

Underpricing and Performance of Australian IPOs: The Impact of Founder Effects

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Declaration

I declare that this thesis is my own work and that, to the best of my knowledge, it contains no material that has been published or written by another person(s) except where due acknowledgement has been made. This thesis has not been submitted for award of any other degree or diploma at Macquarie University or at any other educational institution. I declare that the intellectual content of this thesis is the produce of my own work except to the extent that assistance from others is acknowledged.

Long Zhang

9th Oct 2016

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Abstract

Since 2010, on average over 70 initial public offerings (IPOs) are listed on the Australian Securities Exchange each year. These IPO firms have a wide range of performance in the short term and long term. The impact of founders on a firm's performance is a much debated topic and extant studies provide mixed evidence. Findings from other markets may not apply in Australian markets as different institutional and market settings may moderate or enhance the founder effect. This study assessed the effects of founders on IPO firms' performance in the short term and the long term in Australia. By examining three founder variables of founder ownership, founder CEO and founder experience, we are able to identify founder effects on firm performance. With a dataset of 253 IPO firms from 2003 to 2013, we analysed the mean differences in IPO firms' performance among groups with different founder features. Our results indicate there are significant mean differences in underpricing between different levels of founder ownership. We conducted regression analysis for our whole sample and subsamples. Our results suggest a hump-shape curvilinear relationship between founder ownership and IPO underpricing in the short term. Our findings show that IPO firms led by founder CEOs have poor performance in the long term. The analysis also shows founder CEO firms are younger, smaller and have higher retained founder ownership compared to professional CEO firms.

1 Introduction

An initial public offering (IPO) is a landmark event in the life cycle of a firm. It is a process through which a privately owned firm goes public in order to gain better access to capital markets to raise more funds. Being listed on a stock exchange elevates the position of a firm to a different level, with more legal and regulatory responsibilities, as well as long term opportunities that shape the future course of the firm. IPOs have been a popular issue for researchers in the stock market, particularly due to the profound impact on the share price on the first day of the listing when the market discovers the true value of the newly listed share. Research in different markets across the world has shown that IPO underpricing is a universal phenomenon , with abnormal returns observed on the first day of trading in the stock market (Loughran et al. 1994, Ritter and Welch 2002). In addition to the first day abnormal behaviour, IPO long term poor performance has also attracted much research attention. Numerous factors including market and firm specific characteristics are examined to explain the reasons for IPOs' underpricing in the short term, or their underperformance in the long term. Among these factors, the founder effect on firm's performance has been highly debated.

Founders establish their firm from scratch. Their tie to their firm continues through their financial stake or ownership, as well as the influence of their values and behaviour on the firm's culture. Founders' long time association with their firm provides them with superior information and better tools to make informed decisions. Some studies suggest that founders' psychological

attachment to their firms may influence their managerial motivations (He 2008, Nelson 2003) and investment decisions (Bruton et al. 2009, Certo et al. 2001) in a non-objective way. In addition, understanding the view of external investors towards founders at the IPO is important. Founders are generally regarded by the public as successful entrepreneurs who bring a firm from start-up to the more mature stage. Hence, their existence can serve as a positive signal to external investors during the IPO process. At the same time, information asymmetry and potential agency problems between them and external parties can also generate negative signals in the market. Given founders' attributes and public perception towards them, it is important to know how founders' ownership and behaviour are linked to IPO short term underpricing and their long term underperformance.

The founders' effect on IPO price behaviour has been a fundamental issue in financial research. Some studies have focused on founders' effect on IPO underpricing in the short term, others in the long term or both.

Research on IPO underpricing has focused on how behaviours of founders are translated to ex ante uncertainties. For instance, founder CEO management signals high uncertainty leading to higher underpricing (Certo et al. 2001), founder ownership signals lower uncertainty from reduced agency problems of adverse selection and moral hazard leading to lower underpricing, and founder experience can help access to external resources, which leads to create value and moderate underpricing (Bruton et al. 2009).

Earlier research on founder effects on firm long performance has remained inconclusive. Some of these studies argue that founder CEOs positively contribute to the value of their firms. For example, Adams et al. (2009) showed that founder-led firms enjoy higher valuations, while Fahlenbrach (2009), Gao and Jain (2011), He (2008) and Jayaraman et al. (2000) found founder-led firms also have better stock market performance. At the same time, another stream of research, such as Daily and Dalton (1992) and Willard et al. (1992), asserted that founder CEO positions have no relationship with firms' performance. Yet, evidence from a third group of studies, including by Bennett et al. (2015) and Roosenboom and Schramade (2006), suggests that founder CEOs are value destroyers. However, there are some issues with these studies. Firstly, these conflicting results show that the impact of founders' position on IPO performance is an unresolved question and further research is needed to shed more light on the issue. Secondly, most of these studies investigated large and mature firms. However, IPO firms are relatively young and immature, so the findings may not transfer directly to IPO firms. This has provided a motivation for our research to assess the impact of founder ownership on firms' long term performance in Australia.

There are over 70 IPOs listed on the Australian Securities Exchange each year. Their first day returns vary significantly as well as their long term performance. Previous Australian IPO studies examined numerous factors to explain IPO performance. However, few of them investigated the effects of founders. Most firm founder studies are conducted in the UK and the US markets, but their findings may not be as relevant to other markets with

different institutional settings. According to Engelen and van Essen (2010) and Loughran et al. (1994), institutional framework and IPO market mechanism can moderate underpricing drivers, including founder effects. It is the primary aim of this thesis to extend previous studies about founder effects on IPO firm performance to the Australian equity market. One previous study by Craswell et al. (1997) on the Australian market showed some weak evidence on the relationship between insider ownership and firm performance. However, insiders in their research included both founders and other insiders. As a result, the effect of founder ownership on IPO long term performance can not be inferred from this study. This has provided a further motivation for our research to assess the impact of founder ownership on firms' long term performance in Australia. It is important because Australia has different institutional settings and very little research has been conducted on the founder effects on IPO performance in this country.

Our research is based on a sample of 253 industrial IPO firms during 2003 to 2013. We apply market-adjusted underpricing as a measure of the short term performance, with founder features as the independent variables, while controlling for ex ante uncertainties by two types of market factors and firm-specific and issue-specific factors. Our long term model is based on a model previously developed by Lee et al. (1996) which we adopted with some modifications. For example, we apply buy-and-hold abnormal returns as a measure of the long term performance and incorporate founder features as independent variables. We also control for variables which could affect firm performance. This model examines the relationship between founders and

firm long term performance.

Our findings show that founder ownership in Australia positively contributes to IPO underpricing in the short term in a non-linear way. The hump-shape relationship between founder ownership and underpricing is explained by the mixed effects of agency costs and shareholder coordination costs. Our study also reveals that the founder CEO position becomes a significantly negative signal to investors after the global financial crisis in 2008. And in old firm IPOs, founder CEO is also a significant signal. Finally, our results imply that founder experience can not explain IPO underpricing in the short term and firm performance in the long term under all circumstances. Overall, our results provide some evidence of founder effects on firm performance to managers and investors.

This thesis is structured as follows. Section 2 reviews relevant literatures on the founder effects on the short term and long term performance of IPO firms and introduces the unique features of Australian market. Section 3 discusses the measures for underpricing and long term performance as well as how our performance models are developed. Section 4 provides details about data collection and methodology. The comprehensive empirical results are presented in Section 5. Conclusion are drawn in Section 6, including practical implications to investors and managers.

2 Literature Review

2.1 Founders and IPO underpricing

2.1.1 IPO Underpricing

An initial public offering (IPO) is a process through which private companies go public by launching their shares on the stock exchange for the first time. It is ‘the point of entry that gives firms expanded access to equity capital, allowing them to emerge and grow’ (Fama and French 2004, p.229). The IPO operation is complex and requires knowledge of management, accounting, law, finance and corporate governance issues. An IPO also involves different stakeholders including corporate insiders, investors, underwriters, law professionals, stock exchanges and regulators. Numerous studies have been conducted in the past, or are currently underway to understand the nature of IPO undertakings. They include studies on IPO pricing, IPO market microstructure and IPO performance in the short term and long term. The large number of papers on IPOs can be found by navigating through Google Scholar and Social Science Research Network (SSRN)¹. Using the Boolean search of “IPOs and corporate governance” in Google Scholar returns 16,200 results for scholar articles since 2011 and searching for “IPO” on the more academic website SSRN returns 2,239 results. These provide some evidence of how popular research in this area is.

The complexity of the IPO process is associated with many issues. Ac-

¹ This refers to the website: www.ssrn.com.

According to Pugliese (2014), two fundamental aspects of these issues raised by Fama and French are decisions on reasonable selling prices for owners, and fair buying prices for investors, pointing out the importance of the IPO pricing problem. IPO firms are often new, unknown and privately held. External investors have access to limited information on these firms. In contrast, firm insiders can have access to more detailed internal information about the firm's operation, human resources and growth. Due to external investors and firm insiders receiving different levels of information, they may have distinctively different opinions on IPO pricing. On the first day of trading, the stock price of an IPO firm starts to change to reflect the price investors are willing to pay, according to the trades in the market.

A well known phenomenon found during the IPO process is underpricing. IPO underpricing refers to the positive difference between the subscription or offer price that an IPO firm offers to public investors in its prospectus and the closing price on its first day of trading (Certo et al. 2009, Daily et al. 2003, Ritter and Welch 2002). The most common way to measure underpricing is the first day return or initial return, calculated as first day closing price minus offer price and divided by the offer price. IPO firms on average show a positive first day return in stock markets worldwide, implying they are underpriced, but the magnitude of underpricing varies from one country to another. For instance, UK IPO firms from 1991 to 1998 have an average underpricing of 20.16% while Canadian IPO firms from 1990 to 2000 have an average underpricing of 2.90% (Engelen and van Essen 2010). In the US market, around 70% of IPO firms traded on the first day end with a higher

than subscription price, with an average first day return of 18.8% , according to Ritter and Welch (2002) on a sample of 6,294 IPO firms from 1980 to 2001. In Australia, it shows an average first day return of 25.6% for all IPO firms from 1994 to 1999 (Dimovski and Brooks 2004). As the level of underpricing varies across countries, factors driving this phenomenon could come from different sources, so it is important to find possible explanations for underpricing of IPOs in different markets.

2.1.2 Explanations of IPO Underpricing

Several theories have attempted to explain how underpricing of IPOs in the capital market forms. Previous researchers summarised nine theoretical explanations of IPO underpricing, including ‘risk-averse underwriter hypothesis, monopsony power hypothesis, speculative bubble hypothesis, asymmetric information hypothesis, implicit insurance hypothesis, market feedback hypothesis, bandwagon hypothesis, signalling hypothesis, and ownership dispersion hypothesis’ (Certo et al. 2001, p.643). Asymmetric information and signalling hypotheses are the two explanations of them. As the names imply, the asymmetric information hypothesis asserts IPO underpricing results from unequally shared information among stakeholders while the signalling hypothesis predicts that underpricing is used as a signal about firms’ qualities to outsiders.

These hypotheses may somewhat overlap each other, as the signalling hypothesis is also based on the assumption of information asymmetry (Brau

and Fawcett 2006). For example, when less information is available about IPO firms, outside investors may not be able to make an objective judgement about the firms' qualities. As investors are searching for information to make their investment decisions, IPO firms may attempt to send signals about the qualities of their businesses. These signals conveying inside information, to some extent, can reduce the degree of information asymmetry between firm insiders and outsiders.

Asymmetric information can prevail in two forms in IPO capital markets based on the information possessed by outside investors relative to issuers. The first form states that external investors have less information compared to issuers including company insiders and investment bankers. IPO firms are private before listing on a stock exchange. During the IPO process, they have to disclose information required by regulatory and supervisory bodies to the public. However, not all material information can be disclosed, such as how efficiently a firm is run. Firm insiders, especially founders, board members and senior staff have access to sensitive internal data due to the nature of their tasks, allowing them to know the firm better. Investment bankers, who work closely with IPO firms for capital raising, may also have superior information compared to outsiders. Under these circumstances, external investors face the 'lemons problem', that 'only issuers with worse-than-average quality are willing to sell their shares at the average price' (Ritter and Welch 2002, p.1803), when making investment decisions for IPO firms. Rational risk-averse investors would like to invest in good companies and avoid lower quality ones. However, information asymmetry between issuers and investors

creates uncertainty about these companies, making it difficult for investors to distinguish good from bad (Healy and Palepu 2001). To solve this problem, good companies can afford to sell their shares at a lower subscription price, which reduces costs of uncertainty for external investors. Investors who subscribe to IPO shares at a lower price can make a positive return on the first day of trading when the market discovers the true share price, leaving these companies with a good reputation. By doing so, good companies distinguish themselves from worse-than-average ones as lower quality companies cannot afford to imitate this behaviour. Research by Leite (2007) provides another explanation for underpricing under asymmetric information, arguing that IPO underpricing is one type of compensation to investors. Since outside investors possess less information than company insiders, underpricing may be seen as compensation to uninformed investors for their participation in the IPO. In summary, underpricing probably results from asymmetric information.

When information asymmetry exists, those with superior information over others can profit at the costs of other parties. Agency problems are the consequence of asymmetric information. Adverse selection and moral hazard are the two major outcomes of agency problems resulting from asymmetric information (Bruton et al. 2009). In the case of IPOs, adverse selection emerges when the firms disclose biased information such as overoptimistic forecasts to external investors. This could lead to higher expected values in IPOs personally rewarding insiders. Uninformed investors may protect themselves from this uncertainty by underpricing the firm. If all investors including both

insiders and outsiders have the same level of information, there would be no underpricing at all (Michaely and Shaw 1994). As a result, adverse selection caused by asymmetric information is a source of underpricing. Moral hazard is also induced by asymmetric information. Managers seek opportunities to maximise their own interests rather than owners' interests such as investing in high risk projects for personal interests (Nygaard and Myrteit 2000). Investors suffer from suboptimal investments in the firm. Consequently, agency costs incurred to investors result from both types of agency problems, encouraging investors to take actions to protect their interests. In total, underpricing in this sense may reduce IPO investors' agency costs but does not benefit the original owners.

Another version of asymmetric information hypothesis assumes that investors are better informed than the issuers (Ritter and Welch 2002). According to this view, external investors, as active participants in the capital market, have more knowledge about the demand and pricing of new shares than issuers. As issuers do not know market demand and market expectation prices, they face the problem of pricing their firm assets to match market demand. Issuers need to collect information to determine price, due to superior information possessed by investors. They can collect market information throughout the book-building process. Underpricing is a method used by issuers to induce prospective investors to reveal their demand and the price they are willing to pay for the share. Similarly, based on the assumption that some external investors have superior information while some are uninformed, Rock (1986) argued that underpricing is used to encourage un-

informed investors to participate in IPOs. Overall, asymmetric information between different parties during the IPO process can lead to underpricing.

Signalling theory, based on the assumption that issuers and investors have different information while issuers have superior information, also attempts to explain underpricing of IPOs. Signalling theory suggests that activities or attributes could be regarded as credible indicators of a firm's quality that convey information to other market participants (Sanders and Boivie 2004). With inferior information, investors can not distinguish good firms from bad ones. Underpricing is a credible signal about firms' qualities sent by issuers to less informed investors (Allen and Faulhaber 1989). Good firms can recoup their loss by future issuance. However, owners of bad firms know the quality of their firms. After the IPO, their performance and other information will be disclosed to investors. Thus, they are not able to recoup the loss in the future as their future issuance may not be accepted by investors in the market. Underpricing is thus a costly action that bad firms can not imitate (Welch 1989). According to this, investors perceive that only high quality firms can afford underpricing. The signal of underpricing may enhance the reputation of the issuer, attracting investment bankers to assist them in selling their subsequent new issues at higher prices (Certo et al. 2001). In addition to the underpricing itself as a signal of a firm's quality, other variables could also be signals if they can provide some certifications. Based on the model of Grinblatt and Hwang (1989), fractional holding of issuers is also a signal. Good firm issuers retain more holdings in IPOs while bad firm issuers hold less. As a result, the fractional holding of issuers is positively related to

the level of underpricing as both of them contribute to firm quality. Higher quality firms are thus further underpriced.

While literature on information asymmetry and signalling hypotheses has attempted to explain why an IPO is underpriced, another body of literature has investigated the extent of IPO underpricing. Ritter (1984) argues that the extent of IPO underpricing is positively associated with the level of ex ante uncertainty about a firm's value. Based on this argument, if uncertainty reducing variables of a firm are identified by investors or signalled to investors, they may use this information to have a better knowledge of the firm, reducing the extent of underpricing.

Previous empirical research based on the above hypotheses has identified some factors that may help to reduce uncertainty for IPO firms. Engelen and van Essen (2010), who reviewed previous literature across the world, highlighted several firm-specific and issue-specific factors that explain the degree of underpricing. These factors are associated with ex ante uncertainties and asymmetric information of a firm. They include firm age (the difference between one firm's founding year and its listing year), price earnings ratio, operation in a high technology industry, participation of venture capital, and the nature of the offer (such as fixed price offer or book-building) as the variables explaining the extent of IPO underpricing. For example, firm age is negatively related to the extent of IPO underpricing. Firms with a longer operational history may disclose more information such as financial data to investors reducing information asymmetries between the firm and investors.

The ex ante uncertainties about the firm's value are reduced as a result, contributing to a lower underpricing. Therefore, when characteristics of firms or issues are related to the degree of informational asymmetries and uncertainties, they can explain part of the underpricing.

If the firm-specific and issue-specific characteristics have an impact on IPO underpricing, an interesting question to ask is whether the characteristics of firm insiders can also influence the level of underpricing. In more specific terms, can an insider's action reduce the level of information asymmetry and/or provide a signal to the external investors about the quality of an IPO firm, reducing ex ante uncertainties of the firm's valuation? Firm insiders include founders, chief executive officers (CEO) and executive directors (Alavi et al. 2008). Founders are considered as a special type of company insider, because founders are those who start up the company from scratch and run it from the early stages. During the life of a firm, founders have power and opportunity to shape their business by incorporating their values into the firm's organisational structure, strategy and culture (He 2008). Founders may be associated with their firms in different ways such as financial stakes or management roles, so they can affect their firm. And the influence of founders on their firm could last for a long time (Nelson 2003). Given this behaviour of founders, it is important to know how factors such as *founder ownership*, *founder CEO status* and *founder experience* impact IPO underpricing.

2.1.3 Founder Ownership and IPO Underpricing

The first factor to be examined is the founder's retained ownership at the IPO. The relationship between ownership structure and IPO underpricing has been examined by a large number of studies (Alavi et al. 2008, Booth and Chua 1996, Bouzouita et al. 2015, Brennan and Franks 1997, Field and Sheehan 2004, Filatotchev and Bishop 2002, Hill 2006, Stoughton and Zechner 1998). Some studies that examined CEO retained ownership and underpricing have found mixed results (Daily et al. 2003). However, founders do not always hold the CEO position of their firms. Therefore, the results from assessment of CEO ownership and firm's IPO underpricing can not always be applied to founders. The association between founder ownership and IPO underpricing has rarely been examined. Founders have superior information over their firm (Adams et al. 2009). If they are confident about the firm's future prospects based on their superior information, they may try to retain as many shares in their firms as they can in the post-IPO period. Since founders retaining more shares in the firm is an indication of their expectation of higher firm value in the future, it may be a positive signal to external investors of the quality of the firm. Accordingly, the information conveyed by founder ownership reduces the information asymmetry as well as uncertainty for investors, and should be associated with the level of underpricing.

The agency problem becomes more evident after the IPO, as external investors in combination with internal investors delegate the responsibilities of wealth maximisation to managers (Jensen and Meckling 1976). The agency

problem is not costless² (Fama and Jensen 1983). With founders remaining as shareholders in the company after the IPO, they can monitor the performance of the management team more effectively given their superior information and long-lasting influence. With the supervision of founder-owners, monitoring costs³ for external investors are largely reduced. Since founders with ownership in the firm can provide effective monitoring moderating monitoring costs, an IPO firm may enjoy less uncertainty caused by ineffective monitoring. For these reasons, investors may interpret founder ownership as a positive signal for IPO firms.

Based on these arguments, Bruton et al. (2009) examined the relationship between IPO underpricing and founder retained ownership in UK firms and found a curvilinear relationship between the two. Underpricing declines with an increase of founder retained ownership to a certain degree, then starts to increase afterwards. The inflection point for IPO underpricing lies between 30% and 40% of founder ownership in UK firms. The finding of Bruton et al. (2009) confirms that there is a limit on the level of founder share retention as a positive signal to external investors. Beyond that limit, a high level of founder share retention causes greater uncertainty and higher underpricing.

² Based on Jensen and Meckling (1976), ownership is separated from control and management, leading to agency problems. Agency costs are the results of agency problems. Agency costs refer to the costs of contracts between the principal (owners or investors) and agents (managers) for conflicting interests as the principal and agents do not have the same goal of maximising firm value (Fama and Jensen 1983). Farrer and Ramsay (1998) specify there are three types of agency costs including monitoring costs, bonding costs and residual costs.

³ According to Farrer and Ramsay (1998), monitoring costs are the costs for shareholders to make sure management is acting in the best interests of the owners rather than the managers themselves. It is a type of agency cost.

A higher level of founder ownership beyond the inflection point may be an indication that founders become too powerful to be effectively monitored. External shareholders may incur additional costs or exercise greater efforts to monitor powerful founders. This issue is called the ‘entrenchment problem’ in the literature. Generally, if insider shareholders hold more than 30% of the firm, it causes an entrenchment problem as an takeover by outsiders is difficult to achieve control over the target (Farrer and Ramsay 1998). When founder shareholders become entrenched, their actions or decision-making may be in their own best interests and at the expense of outside shareholders (Zerni et al. 2010). For example, founders may value control as their primary goal in order to pursue private benefits⁴ by expropriation of outside shareholders. The empirical evidence provided by Roosenboom and Schramade (2006) showed that French IPO firm owner-managers pursue their own interest at the expense of minority shareholders. In summary, external investors may not perceive a high level of founder retained ownership as a positive signal due to the costs of entrenchment. Therefore, a high level of founder retained ownership may be associated with increased IPO underpricing.

Brau and Fawcett (2006) provided an alternative view on signalling theory regarding founder retained ownership on IPO underpricing. They examined the signaling theory from inside IPO firms by surveying over 300 chief fi-

⁴ According to Coffee (2001), the private benefits of control is that controllers can obtain benefits for themselves without sharing with other shareholders. Roosenboom and Schramade (2006) further specified the two types of private benefits of control, including monetary and psychic benefits. Monetary benefits refer to higher compensation and psychic benefits involve status, prestige and others as well.

nancial officers for issues in US IPO firms. Based on these responses, selling insider shares or a large portion of a firm at the IPO sends negative signals to outsiders about the firm's prospects. This could lead to increased IPO underpricing.

An opposite view argues that a higher level of ownership held by founders after the IPO may reduce the coordination costs arising from multiple types of equity investors and mitigates various types of agent conflicts between different stakeholders (Bruton et al. 2010). As a result, concentration of founder ownership post-IPO may also reduce IPO underpricing.

Based on the above discussion, a research aim is to test whether founder ownership sends signals to outside investors in Australia and how these signals are interpreted by the market.

2.1.4 Founder CEO and IPO Underpricing

In addition to founder ownership, previous researchers have also conducted some studies on founder CEO features of IPOs. The CEO controls the structure of the firm and makes strategic decisions to run it (Wasserman 2003). The CEO's important role in corporate decision making can affect the overall performance of a firm. Therefore, the presence of a founder CEO could impact on the underpricing of IPOs. The main research question of prior studies is whether a founder holding a CEO position post-IPO provides a signal to external investors. We discuss two opposing views from previous

studies here.

The first view is that the presence of a founder CEO at the IPO sends a negative signal to external investors. There are several reasons behind this argument. The IPO is the first attempt by founders to offer their firms' equity to the public. They are usually inexperienced in managing listed firms, or their management is untested in public firms (Wat 1983). Founder CEOs may have close 'emotional distance' with their firms preventing them from running their firms objectively (Certo et al. 2001). They may exhibit 'extreme optimism' (Cooper et al. 1988), which is detrimental to their firms⁵. Managing a listed firm requires different skill sets. However, most founders fail to become a professional manager after the IPO (Tashakori 1980). These studies detail the managerial uncertainties brought by management under founders, which may not be found in professional managers. Due to these uncertainties, IPO issuers with a founder CEO may offer external investors with a higher discount.

An alternative view suggests that the founder CEO status of IPO firms can send positive signals to the external investors. There are several reasons why founder CEO status may send a positive signal to outsiders. Firstly, founders of an IPO firm are considered as successful entrepreneurs by exter-

⁵ The overoptimism of founder CEOs affects firm performance from two possible aspects. Firstly, overoptimistic founder CEOs could think that their firms are undervalued by the market, then they give up optimal projects to avoid external financing. Secondly, overoptimistic founder CEOs may overvalue their own projects and hence their investments are given to sub-optimal or even bad projects (Heaton 2002). As founder CEOs are central to make corporate decisions, their overoptimistic behaviour may impose negative effects on a firm (Bertrand and Schoar 2003).

nal investors, as they have led a firm from start up to IPO (Nelson 2003). Hence, these firms are valued higher by investors. Secondly, going public by IPO is a highly uncertain event for both firms and investors. Continuing management by founders in the top position can maintain or enhance stability for the firm (Nelson 2003). To the extent that the provided stability offsets uncertainty during the IPO process, the extent of IPO underpricing is diminished. According to Jayaraman et al. (2000), founder CEOs have more incentive to achieve good performance because of their financial and psychological ties to firms. With superior information and higher incentives, investors could believe that founder-led firms tend to perform better in the future. Several studies have documented the superior performance of founder-led firms (Adams et al. 2009, Fahlenbrach 2009, Palia et al. 2008). Based on the above arguments, founder CEOs in IPO firms convey a positive signal to outsiders by reducing uncertainty. Reduction in uncertainty in return can reduce underpricing.

However, not many studies have assessed the relationship between founder CEO and IPO underpricing. One piece of empirical evidence is provided by Certo et al. (2001) showing that founder CEO IPO firms are underpriced 6% more than their professional CEO peers in the US market by risk-averse investment banks as they are not so confident in the untested management by founders. Using a different methodology⁶, Nelson (2003) found a founder

⁶ Certo et al. (2001) applied the common measure of underpricing - first day return. Nelson (2003) adopted a measure called price premium, which is the price per share minus book value per share and then divided by price per share. It measures the difference between a firm's market value and book value.

CEO actually increases a firm's value. However, Nelson (2003) did not provide evidence on how a founder management position could impact on underpricing of IPO firms. In a more recent study, Bruton et al. (2009) showed that the status of a founder CEO is not significant in explaining underpricing in the UK market. Therefore, it is inconclusive about what signals founder CEO status provides to external investors in the market. Certo et al. (2001) recommended further research on the relationship between founder CEO and IPO underpricing should identify other influencing factors in more detail. Bruton et al. (2009) also recommended that the impact of founder CEO on IPO underpricing should be tested in capital markets other than the UK and the US. So, it is important to test these hypotheses again, with an improved model specification in different markets. The current study aims to fill this research gap and extend previous studies by investigating the link between founder CEOs and IPO underpricing in Australia while controlling for other variables.

2.1.5 Founder Experience and IPO Underpricing

The last factor to be examined in relation to the founder is the founder's experience. We define an experienced founder as a person has previously held other board memberships, played a senior management role or was a founder of other businesses before the current IPO. The reasons for investigating the relationship between founder experience and IPO underpricing are discussed as follows.

Firstly, experienced founders can contribute their human capital to the IPO firm. Based on Certo (2003), human capital refers to skills, abilities and/or education of a person. By sitting on a board, holding a senior position or previously establishing a business, founders have had the opportunity to develop their management skills and abilities to manage an organisation efficiently. For example, if founders have held senior positions such as CEO or CFO before, they will have a better understanding of the administrative, structural and financial issues in an organisation and successfully apply them in the new IPO firms. In addition, they may also improve their qualifications to fit these positions. As a result, with these experiences, cultivated skills and abilities, founders can make better investment decisions and implement a better management practice to enhance the quality of the firm.

Secondly, previous experiences also allow founders to accumulate social capital. Social capital is defined by Certo (2003) as networking to others directly or indirectly. By sitting on boards or holding senior positions, founders have opportunities to expand their networks and establish more relationships with others, enabling them to gain access to more external resources. According to the resource dependent theory⁷, the abilities of linking to more external resources can provide better opportunities to a firm and enhance its value. These links in real terms provide some competitive advantages to the firm which could be interpreted as a positive signal by external investors. A

⁷ According to Psaros (2009, p.19), the resource dependent theory states that the ability of a firm to control external resources is key to its success. Therefore, a firm's founders holding external directorships could provide the firm more channels to external resources and opportunities, which can create value for the firm.

study by Filatotchev and Bishop (2002) showed that outside directorships have a significant impact on underpricing. However, they found that outside directorships held by insiders and non-executives have different impacts. Following this study, Bruton et al. (2009) directly tested founder experience on IPO underpricing. They discovered that a founder's experiences of external board directorships can moderate the degree of underpricing. In addition to the social capital provided by founders holding outside directorships or senior management positions, the previous experiences of founding businesses can also add value to a firm. According to Zhang (2011), serial founders, who have experience in founding businesses, could raise more funds than novice founders, allowing firms to grow faster. The social capital together with the capability of raising more funds by these founders could positively contribute to the value of an IPO firm.

Moreover, founders with previous experience in a senior management position provide a positive signal. Previous management experience equips founders to manage a growing organisation such as an IPO firm. It provides some evidence that founder management is a 'tested' management bringing less uncertainty. Therefore, issuers may not discount these types of IPOs.

2.1.6 A Case for Examining the Impact of Founders on IPO Underpricing in Australia

Most studies which investigated the relationship between founders and IPO underpricing focused on the UK and US markets. Engelen and van

Essen (2010) investigated how a country's institutional settings could affect the extent of IPO underpricing. Their results showed that a lower level of underpricing is associated with better minority shareholder protection and stronger law enforcement. It means that a country's institutional framework has an impact on IPO underpricing and a better legal system moderates other factors' influence on underpricing. We provide examples to show how factors influencing IPO underpricing change in significance from country to country. For example, firm age, measured as the firm's number of operating years, is a significant variable explaining underpricing in Australia (Lee et al. 1996) and the US (Certo et al. 2001). However, it is an insignificant variable in Sweden (Thorsell and Isaksson 2014) and the UK (Bruton et al. 2009). Therefore, our discussion on how the Australian market is different from other markets and why it is important to test founder effects in this country will help to investigate the universality of previous findings on IPOs.

Some researchers have investigated the impacts of IPO markets' institutional features and characteristics on underpricing. By examining data from numerous countries, Loughran et al. (1994) pointed out that countries with binding institutional constraints on IPO's offer price can cause a higher level of IPO underpricing. As most Australian IPOs are fixed price offers, the extent of Australian IPO underpricing may vary from the UK and US markets. Bruton et al. (2010) asserted a country's institutional settings can moderate private equity's impact on firm performance. It means variables which can significantly explain firm performance in one country may become insignificant in another country's settings. Since Australian institutional features are

quite different from the US and Europe (Lee et al. 1996), the impact of those factors on IPO underpricing may be enhanced or moderated for Australian IPOs.

The Australian IPO market has some special institutional features which are significantly different from other countries. Cotter et al. (2005) identified the main institutional differences between Australia and other countries.

Firstly, the majority of Australian IPOs are fixed price offerings⁸. Their offer prices are predetermined and disclosed in IPO prospectuses. There is a greater chance of mispricing as the information is more asymmetric between issuers and investors. The higher degree of information asymmetry may make investors seek further information in order to make an investment decision, and founder variables could be useful information for them.

Secondly, issuance information of Australian IPOs is widely available to the general public. Australian IPO firms are required to lodge their prospectus with the Australian Securities and Investments Commission (ASIC), and these prospectuses can be accessed and viewed by the general public. Information in a prospectus is structured in a similar way for all IPO firms to

⁸ According to Loughran et al. (1994), most US IPOs are offering through book-building and most UK IPOs adopt mixed approaches. In UK, small IPOs use placements while medium IPOs use both placements and offerings. Placements are offerings issued to sophisticated investors, whose knowledge and experiences enable them to have a better understanding of the issuing stock. In US, issuers can collect information from investors in the book-building process and set a final offer price afterwards. With market information, the offer price can be closer to its true value. In Australia, most IPOs are fixed price offerings and only a few IPOs use the book-building method, which is subject to the approval of Australian Securities and Investments Commission (Alavi et al. 2008).

satisfy regulatory requirements. Based on the signaling theory, signals provide some effective certifications (Sanders and Boivie 2004). Therefore, extra information on founders such as founder CEO, founders' ownership and their experience may be effective signals to outside investors.

Moreover, Alavi et al. (2008) found that Australian IPOs have a longer lock up period, from one year to three years, during which pre-IPO owners are not allowed to sell their shares. As a result, the wealth of founders is connected to the firm in the long term. Given the long lock up periods, founders may choose an optimal level of ownership at IPO in their own best interests. Otherwise, they will suffer wealth loss if they hold too many shares in a worse-than-average firm. Therefore, founders' ownership could be a better indication of the quality of a firm.

Another point to be discussed is the ownership dispersion requirements of the Australian market. Early evidence indicates that underpricing may be used to induce ownership dispersion (Booth and Chua 1996). Underpricing is a method to attract the participation of investors, which enables ownership to be spread. The Australian Securities Exchange (ASX) has its own requirement of ownership spread. According to *ASX Listing Rule*⁹, admission to ASX requires an entity to satisfy shareholder spread, which means this entity must have a certain number of shareholders with a certain size of holding¹⁰.

⁹ The requirement of ownership spread is specified at condition 7, section 1.1 at Chapter 1 of the listing rule (ASX 2014a, p.103).

¹⁰ For example, if the entity has at least 400 shareholders, then each shareholder must hold no less than \$2,000 value of the main class securities.

Due to the endogenous requirement of shareholder spread, underpricing may not be a method to encourage subscription in the Australian market, and we need to find some other variables to explain underpricing.

Another difference between Australia and other countries is the length of the application period. According to Brennan and Franks (1997), the average application period is 10 days for UK investors, but Australian investors have at least three to five weeks to apply for shares of an IPO (ASX n.d.a)¹¹. The longer application period in Australia provides investors more time to consider an IPO's signals and information. Signals such as founder ownership and founder CEO may be more effective in Australia.

The last key difference in the IPO market's institutional features between Australia and other countries is the voting rights attached to a share. Stock markets in the UK and US allow dual-class shares. In these markets, some classes of shares have more voting powers than other classes. A shareholder can control a company by holding a few super voting shares. As a result, the number of shareholdings is not directly linked to the level of voting powers. In Australia, one share represents one voting power (ASX 2014b, p.604). A shareholder with a higher level of ownership has more voting power. The level of founder ownership not only shows founders' confidence but also indicates founders' powers. In Australia, founders hold more shares revealing that they are confident and they retain control. Therefore, the extent of

¹¹This information is collected from ASX official website addressing the issue of listing process.

founders' ownership could serve as a clearer signal for external investors in the Australian capital market.

In addition to the institutional differences that have motivated our research, the structure and characteristics of the Australian equity market are also different compared to other markets, which may also impact IPO underpricing.

Firstly, Australia has fewer listed companies than the UK and US. During the period from 2007 to 2013, Australia had an average of 1,933 listed companies while the UK had 2,274 and the US had 4,415 (World Bank n.d.a).

Secondly, Australia has a far smaller market capitalisation than the UK and US. In 2013, Australia had a total market capitalisation of US\$1,366 billion while UK market capitalisation was US\$3,086 billion and US was US\$24,035 billion (World Bank n.d.b).

Carvajal et al. (2015) summarised other Australian market characteristics, such as a higher number of loss-making firms than American markets. In addition, they highlighted that Australian listed firms are less covered by analysts and are smaller in size compared to US firms. They also found that the Australian market is dominated by the top 20 firms accounting for 80% of total assets in the ASX and the energy and resource sectors are much larger than in other developed countries.

Finally, the composition of share investors in Australia is different to the US. According to Blume and Keim (2012), the percentage of publicly traded shares owned by institutional investors is 67% in the US. It is only 45% in Australia (Black and Kirkwood 2010). A higher percentage of individual investors with less investment skills in Australia may contribute to the level of information asymmetry. In addition, these difference may also contribute to the effectiveness of signals. Individual investors are generally less sophisticated and have less ability to understand signals by IPO firms than institutional investors.

As the Australian market has these unique features, it provides an incentive to extend Bruton et al. (2009) and Certo et al. (2001) research into this market. In terms of IPO studies, previous research by Lee et al. (1996) mentioned that founder retained ownership would influence IPO underpricing in Australia. However, detailed analysis of this influence on underpricing has not been done in Australia. Also, other founder effects such as founder CEO status and founder experience have not been examined yet. Furthermore, prior Australian underpricing studies focused on mining industries. For example, How (2000) found an average underpricing of 107.18% from 1979 to 1990 in mining industries. Dimovski and Brooks (2008) found an average underpricing of 13.3% from 1994 to 2004 in mining and resource industries. A more recent study by Alavi et al. (2008) investigated the impact of insider ownership on IPO underpricing. The insider ownership in their study included ownership held by founders, CEOs and executive directors. Therefore, the effects of founders alone on underpricing could not be inferred

from their studies. Generally, there are few studies in Australia which have investigated the pattern of IPO underpricing under founder effects. This is identified as a research gap, and motivates for further research.

In the next part of literature review, we discuss the relationship between founders and IPO firm performance in the long term.

2.2 Founders and IPO Long Term Performance

2.2.1 IPO Long Term Performance

In addition to studies on IPO underpricing in the short term, another aspect of IPOs that requires attention is the performance of this event in the long term. The long term performance is defined by Barber and Lyon (1997) as an IPO firm's performance from one year to five years after listing.

Although IPO firms are young and small with strong growth opportunities, Ritter and Welch (2002) found that they generally underperform in the long term. According to their study, US IPOs from 1973 to 2001 have a three-year average market-adjusted return of -24.4% and a style-adjusted average return of -5.1%. These firms have been considered as the worst performing companies over the past several decades. IPO long term underperformance is a universal phenomena documented in other countries such as Australia (Lee et al. 1996), Italy (Giudici and Paleari 1999), Switzerland (Drobetz et al. 2005) and the UK (Espenlaub et al. 2000). Ritter and Welch (2002) have proposed several theoretical explanations for IPO long term underperformance. First, IPO firm shares are purchased by investors with most optimistic expectations. Valuations of these marginal investors will converge to mean valuation in the long term, hence stock prices fall. Second, more IPO issues come after successful IPOs, accounting for a large portion of total IPOs. These IPO firms perform poorly in the long term. Their poor performance causes the overall underperformance of IPOs. Furthermore, overoptimistic managers tend to overinvest in the short term, leading to a

long term downward price correction. The last argument points out the role of managers on IPO underperformance in the long term.

2.2.2 Founder CEO and Firm Performance

From the previously mentioned hypothesis that managers play an important role in IPO long term performance, an interesting question to ask is whether founder management helps or hinders the performance of IPOs in the long term. Founder managers are overly optimistic (Certo et al. 2001), hence their decisions are biased (Heaton 2002), leading to firms' underperformance in the long term. On the other hand, founder CEOs have better extrinsic and intrinsic attributes than professional CEOs (He 2008)¹². Given these attributes, founders are highly motivated to perform better. Both Anderson and Reeb (2003) and Villalonga and Amit (2006) provided evidence that family firms could have a value premium when founders are active in these firms. It confirms that the involvement of founders in a firm can add value. Li and Srinivasan (2011) found firms with founders as directors have higher values and positive premium. However, their finding is based on founders as directors rather than CEOs. Above all, founders can affect a firm's performance. The impact of founder CEOs on firm performance remains unclear from these earlier studies.

¹²According to He (2008), the extrinsic attributes of founders incorporate stronger link to firm, longest tenure and specific knowledge about the firm. The intrinsic attributes of founders include demand for achievement and stronger psychological attachment and commitment to the firm.

Existing literature on founder CEOs, which is mainly focused on large and mature firms, shows a positive relationship between founder CEOs and firm performance¹³ for the following likely reasons. Firstly, it is likely that founder CEOs are closely tied to firms than non-founder CEOs. According to He (2008), founder managers hold more firm shares for a longer period than non-founder managers by ownership. This stronger bond to the firm is more aligned with the external shareholders' interests for wealth maximisation, moderating agency conflicts between founder CEOs and outside shareholders. Secondly, with superior information (Jayaraman et al. 2000) and specific knowledge (He 2008), founders may add more value to firms by implementing better growth strategies and making superior investment decisions. Another reason why founders add value to a firm is that founders spend more effort than non-founders (Palia et al. 2008) in their firm due to their stronger motivation for success and higher emotional attachment to the firm (He 2008).

Researchers who provided empirical evidence on this issue include Adams et al. (2009) who showed that the presence of a founder CEO has positive impacts on firm performance, leading to a marginal effect on Tobin's Q¹⁴ of 0.37 units. Another study by Fahlenbrach (2009) found that firms under a founder CEO have higher valuations and better stock performance. Jayaraman et al. (2000) suggested that the influence of a founder CEO on a firm's financial performance is more positive when firms are young and small. How-

¹³Refer to the studies by Adams et al. (2009), Begley (1995), Duchesneau and Gartner (1990), Fahlenbrach (2009) and Jayaraman et al. (2000).

¹⁴According to Adams et al. (2009), Tobin's Q is a measure of a firm's market valuation. It is calculated as the ratio of a firm's market value to book value. A larger Tobin's Q represents a higher market valuation.

ever, all these studies focused on large firms, such as S&P 500 constituents, Fortune 500 and Forbes 800 companies. For example, Adams et al. (2009) investigated Fortune 500 companies, Fahlenbrach (2009) studied S&P 500 companies and Jayaraman et al. (2000) collected their samples from Forbes 800 constituents. Since all these index constituents are at their mature stage, these research findings may not be highly relevant for IPO firms. Their results exhibit some types of survival bias, as the sample of mature stage firms does not represent IPO firms which may have failed a few years after listing. The research of He (2008) on IPO long term performance is related to founders in the US, showed that firms with founders holding both CEO and chair positions together have superior financial performance. Although both Australia and the US allow one person to hold the dual roles of CEO and chair, Australian listing rules encourage firms to appoint an independent chair¹⁵. In practice, a larger portion of Australian firms have an independent chair than the US. Based on a sample of 170 S&P/ASX 200 firms, a report by AICD (2012) shows that 80% of these firms had an independent chair in 2011. In the US, 56% of the S&P 500 firms had a CEO holding the chair in 2012 (Tribbett III 2012). In 2015, almost a half of the S&P 500 firms still had a CEO holding the board chair role (Francis and Lublin 2016). This difference is a further motivation to investigate whether the performance of Australian founder CEO firms is consistent with the results of their foreign counterparts.

¹⁵The independent chair is encouraged by the recommendation 2.1 of Principle 2 in ASX corporate governance recommendation (ASX 2014c, p.14). A firm's IPO prospectus discloses the firm's current status of compliance with ASX corporate governance recommendations including the independence of the chair.

A different line of argument in the financial literature suggests firm performance is not associated with founder CEOs. For instance, Li and Srinivasan (2011) argued that firm experiences and specific knowledge of founders are not necessarily creating value for a firm as these do not make founders better decision makers in investments such as merger and acquisition events. Based on a sample of high technology firms, Willard et al. (1992) suggested there are no significant differences between founder-led firms and professionally managed firms. They argue that founder CEOs can manage a growing firm as well as professional CEOs. Daily and Dalton (1992) found similar results that founder-led firms' performance does not show any significant differences compared to non-founder-led firms. There are two aspects of their view worth noting. Firstly, there may be no differences in abilities between founder CEOs and professional CEOs. Secondly, firm performance is also affected by other factors such as the board of directors. A founder CEO can not solely affect firm performance. Furthermore, these studies fail to take industry effect into consideration, which may have influenced their results. According to Ritter (1991), IPO performance varies significantly across industries. Nelson (2003) also documented the variations of price premium in different industries. The influence of founder CEO may be distorted by industry effects.

Some studies have considered the possibility of a negative association between founder CEOs and firm performance. Possible reasons that can lead to a negative relationship between founder CEO and firm performance are discussed as follows.

First, the agency conflicts between founders and other shareholders may cause IPO firms' underperformance compared to professionally managed firms. Although founder and other shareholders' interests are aligned through shareholding in an IPO firm, founders' interests may diverge from other shareholders in the long term as their goals change distinctly from external shareholders (Jensen and Meckling 1976), leading to agency conflicts. While external shareholders expect founders to maximise firm's value to increase their wealth, founders' priority changes towards controlling the firm. For instance, when a firm requires additional capital to fund growth, founders might refuse to introduce other significant investors from outside because of fear of losing their control.

Secondly, the difficulties of monitoring founder CEOs by external shareholders due to the power of founders may increase the cost of monitoring, which is detrimental to the firm's value. According to the study of Adams et al. (2005), a founder retained as CEO has more influence on a firm's decisions and strategies, making it difficult for external shareholders to monitor a founder CEO's actions. So, if the founder CEOs are entrenched in a firm, they are more likely to destroy value from their investment decisions (Harford et al. 2012). Empirical evidence from French markets show that investors expect lower value when owner-managers have certain control over their IPO firms (Roosenboom and Schramade 2006).

Furthermore, founder CEOs may lack the required skills to manage IPO

firms. Willard et al. (1992) argued that when firms grow larger, founders may lack the administrative skills to manage their organisation efficiently. It is also not easy for founders to acquire new skills (Certo et al. 2001) and their existing skills may become liabilities to the IPO firm in the long term. As founders can not manage IPO firms in an optimal way, firm performance may suffer in the long term. Some indirect evidence supports this argument. For instance, Jayaraman et al. (2000) showed that founder CEOs only perform better in small and young firms. Due to constraints of management skills, founder CEOs may not be able to add value for growing firms. Their less relevant skills could destroy firm performance in the long term.

2.2.3 Founder Ownership and IPO Long Run Performance

The relationship between ownership structure and firm performance has been much explored (Hermalin and Weisbach 1988, Holderness et al. 1999, McConnell and Servaes 1990, Morck et al. 1988). However, there is not an agreed conclusion for the relationship.

Early studies of Morck et al. (1988) and McConnell and Servaes (1990) found some non-linear relationships between insider ownership and firm performance. Firstly, Morck et al. (1988) found a non-linear relationship between management ownership and firm performance without satisfactory interpretations. Secondly, McConnell and Servaes (1990) found a strong curvilinear relationship between insider holding and firm performance. Their arguments rely on the agency theory. When insiders own more shares, they have

higher incentives to maximise firm value. External shareholders benefit from their actions of firm value maximisation. The agency costs of monitoring and bonding are reduced, creating benefits for firm long term performance.

However, Demsetz (1983) argued that there is no relationship between ownership structure and firm performance measured as profitability, as a firm's ownership structure is the result of mixed effects. In later years, the empirical evidence of Demsetz and Villalonga (2001) shows that there is no relationship between management ownership and firm performance. Ownership structure is a complex issue and varies systematically across industries fitting their own circumstances. Therefore, various ownership types such as insider ownership, management ownership and blockholder ownership have no predictive power on firm performance and any systemic relationships are not expected.

Some recent studies consider some certain types of insider ownership, such as ownership held by founders or CEOs, rather than all insider ownership together. Bruton et al. (2010) found a marginal positive effect between founder ownership and firm performance for both British and French IPO firms. Depending on incentive based explanations, Lilienfeld-Toal and Ruenzi (2014) found CEOs with ownership have more incentives to perform well and suggest higher CEO ownership is connected to better firm performance. These findings support the notion that certain types of insider ownership may relate to firm performance.

Craswell et al. (1997) examined the relationship between ownership structure and firm performance in Australia and found some weak evidence of the curvilinear relationship between insider holding and firm performance. Their findings do provide evidence that some types of ownership may have relationships with firm performance. Another study by Farrer and Ramsay (1998) found no conclusive evidence of the link between director ownership and firm performance in Australia. According to the research of Balatbat et al. (2004), insider ownership is positively associated with IPO firms' operating performance in the longer term in Australia. In summary, no previous Australian studies have disentangled the founder ownership effects on firm performance clearly.

2.3 Research Questions

Based on the extant literature and the research gaps identified, we ask the following research questions in this study:

1. Do founders affect the underpricing for an IPO firm? Specifically, three variables related to founders are examined:
 - What is the relationship between an IPO firm's founder ownership post-IPO and its underpricing?
 - Is there any difference in underpricing if a founder holds the CEO position at the IPO?
 - Does founder experience contribute to the level of underpricing for an IPO firm?
2. Do founders affect the long term performance for an IPO firm? Specifically, two relationship are examined:
 - Do founder CEO IPO firms perform differently from professional CEO IPO firms?
 - What is the relationship between founder ownership and the long term performance?

The methodology to address these questions is presented in the following sections.

3 Discussion and Development of IPO Performance Models

Based on the research question discussed in the previous section, we show how our models are developed and what measures we apply to assess IPO performance in this section. As short and long term models have different measures and drivers, we discuss them separately. We first discuss the IPO underpricing model, then the long term performance model.

3.1 Measuring IPO Underpricing

There are various ways to measure IPO underpricing. The most common method used in the literature (such as Booth and Chua (1996), Bruton et al. (2009), Certo et al. (2001) and Ritter and Welch (2002)) is to subtract the offer price from the closing price on the first trading day, then divide the result by the offer price according to the following formula:

$$R_{i,0} = \frac{P_{i,0} - S_i}{S_i} \quad (1)$$

where, $P_{i,0}$ is the closing price on the first trading day for a firm, and S_i is the initial price or offer price provided in a firm's prospectus. $R_{i,0}$ is the raw first day return, measuring IPO underpricing in percentage terms.

However, some studies propose that underpricing should be adjusted by market return (such as Carter et al. (1998), Cotter et al. (2005), Lee et al.

(1996) and Thorsell and Isaksson (2014)). The formula for measuring IPO underpricing according to this method is:

$$R'_{i,0} = \frac{P_{i,0} - S_i}{S_i} - R_{m,i} \quad (2)$$

where, $R'_{i,0}$ is the underpricing adjusted for market returns (market-adjusted underpricing) and $R_{m,i}$ is the market index return. The increase of underpricing induced by the market should be corrected to reflect its true level. Previous studies have used two different methods to adjust market movements.

There are different methods to adjust the effect of market index returns on underpricing. The first method is proposed by Alavi et al. (2008), IPO underpricing is adjusted by the corresponding daily market return. We follow this method to adjust underpricing, as the stock price of an IPO on the day of listing is affected by the market movement on the same day.

We use ASX All Ordinaries Index¹⁶ as a proxy for the market index. The way we calculate market index return is as follows:

$$R_{m,i} = \frac{M_{i,close} - M_{i,open}}{M_{i,open}} \quad (3)$$

where, $M_{i,open}$ is the opening value of ASX All Ordinaries Index for stock i

¹⁶ASX All Ordinaries Index covers the 500 largest companies in the stock exchange. It is a market capitalization weighted index (refer to http://www.asx.com.au/products/capitalisation-indices.htm#all_ordinaries_index). Since it has the widest coverage of listed companies, we use it to represent the market index in our study.

on the day of listing while $M_{i,close}$ is the closing value of the index on the same day. $R_{m,i}$ represents the intraday market index return for stock i on the day of listing, which is used as the market adjustment in Equation 2. This enables us to measure the true underpricing by excluding market impacts on the day of listing. We define the $R'_{i,0}$ using this method as market-adjusted underpricing.

Another method to adjust underpricing is proposed by Lee et al. (1996) and Cotter et al. (2005), underpricing is adjusted with the accumulative market index returns between the day of IPO prospectus registration and the day of listing. Australian IPO firms generally disclose their offer prices in the prospectus. So, the general public learns about the offer price when an IPO firm lodges its prospectus with ASIC. The exposure period between prospectus registration and listing for trading is around two months (ASX n.d.a)¹⁷. Cotter et al. (2005) argue that the IPO offer price is affected by the market movement during the exposure period, and it should be adjusted by the accumulated market returns through the whole period. According to this method, the market index return is calculated as:

$$R_{m,i} = \prod_t^n (1 + rm_{i,t}) \quad (4)$$

where, $rm_{i,t}$ the daily market index return, accumulating between the day that a stock i lodges IPO prospectus to ASIC and the day of listing. We

¹⁷ASX outlines the listing process, which shows time spent for each step during this process. According to the rule, it will take an average of two months for an IPO to be listed at ASX.

define the $R'_{i,0}$ using this method as accumulative-adjusted underpricing. We use this underpricing to do robustness check for our model.

3.2 IPO Underpricing Model for Founder Effects

According to our earlier discussion, numerous variables may contribute to the extent of IPO underpricing. To ensure our model is well specified, this section examines independent factors that may empirically play an important role in explaining IPO underpricing together with founders' effects.

Our underpricing testable model is:

$$R'_{i,0} = \alpha + \beta_1 \text{Founder Ownership} + \beta_2 \text{Founder CEO} + \beta_3 \text{Founder Experience} + \beta^T \text{Control Variables}_i + \varepsilon_i \quad (5)$$

3.2.1 Independent Variables

There are three independent variables that are relevant to founders in our model: i) *Founder Ownership*; ii) *Founder CEO*; and iii) *Founder Experience*.

Founder Ownership is calculated as the total ownership held by founders after IPO. *Founder CEO* is a dummy variable. We make this variable equal to 1 if one of a firm's founders holds the CEO position after IPO. Otherwise, it is equal to 0. *Founder Experience* is also a dummy variable. We make it equal to 1 if one founder has previous experience and 0 otherwise. A founder

with experience is defined as a person who holds external board memberships or other top management positions, and/or founded other businesses before this IPO. Details on how we collected the data for these variables are discussed in the Section 4 Data and Methodology.

3.2.2 Control Variables

Two types of control variables, with market or firm-specific and issue-specific characteristics, are discussed in this section.

Market Factor The first type of control variable is the market factor.

Market conditions is defined as the level of ex ante uncertainty in the market. According to Beatty and Ritter (1986), there is a strong relationship between the level of ex ante uncertainty and the extent of IPO underpricing. The stock market varies over time leading to different market conditions or different levels of ex ante uncertainty, so we need to control for the change of market conditions as it triggers IPO underpricing. According to Ibbotson and Jaffe (1975) and Ritter (1984), the mean underpricing varies under different market conditions. Their empirical results provide evidence that IPO underpricing can be induced by the change of market conditions. Based on this argument, Derrien and Womack (2003) used market volatility as a measure of the ex ante uncertainty in the market. Their results show that the market volatility is positively related to IPO underpricing in the French

market. With the same measure, Chahine and Filatotchev (2008) found a negative relationship between the market volatility and underpricing in the same market. Based on these findings, the market volatility is related to the IPO underpricing but the direction of their relationship is not clear. Therefore, we control the market volatility in our model for its effects on IPO underpricing. We follow the method proposed by Derrien and Womack (2003) and Bruton et al. (2009). *Market Volatility* is calculated as the monthly standard deviation of daily market index returns in the immediate month before an IPO's first trading date.

The second market factor included in our model is the first day trading volume of an IPO. This factor has not been frequently examined by the extant IPO studies as most of them largely focus on firm-specific and issue-specific characteristics. However, trading volume is an influential factor that helps the price discovery (Chae 2005). It hence should have some impacts on the IPO first day closing price. According to Karpoff (1987), trading volume is positively correlated with price changes in the stock market. Smirlock and Starks (1988) also argue that there is a causal relationship between absolute price changes and trading volume according to their empirical findings. A study by Li et al. (2005) found that IPOs have a very high trading volume on the first day of trading. If an IPO stock has more trades on the first day, its price is expected to have more variations. Hence, the closing price can be greatly different from the IPO's offer price. Based on these findings, we hypothesise that higher trading volume triggers greater changes in stock price on the first trading day. Considering the scale of trading volume being

affected by number of shares on issue, the *Trading Volume* is measured by an IPO's first trading volume deflated by its number of shares on issue.

Firm-specific and Issue-specific Characteristics Another type of control variable incorporated in our model is the firm-specific and issue-specific characteristics.

i) *Board Independence*: According to Fama and Jensen (1983), firms with an independent board can reduce agency costs associated with adverse selection and moral hazard. This sends a signal to the market about the high quality of the firm. The argument of Fama and Jensen (1983) can also apply to the IPO firms as firms with a board with a higher portion of independent members can send positive signals to the markets reducing underpricing. According to Jensen (1986), agency problems are less problematic in a firm with less free cash flows. Since IPO firms generally have poor cash conditions (Certo et al. 2001), agency problem is not problematic in the IPO firms. Still, the empirical results of Certo et al. (2001) indicate that value is created by more insiders sitting on the board in an IPO firm, causing less underpricing. However, a more recent study by Chahine and Filatotchev (2008) found a board with a higher level of independence will produce less underpricing in an IPO. Based on these mixed results, we add the board independence variable to our model to control its effect on underpricing. The variable *Board Independence* is calculated as the number of independent members over the total number of board members for an IPO firm.

ii) *High Tech*: It is a dummy variable equal to 1 if the company is a high technology company and equal to 0 otherwise. In this study, we consider a company as a high technology company when it is in the “Information Technology” sector based on Global Industry Classification Standard (GICS) (ASX n.d.b). The high technology companies have a higher degree of uncertainties than non high technology companies, and may show a higher level of underpricing (Engelen and van Essen 2010).

iii) *Firm Age*: It is measured as the number of years between the calendar year of the firm’s founding date and the calendar year of the firm’s IPO. Empirical evidence by Loughran and Ritter (2004) shows that younger IPO firms are more underpriced than older ones. Older firms have a longer history, which provides more information to investors. This reduces the extent of information asymmetries between investors and the issuer, leading to a lower level of underpricing.

iv) *Investment Bank Market Share*: Investment banks may have a certification role to play during the IPO process, and certifications from prestigious investment banks are more regarded (Beatty and Ritter 1986). With investment banks’ participation, the extent of IPO underpricing should be lower. Viewed from another point, Megginson and Weiss (1991) argue that lower underpricing due to the presence of investment banks arises from asymmetric information reduction between issuing firms and market participants. With less information asymmetries, investors understand a firm with less

uncertainty. However, Dimovski et al. (2011) found controversial evidence in Australia where IPO firms underwritten by prestigious investment banks are even more underpriced. The reason is that prestigious investment banks offer analyst coverage without charging explicit fees and issuers need to pay investment banks by underpricing. Since the involvement of investment banks could lead to variances in IPO underpricing, we need to include a control variable for investment banks' effect on IPO underpricing. Following the method by Certo et al. (2001), Dimovski et al. (2011) and Megginson and Weiss (1991), we adopted the *Investment Bank Market Share* in our model to control for the investment bank effects. This variable is also a proxy for prestige of investment banks as more prestigious investment banks are assumed to have more market shares. Details on calculating investment banks' market share are discussed in the Section 4 Data and Methodology.

v) *Issue Size*: Issue size is the offer size of an IPO in this study. It is measured by the natural logarithm of the gross proceeds of an IPO. There are two reasons why IPO size can influence IPO underpricing. Firstly, IPO size is related to ex ante uncertainty. Smaller size IPOs tend to be more speculative and uncertain, and the level of underpricing for smaller IPOs is higher (Beatty and Ritter 1986). Secondly, Michaely and Shaw (1994) argue that larger size IPOs require more effort to promote and hence greater underpricing is used to compensate such efforts. Although the two arguments are opposite to each other, they all found the issue size of an IPO has an impact on the level of underpricing. We argue that the large IPOs are generally issued by large size firms. Larger firms may have less underpricing as

they have less uncertainty. In order to control the size effect, we incorporate *Issue Size* in our model.

vi) *Risk Factor*: Risk factor is a firm's operationalised risk position outlined in the IPO prospectus. Risk factors adversely affect the firm's operations and investments (DLA Piper 2013). As operations and investments are linked to firm performance, they also affect firm performance (Certo et al. 2001). More risk factors represent a higher level of ex ante uncertainty. A positive association between number of risk factors and IPO underpricing is expected (Daily et al. 2003). In Australia, the content, structure and publication of an IPO prospectus is regulated by *Corporations Act 2001 (Commonwealth)* section 710 and ASIC *Regulatory Guide* 254¹⁸. Under these laws and regulations, it is a statutory requirement for an IPO prospectus to disclose all reasonable information to investors, especially different risks. Risk factors are used by issuers in the prospectus to notify investors about uncertainties faced by a firm. Previous studies by Boatty and St Zajac (1994), Bruton et al. (2010), and Certo et al. (2001) use the number of risk factors as a proxy for the level of firm risks, where more risk factors lead to a higher underpricing (Bruton et al. 2010). However, we do not simply count the total number of risk factors in the IPO prospectus. In Australia, there are two types of risk factors presented in IPO prospectuses. One type is the general risk factor and the other is the firm-specific risk factor. The general

¹⁸Previously, Australian IPO prospectuses were regulated by ASIC *Regulatory Guide* 56. This regulatory document was consolidated by the authority to *Regulatory Guide* 254 in March 2016. Detailed information about the regulatory change can be found at <http://asic.gov.au/regulatory-resources/find-a-document/regulatory-guides/rg-56-prospectuses/>.

risk factors concern impacts of macroeconomic variables on the firm (such as economic conditions, political influence and the share market). These factors affect the overall market. On the other hand, risk factors specific to a firm are listed as firm-specific risk factors (such as manufacturing risk, operating risk, customer retention, key personnel and dependence on suppliers). The specific risk factors can reflect the level of firm risk. We follow the method by Certo et al. (2001) to count those risk factors which are unique to the firm. Since we have already controlled market risk by the variable *Market Volatility*, we only incorporate the number of risk factors specific to an IPO firm. *Risk Factor* is measured as the number of risk factors specific to a firm.

vii) *Time to Listing*: It is the number of days between prospectus registration and the day of listing. There is a long exposure period for Australian IPOs. Lee et al. (1996) argue that the longer delays could not attract informed investors leaving uninformed investors to face the winner's curse. A higher underpricing is expected to compensate the participation of uninformed investors. In contrast, the longer exposure period may also give investors more time to understand the firm and interpret signals sent by the firm. Uncertainty is then reduced as investors have more information about the firm. As a result, a lower extent of underpricing is expected. Empirical evidence by Lee et al. (1996) indicated a longer time to listing is negatively associated with underpricing. In order to control this effect, we add *Time to Listing* to our model.

3.3 Discussion on Excluded Variables in IPO Underpricing Model

Many previous studies of ownership structure and IPO underpricing considered effects of venture capitalists (VCs) and blockholders on IPO underpricing¹⁹. However, we exclude them from our model after further investigating the extant literature. We discuss the reason for excluding these variables from our model in the following section.

3.3.1 Venture Capitalists

According to Bruton et al. (2009), one of the foundation papers for this thesis, venture capitalists play a certification role for IPO firms. Venture capitalists could monitor the firm closely, which benefits external investors (Bruton et al. 2010). Their reputation is also perceived by outside investors as a signal of a firm's quality (Tirole 2010, p.91). Therefore, outside investors may consider the participation of venture capitalists in an IPO as a positive signal, certifying a firm's quality. IPO underpricing may be moderated by the presence of venture capitalists.

According to da Silva Rosa et al. (2003), the Australian venture capital market is less mature and venture capitalists are less experienced. Hence, the role of this factor may not be significant in the Australian IPO market. The result of da Silva Rosa et al. (2003) showed that there is no systematic dif-

¹⁹Refer to the following studies: Alavi et al. (2008), Bouzouita et al. (2015), Bruton et al. (2009, 2010) and Engelen and van Essen (2010).

ference in the extent of IPO underpricing between venture capitalists backed and non venture capitalists backed IPOs in a sample of 333 Australian IPO firms from 1991 to 1999²⁰. The study of Alavi et al. (2008) on a sample of 565 Australian industrial IPO firms between 1995 and 2005 provides more evidence that the participation of venture capitalists in IPOs is not significantly related to underpricing. Based on these findings, the certification role of venture capitalists may not be significant in Australian IPO firms. Furthermore, our early discussion mentioned that institutional ownership in the Australian market only accounts for 45% (Black and Kirkwood 2010). The majority of Australian equity investors are retail investors. They may have less knowledge to identify venture capital²¹ and hence the certification role of venture capitalists is not informative to them.

From the perspective of IPO firms, venture capitalists are also not so significant. According to the survey of Brau and Fawcett (2006), chief financial officers from IPO firms consider venture capitalists backing as a weak positive signal. This confirms that firm insiders are not very keen for venture capitalists' participation in IPOs. According to Suchard (2009), venture capitalists

²⁰The evidence provided by da Silva Rosa et al. (2003) is convincing. They applied four different IPO underpricing measures developed by Habib and Ljungqvist (1998) and Rock (1986). Under all measures, there is no significant differences in IPO underpricing between VC-backed and non-VC-backed IPOs.

²¹Identifying the participation of venture capitalists in an IPO requires sophisticated knowledge in Australia. We investigated two previous Australian studies by Alavi et al. (2008) and da Silva Rosa et al. (2003) for their methods to identify venture capitalists in IPOs. Both studies use professional databases, such as *Australian Private Equity and Venture Capital Association Limited* (AVCAL), to check if venture capitalists participate in an IPO. And da Silva Rosa et al. (2003) even required professionals to assist them in identifying venture capitalists for IPOs. Hence, it is not easy for retail investors to identify venture capitalists and hence the certification provided by venture capitalists for IPO firms may not be known by these retail investors.

mainly influence Australian IPO firms through installing more independent members on boards, and hence venture capitalists backed IPOs have a more independent board. To the extent that it is important and from a corporate governance point of view, we have already controlled the impact of venture capitalists by incorporating the *Board Independence* variable. In summary and based on previously mentioned evidence, the participation of venture capitalists is not likely to directly affect the IPO underpricing in Australia. Therefore, we do not include the venture capitalists as an explanatory variable for measuring the impact of this variable in our model.

3.3.2 Blockholders

Another variable which has been frequently examined in IPO underpricing models is the role of blockholders, defined as shareholders holding a large block of shares, usually 3% or more in a company (Hill 2006). There are two different theoretical explanations for the relationship between blockholders and IPO underpricing. Firstly, IPO underpricing is used to discriminate against large block applicants in IPOs (Brennan and Franks 1997). A lower offer price attracts more small investors to subscribe for shares, promoting a spread of shareholders. With more small shareholders holding the company, it is difficult for a potential acquirer to bid for shares and it prevents a future hostile takeover. The second view is contrary to the first point. It argues that management uses underpricing to encourage the participation of blockholders. The main reason is that blockholders are able to monitor the IPO firm and all external investors can benefit from their monitoring

services (Stoughton and Zechner 1998). The two opposing arguments claim that there is an association between blockholders and IPO underpricing.

However, Field and Sheehan (2004) found only a weak negative link between IPO underpricing and blockholders as the magnitude of the blockholder effect is small. The impact of underpricing on blockholders is moderated by other variables such as firm size. Most importantly, Field and Sheehan (2004) found most IPO firms have blockholders in place before going public, so the presence of blockholders is not a result of underpricing. Their findings contradict both arguments by Brennan and Franks (1997) and Stoughton and Zechner (1998). Except for the evidence from Field and Sheehan (2004), Hill (2006) further confirmed that underpricing also plays no significant role in explaining blockholders at the IPO and also in the long term, and suggested that the direction of research on IPO underpricing should be moved from blockholders to elsewhere. Based on these reasons, we exclude the blockholder variable from our model.

3.4 IPO Firm Long Term Performance Model

Since firm establishment, founders are closely tied to their firm through their ownership stake and psychological sentiments. With these close ties, there is a greater chance that founders are more motivated to perform better. They also have superior information about the organisation they established. It is worth investigating what value they can add to their firm in the long

term.

3.4.1 Measuring IPO Long Term Performance

We need to have an appropriate measure of performance in order to investigate the effects of founders on IPO firms in the long term.

Many prior studies on firm performance adopted return on assets (ROA)²² as the measure of performance (such as Adams et al. (2009), Andres (2008), Begley (1995), Daily and Dalton (1992) and He (2008)). However, there are some concerns for applying ROA to compare performance among firms. Differences of ROA may come from choice of accounting policies such as asset recognition and depreciation methods. For example, a firm can choose to recognise assets or realise expenses associated with a lease under *AASB* 117²³. To avoid the effects of accounting policies and reporting requirements on performance, we adopt a stock-based performance measure. Following Jayaraman et al. (2000), the buy-and-hold abnormal returns (*BHAR*) is used to measure long term performance, which is calculated as follows:

$$r_{i,t} = \frac{P_{i,t}}{P_{i,t-1}} - 1 \quad (6)$$

²²The ROA is calculated as the net income over total assets.

²³AASB is the Australian Accounting Standard Board, which publishes regulatory accounting standards. *AASB* 117 is the Australian Accounting Standard for leases. It specifies two types of lease accounting, which are financial lease and operating lease. The two types of leases have different natures. As a result, they have different impacts on a organisation's balance sheet as well as profit and loss statement. We use lease as an example to show that using accounting measures to compare performance of firms across different firms may yield biases resulting from different accounting policies.

where, $r_{i,t}$ is one firm's daily stock return from the second day of trading ($t \geq 2$) and $P_{i,t}$ is one firm's daily adjusted price. The adjusted closing price is the closing price adjusted for any dilution factors. First day returns are excluded because of their strong anomalies. The formula to calculate market sector index returns is represented as:

$$rm_{j,t} = \frac{V_{j,t}}{V_{j,t-1}} - 1 \quad (7)$$

where, $rm_{j,t}$ is the daily return of one S&P/ASX sector index and $V_{j,t}$ is the daily closing value for one S&P/ASX sector index. Our sample firms come from 10 different GICS sectors and we calculated the daily returns for the corresponding 10 S&P/ASX sector indices²⁴. Hence, buy-and-hold abnormal return of an IPO firm is calculated as follows:

$$BHAR_i = \prod_t^n (1 + r_{i,t}) - \prod_t^n (1 + rm_{j,t}) \quad (8)$$

where, $BHAR_i$ is the buy-and-hold abnormal return. It is a firm's buy-and-hold returns abnormal to the index returns of the sector that the firm is classified in. In other words, it is the stock's compounding returns adjusted for corresponding sector index returns.

Our $BHAR_i$ measure is consistent with the long term performance measures used by Gao and Jain (2011), Jayaraman et al. (2000) and Thorsell and

²⁴The ten sectors include: consumer discretionary, consumer staples, energy, financials (excluding real estate investment trusts), health care, industrials, information technology, materials, telecommunications, utilities.

Isaksson (2014). They used monthly returns to calculate $BHAR_i$, however, we calculate returns on a daily basis as they better reflect the compounding effect of investing.

The time horizon of measuring long term performance is defined by Barber and Lyon (1997) as one to five years. Our study examines long term performance in one year and two years after the IPO. Following Loughran and Ritter (1995), we define one year as 252 trading days and two years as 504 trading days. Since performance varies over time, measuring performance in two time horizons enables us to examine the persistence of founders' effects on the firms.

Another point to discuss is the benchmark used to adjust firm performance. Several studies (such as Bhabra and Pettway (2003), Jayaraman et al. (2000), Loughran and Ritter (1995)) adopted the matched-firm technique to measure long term performance. They matched a founder CEO firm with a professional CEO firm with similarities in size, age or industry. There are several reasons for not applying this method. Firstly, since IPO firms underperform in the long term (Ritter 1991), a matched firm method may yield some biases towards the IPO firm. Secondly, risk is the main source of performance variation between IPO and matched firms and this technique does not properly control the risk. According to Eckbo et al. (2000), IPO firms generally have a lower level of risk because of their lower leverage and higher liquidities. IPO firms' lower level of risk is associated with a lower expected return, which is the reason for the underperformance of IPO firms

relative to matched firms. As a result, we are unable to disentangle the effects of founders on firm performance by using the matched-firm technique. Furthermore, our study investigates the founder effects on firm long term performance. As we can not control the founder effects on matched firms, it also causes errors in our estimation.

Based on the above justifications, we use the performance of 10 S&P/ASX sector indices as the benchmarks for firm performance. The members of these sector indices are derived from ASX200 and ASX300 stocks and pooled based on the Global Industrial Classification Standard. The performance of these indices are more likely to represent the average performance of one sector, reducing the likelihood of biases in measurement.

3.4.2 Development of IPO Long Term Performance Model

Our IPO long term performance model is developed from previous studies of Adams et al. (2009), Jayaraman et al. (2000) and Lee et al. (1996). We incorporate the three independent variables of founders in the model to test the value added by founders. These variables are identical to the underpricing model, which are: i) *Founder Ownership*; ii) *Founder CEO* and iii) *Founder Experience*. We then use Lee et al. (1996) as a benchmark to apply these independent variables with some modifications for a more accurate measure.

As discussed earlier, we measure IPO long term performance by the buy-and-hold abnormal returns (BHARs). Our measure is consistent with Lee

et al. (1996) who also used buy-and-hold abnormal returns as their dependent variable. Barber and Lyon (1997) assert that because BHARs are less biased and take compounding effects of investment into account, they are better than CARs in measuring long term performance. For this reason and earlier discussion on BHARs, we nominate this variable as our dependent variable.

The explanatory variables in the Lee et al. (1996) model are issue size, time to listing, retained ownership and underpricing. We modify these variables to improve our model specification.

According to Adams et al. (2009) and Jayaraman et al. (2000), the size of a firm does affect its performance in the long term. However, Lee et al. (1996) controlled the impact of issue size on the firm's performance in their study. Considering the effect of firm size on firm performance documented by many studies (Adams et al. 2009, Anderson and Reeb 2003, Andres 2008, Jayaraman et al. 2000), we use the firm size instead of the issue size used by Lee et al. (1996). Issue size may be a good proxy for the firm size in the short term, but it is not a good indicator of the firm size in the long term. Firms may raise additional capital in the long term, which will increase their size. However, IPO issue size could not capture such events. Therefore, we use firm size, which is measured by the natural logarithm of post-IPO total assets, as a control variable in our model.

Time to listing is the number of days from prospectus registration to list-

ing. Lee et al. (1996) use this variable as a proxy for the level of information demand in the long term. However, the level of short term information demand may have little impact on firm performance in the long term. The long run performance is affected by perceived risks, contained in the disclosed information and documents. However, time to listing does not capture these types of information to help predict the future performance. The empirical results of Lee et al. (1996) support our argument as there is no significant relationship between time to listing and firm long term performance. Hence this variable is excluded from our model.

However, firm age is a variable that is usually controlled in firm performance studies. According to Ritter (1991), firm age is a proxy for ex ante uncertainty of IPO firms in the long term. Firms with longer operating history may be less risk than new firms. Therefore, old firms have a lower expected long term performance. Furthermore, Jayaraman et al. (2000) argue that founders may have more impact on younger firms as they are involved in daily operating decisions. Ling et al. (2007) also found firm age moderates the effect of founders on firm performance. Previous studies on firm long term performance such as Adams et al. (2009) and Jayaraman et al. (2000) controlled firm age in their models. Based on these grounds, we incorporate the firm age as measured by the natural logarithm of the difference between the year of listing and founding year plus one in our model.

The retained ownership is replaced by *Founder Ownership* in our model in order to test founder effects. We maintain underpricing as a control vari-

able measuring firm quality in our model.

4 Data and Methodology

4.1 Data Collection

Our sample is comprised of 253 industrial firms listed from 2003 to 2013 on ASX. It is the longest period available with corresponding S&P/ASX sector indices as S&P/ASX sector indices have been launched since mid-2002. Our data are sourced from *DatAnalysis*, a research tool provided by Morningstar offering information on all firms listed on the ASX, and *Australian Company Announcement*, a database provided by Securities Industry Research Centre of Asia-Pacific (SIRCA) stores the records of ASX listed firm company disclosures from 1992.

We obtained our sample firms through the following ways. Firstly, we used *DatAnalysis* to find all stocks whose listing dates range from 2003 to 2013. Then we excluded public offerings of mining and resource companies, banks, privatisations, stapled securities, unit and investment trusts, exchange traded funds and pure investment vehicles²⁵ due to their special ownership structure, governance system or nature of business. In addition, we excluded listings of spin-offs and de-mergers as they are in a different firm stage from IPOs. Entitlement offers are also not considered in this study as they only

²⁵These are assets management companies without operations but as vehicles for managed funds to raise capital.

offer to specific groups of people, who may possess different levels of information compared to the public market investors.

The next stage is to identify founders for each IPO firm in order to calculate founders' ownership and define founder CEO and founders' experience. Following the methodology by Bruton et al. (2009), we attempted to collect the founder information from IPO prospectus, particularly in the sections of company history and key personnel biographies. However, ASIC does not require information on founders to be reported in the IPO prospectus. So, we used additional sources such as company websites and LinkedIn.com to find an IPO firm's founders. We excluded those firms whose founders died, departed or could not be identified. Our dataset in final form has 253 firms which went public from 2003 to 2013.

4.2 Variable Construction

4.2.1 Founder Variables

After we identified founders, we constructed founder variables for each firm.

According to ASIC *Regulatory Guide 228*²⁶, IPO firms are required to disclose their capital structure, director interests and management shareholding

²⁶This guide regulates the disclosure of IPO firms to retail investors. It requires the disclosure must be effective to retail investors. This document can be found at: <http://asic.gov.au/regulatory-resources/find-a-document/regulatory-guides/rg-228-prospectuses-effective-disclosure-for-retail-investors/>.

in the prospectus. In addition, IPO firms are required to disclose information about the top 20 shareholders on the day of listing. Top 20 shareholders generally include shareholders who hold more than 1% ownership of an IPO firm. We can find founder ownership information from the two sources. The founder ownership is defined as shares held by all founders divided by total outstanding shares of an IPO firm. If we could not find information on founders' ownership, we assumed founders have a zero ownership. After the completion of founder ownership calculations for all sample firms, we then assigned values to the founder CEO dummy variable depending on whether a founder holds the position of CEO post-IPO or not.

For the variable of founder experience, we followed the method of Bruton et al. (2009) and Filatotchev and Bishop (2002) with some modifications due to the differences of regulatory requirements on IPOs between Australia and the UK. According to the UK IPO rules, firms are required to disclose information on directors' board memberships in the last five years. However, there is no such requirement in Australia. Australian IPO firms provide some short biographies for directors and top management in their prospectuses describing the past directorships and work experience of these directors and senior staff. However, the biographies are generally not in chronological order, making it difficult to operationalise a founder's past experience. We thus used a dummy variable to define their experience. We assigned the value of one to this variable if a founder previously held board memberships or senior management positions or was a serial founder before the current IPO.

4.2.2 Investment Bank Market Share

We computed the investment bank market share²⁷ in a way similar to Certo et al. (2001) and Dimovski et al. (2011). Firstly, we used *DataAnalysis* to screen all IPOs involving investment banks from 2003 to 2013. Secondly, we summed the total proceeds of all underwritten IPOs for the entire period. Then we calculated the total underwritten proceeds of each investment bank for the whole period. One problem to solve during the process is how to obtain each investment bank's underwritten proceeds if an IPO involved more than one investment bank. For example, an IPO firm with the gross proceeds of \$100 million engages four investment banks. We assume each investment bank in this IPO underwrites equal shares of the proceeds, namely each investment bank underwrites \$25 million. Furthermore, we divided the total underwritten proceeds of one investment bank by total proceeds of all underwritten IPOs to obtain this investment bank's market share. We further calculated the *IB Market Share* of an IPO firm as the average of all investment banks' market share in the IPO.

According to *DataAnalysis*, only 88 out of 253 IPOs in our sample hired investment bank(s). For the 88 firms, we calculated the investment bank market share. For those firms which did not hire any investment banks, we assigned the value of zero to their investment bank market share.

²⁷Please refer to Appendix A Formula and Equations for equations to calculate this variable.

4.2.3 Treatment of Delisting Firms in the Long Term

Long term aftermarket stock prices of each IPO are the ‘adjusted prices’²⁸. sourced from *DataAnalysis*. Six firms in our sample delisted within two years and they do not have recorded closing prices for the full 504 trading days. We treated the data on these firm according to the method proposed by da Silva Rosa et al. (2003) in order to keep them in our sample. We calculated buy-and-hold abnormal returns from the second trading day to the last day of trading for delisted firms, then assumed that investors hold this return until the 504th trading day. Finally, one firm started trading in 2006, then was placed in a trading halt from 2006 to 2008 and re-traded from February 2008. Its price records are not consistent and the behaviour of this firm is too abnormal. We thus excluded this firm from our sample for studying long term performance.

²⁸‘Adjusted prices are those prices adjusted by any dilution factors including bonus issues, rights issues and reconstructions.’ (for detailed information, please refer to <http://datanalysis.morningstar.com.au/af/glossary>).

5 Empirical Results

5.1 Data Summary

Table 1 presents the summary statistics for our sample. Within the sample period, the average IPO underpricing is 14.6%. The mean market-adjusted underpricing remains the same as raw underpricing because the adjustment factor of market index intra-day return is very small. The mean accumulative-adjusted underpricing is 12.7%. The median of market-adjusted underpricing is 9.6% and the median of accumulative-adjusted underpricing is 8.7%. Australian IPO firms leave some money for investors. However, they have a lower level of underpricing compared to 20.16% for the UK and 21.14% for the US (Engelen and van Essen 2010). The minimum market-adjusted underpricing is -67.8% and maximum is 219.2%, which is a very wide range. The accumulative-adjusted underpricing is also in a wide range from -105.5% to 218%. Our estimated underpricing is consistent with previous Australian studies ranging from 11.87% to 16.41% (Balatbat et al. 2004, Cotter et al. 2005, Kearney and Sadeghi 1997, Lee et al. 1996).

The average ownership retained by founders post-IPO is 30.1%, suggesting their high influence over the management of their firms. It is close to the UK, where founders retained 32.5% ownership at IPOs (Bruton et al. 2009). Founder ownership has a large dispersion ranging from 0% to 96%, in which founders of six firms do not hold any shares post-IPO. 64% of the sample IPO firms have founder CEOs in place and 52.6% of the sample IPO firms have at least one founder with previous experience.

Table 1: Summary Statistics for the Sample of IPO Firms

<i>Variables</i>	<i>N</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Minimum</i>	<i>25th Percentile</i>	<i>Median</i>	<i>75th Percentile</i>	<i>Maximum</i>
Underpricing	253	0.146	0.302	-0.675	0.000	0.100	0.250	2.200
Market-adjusted Underpricing	253	0.146	0.301	-0.678	-0.001	0.096	0.245	2.192
Accum-adjusted Underpricing	253	0.127	0.311	-1.055	-0.032	0.087	0.235	2.180
Founder Ownership	253	0.301	0.221	0.000	0.122	0.257	0.453	0.960
Founder CEO	253	0.640	0.481	0.000	0.000	1.000	1.000	1.000
Founder Experience	253	0.526	0.500	0.000	0.000	1.000	1.000	1.000
Market Volatility	253	0.008	0.004	0.003	0.005	0.007	0.009	0.025
Trading Volume (in millions)	253	4.411	10.040	0.000	0.392	1.227	3.380	95.204
Issue Size (in millions \$)	253	44.781	111.814	1.000	5.000	11.950	30.000	1064.800
Firm Size (in millions \$)	253	161.403	900.076	1.751	8.476	25.807	68.825	12033.640
Firm Age	253	9.964	9.562	0.000	3.000	7.000	15.000	56.000
Time to Listing	253	55.494	36.442	18.000	35.000	44.000	64.000	256.000
IB Market Share	253	0.015	0.040	0.000	0.000	0.000	0.004	0.185
Board Independence	253	0.489	0.199	0.000	0.400	0.500	0.600	0.857
Risk Factors	253	14.814	5.307	3.000	11.000	14.000	17.000	33.000
High Tech	253	0.123	0.329	0.000	0.000	0.000	0.000	1.000

Our sample consists of 253 industrial IPOs listed between 2003 and 2013. All variables are defined in previous sections and outlined in Table 22 in Appendix B. *Accum-adjusted Underpricing* is accumulative-adjusted underpricing. *Trading Volume* shows the first day trading volume numbers in millions without deflating by number of shares on issue. *Issue Size* shows the gross proceeds of IPO in million Australian dollars. *Firm Size* shows the post-listing total assets of an IPO firm in million Australian dollars. *IB Market Share* is the average market share of investment banks for an IPO. As only 88 firms hired investment banks, those firms which did not hire any investment banks have been assigned an *IB market share* of 0%. More details on this variable are presented in the Investment Bank Market Share section.

The average monthly market volatility of the Australian stock market is 0.8%, which is higher than a comparable figure of 0.62% for the French market (Derrien and Womack 2003). The first day trading behaviors of IPO stocks also require attentions. IPO firms are traded 4.411 million shares on average for the first day, but trading volume varies dramatically across different firms. Two firms had no shares traded at all on the first day, while the most traded firm had a volume of 95.204 million shares.

It is worth noting that Australian IPOs have an extremely wide range of issue size and firm size. The average issue size is \$44.871 million, ranging from \$1 million to \$1,064.800 million. The average firm size is \$161.403 million ranging from \$1.751 million to \$12,033.640 million. Australian IPO

firms are on average 9.964 years old, which is slightly older than the US IPO firms. According to Loughran and Ritter (2004) on a sample of 6,271 US IPO firms from 1980 to 2003, more than half of the sample firms had less than seven years operating history. The average number of days to listing is 56 days which is close to previous studies of 58 days in Cotter et al. (2005) and 53 days in Lee et al. (1996). Only 12.3% of our sample are high technology companies.

Table 2 Panel A provides a summary of one-year and two-year performance of IPO firms, including buy-and-hold raw returns (BHR) and buy-and-hold abnormal returns (BHAR). On average, Australian IPOs produce negative returns for investors over one and two years. The average one-year return is -4.4%, dropping to -8.4% after adjusting for index returns. The average two-year return is -1.8%, substantially falling to -13.7% after adjusting for index returns. These show that the performance of Australian IPOs is far less than the industry benchmark in the long term. And the decline in average IPO performance from one year to two years confirms the long term underperformance of Australian IPOs. It then becomes important to learn whether founder features contribute to a firm's performance in the long term.

Table 2 Panel B presents a break down of long term performance by different sectors, classified by GICS. The average one-year and two-year performances of IPO firms are significantly different across sectors. For example, there are both positive return sectors as well as negative return sectors. For one-year BHR, the energy sector had the highest return of 75.4% among

Table 2: IPO Long Term Performance Summary Statistics

Panel A: IPO Firm Long Term Performance Summary

<i>Variables</i>	<i>N</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Minimum</i>	<i>25th Percentile</i>	<i>Median</i>	<i>75th Percentile</i>	<i>Maximum</i>
One-year BHR	252	-0.044	0.810	-0.974	-0.582	-0.209	0.237	4.097
One-year BHAR	252	-0.084*	0.774	-1.570	-0.532	-0.196	0.119	4.255
Two-year BHR	252	-0.018	1.166	-0.987	-0.723	-0.394	0.190	8.439
Two-year BHAR	252	-0.137*	1.126	-1.644	-0.726	-0.392	0.101	8.496

Panel B: Summary by Sector

<i>Sector</i>	<i>N</i>	<i>One-year</i>		<i>Two-year</i>		<i>Sector Index Ticker</i>
		<i>BHR</i>	<i>BHAR</i>	<i>BHR</i>	<i>BHAR</i>	
Consumer Discretionary	52	-0.110	-0.108	-0.118	-0.151	XDJ
Consumer Staples	8	-0.143	-0.310	-0.146	-0.319	XSJ
Energy	6	0.754	0.612	0.530	0.111	XEJ
Financials (No A-REITs)	28	-0.099	-0.114	-0.157	-0.202	XXJ
Health Care	52	-0.173	-0.367	-0.153	-0.532	XHJ
Industrials	57	0.043	0.111	0.160	0.179	XNJ
Information Technology	31	-0.184	-0.218	-0.185	-0.326	XIJ
Materials	5	0.659	0.422	0.806	0.628	XMJ
Telecommunications	10	0.510	0.524	0.625	0.636	XTJ
Utilities	3	-0.665	-0.436	-0.595	-0.384	XUJ

Our sample consists of 252 IPO firms from IPO underpricing sample. One firm is excluded due to its inconsistent price records. Details of long term variables have been discussed in the section of IPO Firm Long Term Performance Model. Table 23 in Appendix B also outlines the long term variables and their sources. *BHR* represents the buy-and-hold return, which is not adjusted by the sector index return. *BHAR* represents the buy-and-hold abnormal return, calculated as the BHR adjusted by the corresponding sector index return. One year is defined as 252 trading days and two years are defined as 504 trading days. Panel B shows the average *BHR* and *BHAR* by each sector. The last column of Panel B presents the ASX ticker code of each sector index used to adjust the long term performance of IPO firms in that sector. The significance test is applied to the four long term performance variables to examine if they are significantly different from 0. *, **, *** indicate statistical significance at 10%, 5% and 1% level, respectively.

all sectors. In contrast, the utilities sector produced the lowest return of -66.5%. For one-year BHAR, the energy sector still recorded the highest return of 61.2% and the utilities sector also had the lowest return of -43.6%. For two-year firm performance, there are also large variations among different sectors. The highest return sector was the material sector, with 80.6%, while the lowest return sector was the utilities sector with -59.5%. The two-year BHARs are slightly different, as the telecommunication sector had the highest return of 63.6% and the health care sector had the lowest return of -53.2%. Due to the large variations of returns between different sectors, we control for industry effects in our regression model.

5.2 Correlation Analysis

Table 3 presents the Pearson pairwise correlation matrix for our underpricing variables. Overall, most correlations have an absolute value less than 0.5 showing that they are in the minimal-to-modest range.

The dependent variable *Market-adjusted Underpricing* is positively correlated with *Founder Ownership*, *Founder CEO*, *Trading Volume*, *Firm Age*, *Issue Size*, *Firm Size* and *Risk Factors*. By contrast, it is negatively correlated with *Founder Experience*, *Market Volatility*, *Time to Listing*, *Investment Bank Market Share*, *High Tech* and *Board Independence*. Among the three independent variables, only *Founder Ownership* is significant correlated with the dependent variable with a p -value less than 1%.

The main concern is the extremely high correlation between *Issue Size* and *Firm Size*, with a value of 0.999 and significant at 1% level, may cause a multicollinearity problem. The multicollinearity issue between the two variables is discussed in the later section about regression results.

Table 4 reports the correlations of long term performance variables. Most correlations have a value less than 0.4. The only exception is that one-year BHAR and two-year BHAR are highly positively correlated ($p < 0.01$). However, both of them are dependent variables on the left hand side of our model, so it is not a problem for the model.

Among the three independent variables *Founder CEO*, *Founder Ownership* and *Founder Experience*, only *Founder Ownership* is positively correlated with both one-year and two-year BHAR. The other two variables are negatively correlated with the two dependent variables.

One of the control variables, *Total Assets*, is negatively correlated with both one-year and two-year BHAR. The other two control variables, *Firm Age* and *Underpricing*, have positive correlations with the two dependent variables.

Based on the correlation matrix of IPO long term performance variables, there is no serious problem of multicollinearity.

Table 3: Correlation Matrix for IPO Underpricing Variables

<i>Variables</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Market-adjusted Underpricing	1.000													
2 Founder Ownership	0.188***	1.000												
3 Founder CEO	0.025	0.127**	1.000											
4 Founder Experience	-0.010	-0.020	0.030	1.000										
5 Market Volatility	-0.137**	-0.040	-0.043	0.073	1.000									
6 Trading Volume	0.220***	-0.084	-0.024	0.040	-0.160**	1.000								
7 Firm Age	0.130**	0.108*	-0.296***	-0.353***	0.004	-0.010	1.000							
8 Time to Listing	-0.311***	0.033	0.124**	-0.072	0.142**	-0.254**	-0.119*	1.000						
9 IB Market Shares	-0.037	0.012	-0.096	0.157**	0.024	-0.088	-0.052	-0.005	1.000					
10 Issue Size (Log)	0.020	-0.172***	-0.186***	0.119*	0.049	0.386***	0.215***	-0.391***	0.005	1.000				
11 Firm Size (Log)	0.024	-0.170***	-0.189***	0.120*	0.052	0.378***	0.211***	-0.393***	0.011	0.999***	1.000			
12 Risk Factors	0.023	0.115*	-0.042	0.031	0.147**	-0.001	0.008	-0.049	-0.089	0.243***	0.243***	1.000		
13 High Tech	-0.004	0.054	0.054	-0.152**	-0.005	-0.016	0.041	0.061	-0.008	-0.045	-0.043	-0.069	1.000	
14 Board Independence	-0.110*	-0.111*	-0.044	-0.111*	-0.039	0.150**	0.006	-0.038	0.036	0.217***	0.220***	0.026	0.010	1.000

This table reports the Pearson pairwise correlation for our IPO underpricing variables. *, **, *** indicate statistical significance at 10%, 5% and 1% level, respectively. *Issue Size* and *Firm Size* are logarithm transformed variables. *Trading Volume* is an IPO's first day trading volume deflated by the number of shares on issue.

Table 4: Correlation Matrix for IPO Long Term Performance Variables

<i>Variables</i>	1	2	3	4	5	6	7	8
1 One-year BHAR	1.000							
2 Two-year BHAR	0.796***	1.000						
3 Founder CEO	-0.072	-0.076	1.000					
4 Founder Ownership	0.109*	0.134**	0.123*	1.000				
5 Founder Experience	-0.058	-0.005	0.034	-0.014	1.000			
6 Total Assets (Log)	-0.142**	-0.092	0.035	-0.001	0.003	1.000		
7 Firm Age (Log)	0.179***	0.141**	-0.210***	0.096	-0.324***	-0.099	1.000	
8 Underpricing	0.113*	0.097	0.029	0.198***	-0.016	0.099	0.100	1.000

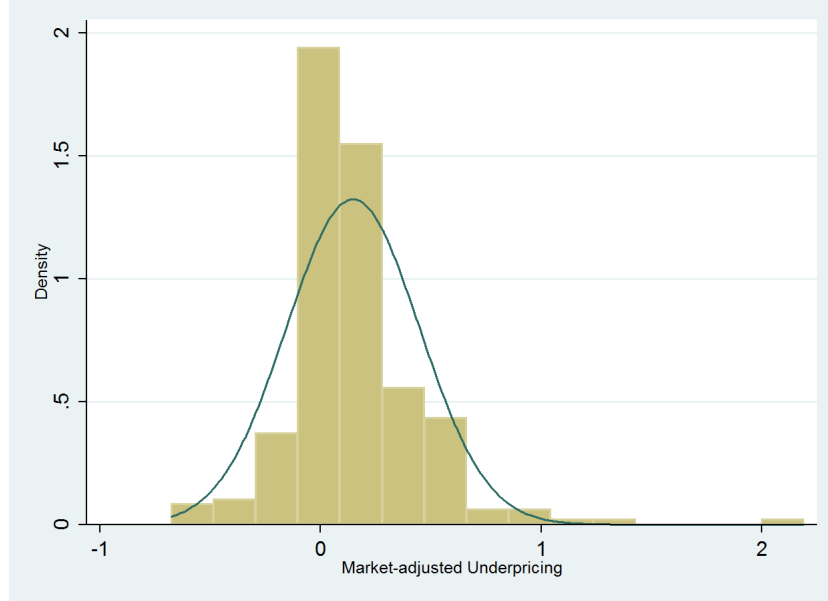
This table reports the Pearson correlation matrix for IPO long term performance variables. *, **, *** indicate statistical significance at 10%, 5% and 1% level, respectively. The three independent variables have the same definition as discussed before. *BHAR* refers to the buy-and-hold abnormal returns discussed previously. One-year BHAR is the buy-and-hold abnormal returns compounded for 252 trading days and two-year BHAR is compounded for 504 trading days. *Total Assets* is an IPO firm's natural logarithm of total assets post-IPO. *Firm Age* is the natural logarithm of firm age plus one as our sample firms include 0 year firms. *Underpricing* is the market-adjusted underpricing of each IPO firm.

5.3 Comparison of IPO Firms with Different Founder Features

We provide a comparison of IPO firms with different founder features in this section. IPO firms are categorised based on their founder features of founder CEO status, founders' experience and founders' ownership. We examine if there are any significant differences between these groups in underpricing and other firm characteristics.

Figure 1 shows the distribution of market-adjusted underpricing. By comparison with a normal curve, the distribution of this variable violates the normal distribution. With this concern, we firstly conduct a Shapiro-Wilk normality test for market-adjusted underpricing to select the best tool to analyse the differences. The Shapiro-Wilk statistic of market-adjusted underpricing is 0.872 with a p -value of 0, indicating that the variable is not normally distributed. We apply the same method to test for other variables

Figure 1: The Distribution Plot of Market-adjusted Underpricing



The histogram shows the distribution of the market-adjusted underpricing of our 253 IPO firms. The curve indicates the normal distribution.

including *Firm Age*, *Issue Size* (in million \$), *Investment Bank Market Share*, *Risk Factors*, *Board Independence*, *Time to Listing* and *Founder Ownership*. All of them are not normally distributed. Furthermore, the three categorical variables of *High Tech*, *Founder CEO* and *Founder Experience* are not normally distributed as they are binary data. As a result, we use a nonparametric methods such as the Kruskal-Wallis test or Wilcoxon rank-sum test to analyse the differences.

As applications of nonparametric methods also require checking equality of variance between groups, we also conduct an F -test to compare the variances between groups. If the two groups have the same level of variances, we apply the Kruskal-Wallis test. If they do not have equal variances, we apply

the Wilcoxon rank-sum test. The t -test is also reported as all our sub groups have a size of more than 30 observations. Median tests are also reported as a complement to the mean tests. Because all variables are not normally distributed, we use the nonparametric median test proposed by Conroy (2012).

5.3.1 Comparison of Founder versus Non-founder CEO IPO firms on IPO Underpricing

Following a similar method by He (2008), we use both mean and median tests to examine the differences between founder CEO and non-founder CEO IPO firms. 64% of sample firms are under founder CEO management while 36% are not. The percentage of founder CEO IPO firms is less than the percentage in the UK of 76% (Bruton et al. 2009) but slightly higher than the percentage in the US of 58% (Jain and Tabak 2008).

Table 5 reports means and medians of key variables for founder CEO and non-founder CEO IPO firms. For the market-adjusted underpricing, founder CEO firms have an average of 15.2% while non-founder CEO firms have an average of 13.6%. However, they are not statistically significant. Overall, underpricing is not a significant indicator to distinguish founder CEO and non-founder CEO firms at this stage. From another perspective, investors may not perceive the two types of firms differently.

Among these firm-specific characteristics, founder CEO and non-founder CEO IPO firms have statistically significant differences in the following as-

Table 5: Comparison of Founder CEO versus Non-founder CEO IPO Firms

Variables	Founder CEO		Non-founder CEO		Variance Test	Mean Test		
						t-Test	Kruskal- Wallis/Wilcoxon	Median Test
	Mean	Median	Mean	Median				
Market-adjusted Underpricing	0.152	0.088	0.136	0.118	1.001	-0.394	0.009	0.493
Firm Age	7.846	6.000	13.736	10.000	3.299***	4.221***	3.502***	4.438**
Time to Listing	58.877	45.000	49.473	42.000	0.696*	-2.084**	-1.886*	1.236
IB Market Share	0.012	0.000	0.020	0.000	2.051***	1.397	0.734	0.417
Issue Size (in million \$)	31.814	10.000	67.866	15.600	6.448***	2.017**	2.913***	5.172**
Risk Factors	14.648	14.000	15.110	15.000	1.507	0.664	0.454	1.214
High Tech	0.136	0.000	0.099	0.000	0.763	-0.857	0.735	0.738
Board Independence	0.482	0.500	0.500	0.500	0.742	0.695	0.293	0.041
Founder Ownership	0.322	0.275	0.263	0.209	0.991	-2.027**	4.928**	1.281
Founder Experience	0.537	1.000	0.505	1.000	1.010	-0.481	0.232	-

***, ***, * indicate statistical significance at 10%, 5% and 1% level, respectively. The total sample size for each row is 253 IPO firms, listed between 2003 and 2013. 162 IPO firms (64.0%) have founder CEOs and the other 94 IPO firms (36.0%) are managed by professional CEOs. We analyse *Issue Size* in dollar amounts, because it can be interpreted in a more meaningful way than log transformed values. The variance test is an *F*-test examining the equality of variance between groups. The null hypothesis of the *F*-test is the two groups have equal variance. Test statistics of *t*-test are also reported as all sub groups have a sample size larger than 30. All variables use standard *t*-test to test mean differences, except for *Firm Age* (Variance Test: $p < 0.01$), *Time to Listing* (Variance Test: $p < 0.1$), *IB Market Share* (Variance Test: $p < 0.01$) and *Issue Size* (Variance Test: $p < 0.01$). Welch's *t*-test for unequal variance is applied to the four variables. The mean test in the column **Kruskal-Wallis/Wilcoxon** depends on the results of variance test. Kruskal-Wallis test is used when the corresponding variance test has a *p*-value greater than 0.100, otherwise Wilcoxon test is applied. All variables use Kruskal-Wallis test while only *Firm Age*, *Time to Listing*, *IB Market Share* and *Issue Size* apply Wilcoxon rank-sum test. χ^2 is reported for **Kruskal-Wallis test** and *z* is reported for **Wilcoxon Rank-sum test**. The variable *Founder Experience* grouped by *Founder CEO* does not satisfy the requirement for the median test, so not results are reported.

pects. Firstly, founder CEO IPO firms are on average younger than non-founder CEO ones (t -test: $p < 0.01$ and Wilcoxon: $p < 0.001$). The mean firm age for founder CEO firms is 7.846 years while non-founder CEO firms have a mean firm age of 13.736 years. Secondly, founder CEO IPO firms on average have a smaller issue size than non-founder CEO ones (t -test: $p < 0.05$ and Wilcoxon: $p < 0.01$). The mean IPO size of founder CEO firms is \$31.814 million. The non-founder CEO firms have a larger IPO size of \$67.866 million on average. Furthermore, the two types of firms are significantly different in founder retained ownership. On average, founders from founder CEO firms retain more shares than those from non-founder CEO firms (t -test: $p < 0.05$ and Wilcoxon: $p < 0.05$). The mean founder ownership by founders from founder CEO firms is 32.2%. In contrast, the mean founder ownership by founders from non-founder CEO firms is 26.3%. The two groups are marginally different in the number of days from prospectus registration to listing. Founder CEO IPO firms on average take a longer time from registration to listing than non-founder CEO firms (t -test: $p < 0.05$ and Wilcoxon: $p < 0.1$). On average, founder IPO firms take 58.877 days to list on stock market while non-founder firms take only 49.473 days.

5.3.2 Comparison of Experienced Founder versus Inexperienced Founder IPO Firms on IPO Underpricing

In this section, we examine whether there are differences in underpricing and founders' ownership between firms with different founder experiences, specifically, if investors perceive firms with experienced founders differently

from those with inexperienced founders. An experienced founder is defined as a founder with previous experience in board directorship, senior management position or founding a business. Details of founder experience have been discussed in previous sections. In the sample of 253 IPO firms, 52.6% of firms have experienced founders while the other 47.7% of firms do not.

Table 6 reports the results of the comparison. Based on the p -values of the two variance tests, experienced and inexperienced founder firms have the same level of variance in terms of underpricing and founder ownership. Therefore, both the t -test and Kruskal-Wallis test are used to test the differences of means.

Firstly, the difference in underpricing between experienced founder and inexperienced founder IPO firms is not statistically significant. The mean underpricings of the two groups are close, where experienced founder firms have an average underpricing of 14.3% and inexperienced founder firms have an average underpricing of 14.9%.

Secondly, the difference of founder ownership between the two groups is also not statistically significant. Founder ownership of the two groups of IPO firms is on average similar. Firms with experienced founders have an average founder ownership of 29.6% while firms with inexperienced founders have an average of 30.5%.

Both the t -test and Kruskal-Wallis test produce very high p -values for the

Table 6: Comparison of Experienced Founder and Inexperienced Founder IPO Firms

Variables	Mean Test					
	Experienced Founder		Inexperienced Founder		Variance Test	
	Mean	Median	Mean	Median	F-stat	t-Test
Market-adjusted Underpricing	0.143	0.096	0.149	0.094	0.754	t-stat
Founder Ownership	0.296	0.253	0.305	0.266	1.173	χ^2
						Pearson's χ^2

**** indicate statistical significance at 10%, 5% and 1% level, respectively. The total sample size for each row is 253 IPO firms, listed between 2003 and 2013. 133 IPO firms (52.6%) have experienced founders and the other 120 IPO firms (47.4%) do not. The variance test is an *F*-test examining the equality of variance between groups. The null hypothesis of the *F*-test is the two groups have equal variance. Because all groups in this table have equal level of variance, we apply **Kruskal-Wallis** test to examine the mean difference. *Experienced Founder* are IPO firms with the dummy variable of founder experience equal to 1. It indicates that at least one of the founders from those firms has previous experience in board membership, senior management or founding a business. *Inexperienced Founders* are IPO firms with the dummy variable of founder experience equal to 0.

differences of underpricing and founder ownership, indicating that there are no statistically differences between experienced and inexperienced firms for the two variables. A similar conclusion can be drawn from the results of the median test.

5.3.3 Comparison of Founder Ownership on IPO Underpricing

Another founder variable investigated is the percentage of founders ownership post-IPO. In contrast to categorical variables of founder CEO and founder experience, founder ownership is a continuous variables. Therefore, we set some thresholds and classify IPO firms based on these founder ownership thresholds. We categorise IPO firms based on founder ownership thresholds of 5%, 10%, 20%, 30% and 50%, according to the following discussion.

According to section 9 of *Corporations Act 2001 (Commonwealth)*, a shareholding and voting power of 5% or more is defined as a substantial shareholding. We firstly use 5% founder ownership to categorise IPO firms to see if there is a difference in underpricing between IPO firms with or without substantial shareholding by founders. When founders stay as substantial shareholders after IPO, it is a sign of confidence regarded by outside investors as a positive signal (Bruton et al. 2009).

We also want to examine if there are any differences in underpricing in IPO firms with or without founders being controlling shareholders after IPO. Australian laws and regulations do not define ‘controlling shareholder’. In

order to test the difference, we borrow definitions from other countries or frameworks to set our thresholds. Firstly, we use the concept of controlling shareholder from the US, which specifies that a shareholder is a controlling shareholder when holding 10% or more (Gadhoum et al. 2005). The second threshold is 20% borrowed from Porta et al. (1999), who argue that a 20% or more shareholding could effectively control a firm in Australia. This argument is supported by *AASB 128*, which states that a shareholder with a 20% or more shareholding could have significant influence on the firm²⁹. In addition, we also borrow the concept of controlling shareholder from the UK, where a shareholder with 30% or more ownership is defined as a controlling shareholder (Financial Conduct Authority 2016)³⁰. The last threshold is set to 50%. A shareholder with a 50% or more shareholding has absolute control of a firm according to the one-share one-vote system in Australia.

For each threshold ownership, we classify IPO firms into two groups depending on their founder ownership. Firms with founder ownership less than the threshold are categorised into the group *Less than the Threshold* and otherwise firms are categorised into the group *Greater than or Equal to the Threshold*.

Table 7 reports the results of the comparison between different founder

²⁹The 20% rule of significant influence is specified in the paragraph 5 of AASB 128. It is available at: http://www.aasb.gov.au/admin/file/content105/c9/AASB128_08-11.pdf

³⁰The Financial Conduct Authority of UK regulates the UK capital market. It publishes *Listing Rules* for UK stock markets. The definition of ‘controlling shareholder’ is outlined in the section 6.1.2A (page LR6/2) of the rule. We checked early versions of the *Listing Rule*, this definition has not been changed.

ownership thresholds. The differences in underpricing between groups of all thresholds are large and all differences are statistically significant (at least all p -values of Kruskal-Wallis or Wilcoxon test <0.1). Groups based on thresholds of 10%, 20% and 30% ownership are significant at the 1% level ($p < 0.01$).

Table 7: Comparison of Founder Ownership on IPO Underpricing

Analysis Variable: Market-adjusted Underpricing							Mean Test			Median Test
Owner-ship Threshold	Less than Threshold			Greater than or Equal to Threshold			Variance Test	t-Test	Kruskal-Wallis/Wilcoxon	Median Test
	N	Mean	Median	N	Mean	Median	F-stat	t-stat	χ^2 or z	Pearson's χ^2
5%	30	0.058	0.018	223	0.158	0.103	0.614	-1.714*	3.930*	1.308
10%	50	0.052	0.018	203	0.169	0.125	0.859	-2.481*	7.296***	6.224**
20%	105	0.067	0.058	148	0.202	0.142	0.479**	-3.801***	-3.407***	6.899***
30%	141	0.086	0.070	112	0.222	0.155	0.456***	-3.488***	-3.414***	4.332**
50%	199	0.134	0.082	54	0.190	0.170	1.227	-1.197	3.297*	3.512*

**** indicate statistical significance at 10%, 5% and 1% level, respectively. For each threshold ownership, the sum of the numbers of IPO firms in the corresponding two groups is equal to 253. N represents the number of firms in that group. The reported mean and median are for the market-adjusted underpricing of IPOs in a group. The variance test is an F -test examining the equality of variance between groups. The null hypothesis of the F -test is the two groups have equal variance. The mean test in the column **Kruskal-Wallis/Wilcoxon** depends on the results of variance test. Kruskal-Wallis test is used when the corresponding variance test has a p -value greater than 0.100, otherwise Wilcoxon test is applied. In this table, only groups based on 20% and 30% thresholds do not have equal variances. Therefore, for groups by the two thresholds, we use both Welch's t -test and Wilcoxon test. All other groups use t -test and Kruskal-Wallis test. χ^2 is reported for **Kruskal-Wallis test** and z is reported for **Wilcoxon Rank-sum test**.

Clearly, different levels of founder ownership could cause differences of IPO underpricing. The results of all groups indicate that firms with less than threshold founder ownership have less underpricing than the firms in the other group. The largest difference in underpricing occurs for groups based on the 30% threshold. The average underpricing of IPO firms whose founders hold less than 30% is 8.6% and the average underpricing for those IPO firms whose founders hold greater than or equal to 30% is 22.2%. The difference between the two groups is 13.6%. IPO firms with controlling founders are further discounted than those not. However, the above analysis only shows the difference between groups while their relationship remains unanswered. We answer this question in a later section.

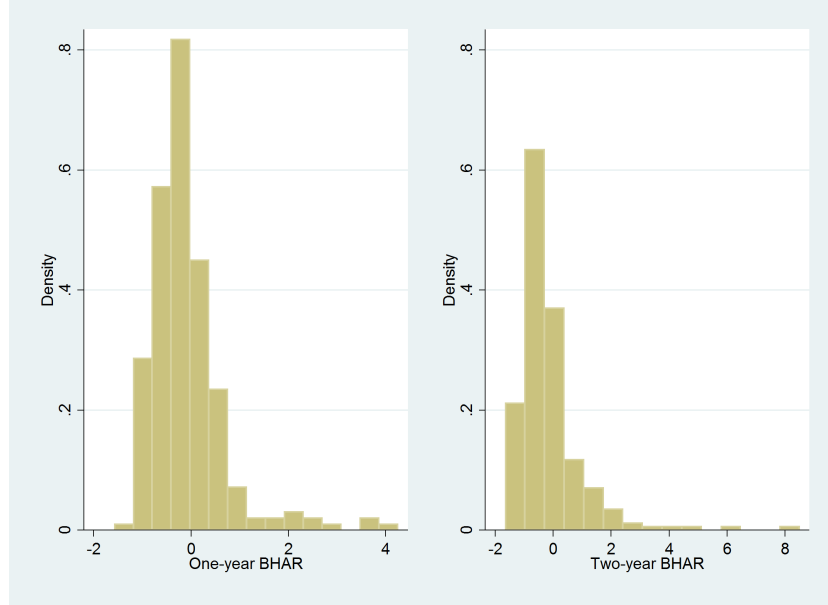
5.3.4 Comparison of IPO Firms on Long Term Performance

In addition to testing the difference in underpricing, we examine the differences in long term performance based on IPO firms' founder features of founder CEO and founder experience. We apply a similar method for comparing underpricing between different groups. We test if there are any differences in long term performance measures between any two groups.

First, we check the normalities of both one-year and two-year BHARs. From Figure 2, both returns do not appear normally distributed. Therefore, we apply the Shapiro-Wilk test to formally examine their normalities. The Shapiro-Wilk statistics of one-year and two-year BHAR are 0.806 ($p < 0.000$) and 0.730 ($p < 0.000$). We conclude that both performance measures are not normally distributed. Therefore, we apply nonparametric methods to test the differences of mean between groups.

Table 8 reports the results of tests. The comparison results show that there are statistically significant differences for one-year BHAR between groups classified based on both founder CEO and founder experience. The average one-year BHAR of founder CEO IPO firms is -12.5% and of non-founder CEO IPO firms is -1%. Their difference is statistically significant at the 10% level ($p < 0.1$). Likewise, the difference of one-year BHAR between firms with experienced founders and with inexperienced founders is also statistically significant at the 10% level ($p < 0.1$). IPO firms with experienced

Figure 2: The Distribution Plot of Long Term BHARs



The number of observations for each graph is 252. The left histogram shows the distribution of one-year BHAR and the right histogram shows the distribution of two-year BHAR.

founders have an average of one-year BHAR of -12.6% and those without experienced founders have an average of -3.7%. The difference is statistically significant at the 10% level ($p < 0.1$). In summary, one-year BHAR is different between firms which have different founder features.

Although there is a large difference in two-year BHAR between founder CEO and non-founder CEO IPO firms, the difference is not statistically significant. The difference in two-year BHAR between firms with experienced founders and without experienced founders is relatively small and is also not statistically significant.

Previous studies suggest a curvilinear relationship between ownership

Table 8: Comparison of Founder CEO and Founder Experience on IPO Long Term Performance

A: Founder CEO Status					Mean Test		
<i>Variable</i>	<i>Founder CEO</i>		<i>Non-founder CEO</i>		<i>Variance Test</i>	<i>T-Test</i>	<i>Kruskal-Wallis</i>
	<i>N</i>	<i>Mean</i>	<i>N</i>	<i>Mean</i>	<i>F-stat</i>	<i>t-stat</i>	χ^2
One-year BHAR	161	-0.125	91	-0.010	0.811	1.139	3.411*
Two-year BHAR	161	-0.201	91	-0.024	0.953	1.202	1.584
B: Founder Experience					Mean Test		
	<i>Experienced Founder</i>		<i>Inexperienced Founder</i>		<i>Variance Test</i>	<i>T-Test</i>	<i>Wilcoxon</i>
	<i>N</i>	<i>Mean</i>	<i>N</i>	<i>Mean</i>	<i>F-stat</i>	<i>t-stat</i>	<i>z</i>
One-year BHAR	133	-0.126	119	-0.037	0.738*	0.920	1.677*
Two-year BHAR	133	-0.142	119	-0.132	0.518***	0.077	0.705

*, **, *** indicate statistical significance at 10%, 5% and 1% level, respectively. Our sample consists of 252 IPO firms. In Panel A, they are categorised based on whether an IPO firm has a founder CEO. In Panel B, they are categorised based on whether an IPO firm's founders have experience (board membership, senior management position and founding a business). *N* stands for the number of IPOs in a group. *BHAR* is the buy-and-hold abnormal return, which is the buy-and-hold return adjusted by sector index return. One-year BHAR is buy-and-hold returns compounding for 252 trading days and adjusted by relevant sector index returns compounded in the same time interval. Two-year BHAR is for 504 trading days. The variance test is an *F*-test examining the equality of variance between groups. Groups by founder experience show that they do not have equal variances, Wilcoxon rank-sum test is applied to test their means.

structure and firm long term performance in Australia (Craswell et al. 1997). The non-linear relationship makes the comparison of means of the long term BHARs between different founder ownership groups difficult to interpret. Hence, we do not conduct an analysis for founder ownership on BHARs.

5.4 Regression Results

5.4.1 Initial Diagnostics for IPO Underpricing Model

Before we present our regression results, we discuss the problem in our original model, which incorporates both *Firm Size* and *Issue Size* as control variables following the model by Lee et al. (1996). However, as noted earlier in Table 3, the firm size (measured as the natural logarithm of total assets) is highly correlated with issue size (measured as the natural logarithm of IPO gross proceeds), with a correlation of 0.999. To avoid a multicollinearity problem, we formally assess this problem by calculating the variance inflation factor (VIF) for each variable in the original model. The VIFs for all variables are less than two, except firm size and issue size, which are 369.47 and 366.93 respectively. The extremely high values of VIF for the two variables indicate that including the two variables in the model causes a multicollinearity problem. Following the solution by Gujarati and Porter (2009, p.262), we decided to drop the variable of firm size and maintain issue size as a control variable. The reason is that issue size can also be a proxy for firm size. Assuming all IPO firms sell the same portion of ownership, a large firm will have a relatively larger IPO size than a small firm.

We also checked the heteroscedasticity for the model excluding firm size to decide if we need to conduct regression with robust standard errors. We adopt the method by Breusch and Pagan (1979) to test the heteroscedasticity. It produces a Breusch-Pagan test statistic of 7.25 ($p < 0.01$). We conclude that our model has inconstant variances. To correct this problem, we apply the robust standard error ordinary least squares regression for our IPO underpricing model.

5.4.2 The Effect of Founders on IPO Underpricing

Table 9 reports robust standard error regression results of our models for the full IPO underpricing sample. The basic testable model is reported in column (1). The result reveals that there is a positive association between *Founder Ownership* and *Market-adjusted Underpricing* with a coefficient of 0.200 ($p < 0.05$). With an increase of *Founder Ownership*, the *Market-adjusted Underpricing* increases as well. The positive sign of the coefficient for *Founder Ownership* is not consistent with our prediction that underpricing is reduced with increasing retained ownership by founders. This also contrasts with the previous finding of a negative relationship between them in the UK (Bruton et al. 2009). In addition to the basic model, *Founder Ownership* is also positively associated with *Market-adjusted Underpricing* in all other four models reported in Table 9 at the 5% significance level. The relationship between the two variables is robust. In column (4), we added a squared founder ownership variable into our model according to our early

discussion. The negative coefficient of *Founder Ownership*² suggests that underpricing is increasing at a diminishing rate with respect to founder ownership, which is inconsistent with the Bruton et al. (2009) model. However, it is not statistically significant even at the 10% level. In column (5), we dropped all insignificant control variables. It allows us to examine the independent variables with less noise.

The coefficients of *Founder CEO* and *Founder Experience* are not statistically significant in all four models, implying both variables do not contribute to IPO underpricing. However, the model in column (2) shows the positive coefficient of cross product of *Founder CEO* and *Issue Size* is statistically significant at the 10% level ($p < 0.1$). It means that *Founder CEO* contributes to IPO underpricing in larger size issues. In column (3), we incorporate the interaction term of *Founder CEO* and *Firm Age*, but the coefficient is not statistically significant. In all, our results imply that *Founder Experience* is not associated with *Market-adjusted Underpricing*, while *Founder CEO* may marginally contribute to a higher level of *Market-adjusted Underpricing* in large IPO issues.

There also are some control variables, which are significantly associated with the dependent variable. For example, *Trading Volume* is positively associated with *Market-adjusted Underpricing* ($p < 0.01$). The positive sign of its coefficient is consistent with Karpoff (1987), who argued the higher trading volume is related to higher returns. We also found that the negative coefficients of *Time to Listing* are statistically significant in all five models

Table 9: OLS Regression Analysis of Founder Variables on IPO Underpricing

<i>Variables</i>	(1)	(2)	(3)	(4)	(5)
Founder Ownership	0.200** (0.081)	0.206** (0.082)	0.200** (0.080)	0.498** (0.235)	0.520** (0.251)
Founder CEO	0.034 (0.039)	-0.596 (0.369)	0.039 (0.060)	0.030 (0.038)	0.031 (0.039)
Founder Experiences	0.013 (0.041)	0.016 (0.041)	0.013 (0.041)	0.011 (0.041)	0.018 (0.037)
Market Volatility	-3.964 (4.278)	-4.731 (4.414)	-3.928 (4.223)	-4.509 (4.367)	
Trading Volume	1.519*** (0.503)	1.481*** (0.497)	1.515*** (0.517)	1.437*** (0.508)	1.432*** (0.525)
Firm Age	0.004** (0.002)	0.005** (0.002)	0.005* (0.003)	0.004** (0.002)	0.005** (0.002)
Time to Listing	-0.003*** (0.001)	-0.002*** (0.001)	-0.003*** (0.001)	-0.002*** (0.001)	-0.003*** (0.001)
IB Market Share	-0.009 (0.437)	-0.048 (0.437)	-0.005 (0.435)	0.011 (0.435)	
Issue Size (Log)	-0.038*** (0.015)	-0.061*** (0.017)	-0.038*** (0.015)	-0.037** (0.015)	-0.041*** (0.013)
Risk Factors	0.003 (0.006)	0.002 (0.006)	0.003 (0.006)	0.002 (0.006)	
High Tech	0.001 (0.083)	-0.003 (0.083)	0.001 (0.083)	0.002 (0.083)	
Board Independence	-0.153 (0.126)	-0.161 (0.127)	-0.153 (0.126)	-0.150 (0.125)	
Founder CEO \times Issue Size		0.038* (0.022)			
Founder CEO \times Firm Age			-0.000 (0.004)		
Founder Ownership ²				-0.399 (0.291)	-0.402 (0.297)
Constant	0.787*** (0.223)	1.169*** (0.282)	0.784*** (0.220)	0.750*** (0.231)	0.740*** (0.219)
Observations	253	253	253	253	253
R^2	0.210	0.216	0.210	0.214	0.202
F-statistic	7.228	6.697	6.760	6.905	10.94

This table reports the results of $R'_{i,0} = \alpha + \beta_1 \text{FounderOwnership} + \beta_2 \text{FounderCEO} + \beta_3 \text{FounderExeprience} + \beta^T \text{ControlVariables}_i + \varepsilon_i$. The dependent variables is *Market-adjusted Underpricing*. Robust standard errors in parentheses, and ***,**,* indicate statistical significance at 10%, 5% and 1% level, respectively. All variables have the same definitions as discussed in previous section of 3.2.2 and also outlines in the Table 22 of Appendix B. *Founder Ownership*² is the squared *Founder Ownership*. *Founder CEO \times Issue Size* is an interaction term equal to *Founder CEO* times *Issue Size* (measured as natural logarithm of IPO gross proceeds). *Founder CEO \times Firm Age* is an interaction term equal to *Founder CEO* times *Firm Age*.

($p < 0.01$). Our finding is consistent with the previous Australian results in Lee et al. (1996). An IPO firm takes a longer time from prospectus registration to listing, contributing to a lower level of underpricing. In addition, the coefficients of *Issue Size* of all five models are negative and statistically significant. All coefficients are significant at the 1% level ($p < 0.01$), except for the model in column (4), which considers the effect of *Founder Ownership*². The coefficient of *Issue Size* in this model is significant at the 5% level ($p < 0.05$). IPO underpricing is reduced in large issues. The relationship between *Firm Age* and *Market-adjusted Underpricing* is significant in all five models at 5% level ($p < 0.05$), except the model in column (3). In column (3), the model considers the co-effect of *Founder CEO* and *Firm Age*. The coefficient of *Firm Age* in this model is significant at 10% level ($p < 0.1$).

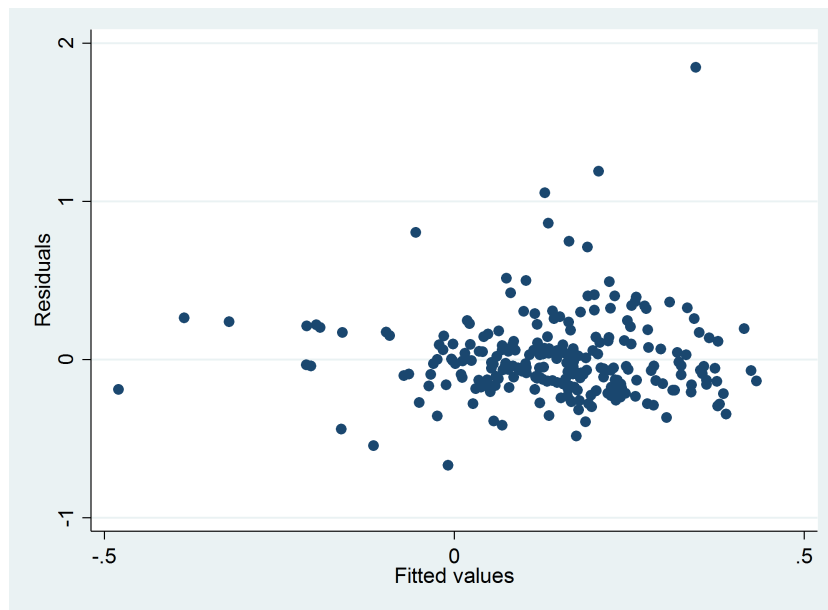
5.4.3 Outliers and Winsorized Model

Although we applied the robust standard error in our regression, outliers may make our estimation less accurate. From our summary statistics, the dependent variable *Market-adjusted Underpricing* has a minimum of -67.8% and a maximum of 219.2%. The maximum value of 219.2% is located too far from the centre of the distribution and may cause problems in the model.

Figure 3 shows the residual plot of our basic model (the model in column (1) of Table 9). There some large positive and negative residuals. The absolute values of four residuals are greater than 4. These outliers could cause some inaccuracies in our estimation. As a result, we apply the winsorization

method to treat these extreme values. We winsorized the *Market-adjusted Underpricing* at the 5% level. It replaces any values greater than the 95th percentile in this variable with the value of 95th percentile as well as any values less than the 5th percentile with the value of the 5th percentile.

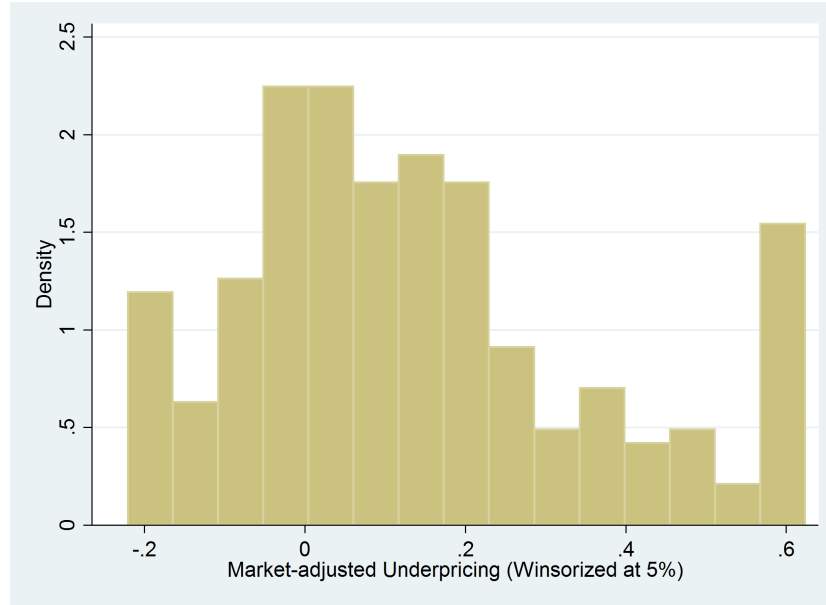
Figure 3: Residuals versus Fitted Values Plot of IPO Underpricing Model



This graph shows the plot for fitted values versus residuals for the model in column (1) of Table 9. Some large residuals are identified in this graph.

Table 10 provides the summary statistics of the *Winsorized Market-adjusted Underpricing*. The mean of *Winsorized Market-adjusted Underpricing* is 13.9%, slightly lower than its original value of 14.6%. Most importantly, the minimum and maximum values are closer to the centre of the distribution. Extreme values in the original variable are well smoothed. Figure 4 shows the distribution of *Winsorized Market-adjusted Underpricing*. We rerun our regression with *Winsorized Market-adjusted Underpricing* as the

Figure 4: The Distribution Plot of Winsorized Market-adjusted Underpricing



This graph shows the distribution of *Winsorized Market-adjusted Underpricing*, which is the *Market-adjusted Underpricing* being worsorized at the 5% level for all 253 observations. Extreme values are smoothed and observations in tails are closer to the centre of the distribution.

dependent variable.

Table 10: Winsorized Market-adjusted Underpricing at the 5% Level

<i>Variables</i>	<i>N</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Minimum</i>	<i>25th Percentile</i>	<i>Median</i>	<i>75th Percentile</i>	<i>Maximum</i>
Winsorized Market Adjusted Underpricing	253	0.139	0.224	-0.221	-0.001	0.096	0.245	0.624

This table reports the descriptive statistic of *Market-adjusted Underpricing* after winsorized at 5% level for all 253 observations. 5% level winsorization replaces any values of *Market-adjusted Underpricing* greater than 95th percentile and less than 5th percentile with the value of 95th percentile and 5th percentile respectively. *Winsorized Market-adjusted Underpricing* is *Market-adjusted Underpricing* being winsorized at 5% level.

Table 11 presents the regression results on the *Winsorized Market-adjusted Underpricing*. *Founder Ownership* still positively contributes to underpricing and its coefficients are statistically significant in all four models. In column (1) to (3), the coefficients of *Founder Ownership* are significant at the 1%

level ($p < 0.01$). In column (4), its coefficient is significant at the 5% level ($p < 0.05$). In column (5), its coefficient is significant at the 10% level ($p < 0.1$). Compared to the coefficients in Table 9, *Founder Ownership* is more significant. The other two independent variables, *Founder CEO* and *Founder Experience*, are not statistically significant in any of the four models. Control variables such as *Trading Volume*, *Firm Age* and *Issue Size* become significant at the 5% level ($p < 0.05$) compared to their significance at the 10% level in the previous models. It also worth noting that the R^2 of all four models are improved to some extent. Overall, extreme values affect our estimation but are not serious. The regression results do not change dramatically after winsorization.

Table 11: OLS Regression Analysis of Founder Variables on Winsorized Market-adjusted Underpricing

<i>Variables</i>	(1)	(2)	(3)	(4)	(5)
Founder Ownership	0.181*** (0.061)	0.186*** (0.061)	0.181*** (0.061)	0.372** (0.187)	0.356* (0.186)
Founder CEO	0.017 (0.027)	-0.470 (0.325)	0.019 (0.039)	0.015 (0.027)	0.015 (0.027)
Founder Experiences	0.019 (0.030)	0.021 (0.030)	0.019 (0.030)	0.018 (0.030)	0.025 (0.028)
Market Volatility	-0.944 (3.023)	-1.538 (3.092)	-0.934 (3.004)	-1.295 (3.041)	
Trading Volume	1.360*** (0.323)	1.331*** (0.322)	1.359*** (0.328)	1.307*** (0.326)	1.330*** (0.327)
Firm Age	0.005*** (0.002)	0.005*** (0.002)	0.005*** (0.002)	0.005*** (0.002)	0.005*** (0.001)
Time to Listing	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)
IB Market Share	0.022 (0.318)	-0.008 (0.318)	0.023 (0.318)	0.035 (0.319)	
Issue Size	-0.035*** (0.012)	-0.052*** (0.015)	-0.035*** (0.012)	-0.034*** (0.012)	-0.039*** (0.011)
Risk Factors	-0.001 (0.003)	-0.001 (0.003)	-0.001 (0.003)	-0.002 (0.003)	
High Tech	-0.037 (0.037)	-0.040 (0.038)	-0.037 (0.037)	-0.036 (0.037)	
Board Independence	-0.053 (0.068)	-0.059 (0.068)	-0.053 (0.069)	-0.051 (0.068)	
Founder CEO \times Issue Size		0.029 (0.019)			
Founder CEO \times Firm Age			-0.000 (0.003)		
Founder Ownership ²				-0.256 (0.234)	-0.242 (0.238)
Constant	0.697*** (0.185)	0.993*** (0.255)	0.696*** (0.184)	0.673*** (0.188)	0.686*** (0.184)
Observations	253	253	253	253	253
R^2	0.250	0.258	0.251	0.254	0.248
F-statistic	8.927	8.579	8.288	8.403	13.39

This table reports the same models as Table 9. The dependent variable is *Winsorized Market-adjusted Underpricing* at 5%. Robust standard errors in parentheses, and *, **, *** indicate statistical significance at 10%, 5% and 1% level, respectively. All variables have the same definitions outlined in Table 22 of Appendix B. *Founder Ownership*² is the squared *Founder Ownership*. *Founder CEO \times Issue Size* is an interaction term equal to *Founder CEO* times *Issue Size* (measured as natural logarithm of IPO gross proceeds). *Founder CEO \times Firm Age* is an interaction term equal to *Founder CEO* times *Firm Age*.

5.4.4 Non-linearity Problem and Logarithm Regression for IPO Underpricing

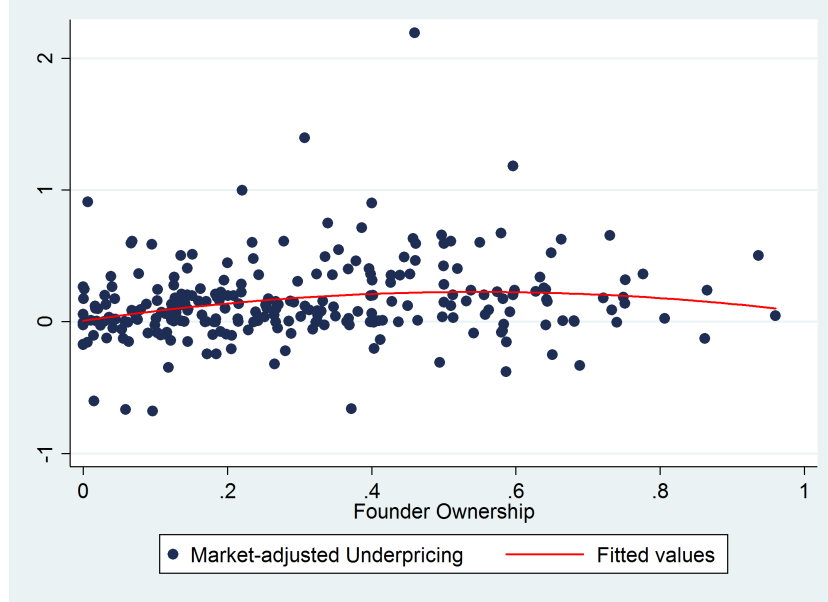
The evidence of non-linearity between founder ownership and IPO underpricing was highlighted earlier. In addition, Craswell et al. (1997) suggest a possible non-linear relationship between corporate insider ownership and corporate performance in Australia. The non-linearities may also exist in the relationship between founder ownership and IPO underpricing, as underpricing is the short term performance.

Figure 5 shows the best fit line between *Founder Ownership* and *Market-adjusted Underpricing*. The corresponding fitted equation is as follows:

$$R'_{i,0} = 0.007 + 0.800 \times \text{Founder Ownership} - 0.732 \times \text{Founder Ownership}^2 + 22.869 \quad (9)$$

Both *Founder Ownership* (t -statistic = 2.94 and $p < 0.01$) and *Founder Ownership*² (t -statistic = -2.11 and $p < 0.05$) have significant coefficients. According to these test statistics, we conclude that our quadratic fitting is significant and their relationship is not linear. The level of IPO underpricing is increasing at a diminishing rate with respect to *Founder Ownership*. When founders hold more than 54% (the inflection point in Equation 9), IPO underpricing starts to decrease. The curve of their relationship is a hump-shape, in contrast to Bruton et al. (2009), who found a U-shape curvilinear relationship.

Figure 5: The Relationship between Founder Ownership and Market-adjusted Underpricing



This graph shows the quadratic fitting between *Market-adjusted Underpricing* and *Founder Ownership*. The horizontal axis represents the percentage of founder ownership and the vertical axis represents the underpricing. The fitted value curve is the best fitted line for the relationship between the two variables.

To solve the non-linearity issue in our model, we apply the linear regression with logarithm transformed dependent variable. The dependent variable *Market-adjusted Underpricing* is logarithm transformed as the natural logarithm of *Market-adjusted Underpricing* plus one.

Table 12 presents the regression results of logarithm transformed *Market-adjusted Underpricing* on founder variables. Firstly, *Founder Ownership* is positively associated with IPO underpricing in all five models ($p < 0.01$ for the model in column (2), $p < 0.05$ for models in column (1) and (3), $p < 0.1$ for models in column (4) and (5)). It confirms the positive relationship between *Founder Ownership* and *Market-adjusted Underpricing*, and shows their rela-

Table 12: Regression Analysis of Founder Variables on Logarithm Transformed Market-adjusted Underpricing

<i>Variables</i>	(1)	(2)	(3)	(4)	(5)
Founder Ownership	0.172** (0.067)	0.177*** (0.067)	0.172** (0.067)	0.364* (0.194)	0.371* (0.206)
Founder CEO	0.048 (0.034)	-0.422 (0.318)	0.052 (0.052)	0.046 (0.034)	0.047 (0.034)
Founder Experiences	0.006 (0.033)	0.008 (0.033)	0.006 (0.033)	0.004 (0.033)	0.009 (0.031)
Market Volatility	-2.710 (3.854)	-3.282 (3.927)	-2.679 (3.853)	-3.061 (3.894)	
Trading Volume	1.327*** (0.394)	1.298*** (0.389)	1.323*** (0.402)	1.273*** (0.397)	1.297*** (0.402)
Firm Age	0.005*** (0.002)	0.005*** (0.002)	0.005** (0.002)	0.005*** (0.002)	0.005*** (0.002)
Time to Listing	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)
IB Market Share	-0.134 (0.435)	-0.163 (0.436)	-0.131 (0.433)	-0.121 (0.431)	
Issue Size (Log)	-0.040*** (0.013)	-0.057*** (0.016)	-0.040*** (0.013)	-0.040*** (0.013)	-0.043*** (0.011)
Risk Factors	0.001 (0.004)	0.001 (0.004)	0.001 (0.004)	0.001 (0.004)	
High Tech	-0.025 (0.056)	-0.028 (0.056)	-0.025 (0.056)	-0.024 (0.056)	
Board Independence	-0.090 (0.087)	-0.095 (0.087)	-0.090 (0.087)	-0.088 (0.087)	
Founder CEO \times Issue Size		0.028 (0.019)			
Founder CEO \times Firm Age			-0.000 (0.003)		
Founder Ownership ²				-0.257 (0.236)	-0.257 (0.245)
Constant	0.801*** (0.198)	1.086*** (0.250)	0.798*** (0.197)	0.776*** (0.203)	0.773*** (0.196)
Observations	253	253	253	253	253
R^2	0.281	0.286	0.281	0.284	0.277
F-statistic	5.324	4.981	4.920	5.047	8.024

This table reports the same models as Table 9. The dependent variable is *Logarithm Transformed Market-adjusted Underpricing*. Robust standard errors in parentheses, and ***, **, * indicate statistical significance at 10%, 5% and 1% level, respectively. All variables have the same definitions outlined in Table 22 of Appendix B. *Founder Ownership*² is the squared *Founder Ownership*. *Founder CEO* \times *Issue Size* is an interaction term equal to *Founder CEO* times *Issue Size*. *Founder CEO* \times *Firm Age* is an interaction term equal to *Founder CEO* times *Firm Age*.

tionship is robust. Secondly, the two independent variables of *Founder CEO* and *Founder Experience* are not statistically significant in any tested models. Furthermore, control variables including *Trading Volume*, *Firm Age*, *Time to Listing*, and *Issue Size* are also significant. The R^2 of all five models further improved to around 28%. Overall and based on our findings, we are confident about the positive relationship between *Founder Ownership* and *Market-adjusted Underpricing* in Australian IPOs.

5.4.5 Robustness Test

Dependent variables in previous regression analyses are the *Market-adjusted Underpricing*. It is obtained by adjusting underpricing following the method proposed by Alavi et al. (2008) as detailed in section 3.1. As discussed early, there is another adjustment method proposed by Cotter et al. (2005) and Lee et al. (1996) that underpricing is adjusted by the accumulative market returns between the day of prospectus registration and the day of listing. It is the *Accmu-adjusted Underpricing* in this study. In order to examine the robustness of our model, we conduct regression analysis with the accumulative market returns adjusted underpricing (*Accmu-adjusted Underpricing*) as the dependent variable.

The data summary of underpricing variables in section 5.1 shows that the *Accmu-adjusted Underpricing* has some extreme values. Its minimum is -105.5% and maximum is 218%, they are very far from the mean value of 12.7%. To avoid the effect of extreme values, we winsorized the *Accmu-*

adjusted Underpricing at 5% level. We used the *Winsorized Accmu-adjusted Underpricing* as the dependent variable in regression analyses.

Table 13 presents the regression results of accumulative market returns adjusted underpricing on founder variables. Firstly, there is a significantly positive association between *Founder Ownership* and *Winsorized Accmu-adjusted Underpricing* ($p < 0.01$ for models from column (1) to (3), $p < 0.05$ for the model in column (5), $p < 0.1$ for the model in column (4)). Secondly, coefficients of the two independent variables of *Founder CEO* and *Founder Experience* remain insignificant in any tested models. Furthermore, control variables including *Trading Volume*, *Firm Age*, *Time to Listing*, and *Issue Size* are significant. The signs of their coefficients have not changed from previous regression models, whose dependent variables are the *Winsorized Market-adjusted Underpricing*. The regression results in this section provide evidence that our model is robust to different measures of underpricing. Overall, we are confident about the positive association between founder ownership and underpricing in Australian IPOs.

Table 13: OLS Regression Analysis of Founder Variables on Winsorized Accumulative Market Returns Adjusted Underpricing

<i>Variables</i>	(1)	(2)	(3)	(4)	(5)
Founder Ownership	0.176*** (0.063)	0.180*** (0.063)	0.177*** (0.062)	0.375* (0.193)	0.392** (0.192)
Founder CEO	0.023 (0.028)	-0.334 (0.320)	0.033 (0.040)	0.020 (0.027)	0.018 (0.028)
Founder Experiences	0.015 (0.030)	0.016 (0.030)	0.014 (0.031)	0.013 (0.030)	0.025 (0.028)
Market Volatility	3.641 (3.465)	3.207 (3.539)	3.720 (3.453)	3.277 (3.487)	
Trading Volume	1.437*** (0.328)	1.416*** (0.327)	1.428*** (0.335)	1.382*** (0.330)	1.309*** (0.333)
Firm Age	0.005*** (0.002)	0.005*** (0.002)	0.005*** (0.002)	0.005*** (0.002)	0.005*** (0.001)
Time to Listing	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)
IB Market Share	0.034 (0.330)	0.013 (0.330)	0.043 (0.331)	0.048 (0.333)	
Issue Size (Log)	-0.033*** (0.011)	-0.046*** (0.015)	-0.033*** (0.012)	-0.033*** (0.012)	-0.035*** (0.011)
Risk Factors	-0.001 (0.003)	-0.001 (0.003)	-0.001 (0.003)	-0.001 (0.003)	
High Tech	-0.037 (0.038)	-0.040 (0.038)	-0.037 (0.037)	-0.037 (0.037)	
Board Independence	-0.079 (0.070)	-0.083 (0.070)	-0.078 (0.070)	-0.077 (0.070)	
Founder CEO \times Issue Size		0.022 (0.019)			
Founder CEO \times Firm Age			-0.001 (0.003)		
Founder Ownership ²				-0.266 (0.248)	-0.295 (0.253)
Constant	0.646*** (0.184)	0.863*** (0.252)	0.639*** (0.183)	0.621*** (0.187)	0.625*** (0.183)
Observations	253	253	253	253	253
R²	0.274	0.278	0.274	0.278	0.268
F-statistic	9.433	8.888	8.915	8.989	13.99

This table reports the same models as Table 9. The dependent variable is *Winsorized Accum-adjusted Underpricing* at 5%. Robust standard errors in parentheses, and ***, **, * indicate statistical significance at 10%, 5% and 1% level, respectively. All variables have the same definitions outlined in Table 22 of Appendix B. *Founder Ownership*² is the squared *Founder Ownership*. *Founder CEO \times Issue Size* is an interaction term equal to *Founder CEO* times *Issue Size* (measured as natural logarithm of IPO gross proceeds). *Founder CEO \times Firm Age* is an interaction term equal to *Founder CEO* times *Firm Age*.

5.4.6 Subsample Analysis of IPO Underpricing on Founder Variables

In order to have a clearer picture of founder effects on IPO underpricing, we conduct a subsample test on our current data following a similar method by Alavi et al. (2008). The sub sample analysis enables us to get more insights on how founder variables affect IPO underpricing under different conditions. We divide our sample into several sub samples based on different criteria as follows.

Firstly, our sample period is between 2003 and 2013 covering the global financial crisis of 2008. According to Loughran and Ritter (2004), significant investment environment change could affect IPOs' underpricing. The investment environment during the financial crisis was different from normal periods. Investors may change their perceptions towards founder variables for an IPO firm. We test if founder variables play different roles in explaining IPO underpricing before and after the crisis period. Following the same definition of crisis period as Magee et al. (2014), we define IPO firms listed before 2008 as in the pre-crisis sample and those listed after 2008 inclusive as in the post-crisis sample.

Secondly, we want to understand if the effects of founders on IPO underpricing vary between young and old firms. Following a more recent study by Haltiwanger et al. (2013), we define an IPO firm of less than 10 years as a young IPO firm and one greater than or equal to 10 years as an old IPO firm.

The last subsample analysis is to examine whether founder effects vary according to issue size. We rank IPO firms into ten equal groups based on their *Issue Size*. We then define an IPO firm has a large issue if it is greater than or equal to the 5th decile of issue size. Otherwise, an IPO firm is categorised into the small issue group.

We examined if founder variables are significantly different between subsamples. We applied the Kruskal-Wallis test to check the difference in *Founder Ownership* and the Wilcoxon rank-sum test to check the difference in *Founder CEO* and *Founder Experience*. Firstly, *Founder Ownership* is significantly different between subsamples by firm age ($\chi^2 = 4.835$ and $p < 0.05$). Secondly, *Founder CEO* is significantly different between subsamples by firm age ($z = 2.582$ and $p < 0.01$) and issue size ($z = 2.049$ and $p < 0.05$). At last, *Founder Experience* is significantly different between subsamples by firm age ($z = 4.463$ and $p < 0.01$) and issue size ($z = -1.696$ and $p < 0.1$).

Table 14 provides the regression results of listing time, trading volume and firm age subsamples. It clearly shows that founder effects do change under different environments.

In the pre-2008 subsample, founder variables are not significant while *High Tech* becomes significant ($p < 0.05$) in this period. In the post-2008 period, both *Founder Ownership* ($p < 0.05$) and *Founder CEO* ($p < 0.01$) are statistically significant. They positively contribute to logarithm transformed

Table 14: Subsample Regression Analysis of Founder Variables on IPO Underpricing

<i>Variables</i>	<i>Subsamples</i>			
	Listing Time		Firm Age	
	<i>Pre-2008</i> (1)	<i>Post-2008</i> (2)	<i>Old Firm</i> (3)	<i>Young Firm</i> (4)
Founder Ownership	0.161 (0.235)	0.639** (0.320)	0.269 (0.315)	0.350 (0.259)
Founder CEO	-0.013 (0.035)	0.211*** (0.071)	0.082* (0.049)	0.029 (0.051)
Founder Experiences	0.004 (0.040)	-0.062 (0.062)	0.022 (0.046)	-0.016 (0.047)
Market Volatility	-1.013 (4.580)	-0.059 (7.504)	-9.194 (6.597)	-0.624 (4.613)
Trading Volume	1.509*** (0.398)	0.449 (0.603)	1.410*** (0.384)	1.216** (0.591)
Firm Age	0.004** (0.002)	0.006 (0.004)	0.006** (0.002)	0.005 (0.007)
Time to Listing	-0.002** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)	-0.003*** (0.001)
IB Market Share	0.366 (0.365)	-1.907*** (0.708)	-0.901 (0.859)	0.187 (0.422)
Issue Size (Log)	-0.029* (0.015)	-0.043* (0.024)	-0.055*** (0.018)	-0.026 (0.020)
Risk Factors	-0.004 (0.003)	0.006 (0.007)	-0.001 (0.003)	0.002 (0.006)
High Tech	-0.082** (0.035)	0.050 (0.117)	-0.056 (0.045)	-0.009 (0.088)
Board Independence	-0.079 (0.087)	-0.056 (0.173)	0.003 (0.110)	-0.133 (0.124)
Founder Ownership ²	-0.038 (0.284)	-0.837** (0.372)	-0.185 (0.370)	-0.204 (0.329)
Constant	0.664*** (0.243)	0.679 (0.424)	1.063*** (0.309)	0.549* (0.306)
Observations	176	77	101	152
R²	0.209	0.481	0.358	0.260
F-statistic	3.925	3.349	4.114	2.393

The dependent variable is logarithm transformed *Market-adjusted Underpricing*. Robust standard errors in parentheses, and *, **, *** indicate statistical significance at 10%, 5% and 1% level, respectively. All variables have the same definitions outlined in Table 22 of Appendix B. *Founder Ownership*² is the squared *Founder Ownership*. The *Pre-2008* sample includes all IPO firms listed before 2008. The *Post-2008* sample includes all IPO firms listed after 2008. The *Old Firms* sample includes all IPO firms aged 10 years or over. The *Young Firms* sample includes all IPO firms aged less than 10 years.

Market-adjusted Underpricing. It also worth noting that *Founder Ownership*² is statistically significant ($p < 0.05$) in the post-2008 period. The coefficient of *Founder Ownership*² is negative, indicating IPO underpricing increases at a diminishing rate with respect to *Founder Ownership*. This post-2008 subsample is consistent with our early estimation of a reverse-U shape relationship between *Founder Ownership* and *Market-adjusted Underpricing*. The subsample analysis of listing time uncovered the change of significance in the two founder variables of *Founder Ownership* and *Founder CEO*. According to Hoffmann et al. (2013), investors' perception is time-varying and they change their perception after crisis. Based on the empirical results, it could see that investors change their perception towards *Founder Ownership* and *Founder CEO* after the financial crisis of 2008.

None of the three independent founder variables are statistically significant in young firms (firm age less than 10 years). For old firms (firm age greater than or equal to 10 years), only *Founder CEO* is significantly associated with logarithm transformed *Market-adjusted Underpricing* ($p < 0.1$).

Table 15 presents the regression results after taking issue size effect into account. With the application of size decile dummies in the regression, we found that the effects of *Founder CEO* come into play for underpricing after controlling for size decile dummies. The coefficient of *Founder CEO* is statistically significant ($p < 0.1$) in column (1). In the subsample analysis, we found that *Founder Ownership* ($p < 0.01$) and *Founder Ownership*² ($p < 0.01$) are highly significant in large issues. This is evidence that the hump-shaped

relationship between *Founder Ownership* and underpricing is more significant in large IPO issues. However, none of the three founder variables are statistically significant in small issues. Furthermore, *Risk Factors* becomes significant ($p < 0.1$) in small issues and *Board Independence* becomes significant at 10% level ($p < 0.1$) in large issues.

Based on Ling et al. (2007), firm age and firm size may moderate the influence of founder CEO on firm. Our subsample analysis found that the significance of founder CEO effects on underpricing changes from young firm to old firm. By using issue size as a proxy for firm size, Therefore, our finding may support the argument by Ling et al. (2007). However, it must note that founder variables are significantly different between subsamples by firm age and issue size.

Overall, the effects of founders on IPO underpricing may change under different circumstances such as the period of listing, firm age and issue size.

Table 15: Regression Analysis of Founder Variables on IPO Underpricing with Issue Size Effects

<i>Variables</i>	<i>Full Sample</i>	<i>Issue Size</i>	
		<i>Small Issue</i>	<i>Large Issue</i>
	(1)	(2)	(3)
Founder Ownership	0.298 (0.207)	-0.041 (0.353)	0.829*** (0.261)
Founder CEO	0.059* (0.033)	0.053 (0.058)	0.065 (0.040)
Founder Experiences	0.007 (0.034)	0.025 (0.052)	0.009 (0.041)
Market Volatility	-3.251 (3.829)	-6.291 (6.672)	2.176 (4.340)
Trading Volume	1.348*** (0.388)	1.120 (1.059)	1.453*** (0.331)
Firm Age	0.005*** (0.002)	0.006** (0.003)	0.004** (0.002)
Time to Listing	-0.003*** (0.001)	-0.003*** (0.001)	-0.003** (0.001)
IB Market Share	-0.177 (0.424)	0.155 (0.507)	-0.054 (0.559)
Issue Size	-0.017 (0.046)	0.053 (0.050)	-0.060*** (0.015)
Risk Factors	0.000 (0.004)	-0.009* (0.005)	0.006 (0.005)
High Tech	-0.031 (0.058)	-0.089 (0.083)	0.032 (0.069)
Board Independence	-0.103 (0.091)	0.039 (0.105)	-0.216* (0.124)
Founder Ownership ²	-0.193 (0.256)	0.325 (0.388)	-1.073*** (0.342)
Constant	0.413 (0.666)	-0.535 (0.753)	1.018*** (0.271)
Observations	253	102	151
R^2	0.296	0.403	0.316
Size Decile Dummy	YES	NO	NO
F-statistic	2.739	2.928	4.072

The dependent variable is logarithm transformed *Market-adjusted Underpricing*. Robust standard errors in parentheses, and *, **, *** indicate statistical significance at 10%, 5% and 1% level, respectively. All variables have the same definitions outlined in Table 22 of Appendix B. *Founder Ownership*² is the squared *Founder Ownership*. IPO firms are ranked into 10 equal groups with respect to their issue size. IPOs in the *Small Issue* groups have a size decile less than 5. IPOs in the *Large Issue* groups have a size decile greater than or equal to 5.

5.4.7 Endogeneity Issues in Underpricing Model

In the area of empirical corporate finance, it is important address the problem of endogeneity, which arises from omitted variables, simultaneity and measurement error (Roberts et al. 2013). Our model may also face the problem of endogeneity. According to Jain and Tabak (2008), the appointment of a founder CEO in IPO firms is influenced by the number of founders, board composition, firm size, firm age, risk factors and many other considerations. Our model does not incorporate all these variables as control variables, for instance, we dropped firm size in our model and firm size is hence captured in the error term. As a result, the error term of our model may correlate with the independent variable *Founder CEO*, violating the assumption of ordinary least squares of no correlation between explanatory variables and error terms. This issue could lead to bias in our estimation making it inconsistent and inaccurate.

To test if endogeneity of *Founder CEO* causes serious problems in our model, we apply the Durbin-Wu-Hausman test proposed by Davidson and MacKinnon (1993). According to this method, we firstly run a regression with *Founder CEO* as the dependent variable and *Founder Ownership*, *Firm Age*, *Risk Factors*, *High Tech*, *Board Independence*, *Firm Size* and *Number of Founders* as the independent variables. After the first regression, we run a second regression with the dependent variable as the logarithm *Market-adjusted Underpricing*. We apply the basic model to run the regression but add the residual from our first regression as an explanatory variable.

Table 16 reports the results of our test. *Founder CEO Residuals* is not statistically significant in the underpricing model. We also conduct a formal test to examine its significance. It is an F -test with a null hypothesis that a variable is not significant. It gives an F -statistic of 0.02 ($p = 0.896$) implying *Founder CEO Residuals* is not significant at the 10% level. According to the Durbin-Wu-Hausman test, we conclude that the endogeneity problem of *Founder CEO* does not trigger bias in our model and our estimation is consistent.

Table 16: Durbin-Wu-Hausman Test for Endogeneity of Founder CEO in IPO Underpricing Model

<i>Variables</i>	Dependent Variable	
	<i>Founder CEO</i> (1)	<i>Market-adjusted Underpricing (Log)</i> (2)
Founder Ownership	0.302** (0.137)	0.118 (0.419)
Founder CEO		0.223 (1.334)
Founder Experience		0.005 (0.033)
Market Volatility		-2.743 (3.825)
Trading Volume		1.321*** (0.359)
Firm Age	-0.015*** (0.003)	0.007 (0.020)
Time to Listing		-0.003*** (0.000)
IB Market Share		-0.135 (0.376)
Issue Size (Log)		-0.034 (0.046)
Risk Factors	-0.003 (0.006)	0.001 (0.005)
High Tech	0.080 (0.088)	-0.039 (0.112)
Board Independence	0.000 (0.153)	-0.087 (0.078)
Founder CEO Residuals		-0.175 (1.336)
Firm Size (Log)	-0.563 (0.394)	
Number of Founders	0.011 (0.030)	
Constant	2.277** (1.063)	0.579 (1.703)
Observations	253	253
R^2	0.127	0.281
Adjusted R^2	0.103	0.242
F-statistics	5.112	7.199

Standard errors in parentheses and and ***,** indicate statistical significance at 10%, 5% and 1% level, respectively. *Firm Size* is the natural logarithm of a firm's total assets after IPO. *Number of Founders* refers to the number of founders in one IPO firm. *Founder CEO Residuals* is the residual term of the regression model in column (1). The dependent variable of the model in column (1) is *Founder CEO* and the dependent variable of the model in column (2) is logarithm *Market-adjusted Underpricing*.

5.4.8 Founders and IPO Long Term Performance

We present the regression analysis of IPO long term performance and founder variables in this section. Two important studies addressed IPO long term performance in Australia. A study by Lee et al. (1996) provided evidence of a curvilinear association between IPO underpricing and long term performance. Additionally, Craswell et al. (1997) argued for a quadratic relationship between ownership structure and firm performance. Based on these studies, we run a curvilinear regression instead of a linear regression for IPO long term performance.

The industry effects also require attention in the IPO long term performance model. As discussed in early sections, IPO firm performance may vary significantly in different industries. The evidence from Ritter (1991) shows the mean IPO performance in the long term varies across industries in the US. Our summary statistics of the IPO long term performance in Section 5.1 indicate that the long term performance of Australian IPOs varies significantly across industries. Due to the long term performance of IPOs is industry-varying, we control for the industry fixed effects following the method by Craswell et al. (1997). This allows us to disentangle the founder effects on IPO firms' long term performance without distortions from industry sectors.

Table 17 provides the results of founder effects on IPO long term performance after controlling industry fixed effects. *Founder CEO* is somewhat

negatively associated with IPOs' long term performance, but neither *Founder Ownership* nor *Founder Experience* is statistically significant in any models.

In column (1) of Table 17, only independent variables and industry effects are considered in the model. It shows a significant negative association between *Founder CEO* and *One-year BHAR* ($p < 0.01$). With the inclusion of control variables, the coefficient of *Founder CEO* also becomes statistically significant ($p < 0.1$) as shown in column (2). The negative coefficient of *Founder CEO* ($p < 0.05$) is statistically significant in the model of column (3), indicating its negative association with *Two-year BHAR*. The coefficient of this variable becomes insignificant after incorporating control variables in column (4).

Furthermore, due to returns of delisted firms are treated, they may cause some inaccuracies in our estimation. We run a regression excluding these firms. The results in column (5) and (6) clearly indicate that there is a significantly negative association between *Founder CEO* and the long term performance of Australian IPOs in one and two years' time ($p < 0.1$ for both cases) excluding delisted firms.

For control variables, they are all significant in one-year's time for IPO firm performance. Only *Underpricing* has a significant association with *Two-year BHAR*. Our results also confirmed the curvilinear relationship between underpricing and firm performance after one year.

In summary, we do not detect any curvilinear relationship between *Founder Ownership* and IPO performance in the long term. The negative relationship between *Founder CEO* and IPO firm performance suggests that *Founder CEO* destroys IPO firms' value in the long term. On average, IPO firms led by a founder CEO produce 11.5% less buy-and-hold abnormal returns after one year and 22.5% less buy-and-hold abnormal returns after two years.

Table 17: Curvilinear Regression Analysis of Founder Variables on IPO Long Term Performance

Variables	Dependent Variables				Excluded Delisting Firms	
	<i>One-year</i>	<i>One-year</i>	<i>Two-year</i>	<i>Two-year</i>	<i>One-year</i>	<i>Two-year</i>
	<i>BHAR</i>	<i>BHAR</i>	<i>BHAR</i>	<i>BHAR</i>	<i>BHAR</i>	<i>BHAR</i>
	(1)	(2)	(3)	(4)	(5)	(6)
Founder CEO	-0.165*** (0.046)	-0.117* (0.054)	-0.263** (0.095)	-0.211 (0.117)	-0.115* (0.055)	-0.225* (0.117)
Founder Experience	-0.010 (0.137)	0.054 (0.145)	0.080 (0.212)	0.146 (0.250)	0.058 (0.146)	0.158 (0.245)
Founder Ownership	0.613 (0.928)	0.368 (0.964)	0.603 (1.194)	0.343 (1.106)	0.336 (0.987)	0.270 (1.141)
Founder Ownership ²	-0.415 (1.030)	-0.238 (1.104)	-0.059 (1.695)	0.132 (1.689)	-0.195 (1.133)	0.253 (1.734)
Firm Size (Log)		-0.063* (0.031)		-0.057 (0.063)	-0.061* (0.033)	-0.055 (0.065)
Firm Age (Log)		0.091** (0.034)		0.099 (0.069)	0.088** (0.034)	0.085 (0.071)
Underpricing		0.413*** (0.112)		0.367* (0.174)	0.438** (0.135)	0.432* (0.196)
Underpricing ²		-0.199* (0.100)		-0.124 (0.119)	-0.214* (0.110)	-0.160 (0.107)
Consumer Staples	-0.193*** (0.019)	-0.214*** (0.031)	-0.182*** (0.031)	-0.194** (0.061)	-0.211*** (0.030)	-0.184** (0.059)
Energy	0.718*** (0.073)	0.773*** (0.073)	0.303** (0.095)	0.360** (0.125)	0.780*** (0.074)	0.386** (0.126)
Financials	-0.047** (0.018)	-0.100*** (0.025)	-0.116*** (0.026)	-0.165*** (0.047)	-0.099*** (0.021)	-0.122** (0.045)
Health Care	-0.236*** (0.032)	-0.236*** (0.031)	-0.362*** (0.034)	-0.361*** (0.031)	-0.245*** (0.032)	-0.364*** (0.032)
Industrials	0.220*** (0.018)	0.152*** (0.029)	0.336*** (0.024)	0.267*** (0.029)	0.154*** (0.032)	0.286*** (0.030)
Information Technology	-0.109** (0.037)	-0.082 (0.045)	-0.160** (0.060)	-0.142* (0.076)	-0.086 (0.054)	-0.137 (0.082)
Materials	0.485*** (0.019)	0.457*** (0.057)	0.726*** (0.019)	0.703*** (0.064)	0.468*** (0.059)	0.738*** (0.068)
Telecommunication Services	0.621*** (0.022)	0.601*** (0.037)	0.778*** (0.023)	0.767*** (0.031)	0.603*** (0.036)	0.780*** (0.029)
Utilities	-0.339*** (0.052)	-0.117 (0.083)	-0.284** (0.115)	-0.070 (0.130)	-0.110 (0.091)	-0.058 (0.139)
Constant	-0.123 (0.209)	0.748 (0.436)	-0.196 (0.259)	0.554 (0.833)	0.707 (0.458)	0.523 (0.876)
Observations	252	252	252	252	246	246
R ²	0.120	0.162	0.100	0.118	0.161	0.120
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

This table reports the model of $BHAR_i = \alpha + \beta_1 \text{Founder Ownership} + \beta_2 \text{Founder CEO} + \beta_3 \text{Founder Experience} + \beta^T \text{Control Variables}_i + \epsilon_i$. Robust standard errors in parentheses, and *, **, *** indicate statistical significance at 10%, 5% and 1% level, respectively. All variables have the same definitions outlined in Table 23 of Appendix B. In column (5) and (6), six firms are excluded as they have been delisted within two years after IPO. *Founder Ownership*² is the squared *Founder Ownership*. *Firm Size* is the natural logarithm of an IPO firm's total assets post-IPO. *Firm Age* is the natural logarithm of an IPO firm's age plus one. *Underpricing* is the market-adjusted underpricing of one IPO firm. *Underpricing*² is the squared *Underpricing*.

5.4.9 Additional Test for the Founder Effects on IPO Long Term Performance

In this section, we run some additional tests to investigate the effects of founders on IPO long term performance according to founders' experience. Firstly, we group firms into subsamples based on their founders' experience. One subsample is the experienced founders group and the other subsample is the inexperienced founders group. Then, we run a regression with *Founder CEO* and *Founder Ownership* on IPO long term performance.

Before the regression, we examined the difference in the two founder variables of *Founder Ownership* and *Founder CEO* between subsamples. Referring to Table 6, *Founder Ownership* is significantly different between subsamples by *Founder Experience*. We applied Wilcoxon rank-sum test to examine *Founder CEO* between subsamples and no statistically significant difference has been found ($z = -0.532$ and $p = 0.5950$).

Table 18 provides the results of subsample analysis. *Founder CEO* without experience is negatively associated with *One-year BHAR* ($p < 0.05$). The negative coefficient of *Founder CEO* is also significant in explaining *Two-year BHAR* ($p < 0.1$). *Founder Ownership* in the experienced founder group is positively associated with *Two-year BHAR* ($p < 0.1$). Our evidence shows that these relationships are weak due to the low values of R^2 of all models.

Table 18: Founder Exeprience Subsample Regression Analysis of Founder Effects on IPO Long Term Performance

Variables	Dependent Variable			
	One-year BHAR		Two-year BHAR	
	Founders with Expeirience	Founders without Expeirience	Founders with Expeirience	Founders without Expeirience
	(1)	(2)	(3)	(4)
Founder CEO	0.114 (0.137)	-0.300** (0.147)	0.074 (0.239)	-0.429* (0.235)
Founder Ownership	1.142 (0.919)	0.914 (0.969)	2.104* (1.253)	0.041 (1.516)
Founder Ownership ²	-0.989 (1.177)	-0.797 (1.188)	-1.694 (1.821)	0.554 (2.138)
Total Assets (Log)	-0.047 (0.048)	-0.080*** (0.030)	-0.017 (0.056)	-0.088* (0.046)
Firm Age (Log)	0.009 (0.011)	0.007 (0.006)	0.026 (0.019)	0.002 (0.009)
Underpricing	0.177 (0.307)	0.720*** (0.244)	0.370 (0.368)	0.468 (0.334)
Underpricing ²	-0.182 (0.140)	-0.380 (0.285)	-0.172 (0.150)	-0.444 (0.303)
Constant	0.342 (0.803)	1.200** (0.554)	-0.502 (0.943)	1.498* (0.844)
Observations	133	119	133	119
R²	0.045	0.170	0.064	0.097
F-statistic	2.103	4.311	1.414	2.417

Robust standard errors in parentheses, and *, **, *** indicate statistical significance at 10%, 5% and 1% level, respectively. The group of *Founders with Exeprience* are IPO firms with founder experience dummy equal to 1. The group of *Founders without Exeprience* are IPO firms with founder experience dummy equal to 0.

5.4.10 Endogeneity Issues in Long Term Performance Models

Similar to the underpricing model, we investigate endogeneity issues in our long term performance models. Adams et al. (2009) and Fahlenbrach (2009) suggest that founder CEO is an endogenous variable in the long term. In their studies, they applied some methods to solve the endogeneity of founder CEO in order to investigate the impact of founder CEO on firm performance. Both of them agree that founder CEO is related to the number of founders in the long term. As our model does not cover this variable, the independent variable *Founder CEO* may correlate with error terms violating the assumption of ordinary least squares estimation. To check if our ordinary least squares estimation is biased by the endogeneity of *Founder CEO*, we apply the Durbin-Wu-Hausman test discussed earlier.

Table 19 reports the results of the Durbin-Wu-Hausman test. The coefficients of *Founder CEO Residuals* are not significant in column (2) and (3). We further use formal tests to confirm the results. We adopt an *F*-test to check the significance of the residual variable in column (2) and (3). The test returns an *F*-statistic of 1.070 ($p = 0.301$) for the residual variable in the *One-year BHAR* model and an *F*-statistic of 1.170 ($p = 0.280$) for the residual variable in the *Two-year BHAR* model. Based on the Durbin-Wu-Hausman test statistics, we concluded that the endogeneity problem of *Founder CEO* does not trigger bias in our long term performance models and its estimation is consistent.

Table 19: Durbin-Wu-Hausman Test for Endogeneity of Founder CEO in IPO Long Term Performance Model

<i>Variables</i>	Dependent Variables		
	<i>Founder CEO</i> (1)	<i>One-year BHAR</i> (2)	<i>Two-year BHAR</i> (3)
Founder CEO		-3.453 (3.220)	-5.411 (4.804)
Founder Experience	-0.024 (0.066)	-0.006 (0.117)	0.052 (0.174)
Founder Ownership	0.258* (0.141)	1.340 (1.183)	1.859 (1.766)
Number of Founders	0.015 (0.031)		
Founder Ownership ²		-0.340 (0.906)	-0.027 (1.352)
Firm Size (Log)	-0.000 (0.020)	-0.063** (0.032)	-0.057 (0.047)
Firm Age (Log)	-0.120*** (0.033)	-0.316 (0.396)	-0.535 (0.590)
Underpricing		0.422* (0.226)	0.381 (0.338)
Underpricing ²		-0.203 (0.184)	-0.130 (0.275)
Founder CEO Residuals		3.338 (3.221)	5.204 (4.806)
Constant	0.839** (0.370)	3.594 (2.809)	4.990 (4.191)
Observations	252	252	252
R^2	0.099	0.165	0.123
Industry Fixed Effects	Yes	Yes	Yes
Adjusted R^2	0.0462	0.101	0.0548
F-statistic	1.869	2.566	1.808

Standard errors in parentheses and *,**,*** indicate statistical significance at 10%, 5% and 1% level, respectively. *Number of Founders* refers to the number of founders in one IPO firm. *Founder CEO Residuals* is the residual of regression model in column (1). The dependent variable in column (1) is the *Founder CEO*. The dependent variable in column (2) is the *One-year BHAR* and the dependent variable in column (3) is the *Two-year BHAR*.

5.4.11 Founder Ownership and Long Term Performance

Previous studies provided mixed results on the relationship between ownership structure and firm performance. In this section, we focus on the relationship between founder ownership and IPO long term performance. Our founder experience subsample analysis for long term performance indicates there is a marginally significant relationship between *Founder Ownership* and *Two-year BHAR*. We dig deeper to examine if there are any undetected relationships between *Founder Ownership* and IPO long performance, for instance, whether some levels of founder ownership are significantly associated with firm performance. When founders are the controlling shareholders in the firm, they have more power on the firm making those firms perform differently than others. Following the method used by Craswell et al. (1997), we run a piecewise regression to investigate their relationship. We categorise IPO firms into different groups according to the level of founder ownership.

The thresholds in the piecewise regression are consistent with our early classification in Section 5.3.3. We set four founder ownership intervals in this regression including less than 5%, between 5% and 20%, between 20% and 50%, and greater than or equal to 50%.

Table 20 provides the result of the piecewise regression over different levels of founder ownership. The coefficients of our three independent variables of *Founder Ownership*, *Founder CEO* and *Founder Experience* are not statistically significant in any one of the models. The only exception is the

significantly negative coefficient of *Founder Ownership* ($p < 0.1$) in column (1) of Panel (a). The marginal significance in a small sample size of 30 observations indicates the relationship is very weak. It may result from some randomness rather than an association between them. The finding of no significant association between *Founder Ownership* and firm long term performance is consistent with previous studies of Demsetz and Villalonga (2001) and Farrer and Ramsay (1998) that ownership structure has no predictive power on firm performance. As a result, we conclude that *Founder Ownership* is not significantly associated with firm performance in the long term.

Table 20: Piecewise Regression Analysis of IPO Long Term Performance in Different Founder Ownership Intervals

(a) One-year IPO Performance				
<i>Dependent Variable: One-year adjusted BHAR</i>				
	Founder Ownership Level			
	<5%	≥ 5% and <20%	≥ 20% and <50%	≥ 50%
	(1)	(2)	(3)	(4)
Founder CEO	-0.042 (0.224)	-0.079 (0.135)	-0.123 (0.224)	-0.049 (0.210)
Founder Experience	0.236 (0.236)	-0.049 (0.151)	-0.106 (0.194)	0.300 (0.274)
Founder Ownership	-9.259* (5.395)	0.890 (1.753)	0.351 (0.874)	-0.647 (0.905)
Firm Size (Log)	-0.034 (0.059)	-0.075 (0.045)	-0.116** (0.047)	0.112 (0.095)
Firm Age (Log)	0.314*** (0.092)	0.035 (0.075)	0.031 (0.100)	0.295*** (0.089)
Underpricing	0.841 (0.533)	0.302 (0.270)	0.157 (0.201)	0.267 (0.307)
Constant	-0.147 (1.033)	0.947 (0.800)	1.920** (0.892)	-2.264 (1.735)
Observations	30	75	94	53
R²	0.392	0.078	0.067	0.115
F-statistic	2.146	1.192	2.208	2.487

(b) Two-year IPO Performance				
<i>Dependent Variable: Two-year adjusted BHAR</i>				
	Founder Ownership Level			
	<5%	≥ 5% and <20%	≥ 20% and <50%	≥ 50%
Founder CEO	0.080 (0.334)	-0.291 (0.259)	-0.086 (0.367)	-0.223 (0.324)
Founder Experience	0.034 (0.298)	-0.149 (0.228)	0.066 (0.309)	0.538 (0.416)
Founder Ownership	-1.300 (7.537)	-0.470 (1.959)	0.097 (1.072)	1.089 (1.685)
Firm Size (Log)	-0.056 (0.120)	-0.024 (0.068)	-0.133* (0.069)	0.073 (0.130)
Firm Age (Log)	0.384** (0.141)	-0.031 (0.107)	0.101 (0.190)	0.287** (0.130)
Underpricing	-0.042 (0.428)	0.175 (0.378)	0.439 (0.283)	0.017 (0.332)
Constant	-0.208 (2.100)	0.503 (1.357)	1.997* (1.103)	-2.659 (2.433)
Observations	30	75	94	53
R²	0.225	0.037	0.053	0.088
F-statistic	1.371	0.421	1.479	1.565

Robust standard errors in parentheses, and *****, ***, **, and * indicate statistical significance at 10%, 5% and 1% level, respectively. Observations indicate the number of firms in that group. The <5% group includes all IPO firms with the founder ownership less than 5%. The ≥ 5% and <20% group includes all IPO firms with the founder ownership ranging from 5% (inclusive) to 20% (exclusive). The ≥ 20% and <50% group includes all IPO firms with the founder ownership ranging from 20% (inclusive) to 50% (exclusive). And the ≥ 50% group includes all IPO firms with the founder ownership greater than or equal to 50%.

6 Conclusion and Implications

6.1 Conclusion

Extending previous studies, this thesis examines founder effects on IPO firms' performance in Australia. By analysing the short term and long term performance of 253 industrial IPOs listed from 2003 to 2013, our study provides an insight on what variables define the founder effect and how founders could influence an IPO firm. Our results show that Australian IPOs are underpriced by 14.6% on average and their performance are inferior compared to industry benchmarks in the long term. We not only contribute to the literature with the Australian evidence but also provide evidence to support Bruton et al. (2010)'s argument that the results of agency problem may vary across countries.

Founders possess several distinctive attributes such as their close ties to the firm, access to superior information and high self-motivations (Adams et al. 2009, He 2008, Jayaraman et al. 2000). They may create value for an IPO firm due to their attributes. On the other hand, founders' psychological attachment may contribute to their bias and overoptimism, preventing them from making objective corporate decisions (Certo et al. 2001, Heaton 2002).

Founder ownership can explain IPO underpricing in both the UK and Australia, but in a different way. In the UK, Bruton et al. (2009) found a U-shape curvilinear relationship between founder ownership and IPO underpricing, which results from the two agency problems of adverse selection and

moral hazard. However, our study shows that the founder ownership and IPO underpricing have a hump-shaped non-linear relationship, in contrast to the finding in the UK. It clearly reveals that the impact of founder ownership on IPO underpricing is different in the two markets.

We found that the means of IPO underpricing significantly vary under different levels of founder ownership. For example, the average underpricing of IPO firms with founder ownership of less than 20% is 6.7%, while the average underpricing of IPO firms with founders holding 20% or more ownership is 20.2%. Founder ownership does send some signals to external investors in the stock market. Our regression analysis also shows the positive non-linear relationship between founder ownership and IPO underpricing is robust and significant after controlling for firm risk and market risk. Our quadratic model suggests that a 1% increase in founder ownership post-IPO induces a 0.498% increase in IPO underpricing. According to Grinblatt and Hwang (1989), the insiders' holding is a signal of a firm's quality to the market as it has a positive relationship with IPO underpricing. Therefore, the positive association between founder ownership and IPO underpricing in our study indicates the founder ownership is also a signal of a firm's quality to the market. An IPO firm will have greater underpricing with a higher level of founder ownership post-IPO.

However, the signalling theory fails to explain the quadratic relationship between founder ownership and IPO underpricing in a complete way, especially why underpricing starts to decrease with a high level of founder owner-

ship post-IPO. Clearly, the relationship between founder ownership and IPO underpricing in Australia do not follow the UK market.

We also explain the relationship according to the agency theory proposed by Jensen and Meckling (1976). Founders' interests are not fully aligned with external investors. Firstly, their supervision of IPO firms may not be in the best interest of external investor due to their own hidden agenda to control the company. The monitoring costs for external investors may not be effectively reduced and hence they seek compensation by underpricing IPO firms with a higher level of founder ownership further. Secondly, the problem of adverse selection may not be moderated with more founder shareholding if founders have an overoptimistic view about the firm value. Therefore, their ownership may not work to reduce information asymmetry. When founder ownership increases, these costs to investors also increase, which is the reason for the increasing relationship between founder ownership and IPO underpricing.

When founders hold a very high level of ownership, of more than 54% ownership in our study, they bear most of the residual risk of the firm. Their interests are more aligned with external investor to maximise firm value. Because founders have a concentrated ownership, there are fewer other shareholders in the firm. Founders can coordinate with different shareholders more efficient, which allows them to have lower coordination costs. The benefits of interest alignments and lower coordination costs outweigh other agency costs, and therefore reduce underpricing.

Our study does not provide evidence of a relationship between firm performance and founders ownership in long term. Our findings are consistent with Demsetz and Villalonga (2001), who argue ownership is a result of market forces and should have no predictive power for firm performance. Founder ownership is also a type of ownership, so it is still a result of several market forces. Hence, it has no relationship with firm performance in the long term.

Our results also imply that the presence of a founder CEO in an IPO firm only provides signals under some cases. Investors are more concerned about uncertainty when making investment decisions post 2008. Consistent with Certo et al. (2001), the ‘untested’ management by founders of an IPO firm induces higher uncertainty. As a result, investors discount an IPO firm with a founder CEO more after 2008. In the long term, the ‘untested’ management give rises to agency conflicts, difficulty of monitoring, overoptimism and lack of skills. All these factors contribute to value destruction of a firm. It is the reason for the poor performance of founder CEO IPO firms compared to firms with professional CEOs. In the long term, founder CEOs lead to 11.5% lower buy-and-hold abnormal returns after one year and 22.5% lower buy-and-hold returns after two years. Our finding contradict some American evidence of superior performance by founder CEO firms.

Inconsistent with Bruton et al. (2009) and Certo et al. (2001), we do not find that founder experience contributes to an IPO firm’s performance. Several reasons may lead to the insignificance of this variable in explaining

IPO performance in the short term and long term. The first reason may be that investors fail to price founder experience of an IPO firm in short term. Investors may not understand the value of founders' experience such as previous directorships and start-up experience and hence ignore this variable. The second reason may be attributed to the different methodology we apply to measure founder experience compared to previous studies of Bruton et al. (2009) and Filatotchev and Bishop (2002). These studies measure founder experience in a time weighted manner. The reporting requirements of Australian IPOs do not ask for founder experience to be disclosed in a chronological way, so we use a dummy variable for founder experience instead.

Based on these empirical findings, this thesis also shows that founder effects on IPO firms in a relatively small capital market such as Australia may possess different properties than in large markets such as the UK and US. It suggests that the future research on the founder effect in Australia should consider differences in institutional and market settings more carefully in their studies.

In summary, our results show that the founder is an important factor influencing IPO pricing. In the short term, low founder ownership may not sufficiently reduce agency costs, while concentrated founder ownership may benefit shareholders by lowering coordination costs. In the long term, founder CEOs reduce value for investors as they fail to become a professional manager for a publicly listed firm. Founder CEOs may not have or acquire the

necessary skills to meet the management requirements of a listed firm.

6.1.1 Implications for Founders and Investors

Our findings not only contribute to the current corporate finance literature, but also provide some practical implications for founders and investors.

For founders, they now know that their behaviour could also affect the pricing issue of their IPO firm. Firstly, they need to consider the first day wealth effects of their behaviour. For example, their decisions on cash out at IPO should also consider the loss shareholders may suffer on the first day. Secondly, they need to address the agency problems in their firm. Our findings suggest the high ownership by founders can reduce the loss of wealth on the first day as it reduces the agency costs. However, it may not be the case in the long term. Most importantly, founders have to think carefully about control versus wealth. Holding the CEO position in their firm could enhance their control, but they may suffer wealth loss in the long term. If they care about their wealth in the long term, they must consider a succession plan to hand their firm to a professional CEO as a part of the IPO. On the other hand, if the control of their firm is their primary goal, founders may need to consider acquiring professional management skills to manage a growing listed firm.

For investors, our findings support the suggestion by Howton (2006) that governance characteristics of a firm should be considered by investors when

making investment decisions. To avoid investing in a ‘lemon’ or low quality firm, investors could also use the founder characteristics of an IPO firm to assess its quality. For example, a firm’s insider holdings such as founder ownership are signals of its quality and a very high founder ownership may indicate lower agent costs in the short term. Furthermore, investors need to pay attention to those firms with a founder CEO. They must carefully assess the skills, capabilities and experience of founder CEOs to understand if they can maximise their wealth in the long term. Investors are also required to consider the differences across capital markets when making investment decisions. Our findings show an example of how the relationship between founder ownership and underpricing varies from one market to another. Therefore, investors need to be more careful if they apply foreign models in Australia.

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Appendix A Formula and Equations

1. Founders on IPO Underpricing Testable Model:

$$\begin{aligned} R'_{i,0} = & \alpha + \beta_1 \textit{Founder Ownership} + \beta_2 \textit{Founder CEO} \\ & + \beta_3 \textit{Founder Experience} + \beta^T \textbf{Control Variables}_i + \varepsilon_i \end{aligned} \quad (10)$$

Control variables are defined in Section 3.2.2 Control Variables and also listed in Appendix B Variable Definitions.

2. Founders on IPO Long Term Performance Testable Model:

$$\begin{aligned} BHAR_i = & \alpha + \beta_1 \textit{Founder Ownership} + \beta_2 \textit{Founder CEO} \\ & + \beta_3 \textit{Founder Experience} + \beta^T \textbf{Control Variables}_i + \epsilon_i \end{aligned} \quad (11)$$

Control Variable_i includes firm age, firm size and underpricing.

3. Investment Bank Market Share:

$$\textit{Market Share}_n = \frac{\sum IB_n}{\textit{Total IPO Proceeds}} \quad (12)$$

$\sum IB_n$ is the total IPO proceeds underwritten by one investment bank from 2003 to 2013. The *Total IPO Proceeds* is the total gross proceeds of all underwritten IPOs from 2003 to 2013. Then the *IB Market Share*

for each IPO is calculated as:

$$IB\ Market\ Share_i = \frac{\sum_1^N Market\ Share_n}{N} \quad (13)$$

Where, $Market\ Share_n$ is the market share for each investment bank in an IPO and N is the number of investment banks in the IPO.

Appendix B Variable Definitions

Table 22: IPO Underpricing Variable Definitions

Variable Name	Definition	Source
<i>Dependent Variable</i>		
<i>Market-adjusted Underpricing</i>	An IPO's first day return adjusted by the market index intra-day return on the same day	<i>DatAnalysis/IPO Prospectus</i>
<i>Independent Variable</i>		
<i>Founder Ownership</i>	The percentage of ownership held by all founders post-IPO	<i>IPO Prospectus</i>
<i>Founder CEO</i>	A dummy variable equals to 1 when one of the founders is the firm's CEO or managing director and equals to 0 otherwise	<i>IPO Prospectus</i>
<i>Founder Experience</i>	A dummy variable equals to 1 when one of founders have previous experience and equals to 0 otherwise	<i>IPO Prospectus</i>
<i>Control Variable</i>		
<i>Market Volatility</i>	The monthly standard deviation of ASX All Ordinary index daily returns in the immediate month before an IPO	<i>Capital IQ</i>
<i>Trading Volume</i>	An IPO's first day trading volume deflated by its number of shares on issue	<i>DatAnalysis</i>
<i>Firm Age</i>	The number of years since establishment	<i>IPO Prospectus</i>
<i>Time to Listing</i>	The number of days from prospectus registration to listing	<i>DatAnalysis/IPO Prospectus</i>
<i>IB Share Market</i>	The average market share of all lead managers in an IPO	<i>DatAnalysis/IPO Prospectus</i>
<i>Issue Size</i>	The natural logarithm of the gross proceeds of an IPO	<i>DatAnalysis</i>
<i>Risk Factors</i>	The number of specific risk factors of an IPO	<i>IPO Prospectus</i>
<i>High Tech</i>	A dummy variable equals to 1 when an IPO firm is classified as 'Information Technology' under GICS and equals to 0 otherwise	<i>DatAnalysis</i>
<i>Board Independence</i>	The percentage of independent members on a board	<i>IPO Prospectus</i>

Table 23: IPO Long Term Performance Variable Definitions

Variable Name	Definition	Source
<i>Dependent Variable</i>		
<i>One-year BHAR</i>	The compounded 252 daily returns adjusted by corresponding compounded S&P/ASX Sector index daily returns for the same period.	<i>DatAnalysis/Capital IQ</i>
<i>Two-year BHAR</i>	The compounded 504 daily returns adjusted by corresponding compounded S&P/ASX Sector index daily returns for the same period.	<i>DatAnalysis/Capital IQ</i>
<i>Independent Variable</i>		
<i>Founder Ownership</i>	The percentage of ownership held by all founders post-IPO	<i>IPO Prospectus</i>
<i>Founder CEO</i>	A dummy variable equals to 1 when one of the founders is the firm's CEO or managing director and equals to 0 otherwise	<i>IPO Prospectus</i>
<i>Founder Experience</i>	A dummy variable equals to 1 when one of the founders have previous experience and equals to 0 otherwise	<i>IPO Prospectus</i>
<i>Control Variable</i>		
<i>Firm Age</i>	The natural logarithm of number of years since establishment plus one	<i>IPO Prospectus</i>
<i>Firm Size</i>	The natural logarithm of a firm's total assets post-IPO	<i>DatAnalysis</i>
<i>Underpricing</i>	The market adjusted underpricing calculated in IPO underpricing model	<i>IPO Prospectus</i>