Under-pricing of South and East Asian IPOs: An Investigation of the Relevance of Governance Quality in Closely Controlled Companies.

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Abstract

In this paper, we investigate the impact of national governance quality on the under-pricing of new equity issues in developing South and East Asian equity markets. A significant feature of many listed companies in these markets is the dominant control position of insider shareholders or family groups. We explore the issue of concentrated control when assessing the extent of under-pricing. We find that governance quality is positively related to IPO under-pricing these markets, contrary to previous research findings on developing markets. This relationship is restricted to companies not associated with concentrated control. We propose that concentrated control is better represented by a proxy, either company size or company leverage, than by concentration of share ownership. Our results, when we employ a proxy for concentrated control, support the 'reduced monitoring hypothesis', contrary to the findings of previous studies.

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1. Introduction

Under-pricing is a widely identified phenomenon that occurs when shares are initially listed on an exchange, and are offered to potential investors. It implies that shares are offered at a price below true market value, offering profit to an investor who successfully subscribes for an initial public offering (IPO) and immediately sells their investment to others. This profit is at the expense of an issuing company that receives less than full market value for the shares they may have sold as a source of new equity capital. Under-pricing has been identified and empirically examined in a wide range of equity markets throughout the world. Reported findings demonstrate that it occurs in practically all markets, both those considered as developed and those considered as developing. Average initial returns on newly listed shares are between six and eight percent, in the case of Austrian, Canadian, and Danish IPOs, whereas average initial returns in Italy, the U.K., and the U.S. range between fifteen and seventeen percent. In contrast, average initial returns in Malaysia, Korea, and India are between fifty percent and ninety percent[1]. Although not definitive, these results imply that very high levels of under-pricing are typically associated with some developing markets, and that although still positive, under-pricing in the developed markets is somewhat lower.

Using national governance indicators, we examine the evidence on whether governance quality has an impact on the extent of under-pricing in South and East Asian developing markets. Available evidence implies that governance does impact on under-pricing, but that it is not an influence in developing market IPOs. The South and East Asian markets are of particular interest, as they are characterised by many companies in which control is concentrated within a small group of shareholders or a family group, and is unrelated to the extent of actual shareholding. A 'reduced monitoring' explanation implies that company management will wish to under-price in order to ensure widely distributed new shareholdings, but only if they have a concern that new blocks of shareholders can take advantage of protections offered by good external regulation. We expect that, in South and

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[1] Source is Loughran, Ritter, and Rydqvist (1994), updated on site.warrington.ufl.edu/ritter/, 2016.

East Asian markets, the impact of governance quality on under-pricing will differ from that reported from studies of IPOs in other markets. External regulation could be less effective in companies with concentrated control, as new shareholders will not be able to use their vote, to take advantage of protections available in a good governance environment.

In this paper, we explore whether National Governance Indicators have explanatory power for the level of under-pricing in South and East Asian equity markets. We have gathered a sample of IPOs in India, Korea, Malaysia, Pakistan, Sri Lanka, and Thailand[2]. Our sample consists of 1009 separate initial public offerings, covering the period from 2010 to 2019, and we search for evidence of a relationship between levels of under-pricing of IPOs and national governance indicators. These indicators capture a number of broad measures of governance quality at national level. We include company-level factors that are commonly identified as having a potential impact on the extent of under-pricing. We explore the issue of concentration of ownership and of control, and we examine whether it has an impact on the relationship between IPO under-pricing and quality of governance. We offer proxies for concentration of control rather than concentration of share ownership, and we again test for potential impact on the relationship between under-pricing and governance quality. We conclude by directly examining the relationship between the extent of under-pricing of IPOs and the subsequent distribution in share ownership.

Our study offers new contributions to the literature. We concentrate on developing markets, and unlike previous studies, we specifically address the issue of concentration of control in individual IPO companies. Our measures of governance quality are Worldwide Governance Indicators, prepared by the World Bank. An attractive feature is that they are updated annually, unlike the governance indicators normally employed in empirical investigations of this type. We also gather individual data on IPOs, rather than sourcing our information from

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[2] We exclude the Taiwan Stock Exchange from our study, as it is the only market requiring that all IPOs trade in a pre-issue market for at least six months prior to issue, as a solution to determining the appropriate issue price. Details and analysis are presented in Chang, Chiang, Qian, and Ritter (2017).

a database. We believe that this may facilitate the identification of a greater number of IPOs, particularly the smaller issues. This may impact on our findings.

We find an insignificant positive relationship between governance quality and levels of IPO under-pricing. In further testing, we consider the impact of concentration in shareholding. We again find a positive but insignificant relationship between governance and under-pricing, regardless of whether or not we separately consider companies with a widely dispersed shareholding. We propose that this is because concentration of shareholding may not indicate concentration of control. In further testing, we use proxies for family or insider related control, as opposed to shareholding, and we do find evidence that governance quality does impact on under-pricing, only in companies not associated with concentrated control. This result is contrary to previous evidence. It also is supportive of 'reduced monitoring'. Due to the unique ownership structure in Asia, our analysis on shareholder distribution adds value to this investigation. We propose that this result is strongly supportive of our proposition that concentration of control in new listing companies will impact on the potential influence of a good governance environment, and therefore on the motivation of insiders to under-price new issues.

In Section 2, we review relevant theory on the relationship between governance quality and the extent of under-pricing. We develop a justification for our proposal that the concentrated control of many companies listed in developing markets will impact on the relationship between governance quality and the motivation to under-price new issues. We establish a number of related hypotheses. Section 3 provides descriptions of the governance measures we employ in this study. Section 4 presents details of our study population, including estimated levels of under-pricing. We outline the company-specific factors we include as a control when assessing the relationship between governance quality and under-pricing. We include numerical details on governance quality measures we use in this paper. Section 5 presents our empirical findings. In an initial sub-section, we examine our full study

4

population. In a further sub-section, we explore the issue of concentration of shareholding, and its impact on the relationship between governance quality and the extent under-pricing. In the next empirical sub-section, we use proxy indicators of concentration of control when exploring the relationship between governance quality and under-pricing of IPOs. A final sub-section offers a direct assessment of the impact of under-pricing on the distribution of post-IPO shareholdings. Section 6 summarises and concludes our paper.

2. Under-pricing, governance quality, and concentration of control

Our paper offers a further investigation of the proposition that IPO under-pricing will occur in an environment in which there is strong protection of individual investors. An effective governance environment is attractive as it will give firms easier access to external capital, management and inside investors however will face a conundrum, as listing requirements will typically weaken their rights, relative to the rights of new outside investors. In other words, an environment that ensures better governance will limit the potential extraction of private benefits by management and by insiders. Brennan and Franks (1997) demonstrate how IPO under-pricing is used to ensure oversubscription and rationing in the share allocation process, to allow insiders to discriminate between applicants for shares, and to minimise the block size of new shareholdings. This will be a feature of environments with strong protection of outside investors. Assuming that insiders will value control and the related potential to extract private benefits, there is an incentive for greater under-pricing, as it will enable discrimination against investors who subscribe for large blocks of new shares. Insiders will wish to ensure a very wide distribution in ownership, so that new investors hold relatively small stakes, so they will either not have the incentive or the ability to monitor and control management. Brennan and Franks (1987) describe this proposition as 'reduced monitoring'. They also report that management of oversubscribed new U.K. IPO firms allocate a disproportionately large proportion of shares to small investors.

5

It is arguable however that IPO under-pricing will be pointless, as large blocks of new shareholdings can be formed after listing, if outside investors subsequently purchase shares on the secondary market. This could undermine any 'reduced monitoring' benefit enjoyed by insiders and by management. Shleifer and Vishny (1986) demonstrate however that if a change in ownership and control is expected, share prices will rise in anticipation of any gains, thereby eliminating potential abnormal returns to outsiders who subsequently purchase large shareholdings. Brennan and Franks (1987) report that IPO under-pricing typically results in over-subscribed offers and subsequent discrimination against large new blocks of shareholdings. They also however find no subsequent evidence of the formation of large blocks of new shareholdings. In conclusion, any benefits of 'reduced monitoring' will continue to be enjoyed by inside investors and by management. In choosing the level of under-pricing, management will trade off the expected benefits of 'reduced monitoring' against the expected marginal cost of under-pricing. The benefits of 'reduced monitoring' will be considerably greater in a strong regulatory environment.

In our study, we offer an exploration of the relationship between governance quality and under-pricing in South and East Asian developing markets. We restrict our study to IPOs in these markets, where we specifically examine the motivation of insiders to under-price new share issues in developing markets. There are two reasons why a study of these markets is of particular interest. Firstly, as we will outline, available evidence (Autore, Boulton, Smart, and Zutter, 2014) implies that governance quality is not an important determinant of under-pricing in developing markets. Nevertheless, as we will subsequently demonstrate, a sizable number of South and East Asian markets operate with strong measures of governance quality, whereas others clearly offer a low quality governance environment. Secondly, there is evidence of a significant deviation between ownership and the control of many companies listed on South and East Asian equity markets. Claessens Djankov and Lang (2000) show that closely held firms and family firms maintain control through a network of connections and holding companies. We expect that this will continue, regardless of the potential impact

6

of external governance regulation on new outside investors and on their wish to protect themselves from expropriation by insiders. We expect that if concentration of ownership does differ from concentration of control, there will be no incentive to under-price IPOs in order to ensure a wide distribution of new shareholdings, as large new shareholders blocks cannot impact on the ability of insiders and managers to continue to extract the private benefits of control. We expect that insiders will only be motivated to under-price new issues in a good quality governance environment, if share ownership is related to control. New investors would be able to take advantage of the protections associated with good governance, only if they can subsequently exercise some control as shareholders.

Smart and Zutter (2003) offer support for 'reduced monitoring', as they identify evidence of lower under-pricing in dual-class IPOs, when compared with single-class issues. Dual-class shares will facilitate the maintenance of insider and management control. Hopp and Dreher (2013) provide further evidence, as they find greater overall levels of under-pricing in countries with a stronger protection of outside investors. Boulton, Smart, and Zutter (2010) find direct evidence in support of 'reduced monitoring', in their study of IPOs in a wide range of national markets. They report a significant positive relationship between governance quality and the extent of under-pricing. This finding supports the proposal that excess under-pricing provides a more dispersed ownership structure and ensures post-IPO insider control. Autore, Boulton, Smart, and Zutter (2014) offer an extension, as they separately assess IPOs in developed and in developing markets. They propose that whereas there are exceptions, quality of governance in developing markets will typically be weaker, and this reduced protection will allow management and insiders to continue to extract private benefits. There should be less incentive to under-price, as management and insiders will not fear loss of control benefits. Their results are supportive of this proposition, as they find no significant relationship between under-pricing and governance quality in developing market IPOs. They also find that financial reporting standards, quality of law enforcement, and enhanced public trust, are all associated with markets in which there is a significant positive

relationship between under-pricing and governance. They infer that, as these aspects of governance quality are less likely to be present in developing markets, there is less incentive on insiders to under-price. They offer this explanation for an absence of relationship between governance quality and under-pricing in developing markets. In contrast, Engelen and Van Essen (2010) find a significant negative relationship between governance quality and the extent of under-pricing. This result is supportive of proposals that under-pricing is required to compensate potential investors who will face greater uncertainty in a weak governance environment. Rock (1986), Welch (1989), Chemmanur (1993), North (1991), Claessens and Laeven (2003), Johnson et al. (2000), Giannetti and Simonov (2006), and Chiou et al. (2010) offer alternative theoretical explanations to justify this negative relationship. We believe that our empirical investigation may assist an exploration of reasons for the contrasting findings in Boulton, Smart, and Zutter (2010), in Autore, Boulton, Smart, and Zutter (2014), and in Engelen and Van Essen (2010).

Our initial research hypothesis therefore is:

H1: Governance quality measures will be a determinant of IPO under-pricing in South and East Asian developing markets.

In order to further investigate this issue, we account for the distribution of shareholdings in the immediate period after IPO. As 'reduced monitoring' implies widely distributed small shareholdings, we allow for concentration in shareholding when we assess the extent of relationship between governance quality and IPO under-pricing in these markets. Our second hypothesis therefore is:

H2: In firms with low levels of post-IPO concentration in share ownership, governance quality is positively related to the extent of IPO under-pricing.

A further research hypothesis will take account of Claessens et al (2000), as we will explicitly allow for the separation of concentration in share ownership from concentration of control.

Using proxies for concentration of control, we categorise these IPOs, and we again assess the extent of relationship between governance quality and the level of IPO under-pricing. We test the following hypothesis:

H3: In firms with low levels of concentration of control, governance quality is positively related to the extent of IPO under-pricing.

In robustness tests, we explicitly examine a central aspect of 'reduced monitoring', as we assess the impact of IPO under-pricing on the subsequent distribution in shareholdings. As well as considering the full population of IPOs, using our proxies, we separately consider the effect of concentration in control on this relationship.

3. Quality of governance indicators

Good governance is required to protect investor interests, and to ensure that they will be prepared to commit investment capital. A good system of investor protection will assist companies wishing to raise either equity or debt capital, it will also impact on the scale of development in financial markets. Differences in quality of governance will impact on the spread of ownership in equity and debt capital. It may also impact on capital structure, on dividend policy, and potentially also on company value. The number of IPOs is related to investor rights, as larger amounts of IPOs occur in countries that provide greater legal protection. Following La Porta et al. (1997, 1998, and 2002), specific differences in national regulatory system have been identified as influencing company management. A number of proxies commonly are applied to represent relevant aspects of a regulatory framework. They typically include a measure of quality of investor protection, the quality of a national legal system (relevant statutes enacted by a national parliament), judicial efficiency (the law in practice), and origin of the legal system. Quality of investor protection is represented by a measure of the extent to which outside investors are protected against expropriation by insiders (Djankov et al., 2008). Quality of the legal system and institutions is captured by estimates of the extent to which individuals and groups have confidence in societal rules and

regulations (Kaufmann et al., 2005). Judicial efficiency is represented by the strength and efficiency of legal enforcement, this can compensate for a relatively poor quality legal system. Origin of legal system requires classification as deriving from a particular legal background. National legal systems are categorised as coming from English Common Law, French Civil Law, German Legal Origin, or Scandinavian Legal Origin.

We apply World Bank Governance Indicators, to capture all aspects of regulatory framework in each of the national markets in our study. Six aggregate indicators are prepared and updated annually, using a large number of data sources[3]. The World Bank states 'The Worldwide Governance Indicators are a research dataset summarizing views on the quality of governance provided by a large number of enterprise, citizen and expert survey respondents in industrial and developing countries. These data are gathered from a number of survey institutes, think tanks, non-governmental organisations, international organisations, and private sector firms'. Aggregate indicators for each country are:

Government Effectiveness (*GE*) reflects perceptions of the quality of public services, the degree of independence from political pressures, the quality of policy formulation and implementation, and the credibility of government commitment to such policies.

Regulatory Quality (*RQ*) reflects perceptions of government ability to formulate and implement sound policies and regulations that promote private sector development.

Rule of Law (*RL*) reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, in particular the quality of contract enforcement, property rights, the police, and the courts.

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[3] Details on the construction of these indicators are available in Kaufmann, Kraay and Mastruzzi (2010).

Control of Corruption (*CC*) reflects perceptions of the extent to which public power is exercised for private gain, including all forms of corruption, as well as "capture" of the state by elites and private interests.

Voice and Accountability (*VA*) reflects perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.

Political Stability (*PS*) measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism.

Whereas the Worldwide Governance Indicators do not directly align with proxies identified in governance literature, there clearly is a close correspondence between them. Quality of investor protection is captured by Control of Corruption. Quality of the legal system is represented by Regulatory Quality and by Government Effectiveness. Judicial efficiency is covered by Rule of Law and by Voice and Accountability. Origin of legal system should also be picked up in these national indicators.

4. Input Data

Our dataset consists of all IPOs from six South-East Asian countries, over the period from January 2010 to December 2019. All IPOs were manually identified, using data available through each national market web page and also individual company web pages. Data collected for each IPO company consists of the date of company foundation, the date or dates of first issue, the initial listing date, the issue or offer price, total proceeds of the new issue, the underwriter(s), closing price on the first trading day, and total market capitalisation on the first trading day. Data-stream offers an alternative data source, which was used to provide either closing day price or market value or to verify the data collected from market and company web pages. In any case where an item of data is missing and could not be

collected elsewhere, this IPO is deleted from our dataset. In common with the standard

methodology in this literature, we estimate under-pricing as the percentage change in value

from issue price to closing first-day price on the secondary market. We do not adjust for

market movements. Realistically, this correction would not impact on our results, as average

IPO returns are very considerably in excess of market returns on any average trading day[4].

We present summary details of our study population in Table 1. We indicate the total number

of IPOs in each national market, during our study period from 2010 to 2019, together with

the overall totals for our study population. When constructing our study population, we

exclude the top and bottom one percent of IPO first day return examples, to eliminate

potential distortions due to error or to outliers. Our final study population then is 1009 IPOs,

listing on the six South and East Asian equity markets. Using all IPOs in each market, we

estimate average national levels of under-pricing. We also indicate the distribution of under-

pricing estimates across each market, by including the standard deviation, skewness and

kurtosis, maximum and minimum values. We include a value weighted estimate of under-

pricing in each market, by adjusting for the relative size of each new issue. To construct this

measure, we weight our estimates of under-pricing by total market capitalisation on the first

listing date. In each market, we then prepare a weighted average estimate, using value

weighted IPOs from all years in the study period. We believe this measure is more

representative of the experience of investors in the new issue market, as the amount of

capital allocated to an individual new issue may be proportional to relative company size.

This has implications for our subsequent analysis.

We find very large differences between markets, as average levels of under-pricing range

from 2.66% (Pakistan) to 46.42% (Thailand). We note that our estimates are considerably

lower than the Loughran, Ritter, and Rydqvist (1994) estimates for these markets. Their

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[4] As an example, Beatty and Ritter (1986) report an average initial return of 14.1%, while the average daily
market return was less than 0.1%. We find that national average initial return ranges from 2.66% to 46.42% in
our study sample.

updated estimates range from 22.1% (Pakistan) to 88.5% (India). We find however that our rankings of average levels of under-pricing in these markets are very similar to those of Loughran et al. (1994). We identify the same markets as being associated with relatively higher levels of under-pricing. Measures of distribution demonstrate very wide variations in under-pricing in all markets. Minimum values show that some issues are over-priced, as we record a decline in value in the secondary market. We note a sizable positive skewness in under-pricing estimates across all markets, with the exception of Pakistan, which records only 35 IPOs. An implication is that very high levels of under-pricing are recorded only in a proportion of IPOs. Nevertheless, excess kurtosis in the distribution of estimates in most markets indicates a relatively large number of extreme values. Our weighted average measures imply that, after we allow for company size, we continue to find significant under-pricing in all markets. Again, Pakistan is the only exception. The small number of examples may not be representative of all IPOs in this market, and may therefore distort our results. Weighted estimates mostly are lower, suggesting that very high under-pricing is associated with smaller companies. They may attract reasonably low levels of investor interest, so greater under-pricing benefits may be required to attract potential new investors. We return to this issue in our subsequent analysis, when we explore the issue of concentration of control in these companies.

In our empirical tests, we include individual company level data that may impact on the level of under-pricing. Summary details are in Table 2. Ritter (1984) recommends a control for hot market effects, and we use *ACT* and *ROR* as controls. *ACT* is an indicator of the extent of new issue activity in the year of IPO. For each new issue, our measure is the number of IPOs in a national market, as a proportion of the total number of market listed companies in that year. Our annual estimate of the number of market listed companies is the number of DataStream listed companies. *ROR* is a measure of national annualised market return over the three month period prior to IPO. Our measure of pre-IPO market return is return on a market index. We use daily observations of the DataStream DS national market indices, as

they are dividend adjusted returns[5]. Mean values of *ACT* and *ROR* respectively are 0.0260 and 0.0659, indicating that the average annual number of IPOs in South-East Asian markets represents 2.6% of the number of listed companies, and that average market return (annualised) in the quarter before issue is 6.59%. The former is relatively stable, as indicated by a low standard deviation across all IPOs, whereas a very high standard deviation indicates a wide variation in pre-issue market return across our sample of new issues.

Offer size and company age also are commonly included in empirical investigations of new issues. To facilitate international comparisons, we convert all values to US$s, using exchange rates at the time. We do not include a control for inflation, as movements in the US$ exchange rate will capture this effect. Any uncaptured element will be minimal, considering levels of US inflation during this period. Average, minimum, and maximum proceeds (in US$s) are $92.05 million, $0.29 million, and $4659 million respectively. Because of this very wide range in values, our input measure in regression tests is the natural log of new issue proceeds. We designate this measure as '*SIZE*'. Our measure of company age is the difference in years between foundation year of a firm and the year of initial listing on the market. We use '*AGE*' to indicate this measure. Average, minimum, and maximum values are 16.1, 0.4, and 145 years respectively. We find a very wide dispersion in age of IPO companies, so we again use the natural log of these values as input values when estimating the regression models.

Either offer size or post-IPO value are included in regression tests, as they can capture the level of asymmetric information between an issuing firm and potential investors. Small size may impact on the extent of under-pricing that is required. Measures of value will relate to the amount and quality of information available to new investors, as greater transparency will be required to attract sizable amounts of investment capital to a larger company. Our

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[5] Details on the construction of DS (Data-stream) Indices are available in 'The Data-stream Global Equity Indices User Guide, Thomson Financial Limited 2015.

measure (*SIZE*) can therefore impact on the extent of under-pricing. Beatty and Ritter (1986), and Mauer and Senbet (1992) report evidence of an inverse relationship between issue size and under-pricing. Company age may also offer an indication of the extent of information asymmetry between a firm and any potential investors. Older firms will have a longer history of trading, and this track record provides another source of information to outsiders, potentially alleviating the perceived impact of information asymmetry. Loughran and Ritter (2004) and Chahine (2008) report a significant relationship between company age and the amount of under-pricing. We also include the volatility of share returns in the immediate post-issue period, which we designate as '*VOL*'. Using daily returns data from DataStream, we estimate volatility as the standard deviation of returns over the initial three months of trading. Although an ex-post measure, it should indicate investor uncertainty regarding intrinsic value. This is a further proxy for information asymmetry, and it may therefore impact on the level of under-pricing. Average post-issue volatility of share returns is 0.1733, but a very sizable standard deviation indicates wide variations across our sample of newly issued companies.

We include dummy variables as a control for the nature of arrangement between a new issue company and its banker(s), as this may impact on the extent of under-pricing. One dummy variable (*BK*) takes a value of one in the event of book-built offers, and a value of zero if there is a firm commitment or other method. Ljungqvist, Jenkinson, and Wilhelm (2003) find that book-built offers typically exhibit more under-pricing, although Ritter (1987) reports the opposite result. In Table 2, we show that 65.3% of our sample firms use a book-built offer. A further dummy (*INT*) signifies an integer offer price in the local currency; otherwise it has a zero value. An integer price may signify uncertainty, as more fine increments in value are less likely to be a concern in a less predictable environment. Bradley, Cooney, Jordan, and Singh (2004) demonstrate that integer priced IPOs are associated with higher under-pricing and also that they are associated with greater levels of post-issue price volatility. A majority of firms in our sample (66.0%) are offered for sale at an

integer price. To control for the impact of underwriter reputation, we create a further dummy variable (*TTU*) which identifies IPOs that are underwritten by a top tier bank. Carter and Manaster (1990) find a relationship between bank reputation and extent of under-pricing. In each year, we identify top-tier underwriters as those listed in the annual Bloomberg Top Twenty League Tables. We find that 6.29% of our IPO population is underwritten by a top-tier bank. A further dummy variable identifies high-tech firms, as they may be associated with excessive levels of under-pricing. We also include dummies, to isolate any effect associated with the particular year in which an IPO occurs. We employ a panel regression with fixed effects, to control for country level heterogeneity.

We present summary details on the governance indicators in Table 3. Each governance quality measure is indicated numerically, with values ranging approximately from -2.5 (very weak) to 2.5 (very strong). To facilitate comparisons between capital markets, we present average values of each indicator, for each individual country. The data indicates that although all six markets are categorised as developing, there is a considerable variation in quality of governance. Korea offers the best quality of governance across all measures, and is followed by Malaysia. Pakistan has the weakest governance environment. Correlation measures between annual national quality measures indicate very high degrees of similarity, as they obviously capture similar related aspects of governance quality. *VA* is an only exception, as the correlations range from 0.689 to 0.453. Although not reported, we note considerable changes in all governance measures throughout the nine year study period, as an overwhelming majority record an improvement. Largest individual improvements are for Sri Lanka (*VA* moves from -0.51 to +0.01), for India (*PS* moves from -1.28 to -0.96), and for Pakistan (*CC* moves from -1.09 to -0.79). Most other measures record sizable improvements over the study period. We find a small number of declining measures. These reductions are very small. An only exception is Thailand, as *VA* declines from -0.50 to -1.10. In conclusion, we believe that sizable improvements in most governance quality indicators for each market provide a strong justification for their use as the measure of governance in this study. In

contrast, governance quality measures used in much of the related literature are fixed in time, and often are based on the laws and institutions that were in place many years before the IPOs that they investigate.

5. Empirical results

5.1 The full study population, governance and under-pricing

We initially regress our estimates of IPO under-pricing on the annual governance quality indicators, together with all company-level measures and dummy variables described in Section 4. Our results are in Table 4. Models 1 to 6 each contain an individual national governance quality measure for the appropriate national market and year. Company-level factors added to each regression model are a measure of recent national IPO activity (*ACT*), national market return prior to the new issue (*ROR*), a measure of new issue value (*SIZE*), age of newly listed company (*AGE*), and return volatility in the period after new issue (*VOL*). Dummy variables indicating a book-built deal (*BK*), an integer offer price (*INT*), a top-tier underwriter (*TTU*), and a high-tech firm IPO (*HT*), are also included. Further dummy variables relate to year of issue. We use fixed effects regressions to control for country level heterogeneity. Although coefficients of some year dummies are significant, we do not report them for reasons of space.

We find no significant relationship between a national governance quality indicator and the extent of under-pricing. Models 1 to 6 each contain one quality indicator. All are positive, but none differ significantly from zero, so we reject our initial research hypothesis. This result conforms to Autore et al. (2014), who find no significant relationship when they examine IPO under-pricing in developing markets. They do however report that governance quality has a significant positive relationship with under-pricing, when tested in a combined population of IPOs from both developed and developing markets. Coefficients on company-level factors are also of interest. Measures of IPO activity (*ACT*) and of overall market return prior to IPO (*ROR*) carry significant positive coefficients in all models. Both imply a hot market effect, the

extent of under-pricing is affected by the frequency of new issues, and probably is motivated by recent market performance. A likely interpretation is that increased competition for new investor capital necessitates greater under-pricing. In all regression models, we find a strongly significant inverse relationship between offer size (*SIZE*) and the extent of under-pricing. Greater transparency associated with larger initial offerings will reduce information asymmetry, resulting in a reduced requirement for under-pricing. We also find a significant positive coefficient on *AGE* in all regression models, indicating that greater under-pricing is associated with older companies. This relationship however is not supportive of the proposal that under-pricing is required to compensate for investor uncertainty. We expect greater investor uncertainty regarding younger companies, implying the opposite relationship. The significant positive relationship between post-issue share return volatility (*VOL*) and the extent of under-pricing implies that uncertainty regarding intrinsic share value is reflected in return volatility, and is likely to result in increased under-pricing. This also conforms to expectations.

Dummy variables indicate an integer (*INT*) offer price and a book-built deal (*BK*). As no coefficients on *INT* are statistically significant, we do not find that integer prices impact on under-pricing. All estimated coefficients on *BK* are negative, and strongly significant. We find that book-built offers are associated with lower levels of under-pricing, as reported by Ritter (1987). Significant positive coefficients on the underwriter reputation dummy (*TTU*) indicate a positive impact on under-pricing, as identified by Loughran and Ritter (2004). Positive coefficients on the high-tech dummy (*HT*) imply greater levels of under-pricing in this sector, but none are statistically significant. Goodness of fit measures indicate that one governance quality measure, combined with individual company level factors, will explain approximately fourteen percent of the extent of under-pricing in our study population. This is of similar scale to measures of explanatory power reported in other related investigations.

5.2 Concentration of shareholding, governance and under-pricing

In further testing, we explore the impact of concentration in ownership on the relationship between under-pricing and indicators of governance quality. If under-pricing is the result of an attempt by management and insider shareholders to maintain their ability to extract private benefits of control after a public listing, we expect to identify a positive relationship only when we focus on IPOs characterised by low levels of concentration in shareholdings. Under-pricing is undertaken to ensure excess demand for the new issue. Large numbers of small new shareholdings are preferred, as a wide distribution of new shareholdings will better facilitate the retention of control by management and insiders. We expect a positive relationship between under-pricing and quality of governance, as there is a greater incentive to under-price. We expect to find this relationship in new IPO companies that have a low concentration of shareholdings, rather than in IPOs characterised by a more concentrated shareholding. We expect that the latter group are companies in which control by managers and insiders is maintained, regardless of quality of investor protection. In this case, there will therefore be no incentive to use under-pricing as a means to achieve a wide dispersion of new investors.

To facilitate this enquiry, we use free-float data provided by Data-stream. It offers historic information on the distribution of shareholdings of most companies in our dataset. Free-float data indicates the percentage of shares held by small investors, defined as those who do not possess a strategic shareholding. A separate category of strategic shareholdings includes holdings in excess of five percent, holdings by a government or government institution, holdings by one company in another, holdings by employees or by those with a substantial position within a company, holdings by pension funds, and holdings by a foreign institution[6]. Although Data-stream offers very wide coverage of free-float data, a small proportion of IPO

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[6] Details on free-float data are available in the Data-stream Free-float Calculation Guide, Thomson Financial Limited 2017.

companies in our study population are not included. Data for some Pakistani and Sri Lankan IPO companies is missing, so they must be excluded from this particular analysis.

We divide the IPOs into separate sub-sections, one in which distribution of ownership is highly concentrated, and one in which there is a very high proportion of small or non-strategic shareholdings. In the event of widely distributed shareholdings, strong regulatory protection will potentially impact on the private benefits of control by management and inside investors, should there be groups of new substantial outside shareholders. We expect a stronger relationship between governance quality and the extent of under-pricing within this group of IPOs, as insiders will employ under-pricing in order to facilitate discrimination against investors who subscribe for a large shareholding. We use free-float data six months after IPO to identify the high- and the low-concentration groups[7]. Using the percentage of non-strategic shareholdings, we rank all IPO companies, and we allocate them to three groups containing equal numbers of companies. We identify the highest ranked group as the low-concentration IPO companies, and the lowest rank group as high concentration IPOs. We then re-estimate our regression models, separately using the low concentration and the high concentration groups. We exclude the middle rank group, as we expect it may retain characteristics of both groups. To ensure comparability with results reported in the previous section, we again include company-level control variables and all dummy variables in our fixed effects regression tests. Our results are in Table 5.

Panel A contains regression estimates for the highly concentrated group of IPOs. Our results are as expected. We find no significant evidence of a relationship between under-pricing and governance quality. In Models 1 to 6, estimated coefficients are positive, but all are insignificant. Results for the company-specific explanatory variables are mixed. Coefficients on *ACT*, *SIZE*, *VOL*, and *BK* mainly are significant, and carry correct signs, indicating the

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[7] As a control, we also use free-float data eighteen months after IPO, when identifying high and low concentration groups of IPO companies. This alternative specification has little impact on our results.

expected relationship. We find no significant relationship with *ROR, AGE*, or *TTU*, indicating that market activity, age, and underwriter reputation, are less important influences on under-pricing of IPOs in the concentrated control group. Regression estimates for low shareholder concentration companies are in Panel B. They however are not as expected. Coefficients on governance quality are positive, but none are significant. Estimated values also are similar to those for the closely concentrated group. Results for company-specific explanatory variables again are stronger. Coefficients for *SIZE, AGE*, and *TTU*, are highly significant, similar to regression results for the full study population. *ACT*, *BK*, and *HT* also are significant in all regression models, and carry expected signs. Goodness of fit is of similar scale in both high and low concentration groups. Any improvement in the latter is due to a greater importance of company-specific variables. We therefore can find no evidence that a low concentration of share ownership has impacted on the relationship between governance quality and extent of under-pricing of IPOs, so we reject the second hypothesis. In both groups, we find positive but insignificant relationships between governance quality and under-pricing. We are unable to identify a significant relationship for IPO sub-groups based on a low concentration in share ownership.

Our test results, based on a segregation of IPOs by concentration of share ownership, do not offer support for 'reduced monitoring'. We find no evidence in support of the hypothesis that IPO firms with low concentrations in ownership have engaged in greater amounts of under-pricing when listing on a national market associated with a strong regulatory environment. We suggest that this failure is due to a conflict between concentration of share ownership and actual concentration of control. As Claessens et al. (2000) demonstrate, South and East Asian companies often exhibit significant deviations of share ownership from control. Many are controlled by a single shareholder, others are family controlled firms, and many have senior management who are related to controlling family shareholders. We therefore undertake alternative tests, in which we use proxies for concentration of control,

and we segregate our population of IPOs on the basis of concentration of control, rather than concentration in ownership.

5.3 Concentration of control, governance and under-pricing

In this section we explore the proposition that concentration of control will impact on an incentive to under-price an IPO in circumstances where insiders face a strong regulatory environment. We identify and use proxies for concentrated control of new IPO companies. Claessens et al. (2000) find that share ownership is not always associated with control. They identify (small) size as the best indicator of when control is more concentrated than implied by share ownership. They also identify (lower) company age as indicating concentrated control, although they fail to find empirical evidence of this proposal. We therefore select only (small) size as a proxy for concentrated control. A further necessary consideration is that both company size and company age are commonly identified indicators of information asymmetry. An alternative unrelated proxy measure therefore is desirable. We propose that company leverage is a suitable alternative proxy for concentrated control. Jensen (1986), Harvey, Lins and Roper (2004), and others, identify debt capital as a means of mitigating the ability of management to expropriate company resources. We therefore expect that low levels of debt are associated with concentrated control. Paligorova and Xu (2012) offer evidence in support of this proposition. We identify (low) company leverage as our second proxy for concentrated control.

We repeat the methodology employed in the previous section, except we now rank all IPO companies firstly by market value, and then separately by company leverage[8]. In each case, we again rank and separate the IPO companies into three groups of equal numbers. We identify the sub-group of smallest (or lowest leverage) companies as associated with concentrated control by insiders, and we designate the sub-group of largest (or highest

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[8] We define company leverage as total debt as a % of total financing, six months after IPO. The DataStream code for this ratio is: WC08221.

leverage) companies as having dispersed control. We again exclude the middle ranking group, as we anticipate they may retain characteristics of each. We re-estimate our cross-section regressions, separately using the low concentration and the high concentration groups. Our results based on company size rankings are in Table 6, and our results based on company leverage rankings are in Table 7.

We initially consider results for rankings based on company size. Panel A contains estimates for the group of larger IPO companies. We anticipate less concentrated control in this group, so we expect that insiders and managers will be motivated to under-price an IPO if they are in a strong regulatory environment. Our results strongly support this proposition. Regardless of regression model, we find that coefficients on all governance quality indicators carry significant positive coefficients. This clearly supports our proposition that under-pricing is positively related to governance quality, in circumstances of less concentrated control. In Panel B, we consider the concentrated control group, as indicated by small company size. In Models 1 to 6, coefficients on all individual governance quality measures are negative, but only one is statistically significant. This implies that under-pricing of smaller IPO companies may be greater in a less regulated environment. This result may offer support to the alternative proposition, that a strong governance environment is required to minimise uncertainty for new investors, and that under-pricing in a weaker governance environment will compensate for any uncertainty faced by external investors. It also coincides with Engelen and Van Essen (2010). If we consider company-level measures, we note that they all (with the exception of the *INT, TTU* and *HT* dummy variables) have unusually strong explanatory power for under-pricing in the group of small companies. All are significant, and carry expected signs. Goodness of fit measures in all models are somewhat larger for this group. In contrast, only INT and *ACT* have significant explanatory power for under-pricing of larger IPOs. We note in particular that coefficients on *ACT* (recent IPO activity in the national market) are significantly negative in all regression models. This implies higher levels of under-pricing in periods of relatively less new issue activity. We interpret this outcome as

supportive of the proposal that under-pricing is largely a response to the need to ensure a wide distribution of new small shareholders in larger less concentrated firms, and that individual firm related characteristics are less relevant in these circumstances.

In Table 7, our results are based on company leverage rankings. Panel A presents results for high leverage IPO companies. In all regression models, we find that governance quality measures have a significant positive relationship with under-pricing In Panel B, we offer estimates for the low leverage IPO companies. We find that coefficients on all governance quality measures are negative, although none are statistically significant. This outcome is very similar to that when we use small size as a proxy for concentrated control. Assuming that low leverage does indicate concentrated control, we find further support for our proposal that under-pricing of IPOs in a good regulatory environment only occurs when insiders do not have the advantage of concentrated control. Regression results based on leverage are supportive of our results based on company size. We identify a positive relationship between governance quality and under-pricing only in IPO companies without concentrated control. If we consider results for company level measures, we do not find the same contrast between high and low leverage IPOs. We find significant coefficients on *SIZE* and *TTU* in each group, with the expected negative and positive signs respectively. Goodness of fit is of similar scale for both groups. Nevertheless, our findings in relation to the less concentrated control group of IPOs again support 'reduced monitoring', and support acceptance of the third hypothesis.

5.4 Distribution of shareholdings and under-pricing, a direct test
In robustness tests, we offer an alternative exploration of 'reduced monitoring', by assessing the relationship between a post-IPO distribution in share ownership and under-pricing. We therefore directly test the proposition that under-pricing will ensure an increased distribution in share ownership. Although we do not include governance quality, we believe this test offers a useful investigation of elements of 'reduced monitoring', as it identifies the impact of

under-pricing on a subsequent distribution in company shareholdings. 'Reduced monitoring' proposes that under-pricing is motivated by a desire to ensure a widely distributed shareholding. Using the full population of IPOs, we test this proposition. We offer separate tests on low and high concentration of control IPOs, as identified by our proxies, company size and company leverage. Following the significant test results we report in Tables 6 and 7, we believe that these proxy measures offer a more appropriate method of identification of low and high concentration of control IPOs[9].

Using Data-stream, we construct two measures of post-IPO ownership distribution. They are a shareholding Herfindahl Index (*H*) and an alternative index (*OB*) representing the proportion of shares held in blocks of five percent or more. We calculate the Herfindahl Index using percentage holdings by a government institution, the percentage of shares held by another company, the percentage of shares held by pension or endowment funds, the percentage of shares held as a strategic holding by investment banks, any other strategic holdings in excess of five percent, and the percentage of shares carrying significant voting power that are held by employees or others (usually family) with a substantial position within a company. Our alternative index includes all of these categories, with the exception of employee and other internal holdings with significant voting power. We believe that this category is particularly relevant to South and East Asian IPOs, as it arguably represents insiders and management wishing to maintain control benefits. We construct both indices using shareholding data six months after IPO, and again using data eighteen months after IPO. Our shareholding data comes from DataStream. Higher index values imply greater percentage shareholdings in the specified strategic categories, and therefore lower holdings by non-strategic small shareholders associated with a wide distribution in share ownership. Each index will have values ranging from zero to one. As this is our dependent variable, it is limited to an interval of one, causing a potential problem with regression estimation. We

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[9] In a further test, we do explore the relationship between distribution in share ownership and IPO under-pricing in the high and low shareholder concentration groups of IPO companies. We find little difference between these groups, so for reasons of space, we do not report these results.

therefore transform these values, taking the natural log of a ratio of the concentration index to one minus the concentration index.

In cross-section regressions, our transformed indices of ownership distribution are the dependent variables, the independent variables are estimates of under-pricing (*UPRICE*), and the company-level control variables which we included in previous regression estimates. We also include a further variable representing strategic shareholdings by insiders and family members (*OWN*). As lower values of transformed concentration indices imply a more widely distributed share ownership, 'reduced monitoring' requires a negative coefficient on estimated under-pricing, demonstrating that it produces well distributed small shareholdings. Our results are in Table 8. Separate panels present results for the full population of IPOs, for low and high concentration of control IPOs as indicated by company size, and also for low and high concentration of control IPOs as indicated by company leverage.

Results for the full population of IPOs do not support 'reduced monitoring', as we find a positive relationship between under-pricing and all indices of shareholder distribution. In all cases, there is a positive coefficient on *UPRICE*, although significant values are confined to regressions on indices formed six months after IPO, (*H*6 and *OB*6). This implies that under-pricing facilitates increased shareholdings by groups of strategic investors. It follows from our earlier test results in Table 4, where we fail to find a relationship between under-pricing and national governance quality. We do however find contrasting results when we separately examine low concentration of control and high concentration of control IPOs. We initially consider a separation based on company size. Results for low concentration of control (larger) companies show the expected negative relationship between under-pricing and shareholder distribution, but we only find significant coefficients on under-pricing, when regressed on distribution indices formed six months after IPO (*H*6 and *OB*6). Although negative, coefficients on under-pricing lose significance, when regressed on the indices constructed from data eighteen months after IPO. Nevertheless, these results are supportive

of 'reduced monitoring', suggesting that under-pricing achieves the objective of widely distributed groups of small shareholdings. Results for low concentration of control (high leverage) companies offer further support. We now find significant negative coefficients on under-pricing, when regressed on the alternative index of distribution (OB6 and OB18). We find negative but insignificant coefficients on under-pricing, when regressed on adjusted Herfindahl Indices (H6 and H18). We interpret these results as offering further support to our analysis of regression results in Tables 6 and 7, where we find a significant relationship between under-pricing and governance quality, when we restrict our study to companies that we identify as less likely to have concentrated control.

We also consider companies identified as associated with concentrated control. Regardless of proxy used to identify these companies, we find positive coefficients on IPO under-pricing, when regressed on a shareholder concentration index. Many, but not all coefficients are significant. Under-pricing apparently results in greater holdings by the strategic groups of shareholder, which may include outsiders. We expect that these companies will be closely controlled by management and insider groups, who are indifferent as to whether outside strategic groups acquire a significant shareholding. In all regressions, we note significant coefficients on $OWN,$ representing the percentage shareholding by employees and other insiders. Positive coefficients can be expected when this measure is regressed on H6 and H18 values, as they include this category of shareholder. When regressed on OB6 and on OB18, we find significant negative coefficients. As constructed, the OB indices do not include holdings by employees and other insiders, so if a sizable percentage holding is recorded for this group, it may imply a reduced holding by other groups that comprise the OB indices, thus resulting in a negative relationship. We also identify significant coefficients on a number of company level control variables. We find that $SIZE$ carries a significant positive coefficient, regardless of whether we consider the full study population of IPOs or all groups segmented by concentration of control proxies. In all cases, we also note a significant negative relationship between ACT and all ownership distribution indices, with the exception

of low leverage IPOs, where this relationship is not significant. Finally, a lower number of observations in regression tests on the smaller company IPOs and also in tests on both high leverage and low leverage company IPOs is because of missing shareholding or leverage observations from DataStream

6. Summary and conclusions

We find evidence that governance quality indicators are significantly related to estimated levels of under-pricing of new issues in South and East Asian equity markets, when we allow for concentration of control. Using data collected from these markets, and from individual company web pages, we identify all initial public offerings of new equity over the period from January 2010 to December 2019. After excluding examples with missing information, and potential outliers, we identify a population of 1009 IPOs. We use World Bank Governance Indicators, to capture national governance quality. There is a concern regarding the reliability and comparability of information in less developed nations, as they will be less attractive and therefore of less interest to international investors. Methodology employed by the World Bank should ensure reasonably consistent quality of information, and therefore less concern regarding comparability across markets.

We specify a number of hypotheses, allowing us to further investigate a 'reduced monitoring' explanation for the impact of governance quality on IPO under-pricing. We find evidence of a significant positive relationship between quality of governance and estimated levels of under-pricing of IPOs in South and East Asian equity markets, when we control for closely controlled companies. Our findings are unaffected by the inclusion of company-specific factors identified as impacting on the level under-pricing. This relationship is supportive of 'reduced monitoring'. It implies that under-pricing is motivated by insiders who wish to maintain control benefits after public listing, as they ensure a wide distribution of new investors who are unable to maintain influence, in the event of a strong regulatory environment. Our results are in contrast to Autore, Boulton, Smart, and Zutter (2014), who

find that evidence of a 'reduced monitoring' explanation is absent, when they examine IPOs in developing markets.

We explore the 'reduced monitoring' explanation by dividing our population of South and East Asian IPOs into a concentrated control sub-group and a less concentrated control sub-group. We identify the group of IPOs with less concentrated control as examples in which a strong governance environment will facilitate new investors wishing to take exercise control, and to protect themselves against potential expropriation by management and by insiders. Management and insiders may be motivated to under-price if they are concerned that a good quality governance environment will limit their ability to maintain control, and to extract excess benefits. They will wish to ensure any new investors are widely dispersed and are less likely to be able to protect their interests. We initially use the proportion of free-float shareholdings to identify IPO companies with less concentrated shareholdings. We also follow Claessens, et al. (2000), as they demonstrate that proportionate share ownership is not a good indicator of control in companies listed on the developing South and East Asian equity markets. We use company size and company leverage as alternative proxies for less concentrated control companies. When using these proxies, our findings support reduced monitoring, as we find a positive relationship between governance quality and under-pricing in the sub-groups of less concentrated control IPOs. Our results also imply support for the proposition that share ownership is not the best indicator of control in many South and East Asian companies. Further, by demonstrating that the 'reduced monitoring' explanation applies to many IPOs listing in developing markets, we provide support for the empirical findings Boulton, Smart, and Zutter (2010), rather than for Engelen and Van Essen (2010).

In a final series of robustness tests, we assess the relationship between under-pricing and measures of post-IPO concentration in share ownership. Regardless of governance quality, this is a direct test of whether under-pricing provides a wider distribution of share ownership. We find that under-pricing is associated with widely dispersed share ownership, only in IPO

companies with less concentrated control. We identify concentration in control, using either company size or company leverage as appropriate proxies. We believe that this previously unreported result offers further evidence in support of 'reduced monitoring', as only insiders in these companies will be motivated to under-price an IPO, to ensure 'reduced monitoring'.

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Table 1

Under-pricing percentages – Summary details

Market	No. of IPOs	Average	Std. Deviation	Skewness	Kurtosis	Minimum	Maximum	Weighted Average
India	221	15.40	43.28	1.92	6.77	-77.60	218.60	12.01
Korea	317	23.12	56.48	1.36	2.14	-79.53	247.50	19.30
Malaysia	164	14.68	28.59	2.31	8.27	-39.34	164.00	9.93
Pakistan	35	2.66	21.22	-0.14	1.44	-46.64	53.57	-0.54
Sri Lanka	40	24.08	40.32	2.16	4.83	-17.14	165.00	11.83
Thailand	233	46.42	57.96	1.30	0.92	-30.07	200.00	18.90
Overall	1009	24.77	50.52	1.64	3.30	-79.53	247.50	14.07

This table presents descriptive statistics on the extent of under-pricing in each national market, from January 2010 to December 2019.

Table 2

Individual IPOs – Descriptive statistics

Variable	Number	Average	Median	Std. Deviation	Minimum	Maximum
ACT	1009	0.0260	0.0237	0.0183	0.0011	0.0608
ROR	1009	0.0659	0.0905	0.1655	-0.3032	0.6333
SIZE	1009	90.059	82.493	6.0868	0.2935	4659
AGE	1009	16.148	12..883	16.093	0.4	145
VOL	1009	0.1733	0.0316	0.8175	0	19.653
INT	1009	0.6601	1	0.4739	0	1
BK	1009	0.6532	1	0.4762	0	1
TTU	1009	0.0629	0	0.2430	0	1
HT	1009	0.0885	0	0.2842	0	1

This table presents individual company level data on IPO companies. *ACT* represents recent IPO activity in the national market, and *ROR* indicates national market return prior to IPO. *SIZE* indicates offer value, *AGE* represents company age, and *VOL* is post-issue share return volatility. *INT* is a dummy variable with a value of one when an offer is at an integer unit value, otherwise it is zero. *BK* is a dummy variable taking a value of one when an IPO is book-built, otherwise it is zero. *TTU* is a dummy variable with a value of one if an IPO is underwritten by a bank appearing in the Top 20 Bloomberg Official League Table in the same year, it is zero otherwise. HT is a dummy variable taking a value of one if the IPO is a high technology firm, otherwise it is zero.

Table 3
Governance Indicators – Descriptive Statistics
Panel A – Average Measures

Model	RL	RQ	GE	PS	CC	VA
India	-0.04	-0.34	0.02	-1.04	-0.38	0.41
Korea	1.06	1.04	1.17	0.31	0.54	0.72
Malaysia	0.51	0.67	0.99	0.14	0.20	-0.34
Pakistan	-0.78	-0.65	-0.71	-2.51	-0.91	-0.77
Sri Lanka	-0.06	-0.13	-0.12	-0.37	-0.34	-0.34
Thailand	-0.09	0.19	0.30	-1.00	-0.39	-0.74

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Panel B – Correlations

Model	RL	RQ	GE	PS	CC
RQ	0.931				
GE	0.944	0.962			
PS	0.910	0.844	0.875		
CC	0.969	0.937	0.951	0.901	
VA	0.689	0.453	0.507	0.527	0.640

This table presents descriptive statistics on the governance indicators. RL indicates Rule of Law, RQ indicates Regulatory Quality, and GE refers to Government Effectiveness. PS indicates Political Stability, CC indicates Control of Corruption, and VA refers to Voice and Accountability. We include correlations between each governance indicator.

Table 4

Regression results – Full population of IPOs

Model	1	2	3	4	5	6
Intercept	22.56**	22.66**	20.82**	23.64**	23.78**	24.57**
RL	1.40					
RQ		4.59				
GE			4.62			
PS				1.83		
CC					4.69	
VA						3.08
ACT	45.58**	39.09**	40.90**	44.65**	42.54**	45.80**
ROR	52.73**	50.89**	51.59**	52.31**	51.20**	53.73**
SIZE	-5.90**	-6.03**	-6.12**	-5.96**	-5.99**	-5.88**
AGE	6.90**	7.16**	7.22**	7.04**	7.11**	6.86**
VOL	0.22*	0.22*	0.22*	0.22*	0.22*	0.22*
INT	2.17	3.20	3.42	2.74	2.78	1.06
BK	-11.69*	-12.16*	-12.29*	-12.09*	-13.07**	-13.50**
TTU	21.34**	22.42**	22.12**	21.65**	21.85**	20.68**
HT	3.27	3.15	3.07	3.21	3.15	3.24
Adj. R^2	0.135	0.136	0.136	0.135	0.136	0.135
No.	1009	1009	1009	1009	1009	1009

Notes: *RL* indicates Rule of Law, *RQ* indicates Regulatory Quality, and *GE* refers to Government Effectiveness. *PS* indicates Political Stability, *CC* indicates Control of Corruption, and *VA* refers to Voice and Accountability. Other measures relate to each individual firm. *ACT* represents recent IPO activity in the national market, and *ROR* indicates national market return prior to IPO. *SIZE* indicates offer value, *AGE* represents company age, and *VOL* is post-issue share return volatility. *INT* is an integer price dummy, and *BK* is a book-built deal dummy. *TTU* is a dummy indicating a top-tier underwriter, and *HT* is a dummy indicating a high-technology IPO. Year dummies are included in the regression estimates, although they are not reported. * and ** indicate statistically significant coefficients, at the 5% and 1% levels. Model goodness of fit is indicated by adjusted R^2s, and we indicate the number of observations. The coefficient of ACT is *1/10.

Table 5

Regression results – The impact of shareholder distribution

Model	1	2	3	4	5	6
Panel A – High share concentration IPOs						
Intercept	9.98	8.83	5.49	12.02	11.04	8.72
RL	2.02					
RQ		8.10				
GE			8.21			
PS				4.69		
CC					8.41	
VA						-7.77
ACT	49.14*	36.10	40.20*	44.05*	43.03*	53.24*
ROR	13.14	7.07	6.35	9.20	7.30	11.69
SIZE	-4.26*	-4.18*	-4.24*	-4.25*	-4.13*	-4.76**
AGE	2.37	2.84	2.77	2.65	2.08	2.00
VOL	0.46*	0.45*	0.45*	0.45*	0.45*	0.47*
INT	10.46	12.91	13.35	12.69	11.95	12.57
BK	-15.57*	-16.58*	-16.91*	-17.17*	-18.18*	-7.06
TTU	12.03	13.67	13.34	13.08	12.77	12.24
HT	-11.12	-11.29	-11.48	-11.47	-11.32	-10.93
Adj. R^2	0.198	0.203	0.202	0.200	0.201	0.201
No.	320	320	320	320	320	320
Panel B – Low share concentration IPOs						
Intercept	39.66*	39.08*	35.68*	40.56*	40.46*	52.21*
RL	6.51					
RQ		7.59				
GE			6.04			
PS				3.24		
CC					7.77	
VA						14.58
ACT	56.17*	52.89*	58.16*	61.55*	58.34*	49.44*
ROR	19.34	16.26	19.29	20.38	17.80	22.97
SIZE	-8.98**	-9.05**	-9.01**	-8.92**	-8.99**	-8.87**
AGE	11.09**	11.17**	11.17**	11.06**	11.13**	10.91**
VOL	0.25	0.25	0.25	0.24	0.25	0.25
INT	-4.98	-4.05	-4.13	-4.68	-4.42	-9.72
BK	-26.92*	-25.79*	-25.46*	-25.36*	-27.38*	-35.66**
TTU	50.44**	51.16**	50.15**	50.03**	50.29**	46.08**
HT	20.07*	20.08*	20.14*	20.17*	20.16*	19.80*
Adj. R^2	0.233	0.234	0.233	0.233	0.233	0.236
No.	319	319	319	319	319	319

Notes: This table presents regression estimates of IPO under-pricing on independent variables. *RL* indicates Rule of Law, *RQ* indicates Regulatory Quality, and *GE* refers to Government Effectiveness. *PS* indicates Political Stability, *CC* indicates Control of Corruption, and *VA* refers to Voice and Accountability. Other measures relate to each individual firm. *ACT* represents recent IPO activity in the national market, and *ROR* indicates

national market return prior to IPO. *SIZE* indicates offer value, *AGE* represents company age, and *VOL* is post-issue share return volatility. *INT* is an integer price dummy, and *BK* is a book-built deal dummy. *TTU* is a dummy indicating a top-tier underwriter, and *HT* is a dummy indicating a high-technology IPO. Year dummies are included in the regression estimates, although they are not reported. * and ** indicate statistically significant coefficients, at the 5% and 1% levels. Model goodness of fit is indicated by adjusted R^2s, and we indicate the number of observations. The coefficient of ACT is *1/10.

Table 6
Regression results – The impact of control concentration

Model	1	2	3	4	5	6
Panel A – Larger company IPOs						
Intercept	43.94*	42.43*	40.23*	50.71*	49.87*	45.99*
RL	11.38*					
RQ		9.85*				
GE			12.08*			
PS				9.41*		
CC					15.95*	
VA						10.67*
ACT	-57.06**	-56.36**	-55.37**	-55.46**	-56.35**	-43.53**
ROR	-30.01	-30.17	-33.32	-33.04	-33.39	-26.22
SIZE	-1.08	-1.17	-1.51	-1.36	-1.32	-0.27
AGE	2.10	2.03	2.14	2.33	2.15	1.76
VOL	-0.06	-0.06	-0.05	-0.05	-0.06	-0.05
INT	11.81*	13.19*	14.25*	14.30*	12.84*	6.43
BK	-4.53	-1.19	-2.76	-4.69	-6.73	-8.24
TTU	6.37	6.90	6.91	6.82	6.85	2.82
HT	-3.02	-2.94	-3.19	-3.23	-2.98	-2.93
Adj. R^2	0.110	0.110	0.112	0.113	0.113	0.103
No.	341	341	341	341	341	341
Panel B – Smaller company IPOs						
Intercept	-10.70	-12.13	-8.85	-15.65	-14.03	-16.49
RL	-16.28*					
RQ		-7.85				
GE			-9.33			
PS				-5.88		
CC					-13.81	
VA						-6.22
ACT	119.58**	106.72**	107.83**	102.44**	107.41**	99.63**
ROR	76.79**	77.85**	75.79**	74.84*	77.99**	70.44**
SIZE	-5.34**	-5.50**	-5.16**	-5.42*	-5.59*	-5.82**
AGE	6.46*	7.48**	7.17**	7.35**	6.99*	8.09**
VOL	0.43*	0.45*	0.45*	0.43*	0.45*	0.46*
INT	-9.81	-9.01	-10.05	-9.85	-9.43	-5.82
BK	-24.25**	-27.95**	-28.00**	-26.06**	-25.06**	-24.96**
TTU	9.84	11.60	10.59	10.37	10.79	12.01
HT	8.75	7.82	8.59	8.41	8.35	7.69
Adj. R^2	0.384	0.379	0.380	0.380	0.381	0.378
No.	342	342	342	342	342	342

Notes: This table presents regression estimates of IPO under-pricing on independent variables. *RL* indicates Rule of Law, *RQ* indicates Regulatory Quality, and *GE* refers to Government Effectiveness. *PS* indicates Political Stability, *CC* indicates Control of Corruption, and *VA* refers to Voice and Accountability. Other measures relate to each individual firm. *ACT* represents recent IPO activity in the national market, and *ROR* indicates

national market return prior to IPO. *SIZE* indicates offer value, *AGE* represents company age, and *VOL* is post-issue share return volatility. *INT* is an integer price dummy, and *BK* is a book-built deal dummy. *TTU* is a dummy indicating a top-tier underwriter, and *HT* is a dummy indicating a high-technology IPO. Year dummies are included in the regression estimates, although they are not reported. * and ** indicate statistically significant coefficients, at the 5% and 1% levels. Model goodness of fit is indicated by adjusted R^2s, and we indicate the number of observations. The coefficient of ACT is *1/10.

Table 7
Regression results – The impact of control concentration

Model	1	2	3	4	5	6
Panel A – High leverage Company IPOs						
Intercept	34.85*	35.24*	30.59*	42.14*	40.41*	43.06**
RL	10.68*					
RQ		12.41*				
GE			12.60*			
PS				9.30*		
CC					17.07*	
VA						16.56*
ACT	35.88	28.28	33.19	34.62	31.88	46.52*
ROR	75.89*	70.82*	76.91**	74.16*	70.77*	87.85**
SIZE	-7.98**	-8.09**	-8.29**	-8.31**	-8.10**	-7.52**
AGE	4.53	4.52	4.69	4.72	4.82	4.37
VOL	-0.02	-0.02	-0.01	-0.01	-0.02	-0.05
INT	8.35	10.37	10.13	9.88	9.72	2.38
BK	-12.02	-9.81	-10.24	-11.39	-14.55	-22.08*
TTU	19.17*	19.76*	19.26*	19.66*	19.29*	15.78*
HT	11.11	11.25	10.93	10.51	11.05	10.84
Adj. R^2	0.149	0.153	0.154	0.155	0.155	0.155
No.	321	321	321	321	321	321
Panel B – Low leverage Company IPOs						
Intercept	54.99**	55.42**	57.04**	52.17**	53.49**	53.90**
RL	-7.36					
RQ		-3.23				
GE			-3.55			
PS				-5.83		
CC					-7.41	
VA						-2.77
ACT	29.85	24.98	24.01	27.23	26.57	21.60
ROR	-5.12	-6.88	-6.74	-5.16	-4.29	-7.98
SIZE	-9.76**	-9.94**	-9.87**	-9.73**	-9.82**	-10.01**
AGE	7.43*	7.78*	7.67*	7.20*	7.46*	7.95*
VOL	0.12	0.12	0.12	0.12	0.12	0.12
INT	6.66	6.93	6.70	5.35	6.43	8.02
BK	-9.79	-13.03	-12.91	-9.84	-10.17	-12.68
TTU	36.55*	38.18*	38.24*	36.22*	37.36*	40.05**
HT	6.57	6.35	6.34	6.64	6.56	6.17
Adj. R^2	0.160	0.159	0.159	0.161	0.160	0.158
No.	320	320	320	320	320	320

Notes: This table presents regression estimates of IPO under-pricing on independent variables. *RL* indicates Rule of Law, *RQ* indicates Regulatory Quality, and *GE* refers to Government Effectiveness. *PS* indicates Political Stability, *CC* indicates Control of Corruption, and *VA* refers to Voice and Accountability. Other measures relate to each individual firm. *ACT* represents recent IPO activity in the national market, and *ROR* indicates

national market return prior to IPO. *SIZE* indicates offer value, *AGE* represents company age, and *VOL* is post-issue share return volatility. *INT* is an integer price dummy, and *BK* is a book-built deal dummy. *TTU* is a dummy indicating a top-tier underwriter, and *HT* is a dummy indicating a high-technology IPO. Year dummies are included in the regression estimates, although they are not reported. * and ** indicate statistically significant coefficients, at the 5% and 1% levels. Model goodness of fit is indicated by adjusted R^2s, and we indicate the number of observations. The coefficient of ACT is *1/10.

Table 8

Regression results – Determinants of shareholder distribution

Dependent	H6	H18	OB6	OB18	H6	H18	OB6	OB18
			All IPOs					
Intercept	-2.65**	-2.66**	-1.32**	-1.23**				
UPRICE	0.17*	0.12	0.22*	0.11				
SIZE	0.23**	0.22**	0.32**	0.31**				
AGE	0.27	0.61*	0.16	0.20				
ROR	0.99*	0.70	0.69	0.48				
VOL	-0.42	-0.45	-0.92	-1.19*				
ACT	-1.30**	-1.30**	-1.68**	-1.76**				
TTU	-0.23	-0.06	-0.09	0.09				
OWN	0.23**	0.24**	-0.68**	-0.68**				
Adj. R^2	0.236	0.260	0.514	0.494				
No.	929	950	929	950				
		Larger Company IPOs				Smaller Company IPOs		
Intercept	-2.20**	-2.36**	-1.20*	-1.40*	-2.52**	-2.55**	-1.28**	-1.23**
UPRICE	-0.14*	-0.13	-0.14*	-0.11	0.30*	0.17	0.27*	0.21*
SIZE	0.24**	0.24**	0.28**	0.29**	0.37**	0.33**	0.39**	0.38**
AGE	0.28	0.62*	0.32	0.39	0.38	0.81*	0.11	0.72*
ROR	0.82	1.06*	0.70	0.87	0.75	0.35	0.59	-0.32
VOL	-1.61*	-1.38*	-1.44*	-1.17*	0.14	0.15	0.02	0.05
ACT	-1.17*	-1.25*	-1.12*	-1.25*	-3.15**	-2.65**	-1.99**	-1.71**
TTU	-0.22	-0.16	-0.23	-0.19	0.36	0.26	1.01*	0.83
OWN	0.07*	0.07*	-0.44**	-0.45**	0.23**	0.26**	-0.37**	-0.36**
Adj. R^2	0.133	0.164	0.566	0.576	0.543	0.525	0.554	0.501
No.	341	344	341	344	326	329	326	344
		High Leverage Company IPOs				Low Leverage Company IPOs		
Intercept	-2.82**	-2.84**	-0.79	-0.86	-2.67**	-2.51**	-1.77**	-1.41**
UPRICE	-0.01	-0.08	-0.26*	-0.48**	0.27*	0.25*	0.20	0.16
SIZE	0.19**	0.21**	0.25**	0.27**	0.25**	0.22**	0.38**	0.37**
AGE	1.51**	1.53**	0.47	0.59	0.05	0.19	-0.42	-0.31
ROR	1.68*	1.08	0.78	0.69	-1.26	-1.67	-1.77	-3.24*
VOL	-0.32	-0.17	0.11	0.39	-0.69	-0.82	-1.07	-1.74*
ACT	-1.07*	-1.17*	-1.55*	-1.64*	-0.51	-0.46	-0.39	-0.92
TTU	-0.71*	-0.27	-0.37	-0.39	0.48	0.38	0.60	0.33
OWN	0.23**	0.23**	-0.71**	-0.74**	0.21**	0.22**	-0.61**	-0.61**
Adj. R^2	0.281	0.326	0.533	0.573	0.201	0.214	0.497	0.481
No.	321	332	321	332	314	316	314	316

This table presents regression estimates of post-IPO ownership concentration measures on initial return (under-pricing, designated as *UPRICE*) and other explanatory factors. Each dependent variable is estimated as the natural log of the concentration measure, divided by one minus the concentration measure. *H6* and *H18* are transformed Herfindahl Indices, six and eighteen months after IPO date. *OB6* and *OB18* are transformed percentage measures of distribution, six and eighteen months after IPO. Other measures may be explanatory. They are *SIZE*, which indicates IPO offer value. *AGE* represents company age, and *ROR*,

which indicates national market return prior to IPO. *VOL* is post-issue share return volatility, and *ACT* represents recent IPO activity in the national market. *TTU* is a dummy indicating a top-tier underwriter. *OWN* which is the percentage of shares held by family members of significant employees, either six or eighteen months after IPO. Year dummies and a dummy indicating high-technology IPOs also are included in regression estimates, although the coefficients are not reported. Reported coefficients of *UPRICE, VOL*, and *AGE* are $*10^2$, coefficients of *OWN* are $*10$, and coefficients of *ACT* are $*10^{-1}$. * and ** indicate statistically significant coefficients, at the 5% and 1% levels. Model goodness of fit is indicated by adjusted R^2s, and we indicate the number of observations.