



Association between independent audit committee members' human-resource features and underpricing

Singapore IPOs

179

The case of Singapore IPOs from 1997-2006

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Abstract

Purpose – The primary objective of this paper is to examine the association between the seven human-resource features (spanning three major themes: qualifications and credentials; business and initial public offering (IPO) launch experience; and diversity) of independent audit committee members and the level of underpricing.

Design/methodology/approach – A sample of 410 Singapore IPOs listing on the stock exchange of Singapore from January 1, 1997 to December 31, 2006 was used.

Findings – Empirical results overall suggest no overwhelming association between the human-resource features of IPO audit committees and underpricing. Rather, the findings suggest only some specific human-resource features (e.g. presence of an independent audit committee member with accounting qualifications and credentials) are of significance. Others (e.g. gender diversity of independent audit committee members) have little or no association. Also, results do not suggest a major category of human-resource features (i.e. qualifications and credentials, business and IPO launch experience, or diversity) is associated with underpricing. Time also does not appear to affect the results.

Practical implications – As human-resource features tended to increase rather than lower an IPO's cost of capital, or had not influence at all, our findings generally do not support some policymakers' arguments for the introduction of mandated uniform audit committee structures. Rather, the results support flexibility to determine the properties of the audit committee.

Originality/value – This study is one of the first (particularly outside the USA) to investigate linkages between audit committee human-resource features and underpricing. Whilst acknowledging some caveats associated with this study, such as focusing on a single nation, this paper contributes relevant insights to the debate about audit committee effectiveness.

Keywords Audit committees, Pricing, Singapore

Paper type Research paper

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1. Background and motivation

A potentially unexpected byproduct of the financial scandals at the beginning of the twenty-first century is a renewed recognition of the crucial role auditing plays in maintaining the successful and efficient operations of the world's financial markets. At the same time, greater appreciation for the auditing function has increasing since "Enron" there has also been wider criticism that aspects of auditing not longer function proper and require fundamental reform (DeFond and Francis, 2005). Whilst natural to associate questions on the role of auditing directly with the auditor the function of the audit committee has also come in for heated debate. The enactment of the Sarbanes-Oxley Act in the USA, for example, required firms to compose their audit committees solely of independent directors whilst in many nations (such as those in Asia) new requirements were introduced obliging firms to establish mandatory audit committees. Researchers – such as Bradbury (1990) and Beasley and Salterio (2001) – argue audit committees play a pivotal role in increasing the credibility of the financial reporting process. The Securities Exchange Commission (SEC) (1999, p. 1) suggest:

[...] audit committees play a critical role in the financial reporting system by overseeing and monitoring management's and the independent auditor's participation in the financial reporting process. Audit committees can, and should, be the corporate participant best able to perform that oversight function.

Pincus *et al.* (1989) and Beasley and Salterio (2001), amongst others, suggest audit committees can meet directly with the external auditor. This interaction can to potentially improve the quality of information provided to independent board of director members as audit committee member development more detailed knowledge about the firm's financial reporting process. Consequently, the quality of financial and non-financial information supplied to external stakeholders will increase.

Scholars, corporate governance reformists and policy makers commonly argue audit committee effectiveness is a function of the sub-committee's structure (McMullen and Raghunandan, 1996; Carcello and Neal, 2000; Beasley and Salterio, 2001; Bedard *et al.*, 2004). There is a common expectation that independence plays a pivotal role in defining the effectiveness of the audit committee (Carcello and Neal, 2000; Beasley and Salterio, 2001; Bedard *et al.*, 2004). It is commonly suggested that as audit committee independence increases the credibility of the financial information disclosed to investors is greater as independent audit committee members have heightened incentive to effectively oversee the financial reporting process (Beasley, 1996; Klein, 1998). Empirical evidence supporting a positive independence – effectiveness, however, is somewhat mixed. Klein (2002), for example, finds a significant positive relationship between earnings management and audit committees with less than a majority of independent directors. No significant association is found, however, between earnings management and audit committees comprised solely of independent directors. Bedard *et al.* (2004), meanwhile, find an audit committee composed solely of non-executive directors is negatively associated with earnings management. Xie *et al.* (2003), however, find no significant relationship between the percentage of independent directors on the audit committee and earnings management. Other studies highlight the link between the audit committee member independence and fraudulent financial reporting or the informativeness/quality of earnings. For example, Abbott and Parker (2000) find companies with audit committees composed of independent directors are

less likely to be sanctioned by the Securities Exchange Commission for fraudulent or misleading financial reporting. Similarly, Beasley *et al.* (2000) find that fraud companies had less independent audit committees than no-fraud industry benchmarks.

Whilst not dismissing the significance of independence other factors may influence the operational effectiveness of the audit committee. We postulate one such group of factors is the human-resource properties of independent directors on the audit committee. Whereas the majority of prior research and debate concentrates on audit committee effectiveness (Klein, 2002; Xie *et al.*, 2003; Bedard *et al.*, 2004; Abbott *et al.*, 2004; Karamanou and Vafeas, 2005) audit committee features (such as the independence level or human-resource properties) may translate into other business practices and procedures to the benefit of firms and stakeholders. One area may be in reducing the cost of capital to issuers of an initial public offering (IPO). An appropriately structured audit committee comprising independent directors with noted human-resource properties at the time of listing could be interpreted as a signal to investors of an IPOs quality and the credibility of financial and non-financial information the IPO reports. If interpreted as such as signal this could lead to a reduction in the cost of capital to the issuer in the form of lower underpricing.

The primary objective of this study, therefore, is to analyze the association between a set of seven human-resource properties of independent directors on the audit committee of an IPO at the time of listing and the level of underpricing. The seven human-resource properties of the audit committee in respect to the independent directors are:

- (1) accounting qualifications and credentials;
- (2) legal qualifications and credentials;
- (3) presence of a independent director concurrently holding senior executive positions in other publicly listed firms;
- (4) prior IPO launch experience;
- (5) age differential;
- (6) gender diversity; and
- (7) ethnic diversity.

As an extension of primary objective we seek to determine if associations between the seven human-resources properties of the audit committee and underpricing shifted during a major transitional period in Singapore's corporate governance environment. Our analysis is based on a sample of 410 Singapore IPOs between January 1, 1997 and December 31, 2006. Major reforms to Singapore's corporate governance landscape – with implications for the structure of audit committees – were announced in March 2001 with effect from January 1, 2003.

The remainder of this paper is organized as follows. Section 2 addresses the link between corporate governance mechanisms, human-resource characteristics and IPOs utilizing a resource-dependency lens. Testable hypotheses to examine the main underlying proposition of this study are developed in Section 3. The research method is defined in Section 4 with results reported in Section 5. Discussion of the findings as per the testable hypotheses is provided in Section 6. Concluding remarks are the defined in Section 7.

2. Human-resource characteristics, corporate governance, and IPOs

The beginning of the twenty-first century is potholed with numerous accounting scandals worldwide, major global stock market adjustments and sweeping equity market security reforms. “Enron” has emerged as symbolic stand-out of this period (such as WorldCom, Parmalat, Tyco, HIH, Global Crossing, China Overseas Petroleum) that led regulators, market participants and the public globally to reassess and question the concept of corporate governance. A phrase associated with a broad spectrum of high-level corporate management issues three topics associated with corporate governance have received specific attention:

- (1) management of risk (i.e. system establishment for risk, oversight of risk and internal control);
- (2) leadership management (i.e. development of strategies, key investment decisions and management overview); and
- (3) board operations (i.e. composition, executive compensation, stakeholder management).

Much attention in focusing on these three topics has concentrated on the monitoring role the board of directors, and mechanisms that can to enhance a board’s monitoring effectiveness. Driving this attention is, in part, due to a renewed interest in and acceptance of the dominant paradigm underlying much of the corporate governance research. Whilst Hawley and Williams (1996) identify four corporate governance models the finance model has received the majority of attention[1].

The finance model that is based primarily on the tenants of agency theory assumes all corporate parties – including directors and executives – act in their own self-interests. The corporate governance system, therefore, is an additional control mechanism established to provide assurance shareholder wealth is not expropriated by self-interested parties (i.e. directors, executives and general management) for their personal consumption. Another major assumption behind the finance model of corporate governance is that elements of the corporate governance system are used as signals for the buying and selling of shares. Hence, one role of the corporate governance system is to ensure capital markets are well informed, thereby, enhancing efficiency and liquidity.

Mechanisms capable of enhancing the corporate governance system’s monitoring and control function can be internally or externally developed (Bushman and Smith, 2001; Farinha, 2003). A board of directors is frequently championed as a major internally derived mechanism central to the corporate governance system (Fama, 1980; Fama and Jensen, 1983). As the complexity of the business environment has evolved and become more dynamic boards of directors are increasingly delegating key responsibilities to specialized sub-committees (Blue Ribbon Committee, 1999; National Association Corporate Directors, 1999). The audit committee is one such sub-committee.

The vast majority of prior audit committee research has focused on independence as the pivotal feature of the sub-committee’s effectiveness. It is not the intension of our study to dispute the reputed importance of independence to the effectiveness of the audit committee. Rather, we argue the focus on independence alone could prompt a neglect of other features that could influence audit committee effectiveness or the cost of capital to a firm. It is our general conjecture human-resource features of an audit committee, particularly as it pertains to independent directors on this pivotal sub-committee, can influence operational effectiveness and investor perceptions.

A key responsibility of the board of directors and the audit committee is to ensure effective risk management combined with sound and effective internal control processes. There is a dearth of empirical research indicating a direct linkage between corporate governance and human-resource management, and risk management and human-resource management. Whilst there is a lack of formal research simultaneously linking all three practices there is a realization amongst some regulators and corporate governance reformists each are intertwined. Bies (2002) and Olsen (2002), for example, remarked there is a need to integrate risk management, corporate governance and human-resource management. Directors are responsible for ensuring firms adopt suitable risk management procedures whilst ensuring sound internal control processes are effectively maintained. Potter (2003) comments constructive human-resource management of the board of director and its respective sub-committees can enhance overall effectiveness. Similarly, Erven (2003, p. 2) remarked that “like risk, human resources are pervasive in the business.”

The vast majority of corporate governance research relies on agency theory. Resource dependency theory, however, provides an alternative theoretical framework to examine the influence of human-resource features in regard to audit committees. Resource dependence theory focuses on the following key issues:

- resources;
- flow or exchange of resources between organizations;
- dependencies and power differentials created from unequal resource exchange;
- constraining influences the organization’s dependence has on its action; and
- the efforts of organizational leaders to manage this resource dependence.

Resource dependence theorists argue a given organization will respond to and become dependent on those actors, organizations or entities in its environment that control resources that are both critical to its operations and over which it has limited control. Organizations are motivated to undertake such action so as to minimize their loss in power due to a reliance on others for resources. The objective is to maximize their power in acquiring power over resources they require and then having others reliant upon them.

A further tenant of resource dependence theorists is that to best meet the challenges of an uncertain environment the board of directors needs to be well balanced and structured. It is suggested that to better achieve stability and structure that will enhance a firm’s performance requires increased diversity amongst its members. Greater diversity amongst the members of a board of directors is said to lead to less insular decision-making processes and greater openness to change (Carter *et al.*, 2003). Furthermore, increased diversity means a wider range of experiences, skills and backgrounds are available to the board of directors strengthen its value. An organization is then in a better position to establish coalitions with a greater spectrum external and internal actors, entities and organizations from whom it can obtain the resources it requires for future success and survivability. Greater diversity amongst board of directors may be especially pertinent in the highly uncertain business environment. Resource dependence theorists would argue an organization that restructures it board of directors to encompass greater ethnic diversity is better placed to address its resource needs in an environment where a wider number of ethnic groups have gained power and influence.

Benefits to the firm of effective structuring of a key human-resource-based corporate governance mechanism such as the board of directors or the audit committee may not be limited to operational and organizational aspects. Rather, benefits may extend to key financial matters such as reducing the cost of capital in acquiring funding such as through an IPO. The IPO represents a significant development in a firm's life cycle moving the firm from the private arena squarely into the public eye. Access to funding via capital markets is becoming increasingly important to firms as the number seeking listing on exchanges worldwide have expanded rapidly during the past decade. An ability to access equity funding at the lowest cost of capital, therefore, is considered to be of critical importance. However, underpricing, a well documented IPO phenomenon traversing time and geographical location, is a major cost of capital to issuers associated with an IPO. It is reasonable to assume, therefore, it is important for issuers to reduce underpricing (and, thereby, their cost of capital) to minimize the amount of money they (the issuer) "leaves on the table."

Prior research suggests a firm's corporate governance structure and mechanisms influences underpricing. Daines and Klausner (2001), for example, analyzed the application of takeover provisions at the date of listing of 310 IPOs. They (Daines and Klausner, 2001) found more than two-thirds of their sample had anti-takeover provisions in place. Through an analysis of determinants of anti-takeover provisions Daines and Klausner (2001) concluded firms adopted anti-takeover provisions to entrench corporation than maximize value. This ultimately led to greater underpricing. Field and Karpoff (2002) find similar results to Daines and Klausner (2001). Smart and Zutter (2003), meanwhile, find that underpricing is higher for single-class IPOs relative to dual-class IPOs. Institutional ownership is found to be higher amongst dual-class IPOs that were also able to obtain higher price-sales multiples at the time of listing. As for board structure Baker and Gompers (2003) argue a board of directors' composition is the outcome of a bargaining game between management and investors. They (Baker and Gompers, 2003) suggest the presence of venture capitalists on the board acts as a sort of balance for CEO power. Venture capitalists have incentives to reduce the cost of capital (both to themselves and the firm) (Hellmann and Manju, 2002; Cornelli and Yosha, 2003); thus, underpricing is affected.

Theoretical explanations for underpricing typically rely upon the concept of asymmetrical information (Benveniste *et al.*, 2003; Schrand and Verrechia, 2004). At the time of listing the level of asymmetrical information between issuers (or insiders) and investors (or outsiders) is naturally high. It is argued that if issuers reduce the level of asymmetrical information at the time of listing the cost of capital to the issuer will be lowered. Various ideas have been postulated as viable avenues for reducing asymmetrical information. One group of ideas focuses on the concept of signaling whereby issuers can signal an IPO's higher quality by self-selecting devices and mechanisms that are too costly for low-quality IPOs to replicate (Jog and McConomy, 2003). Meanwhile, another stream of the IPO literature highlights the role disclosure of financial and non-financial information can play in reducing asymmetrical information. The quality and extent of disclosure is directly associated with information asymmetry as it decreases the amount of private information relative to public information. Disclosure quality and quantity is indirectly associated with information asymmetry reducing investor incentives to search for private information.

Audit committees play a pivotal role in determining and defining the credibility, quality and quantity of financial and non-financial information reported (Bradbury, 1990; Beasley and Salterio, 2001). Given the audit committee's influential role investors are likely to proactively question the sub-committee's quality and that of its members as a sign of the information being reported. Simply put, if the quality of the audit committee is called into question the credibility of financial and non-financial information will also be cast in doubt. Within an IPO setting this prompts more expansive underpricing. Presuming audit committee structure is viewed by investors as an effective tool for improving a firm's financial reporting process and the quality of information reported, investors may perceive the structure of an IPO's audit committee at listing as a signal of the IPO's quality. Consequently, this should reduce underpricing enabling the IPO to access equity funding at a lower cost of capital.

The IPO literature details a range of factors that may assist an IPO in distinguishing itself from others with the aim of reducing underpricing. It is our general postulation human-resource characteristics of an audit committee can be interpreted by investors as a sign of the sub-committee's quality, and, henceforth, the credibility and reliability of financial and non-financial information provided by an IPO. If this interpretation holds then underpricing is likely to be lower amongst IPOs with audit committee's comprised of human-resource characteristics deemed as influential in determining the sub-committee's effectiveness.

3. Hypothesis development

To formally test the linkage between human-resource characteristics of audit committees and underpricing, we three broad categories:

- (1) expertise of audit committee members;
- (2) audit committee members' experience; and
- (3) diversity of the audit committee.

Testable hypotheses are developed in the following sub-sections in respect to the three aforementioned categories.

3.1 *Expertise: legal and accounting qualifications and credentials*

Recent audit committee literature and debate highlights the importance of members' expertise to improving the sub-committee's effectiveness and quality (Kalbers, 1992a, 1992b; DeZoort, 1997, 1998; Beasley and Salterio, 2001). Prior studies indicate great variation in audit committee members' expertise with many lacking adequate experience and expertise in relevant oversight areas (Spangler and Braiotta, 1990; Kalbers, 1992a, 1992b; McMullen and Raghunandan, 1996). Empirical research also highlights the influence of audit committee members' expertise. Archambeault and DeZoort (2001), for example, found companies with suspicious auditor switches had fewer audit committee members with experience in accounting, auditing, or finance than their non-switching counterparts. Beasley and Salterio (2001), meanwhile, find Canadian boards that voluntarily increase audit committee members' collective financial reporting, and audit committee knowledge and experience is related to board size, proportion of outsiders on the board, and separation of board chair and CEO/president (Beasley and Salterio, 2001). Additionally, McMullen and Raghunandan (1996) found companies with financial reporting problems were less likely to have

CPAs on the audit committee. Based on this prior theoretical and empirical research we suggest audit committees with members having greater expertise (as defined by relevant qualifications and credentials) in accounting, auditing and finance, or legal[2] matters are likely to be perceived as being of a higher quality. We then propose an expert lauded audit committee sends a favorable signal of the firm's quality to investors. This signal will reduce *ex ante* uncertainty (i.e. information asymmetry), thereby, lowering underpricing. We hypothesize then:

- H1. Underpricing of an IPO with an independent director on the audit committee with legal qualifications and credentials will be significantly lower underpricing than an IPO without an independent director on the audit committee with legal qualifications and credentials.
- H2. Underpricing of an IPO with an independent director on the audit committee with accounting qualifications and credentials will be significantly lower underpricing than an IPO without an independent director on the audit committee with accounting qualifications and credentials.

3.2 Prior business environment and IPO launch experience

A sizeable proportion of the corporate governance literature focuses on CEO related issues (such as CEO duality or CEO compensation arrangements) and the potential impact on firm value. A CEO related issue that may influence investor perceptions of the impartiality of the audit committee but one that has to date receive limited attention (Klein, 2002) is presence of a CEO from another listed company being an independent director and audit committee member on another listed (or to be listed) firm. Prior research (O'Reilly *et al.*, 1988; Klein, 2002) suggests corporate CEOs are generally a relatively homogenous and coherent group. Consequently, CEOs are likely to support their peers in board rated issues including those related to the financial reporting process. Specifically, a CEO of another listed firm working in the capacity of an independent director and serving on the audit committee of another listed firm may when reviewing the financial reporting process and auditor's report recommend measurement and disclosure adjustments more consistent with their preferences as a CEO (and, therefore, in line with their CEO colleague) than that of shareholders (Westphal and Zajac, 1997; Conyon and He, 2004). If investors perceive CEOs are likely to "be in cahoots" due to their close affiliation as senior corporate executives the presence of a CEO of another firm sitting on the audit committee may be viewed as a negative signal of the sub-committees independence and transparency. Thus, we hypothesize the following:

- H3. An IPO with an independent director on the audit committee that is a CEO on another publicly listed firm will have significantly higher underpricing than an IPO without an independent director on the audit committee that is a CEO on another publicly listed firm.

Whereas the presence of a CEO from another publicly listed firm sitting on the IPO's audit committee may be seen in a negative light the existence of an individual with prior experience of an IPO launch is likely to be viewed in an alternative light. The IPO process is undoubtedly a very complex procedure not only legally but practically. In respect to financial accounting an IPO presents a completely different window in a

firm's life cycle relative to its normal annual or interim reporting times. The IPO typically speaking is a one-off condition in which the information needs of stakeholders are likely to differ for a continuous and regular reporting period. Furthermore, stakeholders to whom issuers will wish to address during the IPO process are likely to differ than during the regular reporting period. For example, at the time of the IPO special interest groups are likely to be of limited (if not any) importance. On an annual reporting basis, however, firms are likely to pay greater attention to the needs of special interest groups. Having individuals on the board of directors and audit committee with prior IPO launch experience is likely to aid an issuer to not only best address regulatory requirements but develop suitable disclosure and reporting strategies that best attend to the information needs of interested parties. Thus, we conjecture to test the following hypothesis:

- H4.* An IPO with an independent director on the audit committee that has prior experience with the IPO launch of a Singapore publicly listed firm will have significantly lower underpricing than an IPO without an independent director on the audit committee without such IPO launch experience.

3.3 Diversity: age difference, gender and ethnic background

Resource-dependence and corporate governance theorists recognize a board of directors as an essential mechanism that can enhance and create the coalitions with the stakeholders controlling resources required by a firm (Westphal and Milton, 2000). Wang and Dewhirst (1992) argue each director brings unique collection different experiences, attachments and points of view to a board. If members' perceptions, views and backgrounds are relatively homogenous in nature there is a higher likelihood decision-making strategies of this corporate governance mechanism will be single-minded, predictable and inflexible (Westphal and Zajac, 1998; Dalton *et al.*, 1999). Boards with a more diversity mix of members with better enable it to address the challenges of an uncertain and dynamic business environment (Daily *et al.*, 1999; Gilbert and Ivancevich, 2000). Greater diversity (in such forms as gender and ethnic background) can enhance a board of directors' influence on a firm's performance and strategies. For example, directors of diverse background can contribute different sociological perceptions and understandings to the decision-making process (Crano and Chen, 1998). As a result, a board is better able to instigate more comprehensive policies, strategies, activities and projects (Cox and Blake, 1991). Diversity can also enhance the board's flexibility in its decision-making process due to a wider set of perceptions and views (Gilbert and Ivancevich, 2000). This will enable a firm to better facilitate strategic change (Wiersema and Bantel, 1992). Consequently, a firm will be able to respond more rapidly to changes in a dynamic and uncertain business environment. A diversified board can be of benefit in other areas. For example, a diverse board of directors can help the firm develop well-rounded recruiting policies and strategies, and working conditions attractive to a broader spectrum of potential employees and exploit its existing human-resource capital (Powell, 1990; Shrader *et al.*, 1997).

If, as argued, diversity enhances a board's abilities such as in decision-making, strategic development and analytical processing, such benefits are likely to spillover to key sub-committees. For instance, a more diverse audit committee may be able to better assess the information needs of a firm's stakeholders which will then be translated into the delivery of high quality disclosures that better assists to reduce

asymmetrical information concerns. If investors perceive diversity enhances an audit committee's effectiveness the quality of information reported then this may lead to reductions in cost of capital to a firm such as lower underpricing in the case of an IPO. We test the diversity presumption in respect to age difference, gender and ethnic background[3] forming the following hypotheses:

- H5. There is a positive association between the difference in average age of independent directors on the audit committee and average age of the remaining directors on the board of directors.
- H6. An IPO with gender diversity across the independent directors on the audit committee will have significantly lower underpricing than an IPO without any gender diversity amongst the independent directors on the audit committee.
- H7. An IPO with ethnic diversity across the independent directors on the audit committee will have significantly lower underpricing than an IPO without any ethnic diversity amongst the independent directors on the audit committee.

4. Research method

4.1 *Dependent variable metric – underpricing*

Consistent with prior IPO/underpricing studies (Jog and McConomy, 2003) we measure underpricing ($UP_{i,t}$) as the difference between the closing price on the first day of trading and the initial offering price for firm i . $UP_{i,t}$ is expressed as a percentage of the initial offering price. An underpriced security exists when $UP_{i,t}$ is positive. It is presumed issuers prefer the price at which the shares begin trading be the price at which they're sold to investors (i.e. the offer price). If offered shares are significantly underpriced the issuer receives less financing than received for a smaller number of shares issued at a higher offer price. This infers pre-IPO owners suffer a greater dilution of pre-IPO holdings, whilst the wealth of new shareholders also decreases. Conversely, if overpricing is the norm investors will be unwilling to buy the shares at issuance. Instead, investors will be content to wait several days after issuance to buy at a lower price[4].

4.2 *Independent variable metrics*

Corporate governance advocates and policy makers have formulated several operational definitions as barometers for audit committee experience and expertise. Beasley and Salterio (2001), for example, suggest one major component that enhances an audit committee's experience and expertise is if independent directors on the sub-committee hold suitable qualifications in accounting or law. This view is consistent with Code of Corporate Governance (The Code) (2001) definitions. Following this view we construct two proxy measures – $ACILE_{i,t}$ and $ACIAE_{i,t}$ – to test $H1$ and $H2$, respectively. For $ACILE_{i,t}$ ($ACIAE_{i,t}$) an IPO firm i is scored one [1] if at least one of the independent directors on the audit committee at the time of listing had academic qualifications and held professional credentials in law (accounting); otherwise the IPO firm i is scored zero [0].

For testing $H3$ a proxy measure for the dummy variable $ACISDC_{i,t}$ is formed, whereby, an IPO firm i is scored one [1] if any of the independent directors assigned to the audit committee of the IPO at listing is also a senior executive (i.e. executive chairperson, chief executive officer, managing director or president) of another publicly listed firm.

Otherwise the IPO firm i is scored zero [0]. The independent variable $ACIPre_{i,t}$ is formed to test $H4$. The proxy measure for this variable is a dummy variable where an IPO firm i is scored one [1] if at least one of the independent directors sitting on the audit committee had prior recent experience (within five years) in an IPO launch; otherwise the IPO firm i is scored zero [0]. In testing $H5$ we define the independent variable $ACAD_{i,t}$ as the difference between the average age of the independent directors assigned to the audit committee and the average age of all directors remaining directors presiding on the board of directors of the listing firm i at the time of the IPO. Two dummy variables $ACIF_{i,t}$ and $ACIE_{i,t}$ are formed to test $H6$ and $H7$, respectively. For $ACIF_{i,t}$ ($ACIE_{i,t}$) an IPO firm i is scored one [1] if at least one of the independent directors assigned to the audit committee is female (non-Chinese ethnic background); if not the IPO firm i is scored zero [0].

All information used to score the respective independent variables is drawn from the corporate governance intellectual capital (CGIC) archive. The CGIC archive is a comprehensive database summarizing key company data of all publicly listed firms on the stock exchange of Singapore (SGX) from January 1, 1997 to December 31, 2006. Company information includes personal details (such as name, age, committee positions held, director designation) about every director and key personal of these listed firms, and key financial and intellectual capital related firm information.

4.3 Control variable metrics

An audit committee's composition can be the subject of board of director characteristics and regulatory pressures. We include control variables in the regression analysis for board size, board independence and duality. The proxy measure for the board size ($BDS_{i,t}$) is the total number of individuals designated as directors on the firm's board at the time of listing. Board independence ($BDI_{i,t}$) is the number of independent directors to the total number of directors at the time of listing expressed as a percentage. For duality ($Duality_{i,t}$) an IPO is scored one [1] if at the time of listing the roles of board chairperson and chief executive officer is occupied by the same individual; otherwise scored zero [0].

Singapore's corporate governance landscape adjusted following the code recommendations that may have resulted in investors placing a higher premium on specific audit committee human-resource features at different times during our observation period. Changes were announced in March 2001 and took formal effect from January 1, 2003. Thus, we divide the observation period into three distinctive periods:

- (1) pre-CGC announcement (prior to March 2001);
- (2) con-CGC (March 2001-December 31, 2002); and
- (3) post-CGC implementation (January 1, 2003 and after).

We construct three dummy variables – $Pre-CGC_{i,t}$, $Con-CGC_{i,t}$ and $Post-CGC_{i,t}$ – representing each major time period.

We also include control variables in the regression analysis to monitor compounding influences of alternative signaling mechanisms. Researchers (Kim *et al.*, 1993; Page and Reyneke, 1997; Firth and Liao-Tan, 1998; Jog and McConomy, 2003) argue retained ownership is one such signal. We first measure retained ownership (denoted α_i) as the number of post-IPO outstanding common shares less the primary

shares issued as part of the IPO, scaled by the number of post-IPO outstanding common shares (Clarkson *et al.*, 1992; Firth and Liao-Tan, 1998). Following Downes and Heinkel (1982) we take the log transformation ($\text{Ln}(\alpha_{i,t})$) of $\alpha_{i,t}$ ($\text{Ln}\alpha_{i,t} = \alpha_{i,t} + \ln(1 - \alpha_{i,t})$). We also proxy for the influence of proceeds use by measuring the ratio of proceeds allocated to working capital (including short-term debt repayment) to total proceeds raised ($\text{RWCGP}_{i,t}$). To control for the possible compounding effects of auditor reputation and underwriter prestige we include two control variables $\text{Aud}_{i,t}$ and $\text{Und}_{i,t}$. An IPO using a Big-4[5] audit firm is coded one (1) for $\text{Aud}_{i,t}$, otherwise zero (0). For $\text{Und}_{i,t}$, an IPO is scored one [1] if it uses either of the top two underwriter firms (based on frequency) in the IPO's year of listing with all remaining IPOs scored zero [0]. Our approach to measuring $\text{Aud}_{i,t}$ and $\text{Und}_{i,t}$ is consistent with prior research (Firth and Liao-Tan, 1998; Jog and McConomy, 2003). Prior research indicates litigation risk may influence underpricing (Hughes and Thakor, 1992; Keloharju, 1993). To control for signaling effects of solicitor selection we employ $\text{Sol}_{i,t}$ as a control variable. An IPO is scored one [1] if it uses the services of either of the top two IPO solicitors (based on frequency) in their year of listing. All remaining IPOs are scored zero [0].

We include three controls (offering size, firm age and industry sector) capturing an IPO's fundamental risk. We measure offering size ($\text{Ln GP}_{i,t}$) as the natural logarithm of gross proceeds of the IPO as per the prospectus. For firm age we measure prior operating history of the IPO ($\text{Ln}(\text{Age})_{i,t}$) as the natural logarithm of the number of days from the date of the firm's incorporation to the IPO date. Finally, following prior studies (Demers and Lewellan, 2003; Ittner *et al.*, 2003; Murphy, 2003) we split the sample into three major industry classifications:

- (1) "new economy"[6];
- (2) "old economy"[7]; and
- (3) "non-classified economy"[8].

We construct three dummy variables ($\text{NE}_{i,t}$, $\text{OE}_{i,t}$ and $\text{NCE}_{i,t}$) with an IPO scored one [1] if from a specific industry category, otherwise scored zero [0].

We also include two control variables for possible compounding influences of demand pressures for an IPO's stock. A momentum factor ($\text{Mom}_{30,i,t}$) measured as the percentage of change in the STI a month prior to the offer date of firm i is included to control for any influencing shift in overall market sentiment prior to listing. Koh and Walter (1989) suggest the greater interest shown in an IPO (i.e. its popularity) the higher underpricing will be. Thus, we proxy popularity of an IPO issue using the subscription rate ($\text{TOS}_{i,t}$).

Finally, we include two control variables to counter undue influence of cross-sectional differences in firm-level characteristics. First, to control any influence of pre-listing financial performance on investor perceptions and underpricing we use the reported historical earnings per share (based on pre-issue stock capital) ($\text{EPS_PI}_{i,t}$) from the IPO prospectus as the relevant proxy. Second, as *ex ante* uncertainty is likely to be greater for foreign incorporated firm relative to domestically incorporated firms we use the $\text{FI}_{i,t}$ where an IPO is scored one [1] if incorporated in Singapore, and zero (0) if incorporated elsewhere.

All proxy measures are defined and summarized in Table I[9].

Title	Variable description
$UP_{i,t}$	Difference between the closing price on the first day of trading and the initial offering price for firm i , expressed as a percentage of the initial offering price
$ACILE_{i,t}$	Dummy variable with IPO firm i scored one [1] if an independent director on the audit committee at listing has legal qualifications and experience; otherwise scored zero [0]
$ACIAE_{i,t}$	Dummy variable with IPO firm i scored one [1] if an independent director on the audit committee at listing has accounting qualifications and experience; otherwise scored zero [0]
$ACISDC_{i,t}$	Dummy variable with IPO firm i scored one [1] if an independent director on the audit committee at listing is a senior executive (executive chairperson, chief executive officer, managing director or president) of another publicly listed firm; otherwise scored zero [0]
$ACIPre_{i,t}$	Dummy variable with IPO firm i scored one [1] if an independent director on the audit committee has been previously involved in the IPO of another firm; otherwise scored zero [0]
$ACAD_{i,t}$	Average age of independent directors on the audit committee of IPO firm i less average age of directors of the board of directors (excluding independent directors on the audit committee) of IPO firm i
$ACIF_{i,t}$	Dummy variable with IPO firm i scored one [1] if an independent director on the audit committee at listing is female; otherwise scored zero [0]
$ACIE_{i,t}$	Dummy variable with IPO firm i scored one [1] if an independent director on the audit committee at listing is of a non-Chinese heritage; otherwise scored zero [0]
$BDS_{i,t}$	Total number of individuals comprising the board of directors of IPO firm i at the time of listing
$BDI_{i,t}$	Percentage of the board of directors of IPO firm i at listing that are independent directors
$Duality_{i,t}$	Dummy variable with IPO firm i scored one [1] if the same individual holds the positions of chairperson and chief executive officer; otherwise scored zero [0]
$\text{Ln}(\alpha)_{i,t}$	$\alpha_{i,t}$ is calculated as $\alpha = (N - N_p - N_s)/N$ where N , number of common outstanding after the IPO of firm i ; N_p , number of primary common outstanding shares offered via the IPO of firm i ; and N_s , number of secondary common outstanding shares offered via the IPO of firm i . Then $\text{Ln}(\alpha)_{i,t} = \alpha_{i,t} + \ln(1 - \alpha_{i,t})$ (Downes and Heinkel, 1982; Clarkson <i>et al.</i> , 1992; Jog and McConomy, 2003)
$\text{Ln GP}_{i,t}$	Natural logarithm of the net proceeds (based on the net proceeds of the IPO as per the prospectus) to be received by firm i from the IPO (expressed in Singapore dollars)
$\text{RWCGP}_{i,t}$	Ratio (expressed as a percentage) of the total net proceeds IPO firm i is allocating for working capital purposes to total net proceeds
$\text{Aud}_{i,t}$	Dummy variable with IPO firm i scored one [1] if engages a Big-4 (or Big-5/6) ^a audit firm as the auditor; otherwise scored zero [0]
$\text{Und}_{i,t}$	Dummy variable with IPO firm i scored one [1] if engages either of the top two underwriter firms (based on frequency) in the year of the firm's IPO; otherwise scored zero [0]
$\text{Sol}_{i,t}$	Dummy variable with IPO firm i scored one [1] if engages either of the top two solicitor firms (based on frequency) invited to the IPO in the year of the firm's IPO; otherwise scored zero [0]
$\text{Ln}(\text{Age})_i$	Natural logarithm number of days from the date of incorporation of firm i to the date of the IPO
$\text{EPS_PI}_{i,t}$	The earnings per share reported by IPO firm i in the financial period immediately prior to listing
$\text{Mom}_{30}_{i,t}$	Momentum variable indicating the percentage change in performance of the SGX's major index dummy (i.e. the straits times index) from 30 days prior to the date of the IPO for firm i
$\text{TOS}_{i,t}$	The number of times total shares on offer by IPO firm i is subscribed
$\text{FI}_{i,t}$	Dummy variable, IPO firm i scored one [1] if Singapore incorporated; otherwise scored zero [0]

(continued)

Table I.
Summary variables and their proxy measure determination

Title	Variable description
OE _{<i>i,t</i>}	Dummy variable with IPO firm <i>i</i> scored one [1] if classified as belonging to an “old economy” ^a industry sector; otherwise scored zero [0]
NE _{<i>i,t</i>}	Dummy variable with IPO firm <i>i</i> scored one [1] if classified as belonging to a “new economy” ^b industry sector; otherwise scored zero [0]
NCE _{<i>i,t</i>}	Dummy variable with IPO firm <i>i</i> scored one [1] if classified as belonging to a “non-classified economy” ^c industry sector; otherwise scored zero [0]
Pre-CGC _{<i>i,t</i>}	Dummy variable with IPO firm <i>i</i> scored one [1] if listed prior to the release of the code (i.e. March 2001); otherwise scored zero [0]
Con-CGC _{<i>i,t</i>}	Dummy variable with IPO firm <i>i</i> scored one [1] if listed release date of the code (i.e. March 2001) and its date of implementation (i.e. January 1, 2003); otherwise scored zero [0]
Post-CGC _{<i>i,t</i>}	Dummy variable with IPO firm <i>i</i> scored one [1] if listed after the implementation date (i.e. January 1, 2003) of the code (i.e. March 2001); otherwise scored zero [0]

Notes: ^aFirms are scored one [1] if when listing in the periods: 1997-1998 and audited by the Big-6 (the merger between Coopers and Lybrand and Pricewaterhouse to form Pricewaterhouse Coopers did not take effect till July 1, 1998. Thus, IPOs during the 1997-1998 were still being audited by the Big-6 audit firms (Arthur Andersen, Ernst and Young, KPMG, Coopers and Lybrand, Pricewaterhouse, and Deloitte); 1999-2002 and audited by the Big-5 (The collapse and dissolution of Arthur Andersen took place in 2002. IPOs in Singapore were observed to be audited by Arthur Andersen during 2002. Thus, for the period 1999-2002 it is presumed the high quality reputation audit firms known as the Big-5 comprised Arthur Andersen, Ernst and Young, KPMG, Pricewaterhouse Coopers, and Deloitte); 2003-2006 and audited by the Big-4 (following the demise of Arthur Andersen the audit firms comprising the Big-4 were Ernst and Young, KPMG, Pricewaterhouse Coopers, and Deloitte. The Big-4 is assumed to represent the high quality reputation audit firms in the Singapore audit market during 2003-2004). Otherwise the firm is scored zero [0]. Footnote [7] for definition used to classify “old economy” IPOs. ^bFootnote [6] for definition used to classify “new economy” IPOs. ^cFootnote [8] for definition used to classify “non-classified economy” IPOs

Table I.

4.4 Statistical model

We use OLS regression (based on Equation (1)) as our major test of the hypotheses[10]:

$$\begin{aligned}
 UP_{i,t} = & \lambda_j + \beta_1 ACIAE_{i,t} + \beta_2 ACILE_{i,t} + \beta_3 ACISDC_{i,t} + \beta_4 ACIPre_{i,t} \\
 & + \beta_5 ACAD_{i,t} + \beta_6 ACIF_{i,t} + \beta_7 ACIE_{i,t} + \beta_8 BDS_{i,t} + \beta_9 BDI_{i,t} \\
 & + \beta_{10} Duality_{i,t} + \beta_{11} \ln(\alpha)_{i,t} + \beta_{12} \ln GP + \beta_{13} RWCGP_{i,t} \\
 & + \beta_{14} Aud_{i,t} + \beta_{15} Sol_{i,t} + \beta_{16} Und_{i,t} + \beta_{17} \ln(\text{Age})_i + \beta_{18} EPS_PI_{i,t} \\
 & + \beta_{19} Mom_30_{i,t} + \beta_{20} TOS_{i,t} + \beta_{21} FI_{i,t} + \beta_{22} OE_{i,t} + \beta_{23} NE_{i,t} \\
 & + \beta_{24} NCE_{i,t} + \beta_{25} Pre-CGC_{i,t} + \beta_{26} Con-CGC_{i,t} + \beta_{27} Post-CGC_{i,t} + \eta_j,
 \end{aligned} \tag{1}$$

where formal definitions of dependent, independent and control variables are presented in Table I; λ_j , coefficient on the intercept term; β_i , coefficients 1 thru 27 on the independent and control variables; and η_j , error term.

5. Results

5.1 Sample selection and industry distribution

Our analysis focuses on Singapore for several reasons. First, an audit committee is a long established part of Singapore corporate governance landscape (Companies Act, 1990). Second, corporate governance practices and philosophy in Singapore have

evolved in line with those of the USA and UK with recent developments closely mirroring standards promulgated by the organization for economic co-operation and development in 2000 (Jensen and Ruback, 1983; Phan and Yoshikawa, 2005). Such similarities enable greater flexibility to generalize and compare findings to other major markets. Third, Singapore's IPO market has been a relative "hot-bed" of activity since 1997 with the number of listed firms virtually doubling by the end of 2004. Finally, audit committee structural features have been a major focus of corporate governance reform and debate in Singapore during the majority of the observation period. This heightened investor awareness of issues related to audit committees such that if any value is given to audit committee human-resource properties by investors should be reflected in underpricing levels.

The initial sample comprises IPOs satisfying the following criteria:

- The IPO applied for initial listing on the SGX between January 1, 1997 and December 31, 2006 (based on listings from the SGX).
- The IPO issued equity shares not previously publicly traded, and whose fiscal year end was prior to or on December 31, 2006.
- The IPO is not a life investment fund, stock index fund, real estate unit fund or limited partnership.
- The IPO did not issue preferred shares only.
- The IPO did not provide a prospectus as part of a cross-listing arrangement.

Of 516 firms applying for a SGX listing during the observation window 440 met our prescribed criteria. Those excluded were 27 seasoned offerings, 27 unit fund related issues and five issued only preferred shares. Another 13 IPOs are excluded:

- due to insufficient prospectus information to construct the proxy measures; or
- incomplete prospectuses to enable measurement of IC disclosures.

Finally, we excluded four outliers (>4 standard deviations from the mean underpricing). Our final useable sample comprises 440 IPOs representing 85.271 percent of total IPO listing during the review period.

An annual breakdown of the sample selection process (Table II, Panel A) indicates IPO activity is particularly high during two sub-periods:

- (1) 1999/2000; and
- (2) 2003-2004.

Strong IPO activity during 1999/2000 is synonymous with the hype surrounding the "Dot.Com Bubble" as found in other major capital markets (Ljungqvist and Wilhelm, 2002; Loughran and Ritter, 2002; Ofek and Richardson, 2003). High IPO activity in 2003-2006 can be attributed, in part, to a growing exuberance toward:

- attracting China-based firms; or
- investment into Singapore domestically incorporating firms developing and/or expanding operations in China.

Low IPO activity in 1997/1998 and 2001/2002 is likely due to poor economic conditions during these times[11]. The industry breakdown (US SIC single alphabetic classification)

<i>Panel A: Sample selection</i>							
<i>Year</i>	<i>Listing</i>	<i>Reason for exclusion from sample</i>				<i>Included in sample</i>	
	<i>N</i>	<i>Seasoned offering</i>	<i>Fund types^a</i>	<i>Preferred shares</i>	<i>Insufficient data^b</i>	<i>N</i>	<i>Total listing (percent)</i>
1997	15	2	1	0	1	11	73.333
1998	23	2	0	0	1	20	86.957
1999	51	3	2	0	2	41	80.392
2000	82	7	5	3	4	65	79.268
2001	37	3	1	0	0	36	97.297
2002	33	2	3	0	1	26	78.788
2003	60	4	2	1	2	49	81.667
2004	80	2	0	1	0	74	92.500
2005	69	1	4	0	1	63	91.304
2006	66	1	9	0	1	55	83.333
Total	516	27	27	5	13	440	85.271
<i>Panel B: Industry composition of sample</i>							
<i>Code</i>	<i>SIC industry class description</i>	<i>N</i>	<i>Sample (percent)</i>				
A	Agriculture, forestry and fishing	7	1.591				
B	Mining	3	0.682				
C	Construction	24	5.455				
D	Manufacturing	212	48.182				
E	Transportation, communications, electric, gas and sanitary services	41	9.318				
F	Wholesale trade	29	6.591				
G	Retail trade	15	3.409				
H	Finance, insurance and real estate	9	2.045				
I	Services	96	21.818				
J	Public administration	4	0.909				
	Total	440	100.000				

Notes: ^aOfferings categorized in this group included life investment funds, stock index funds and real estate funds that issued unit trusts via the SGX. ^bIPOs classified as “insufficient data” typically included those where a verifiable copy of the original prospectus could not be obtained, or IPOs where a prospectus was obtained but necessary information relevant to this study (such as for determining key variables) was not available

Table II.
Breakdown of sample selection process

reported in Table II, Panel B shows nearly 50 percent of the IPOs in the final useable sample are from the Manufacturing sector. The next largest industry sector representation is the Services sector. Given Singapore’s lack of natural resources it is not surprising to few IPOs are from the Agriculture, Forestry and Fishing, and Mining sectors.

5.2 Pooled-sample descriptive statistics

Average (median) underpricing for the pooled sample is 21.615 percent (10.930 percent) (Table III, Panel A). The spike in average underpricing in 1999 (38.319 percent) is consistent with the “Dot.Com Bubble” hype. Following relatively subdued years in 2000 and 2001 underpricing rises sharply in 2002 and 2003 in response to renewed enthusiasm in Singapore’s economic prospects following a deep economic recession and SARS, and also eagerness to invest into China-orientated firms. Whilst average underpricing appears to change considerably year-on-year an ANOVA test (not tabulated) shows no significant variation (at conventional levels). Overall, our average

	Mean		25th P'tile	Median	
<i>Panel A: Breakdown of $UP_{i,t}$ by year</i>					
Year		SD			75th P'tile
1997 ($n = 11$)	2.908	24.452	- 15.385	- 3.333	9.091
1998 ($n = 20$)	17.763	28.925	- 9.460	14.762	37.937
1999 ($n = 41$)	38.319	37.785	1.515	29.091	69.790
2000 ($n = 65$)	9.975	28.153	- 7.796	3.093	18.333
2001 ($n = 36$)	13.966	32.146	- 3.142	4.904	26.222
2002 ($n = 26$)	25.772	32.616	6.364	17.133	47.000
2003 ($n = 49$)	33.527	32.617	7.083	27.500	56.663
2004 ($n = 74$)	19.521	32.411	- 5.000	9.259	36.026
2005 ($n = 63$)	26.893	34.110	2.810	25.820	48.362
2006 ($n = 55$)	17.263	31.972	1.035	18.082	34.920
Total ($n = 440$)	21.615	33.361	- 2.101	10.930	38.644
<i>Panel B: Descriptive statistics for independent and control variables for pooled-sample ($N = 322$)</i>					
Variable ^a		SD ^b			75th Pe'tile
<i>ACILE_{i,t}</i>	38.437				
<i>ACIAE_{i,t}</i>	33.612				
<i>ACISDC_{i,t}</i>	30.487				
<i>ACIPre_{i,t}</i>	59.325				
<i>ACAD_{i,t}</i>	1.113	8.587	- 1.000	2.400	5.497
<i>ACIF_{i,t}</i>	7.171				
<i>ACIE_{i,t}</i>	14.702				
<i>BDS_{i,t}</i>	6.336	1.577	5.000	6.000	7.000
<i>BDI_{i,t}</i>	38.810	12.360	27.630	33.330	40.000
<i>Duality_{i,t}</i>	27.122				
<i>(α)_{i,t}</i>	0.779	0.063	0.748	0.760	0.803
<i>Ln(α)_{i,t}</i>	- 0.741	0.253	- 0.821	- 0.646	- 0.615
Net proceeds	\$18,638,491	\$28,241,452	\$4,750,000	\$9,510,000	\$18,910,000
<i>Ln GP_{i,t}</i>	16.741	0.987	15.374	16.068	16.755
Working capital	\$5,610,399	\$15,102,324	\$1,004,000	\$2,640,000	\$4,970,000
<i>RWCGP_{i,t}</i>	0.319	0.212	0.134	0.271	0.435
<i>Aud_{i,t}</i>	79.471				
<i>Und_{i,t}</i>	46.181				
<i>Sol_{i,t}</i>	38.295				
Age in days	2,172	2,981	236	682	3,461
<i>Ln(Age)_{i,t}</i>	7.683	1.529	5.464	6.525	8.149
<i>EPS_PI_{i,t}</i>	0.051	0.274	0.020	0.030	0.040
<i>FI_{i,t}</i>	74.546				
<i>Mom_30_{i,t}</i>	1.482	7.765	- 2.851	1.043	5.281
<i>TOS_{i,t}</i>	12.860	19.110	2.020	5.600	15.535
<i>OE_{i,t}</i>	53.601				
<i>NE_{i,t}</i>	17.480				
<i>NCE_{i,t}</i>	28.919				
<i>Pre-CGC_{i,t}</i>	34.091				
<i>Con-CGC_{i,t}</i>	12.727				
<i>Post-CGC_{i,t}</i>	53.182				

Notes: Table I for variable descriptions and definitions. The control variables are all shown in italics. Variables not in italics are supplementary information related to respective control variables before transformation. ^aOf all the dependent, independent and control variables ANOVA tests indicate only significant variations in mean values between each year of the review period for $Ln\alpha_{i,t}$ and $Age_{i,t}$; ^bin the cells that are blank there are no relevant standard deviation, 25th percentile, median or 75th percentile as the variables in question are dichotomous in nature

Table III.
Descriptive statistics

underpricing is consistent with prior studies of Singapore's IPO market (Koh and Walter, 1989; Lee *et al.*, 1996; Firth and Liau-Tan, 1998; Ljungqvist, 2005).

Descriptive statistics for the independent variables are reported in Table III, Panel B[12]. With respect to the legal (accounting) expertise of independent audit committee members we find 38.437 percent (33.612 percent) of the IPOs in our sample had a least one independent director with legal (accounting) qualifications and professional credentials. These levels of representation are higher than reported by Beasley and Salterio (2001) when using Canadian data. The difference could be due to:

- greater value attributed to legal and accounting qualifications in Asia than North America;
- a smaller pool of suitably qualified individuals to serve as independent directors; or
- a response to heightened demand by regulators and stakeholders for audit committees to be comprised of more suitably qualified (including those with legal and accounting expertise) follow the rash of high profile financial scandals (e.g. WorldCom, Enron, Parmalat) that plagued the world's business environment at the turn of the millennium.

The percentage of independent directors on the audit committee holding senior executive positions in other firms is 30.487 percent a figure below that reported in North America (Beasley and Salterio, 2001). Whilst senior executive experience may benefit an audit committee's effectiveness an IPO may be less unwilling to use such senior executives from other firms fearing competitive conflicts. This fear could be more pronounced in Singapore because a lack of natural resources and geographical space means industry concentration is likely to be higher than in larger nations. A somewhat surprising descriptive statistic is the percentage of our sample (i.e. 59.325 percent) having at least one independent director on the audit committee with prior recent IPO launch experience. This higher than expected percentage may reflect a preference amongst pre-IPO owners (i.e. the issuer) to seek independent directors with a prior IPO experience to give greater credibility to the firm going public in addition to extra knowledge and understanding of the IPO launch procedure. Alternatively, the high percentage could suggest the pool of talent of independent directors from which an issuer can select may be relatively thin in Singapore. Or given the cultural fabric of Singapore as defined by Hofstede (1980) and Gray (1988) that suggests a high power distance and collectivism society that prefers secrecy, Singapore issuers could actively seek to consistently seek to appoint the same set of independent directors so as to confine external networks and maintain an "inner-closed" cohort between directors.

Average age of independent directors on the audit committee of IPOs in our sample is slightly higher on average (i.e. 1.113 years) than the average age of remaining directors. The higher average may reflect the point independent directors are likely to comprise a number of retired individuals with a naturally higher age demographic. Executive (and also non-executive) directors on an IPO's board are likely to be younger because they are still likely to be in their active business and entrepreneurial prime. Finally, there appears to be a significant reluctance amongst Singapore IPOs to appoint independent directors that are female and of a non-Chinese ethnic background. Specifically, only 7.171 percent of the sample had an independent female audit committee member whilst only 14.702 percent had an independent audit committee of a non-Chinese ethnic background. Low gender and ethnic diversity could imply a

preference to construct homogeneous boards to develop a closer affiliation amongst members in an effort to improve cohesion, and a more collective decision-making process. Importantly, we note the low degree of gender and ethnic diversity is not an anomaly isolated to independent directors of Singapore IPOs (Powell, 1990; Shrader *et al.*, 1997).

Summary descriptive statistics for the control variables as reported in Table III, Panel B are relatively on par with prior studies of the Singapore IPO and capital markets (Koh and Walter, 1989; Firth and Liao-Tan, 1998). Of the corporate governance features, board size and board independence of Singapore IPOs is lower than the broader established market. Van der Zahn and Tower (2004), for example, find from a sample of 268 Singapore listed firms in 2001 the board size averaged 7.121 individuals with independent directors comprising 39.057 percent of total board directorships. Interestingly, the percentage of IPOs having the same individual holding the role of chairperson and chief executive officer is lower than prior studies using seasoned Singapore publicly listed firms (Van der Zahn and Tower, 2004). The lower value we report could reflect a response to regulatory and stakeholder calls in recent years to separate the two roles.

5.3 Tests-of-means

Results of tests-of-means in respect to our hypotheses (aside from *H5*) are reported in Table IV. Descriptive results indicate the mean level of underpricing is lower amongst IPOs with audit committees having:

- at least one independent with legal qualifications and professional credentials;
- no independent directors with accounting qualifications and professional credentials;
- at least one independent who is a senior executive of another publicly listed firm;
- at least one independent audit committee member having prior IPO launch experience;
- no gender diversity; and
- with all members being of the same ethnic background.

Tests-of-means, however, indicate only significant differences at conventional levels where at least one independent director on the audit committee has:

- legal qualifications and professional credentials ($p < 0.10$);
- accounting qualifications and professional credentials ($p < 0.01$);
- prior IPO launch experience ($p < 0.05$); and
- from a non-Chinese ethnic background ($p < 0.10$).

5.4 Correlations

Table V presents an (abridged) correlation matrix[13] with the upper half reporting Pearson pairwise correlation coefficients (cr_p), the lower half Spearman correlation coefficients (cr_s). $UP_{i,t}$ is positively and significantly correlated with $ACIAE_{i,t}$ ($p < 0.05$, cr_p and cr_s), $ACAD_{i,t}$ ($p < 0.01$, cr_p ; $p < 0.05$, cr_s) and $ACIE_{i,t}$ ($p < 0.01$, cr_p ; $p < 0.05$, cr_s). In contrast, the dependent variable is a negatively significantly correlated with $ACILE_{i,t}$ ($p < 0.05$, cr_p and cr_s) and $ACIPre_{i,t}$ ($p < 0.01$, cr_p and cr_s).

Variable name	Mean	SD	SE	N
<i>Panel A: Independent director with legal expertise on audit committee vs none present</i>				
ACILE _{i,t}	0.172	0.324	0.034	169
Others	0.244	0.336	0.022	271
Statistical note	<i>t</i> -statistic	0.082***	<i>z</i> -statistic	-2.117**
<i>Panel B: Independent director with accounting expertise on audit committee vs none present</i>				
ACIAE _{i,t}	0.299	0.362	0.038	148
Others	0.174	0.317	0.022	292
Statistical note	<i>t</i> -statistic	0.000*	<i>z</i> -statistic	-2.798*
<i>Panel C: Independent director senior executive other listed firm on audit committee vs none present</i>				
ACISDC _{i,t}	0.208	0.341	0.031	134
Others	0.220	0.329	0.021	306
Statistical note	<i>t</i> -statistic	0.963	<i>z</i> -statistic	-0.386
<i>Panel D: Independent director with prior IPO launch experience on audit committee vs none present</i>				
ACIPre _{i,t}	0.178	0.292	0.044	261
Others	0.272	0.355	0.033	179
Statistical note	<i>t</i> -statistic	0.045**	<i>z</i> -statistic	-1.952***
<i>Panel E: Female independent director on audit committee vs none present</i>				
ACIF _{i,t}	0.224	0.355	0.062	32
Others	0.216	0.330	0.020	408
Statistical note	<i>t</i> -statistic	0.342	<i>z</i> -statistic	-0.156
<i>Panel F: Non-chinese ethnic independent director on audit committee vs none present</i>				
ACIE _{i,t}	0.286	0.348	0.068	65
Others	0.204	0.336	0.018	375
Statistical note	<i>t</i> -statistic	0.057***	<i>z</i> -statistic	-1.811***

Table IV.
Tests-of-means analysis

Notes: Table I for variable descriptions and definitions. *, **, and *** significant at 0.01, 0.05, and 0.10 confidence limits (two-tailed significance)

Correlations between UP_{i,t} and the two remaining independent variables (namely ACISDC_{i,t} and ACIF_{i,t}) are statistically insignificant from zero. Whilst not tabulated (for brevity) UP_{i,t} is also positively significantly correlated with:

- Sol_{i,t} (*p* < 0.01, cr_p and cr_s).
- Ln(Age)_{i,t} (*p* < 0.05, cr_s).
- Mom_30_{i,t} (*p* < 0.01, cr_p and cr_s).
- TOS_{i,t} (*p* < 0.01, cr_p and cr_s).

In addition UP_{i,t} is negatively significantly correlated with:

- Ln GP_{i,t} (*p* < 0.05, cr_p and cr_s).
- Und_{i,t} (*p* < 0.01, cr_p and cr_s).

Some significant correlations arise between the independent variables. The highest value between ACILE_{i,t} and ACAD_{i,t} (-0.257, *p* < 0.01, cr_s) is below the critical limit of 0.8 (Hair *et al.*, 1995; Greene, 1999). This indicates little evidence of serious multicollinearity concerns between the independent variable. Correlations between control variables are also present but are again all below 0.5 apart from that between Pre-CGC_{i,t} and Post-CGC_{i,t} (-0.712, *p* < 0.01, cr_p and cr_s). Whilst close to the critical limit for multicollinearity, this correlation does not represent a multicollinearity

Variable	UP _{<i>i,t</i>}	ACILE _{<i>i,t</i>}	ACIAE _{<i>i,t</i>}	ACISDC _{<i>i,t</i>}	ACIPre _{<i>i,t</i>}	ACAD _{<i>i,t</i>}	ACIF _{<i>i,t</i>}	ACIE _{<i>i,t</i>}
UP _{<i>i,t</i>}								
ACILE _{<i>i,t</i>}	-0.106 ^{***}							0.103 ^{***}
ACIAE _{<i>i,t</i>}	0.175 [*]	0.069	0.068	-0.048	0.059	-0.189 [*]	0.132 [*]	0.052
ACISDC _{<i>i,t</i>}	-0.029	-0.048	-0.184 [*]	-0.181 [*]	0.140 [*]	-0.029	-0.105 ^{***}	0.019
ACIPre _{<i>i,t</i>}	-0.157 [*]	0.064	0.147 [*]	0.064	0.052	0.085	-0.018	0.033
ACAD _{<i>i,t</i>}	0.121 ^{***}	-0.233 [*]	-0.071	0.010	0.050	0.062	-0.151 [*]	-0.122 ^{***}
ACIF _{<i>i,t</i>}	0.032	0.135 [*]	-0.105 ^{***}	-0.018	-0.147 [*]	-0.036	-0.007	0.061
ACIE _{<i>i,t</i>}	0.181 [*]	0.051	0.019	0.033	-0.113 ^{***}	0.052	-0.048	-0.048

Notes: Table I for variable descriptions and definitions. * and ** significant at 0.01 and 0.05 confidence limits (two-tailed significance)

Table V.
Pearson (cr_p) and
Spearman (cr_s)
correlation matrix
(abridged – dependent
and independent
variables only)

concern in the regression analysis as either Pre-CGC_{*i,t*} or Post-CGC_{*i,t*} are automatically excluded (the excluded variable acts as the intercept point to determine if there is significant variation in underpricing between the three major corporate governance periods)[14]. To further gauge multicollinearity concerns we calculate variance inflation factor (VIF) scores. The highest VIF score is 2.19. VIFs exceeding ten are deemed evidence of serious multicollinearity (Netter *et al.*, 1989, p. 40). Based on Pearson and Spearman correlations, and VIF values, we conclude standard interpretations of the regression coefficients in Table VI can be made[15].

5.5 Multiple regression analysis

Table VI, Panel A reports cross-sectional regression results for the pooled-sample. Amongst the independent variables the coefficients on ACIAE_{*i,t*} ($p < 0.05$, two-tailed), ACAD_{*i,t*} ($p < 0.10$, two-tailed), and ACIE_{*i,t*} ($p < 0.10$, two-tailed) are shown to be positive and statistically significant. In contrast, the coefficient on ACIPre_{*i,t*} ($p < 0.05$, two-tailed) is negative and statistically significant. The coefficients on ACILE_{*i,t*}, ACISDC_{*i,t*}, and ACIF_{*i,t*} are all insignificant from zero. We also note several control variables are statistically significant:

- Sol_{*i,t*} (negative, $p < 0.05$).
- Und_{*i,t*} (positive, $p < 0.05$).
- TOS_{*i,t*} (positive, $p < 0.01$).
- Con-CGC_{*i,t*} (positive, $p < 0.10$).
- Post-CGC_{*i,t*} (positive, $p < 0.10$).

The significance of the coefficients on Con-CGC_{*i,t*} and Post-CGC_{*i,t*} as reported in Table VI, Panel A are of importance because this infers underpricing behavior before and after the announcement of The Code (2001) differed significantly. This underlies support for partitioning of the pooled-sample by the corporate governance period in which an IPO listed (i.e. pre-, conversion-, or post-). Cross-sectional regressions for each sub-sample are reported in Table VI, Panels B, C, and D.

The positive and significant association between ACIAE_{*i,t*} and UP_{*i,t*} as reported in Table VI, Panel A is repeated across the three partitioned sub-samples. The positive ACIAE_{*i,t*} – UP_{*i,t*} association is strongest for the Pre-CGC and Post-CGC sub-samples (Panel B and D $p < 0.01$, two-tailed; Panel C $p < 0.05$, two-tailed). As with the Table VI, Panel A findings a negative ACIPre_{*i,t*} and UP_{*i,t*} result is reported in Table VI, Panels B ($p < 0.01$, two-tailed), C ($p < 0.10$, two-tailed), and D ($p < 0.10$, two-tailed). Results of the partitioning analysis related to an ACIPre_{*i,t*} – UP_{*i,t*} association implies, in part, that the importance of prior IPO launch experience amongst independent directors had become less relevant to investors across the analysis period. The positive and statistically significant association between UP_{*i,t*} and ACAD_{*i,t*} (as reported in Table VI, Panel A) is replicated across all three sub-sample regressions though the strength of the association varies (i.e. $p < 0.01$ Pre-CGC sub-sample, $p < 0.10$ Con-CGC sub-sample, and $p < 0.05$ Post-CGC sub-sample). An ACIE_{*i,t*} – UP_{*i,t*} association show in Table VI, Panel A is also replicated across all three sub-sample regressions. In contrast to the ACAD_{*i,t*} – UP_{*i,t*} association the positive ACIE_{*i,t*} – UP_{*i,t*} relationship is strongest for the Pre-CGC sub-sample ($p < 0.05$, two-tailed) in contrast to the Con-CGC and Post-CGC sub-samples ($p < 0.10$, two-tailed). Whilst the coefficient on ACILE_{*i,t*} is

Variable	Panel A: Pooled Standardized β (<i>t</i> -statistic)	Panel B: Pre-CGC period Standardized β (<i>t</i> -statistic)	Panel C: Con-CGC period Standardized β (<i>t</i> -statistic)	Panel D: Post-CGC period Standardized β (<i>t</i> -statistic)
ACILE _{<i>i,t</i>}	-0.086 (-1.490)	-0.125 (-1.740)***	-0.267 (-1.431)	-0.084 (-1.041)
ACIAE _{<i>i,t</i>}	0.138 (2.617)*	0.142 (2.848)*	0.126 (1.951)**	0.252 (3.345)*
ACISDC _{<i>i,t</i>}	0.009 (0.145)	0.029 (0.361)	-0.168 (-0.938)	0.039 (0.548)
ACIPre _{<i>i,t</i>}	-0.142 (-2.098)**	-0.177 (-2.993)*	-0.164 (-1.918)***	-0.129 (-1.732)***
ACAD _{<i>i,t</i>}	0.132 (1.754)***	0.181 (2.863)*	0.125 (1.803)***	0.166 (2.104)**
ACIF _{<i>i,t</i>}	-0.007 (-0.102)	-0.023 (-0.290)	0.014 (0.095)	0.061 (0.811)
ACIE _{<i>i,t</i>}	0.108 (1.968)***	0.206 (2.514)**	0.080 (1.671)***	0.142 (1.941)***
BDS _{<i>i,t</i>}	-0.088 (-1.163)	-0.133 (-1.322)	-0.092 (-0.314)	-0.238 (-2.892)*
BDI _{<i>i,t</i>}	-0.064 (-0.827)	0.081 (0.697)	-0.106 (-0.468)	-0.073 (-0.746)
Duality _{<i>i,t</i>}	-0.032 (-0.610)	-0.067 (-0.879)	-0.140 (-0.804)	-0.161 (-1.932)***
Ln(α) _{<i>i,t</i>}	0.047 (0.859)	0.179 (2.139)**	0.095 (0.596)	0.038 (0.488)
Ln GP	-0.054 (-0.801)	-0.201 (-2.226)**	-0.258 (-1.253)	-0.294 (-3.211)*
RWCGP _{<i>i,t</i>}	-0.032 (-0.597)	0.009 (0.120)	-0.098 (-0.585)	-0.169 (-2.233)**
Aud _{<i>i,t</i>}	-0.061 (-1.021)	-0.106 (-1.374)	-0.185 (-0.901)	-0.083 (-1.107)
Und _{<i>i,t</i>}	0.141 (2.371)**	0.209 (2.702)*	0.098 (0.682)	0.011 (0.153)
Sol _{<i>i,t</i>}	-0.116 (-2.211)**	-0.026 (-0.337)	-0.354 (-2.099)**	-0.044 (-0.512)
Ln(Age) _{<i>i</i>}	0.096 (1.599)	0.178 (2.107)**	0.123 (0.614)	0.045 (0.735)
EPS_PI _{<i>i,t</i>}	-0.021 (-0.317)	-0.066 (-0.831)	0.213 (1.088)	-0.062 (-0.915)
FI _{<i>i,t</i>}	-0.053 (-0.918)	-0.103 (-1.130)	-0.008 (-0.033)	0.006 (0.072)
Mom_30 _{<i>i,t</i>}	0.075 (1.398)	0.003 (0.034)	0.316 (1.569)	0.141 (1.931)***
TOS _{<i>i,t</i>}	0.426 (7.928)*	0.401 (5.034)*	0.256 (2.270)**	0.643 (8.492)*
OE _{<i>i,t</i>}	0.068 (1.237)	0.034 (1.739)***	-0.085 (-0.606)	0.044 (0.105)
NE _{<i>i,t</i>}	0.009 (0.171)	0.142 (0.431)	0.246 (1.366)	0.011 (0.645)
Con-CGC _{<i>i,t</i>}	0.103 (1.727)***			
Post-CGC _{<i>i,t</i>}	0.143 (2.183)**			
Intercept	(1.116)	(1.706)***	(1.040)	(-2.108)***
<i>Summary</i>				
<i>F</i> -statistic	6.381*	5.643*	4.748*	8.481*
Adjusted <i>R</i> ²	0.261	0.298	0.245	0.435
<i>N</i>	410	143	56	211

Notes: The base model for each regression is defined in the following equation: $UP_{i,t} = \lambda_i + \beta_1 ACILE_{i,t} + \beta_2 ACIAE_{i,t} + \beta_3 ACISDC_{i,t} + \beta_4 ACIPre_{i,t} + \beta_5 ACAD_{i,t} + \beta_6 ACIF_{i,t} + \beta_7 ACIE_{i,t} + \beta_8 BDS_{i,t} + \beta_9 BDI_{i,t} + \beta_{10} Duality_{i,t} + \beta_{11} Ln(\alpha)_{i,t} + \beta_{12} Ln GP_{i,t} + \beta_{13} RWCGP_{i,t} + \beta_{14} Aud_{i,t} + \beta_{15} Sol_{i,t} + \beta_{16} Und_{i,t} + \beta_{17} Ln(Age)_i + \beta_{18} EPS_PI_{i,t} + \beta_{19} Mom_30_{i,t} + \beta_{20} TOS_{i,t} + \beta_{21} FI_{i,t} + \beta_{22} OE_{i,t} + \beta_{23} NE_{i,t} + \beta_{24} NCE_{i,t} + \beta_{25} Pre-CGC_{i,t} + \beta_{26} Con-CGC_{i,t} + \beta_{27} Post-CGC_{i,t} + \eta_j$. Table I for variable descriptions and definitions. λ_j , coefficient on the intercept term. β_j , coefficients 1 thru 27 on the independent and control variables. η_j , error term. and *, **, and *** significant at 0.01, 0.05, and 0.10 confidence limits (two-tailed significance with *t*-statistic based on White's heteroscedasticity-consistent covariance matrix)

Table VI.
Multivariate tests

insignificant from zero for the pooled-sample the coefficient on this independent variable is negative and significant ($p < 0.10$) for the Pre-CGC sub-sample regression analysis. Coefficients on ACILE_{*i,t*} in the regression analysis for the remaining two sub-samples are again insignificant from zero. Results related to ACILE_{*i,t*} may suggest legal qualifications and credentials were of greater relevance to investors in the Pre-CGC period but have diminished since. As with the pooled-sample results the

coefficients on $ACISDC_{i,t}$ and $ACIF_{i,t}$ are insignificant from zero in three regressions analyzing the sub-samples.

Also consistent with the pooled-sample results is the positively significant coefficient on $TOS_{i,t}$ across the three sub-sample regressions (Panel B and D, $p < 0.01$, two-tailed; Panel C, $p < 0.05$, two-tailed). Significance of other control variables, however, varies across the different sub-samples. In relation to the Pre-CGC sub-sample (Table VI, Panel B) there is a positive and significant association between underpricing and:

- amount of retained ownership ($p < 0.05$);
- underwriter reputation ($p < 0.01$);
- age of the firm ($p < 0.10$); and
- old economy firms ($p < 0.10$).

Meanwhile, the coefficient on $\text{LnGP}_{i,t}$ ($p < 0.05$) is negative and significant at conventional levels. In contrast to the Pre-CGC period sub-sample results, regression findings for the Con-CGC period sub-sample show only the coefficient on $\text{Sol}_{i,t}$ ($p < 0.05$) is negatively statistically significant. Cross-sectional regression results reported in Table VI, Panel D show also show the coefficient on $\text{Mom}_{30,t}$ is positive and statistically significant ($p < 0.10$), whilst coefficients on $\text{BDS}_{i,t}$ ($p < 0.01$), $\text{Duality}_{i,t}$ ($p < 0.10$), $\text{LnGP}_{i,t}$ ($p < 0.01$) and $\text{RWCGP}_{i,t}$ ($p < 0.05$) are negative and statistically significant.

5.6 Supplementary and sensitivity analysis

To further analyze the association between audit committee structural features and underpricing, and to test the robustness of our main results, we conduct additional tests. One series of additional tests focused on measuring underpricing. Our approach to measuring underpricing is consistent with technique used in the majority of prior literature (Jog and McConomy, 2003). Others, however, use the return after the first week of trading or the market-adjusted first trading day abnormal returns (Aggarwal *et al.*, 1993; Chi and Padgett, 2005). For completeness we perform the main regression analysis (as reported in Table VI) again using the first week return and market-adjusted first trading day abnormal returns. Tests using alternative measures for underpricing fail to show any qualitative variations from our previous reported main results.

Aside from using alternative proxy measures for the dependent variable we also perform the main tests again using different measures for the independent variables. For example, rather than use a dichotomous scale to measure gender or ethnic diversity we used the proportion of female or non-Chinese independent directors on the audit committee to the total number of individuals on this sub-committee. Additional regression analysis again yields no significant differences to prior findings. Proportionate measures were also used for the remaining independent variables (where appropriate) with main results persisting[16].

The literature indicates “hot-market” is one of three major IPO phenomena[17]. Specifically, past literature results show the level of underpricing is magnified during select periods when investors perceive the market to be a “sure bet”. The “Dot.Com” period from 1999 to early 2001 is cited as one classic example of a “hot-market” period.

As our study transcends the “Dot.Com” period this may have influenced our results. To this end we partitioned our sample into three sub-samples:

- (1) pre-“Dot.Com” listing period;
- (2) “Dot-Com” listing period; and
- (3) post-“Dot.Com” listing period.

We then performed the multiple regression analysis again using each of the three aforementioned partitioned “Dot.Com” sub-samples. Overall, our major findings reported in Table VI, Panel A continue to hold in respect to our independent variables. However, several points were worth noting. First, the association between $ACIAE_{i,t}$ and $UP_{i,t}$ is found to be highly significant and positive for the pre- and post-“Dot.Com” listing period sub-samples ($p < 0.01$, two-tailed) but less so for the “Dot.Com” listing period sub-sample. Second, negative $AICPre_{i,t} - UP_{i,t}$ associations were strongest in tests including only the “Dot.Com” sub-sample ($p < 0.01$, two-tailed) than the other two sub-samples ($p < 0.10$, two-tailed, respectively). Thirdly, though the positive association between $ACIE_{i,t}$ and the dependent variable is significant across all three “Dot.Com” sub-samples it is particularly strong for the pre-“Dot.Com” IPOs ($p < 0.01$, two-tailed). The $ACIE_{i,t} - UP_{i,t}$ association is only moderately significant for the “Dot.Com” sub-sample ($p < 0.10$, two-tailed). Finally, the coefficient on $ACIF_{i,t}$ is moderately significant ($p < 0.10$, two-tailed) for IPOs comprising the post-“Dot.Com” sub-sample but not the other two. Despite some minor differences we conclude our results are not significantly biased by the “Dot.Com” period.

The regression analysis was also conducted again following respective modifications to control variables. For instance, rather than measure the pre-IPO market momentum across a 30-day observation window were also measured it for 60- and 90-day periods. Tests using alternative measures for relevant control variables yielded similar results to those reported in Table VI. Our study does not claim to include an exhaustive list of control variables. Prior research notes other factors could have an influence on underpricing. To ensure the robustness of our findings and comprehensiveness of our analysis we performed a range of tests including alternative control variables. These included controls for firm growth, managerial forecast, leverage and firm size prior to listing. Regardless of the additional control variables included results of the additional tests are consistent with those reported in Table VI.

Finally, aside from control variables noted we repeated tests including other factors in light of key socio-political and economic features of the Singapore’s business and institutional environment. For instance, unlike in many Western nations the Singapore government is a major actor in the nation’s capital market. For example, via its corporate arm (i.e. Temasek Holdings Private Limited) the Singapore government is a pivotal or controlling owner in key Singapore corporate entities such as Singapore Airlines Limited, Chartered Semiconductors Manufacturing Limited, and Singapore Telecommunications Limited[18]. Given the influence of the Singapore government and GLCs we controlled for this in additional tests (using a dummy variable whereby an IPO is scored one [1] if a GLC is a substantial shareholder pre-invitation). Tests including the additional control variable did not alter main findings as reported in Table VI, and the coefficient on the control variable is not significant from zero.

6. Summary of hypothesis test results

Whilst having used a range of univariate, correlation and cross-sectional regression tests to analyze our testable hypotheses we, for simplicity of argument, base our main conclusions on results from the cross-sectional regression analysis. *H1* and *H2* focused on the accounting and legal qualifications and credentials of the independent directors assigned to the audit committee. Cross-sectional regression results imply a strong and consistent positive association between the presence of an independent director with accounting qualifications and credentials on audit committees of Singapore IPOs and underpricing. A positive association contradicts the predicted direction of *H1*. A positive association could imply investors place an additional premium on the value of IPOs with accounting qualified independent audit committee members leading to more aggressive bidding for the IPO's shares. Issuers, meanwhile, whilst possibly knowing they could reduce their cost of capital at the time of listing by constructing audit committees with accounting qualified independent directors, may opt to "leave more money on the table" upon listing with an aim of recouping the money at a later date. In contrast to accounting expertise the influence of independent audit committee members with legal qualifications and credentials on underpricing is at best limited. We only find a significant legal expertise – underpricing association amongst IPOs listing on the SGX prior to the announcements of the code. Thus, issuers and investors generally appear to be quite indifferent to the presence of an independent audit committee member with legal qualifications and credentials. Overall, our empirical findings do not support *H1* and *H2* as stated.

H3 and *H4* both focus on the experience of independent audit committee directors. Cross-sectional results indicate in the case of *H3* no significant difference in the level of underpricing of IPOs with at least one independent audit committee member who concurrently serves as a senior executive on another publicly listed firm and those IPOs without such independent audit committee members. This finding is persistent across all time period partitions analyzed. In contrast, our findings are generally consistent with *H4* predictions. Specifically, underpricing levels of IPOs with at least one independent audit committee member having prior IPO launch experience is significantly lower than IPOs lacking independent audit committee members with such experience. We note, however, strength of the significant negative IPO launch experience – underpricing link declines from pre-announcement of the code and its enactment. In conclusion our empirical findings do not support *H3* as stated whilst there is general moderate support for accepting *H4*.

Diversity is the final major set of human-resource features we focus on. Consistent with *H5* predictions empirical findings show a persistent and positive association between underpricing and the age difference of independent audit committee members relative to remaining board directors. A positive association supports the argument investors may perceive a growing age differential as having a negative influence on group dynamics and cohesiveness amongst board and audit committee members, and between these two groups (i.e. the board and the audit committee). Contrary to *H6* predictions our empirical findings indicate underpricing of IPOs with audit committees having greater gender diversity amongst independent members did not differ significantly from IPOs with gender homogeneity amongst independent audit committee members. Whilst gender diversity is not influential our empirical results indicate a positive relationship between ethnic diversity and underpricing.

Specifically, we find the level of underpricing for an IPO with an audit committee comprised of independent directors who are not all of a Chinese ethnic background is significantly higher than an IPO where the independent directors on the audit committee are all of a Chinese ethnic background. The positive association, contrary to the predicted direction of *H7*, suggests investors may give higher value to IPOs with audit committee having broader ethnic representation. Investors may assign such a higher value in the belief greater ethnic diversity bring a wider set of experiences and views that could enhance the decision-making process of the financial reporting associated sub-committee. Based on empirical findings as described above there is support for accepting *H5* whilst *H6* and *H7*, as stated, is rejected.

7. Concluding remarks

Casual observation, mixed with anecdotal and empirical evidence, suggests a wide cross-sectional variation in the composition and human-resource properties of the audit committees, not only across national boundaries, but within countries. Given this wide variation the nature of the association between human-resource properties of the audit committee and underpricing is a fundamental research question with clear policy implications. If empirical evidence indicates lower underpricing is associated with audit committee having independent directors of specific human-resource properties will aid in justifying policy efforts that support the mandating of a uniform audit committee structure. Conversely, the lack of any association would be consistent with an efficient contracting view that suggests uniform reforms of the audit committee structure will be more costly to a firm. As noted above empirical analysis of an audit committee – underpricing structure is currently limited to the presence rather than structural characteristics or human-resource properties of this pivotal board sub-committee. A major contribution of our study is to provide, in part, initial exploratory evidence of the association, if any, between human-resource properties of independent directors on the audit committee and underpricing.

Our study diverges from prior literature focusing on IPOs with a primary objective of examining the association between human-resource features of independent directors presiding on IPO audit committees and underpricing. In contrast to our study the majority of recent studies of audit committees have debated the need for and effectiveness of this sub-committee. Such debate has been spurred by the aftermath of major worldwide corporate collapses (e.g. Enron, WorldCom and Parmalat) blamed on failures in existing systems of accounting and governance. Another contrast between our study and prior audit committee research is the vast proportion of academic attention on audit committees to date (both pre- and post-recent financial scandals) is limited to existing publicly listed firms.

In our study, we specifically look at seven human-resource features covering three major categories (qualifications and credentials, business and IPO launch experience, and diversity). The general proposition underlying our study is that if investors perceive human-resource features of independent audit committee members as a signal of the IPO's quality this will influence an IPO's first-day trading return. Also, our study also investigates if associations between human-resource features of independent audit committee members and underpricing shift during a transitional period in Singapore's corporate governance regulations. Audit committees have a long established history in

Singapore with attention renewed with the release and enactment of requirements contained in the code.

Taking our empirical results together suggests no overwhelming association between the human-resource features of IPO audit committees and underpricing. Rather, our findings suggest only some specific human-resource features (e.g. presence of an independent audit committee member with accounting qualifications and credentials) are of significance with others (e.g. gender diversity of independent audit committee members) having no association. Also, results do not suggest a major category of human-resource features (i.e. qualifications and credentials, business and IPO launch experience, or diversity) is associated with underpricing. The mixed results are consistent with the argument that investors view audit committee formation for any given firm as an efficient contracting arrangement. That is, to achieve an optimal mix of control mechanisms for each firm can best be achieved if each firm is allowed to structure their audit committee that will best fit its specific needs and requirements. Arguments for policies seeking to mandate audit committees be comprised of pre-determined human-resource features and structures are not supported by our results. Indeed, our results imply that if regulations require IPO audit committees comprise specific human-resource features some firms may be unjustly penalized with higher costs of capital placing such entities at a disadvantage to counterparts that benefit from incorporating such human-resource features in the construction of their audit committee. Finally, despite the renewed attention and focus on audit committees our empirical results do not indicate any relevant shift – either to or from – amongst investors to the importance of human-resource features of independent audit committee members in determining the value of an IPO.

In conclusion, whilst acknowledging some caveats associated with our study such as focusing on a single nation, our study does contribute relevant insights to the debate about audit committee effectiveness. Our analysis indicates investors (and/or issuers) appear to place little value on human-resource features of independent audit committee members in determining the value of an IPO. Consequently, an IPO's cost of capital (i.e. underpricing) does not appear to be enhanced or comprised is the listing firm constructs its audit committee with independent directors having specific human-resource qualities.

Notes

1. The other three models identified by Hawley and Williams (1996) are the political model, the stakeholder model and the stewardship model.
2. Legal qualifications and credentials are viewed as a mark of expertise in the context of legislation and legal requirements regarding corporate governance, and accounting and financial matter.
3. The dominant ethnic group in Singapore is the Chinese who make up approximately 77 percent of the total population. For simplicity we define an audit committee to be ethnically diverse if one of the independent directors on the audit committee is not from a Chinese heritage.
4. Consistent with prior research (Jelic and Briston, 1999) we cap the maximum underpricing at 100 percent to reduce outlier influences. Review of underpricing of the final useable sample found eight firms (four in 2003 and two in both 2002 and 2004) with underpricing greater than 100 percent. In sensitivity tests we conducted tests using unwinsorized and winsorized values.

These tests do not indicate any significance qualitative differences. Winsorizing, therefore, does not affect the results and implications of our research.

5. For 1998-2001 the Big-5 audit firms is used after which point Arthur Andersen folded leaving the Big-4. In 1997 and early 1998 the Big-6 term applies. This is prior to the Coopers Lybrand and Pricewaterhouse merger.
6. Following Demers and Lewellan (2003), Ittner *et al.* (2003) and Murphy (2003) and building on the underlying definition defined earlier in this paper, an industry is defined as “IC intensive” if the US SIC designation is 3,570 (computer and office equipment), 3,571 (electronic computers), 3,572 (computer storage devices), 3,576 (computer communication equipment), 3,577 (computer peripheral equipment), 3,661 (telephone and telegraph apparatus), 3,669 (communications equipment), 3,762 (printed circuit boards), 3,764 (semiconductor and related devices), 4,812 (wireless telecommunications), 4,813 (telecommunications), 5,045 (computers and software wholesalers), 5,961 (electrical mail-order houses), 7,370 (computer programming and data processing), 7,371 (computer programming services), 7,372 (prepackaged software), 7,373 (computer integrated systems design), 7,374 (computer processing and data preparation), 7,385 (telephone interconnect systems), 8,000 (health services), 8,011 (doctoral facilities), 8,050 (nursing and personal care facilities), 8,051 (skilled nursing care facilities), 8,060 (hospitals), 8,071 (medical laboratories), 8,082 (home healthcare services), 8,111 (legal services), 8,200 (educational services), 8,711 (engineering services), 8,731 (commercial physical and biological research), 8,734 (testing laboratories), 8,741 (management services), 8,742 (management consulting services) and 8,744 (facilities support management services).
7. “Old economy” IPOs are those with US SIC codes less than 4,000 not otherwise categorized as “new economy”.
8. “Non-classified” IPOs are those with US SIC codes above 4,000 not otherwise categorized as “new economy.”
9. Besides the control variables included in Table I we did perform sensitivity tests using other possible compounding factors that could have unduly influenced our findings. For example, given the possible influence of the “hot IPO” period surrounding the “Dot.Com Bubble” years we performed sensitivity tests using an indicator variable to assess the impact of this variable. Univariate and multivariate findings, however, did not indicate this indicator variable had a significant influence on our main findings. For brevity we have limited our main findings to only include specific control variables as defined in Table I and its related discussion.
10. A series of indicator variables are also included in the regression analysis to control for any annual influences on underpricing that could have affected the results. For brevity standard errors and *t*-values for the yearly indicator variables are not shown. Overall, the year of listing does not appear to significant compound our main findings.
11. In late 1997 Singapore (like other Asian nations) was savaged by the Asian Financial Crisis that lingered into 1998. Whilst in the midst of an economic recession in 2001/2002 Singapore’s economic prosperity was further dampened by the SARS crisis.
12. As a point of interest just under a fifth (i.e. 19.565 percent) of our sample had audit committees comprised solely of independent directors. This is considerable below North American values (Beasley and Salterio, 2001; Klein, 2002) but not completely unexpected as we focus on IPOs rather than seasoned listed firms. Further, we use data from a region (i.e. Asia) likely to be more reluctant to rely on independent directors than North America and European nations due to societal and cultural values.
13. An abridged correlation matrix (one showing only correlations between dependent and independent variables) is reported due to size of the full matrix and size and length considerations of the paper. As the correlations related to control variables are not above

critical limits we conclude a showing of the full matrix is not critical to the paper's content. A full matrix, however, can be obtained from the authors upon request.

14. This technique is also used for dummy variables that proxy the three major industry sectors.
15. Other diagnostics (eigenvalues and condition values) also suggest multicollinearity is not a significant problem.
16. Some may argue proportionate (or continuous) measures are more appropriate than dichotomous (or discrete) measures. However, in our study the proportionate and dichotomous measures were virtually one in the same due primarily to a lack of variation. Thus, we determined a dichotomous scaled approach is more befitting the circumstances and upon which to base our major empirical findings.
17. The other two phenomena are underpricing and negative post-issue stock performance.
18. Corporations where the Singapore government is a substantial and controlling owner are termed government linked corporations (GLCs). Listed GLCs make up approximately 30-40 percent of the total market capitalization of the SGX (Van der Zahn and Tower, 2004; Phan and Yoshikawa, 2005).

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