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# Global Board Reforms and the Pricing of IPOs

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## Abstract

We document that global board reforms are associated with a significant reduction in the underpricing of initial public offerings (IPOs). The effect is amplified for IPOs with greater agency problems and mitigated for IPOs certified by reputable intermediaries, IPOs with greater disclosure specificity, and IPOs in countries with better shareholder protection and stringent financial reporting regulations. Furthermore, global board reforms have led to an improvement in the long-term market performance, proceeds, and subscription level of IPOs and have enhanced board independence in the issuing firms. Our findings suggest that global board reforms have strengthened board oversight in the issuing firms, leading to less underpriced IPOs.

## I. Introduction

We study the impact of corporate board reforms around the world on the underpricing of IPOs, the tendency of IPO share prices to experience a significant upward jump on the first day of trading. The publication of the United Kingdom's Cadbury Report in 1992 prompted many countries to implement board reforms, with an emphasis on improving board practices and imposing or recommending greater board independence, separation of the CEO and chair-of-the-board positions, and greater audit-committee independence (Kim and Lu (2013), Fauver, Hung, Li, and Taboada (2017)). A line of research considers agency frictions between the management of newly listed firms and investors to be an important antecedent of IPO underpricing (Brennan and Franks (1997), Ljungqvist and Wilhelm (2003), and Smart and Zutter (2003)). Insights from this literature suggest that by strengthening board oversight in IPO firms, board reforms should play a material role in the pricing of the new issues.[1,2] Yet, although a number of studies document the impact of board

We thank Paul Malatesta (the editor) and John McConnell (the referee) for helpful comments.

[1]Global board reforms apply to all publicly listed companies, both mature and newly listed, in the corresponding countries (Kim and Lu (2013)). Accordingly, IPO firms are obliged to comply with the regulations at the time of listing.

[2]Corporate boards are viewed as the key governance mechanism for mitigating agency issues (Denis and McConnell (2003), Hermalin and Weisbach (2003)) and are considered to play an important role in



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reforms on listed firms (e.g., Fauver et al. (2017), Bae, Ghoul, Guedhami, and Zhen (2021)), we have scant understanding of the implications of these reforms for IPO outcomes. This constitutes an important gap in the literature because governance demands of IPO firms are thought to be different from those of their listed counterparts, emphasizing that new regulations should not be based on research focused solely on listed firms and that governance research should also consider IPO companies (Johnson, Karpoff, and Yi (2015), Lowry, Michaely, and Volkova (2017)). The current study aims to address this research gap.

Ex ante, the effect of board reforms on the underpricing of new issues is ambiguous. On the one hand, a body of IPO research considers agency-related frictions between management and investors to be important factors that affect IPO underpricing. Brennan and Franks (1997) propose the *reduced-monitoring hypothesis*, suggesting that managers of issuing firms seek to retain control over their firms by offering a greater discount on the offer price in order to attract more investors and create a more dispersed ownership. Consistent with this view, Smart and Zutter (2003) find that underpricing is less prevalent among dual-class IPOs whose capital structure design concentrates voting power among the management. Ljungqvist and Wilhelm (2003) demonstrate that managerial complacency and opportunistic share allocations can also affect IPO underpricing. Further, prior research highlights the role of informational frictions in IPO underpricing, maintaining that information asymmetry among investors leads to a risk premium in the form of an underpricing discount (see Ljungqvist (2007) for a review). An increased level of corporate transparency reduces informational frictions, leading to lower IPO underpricing (Ang and Brau (2002), Boulton, Smart, and Zutter (2011), and Hong, Hung, and Lobo (2014)). A common emphasis of board reforms is that stronger board oversight arising from increased board independence curbs the opportunistic behavior of managers and improves the integrity and transparency of financial reporting (Dahya and McConnell (2007), Fauver et al. (2017)). The foregoing discussion suggests that by strengthening board oversight, board reforms should reduce IPO underpricing.[3]

On the other hand, this hypothesized relationship is challenged by the presence of several conflating factors. First, the premise that IPO underpricing creates more dispersed ownership (Brennan and Franks (1997), Smart and Zutter (2003)) is not without tension. Stoughton and Zechner (1998) develop a theoretical model that demonstrates how underpricing may lead to the creation of blockholders, resulting in less dispersed ownership. In their model, underpricing and rationing that favor large shareholders lead to a higher intrinsic firm value due to blockholders' monitoring, which outweighs the costs of underpricing. Second, other studies suggest

the IPO process (Westenberg (2011), Judge, Witt, Zattoni, Talaulicar, Chen, Lewellyn, Hu, Shukla, Bell, Gabrielsson, Lopez, Yamak, Fassin, McCarthy, Rivas, Fainshmidt, Van Ees (2015)). As Judge et al. (p. 1176) point out: "it is the board's responsibility to understand the information presented, to challenge underlying assumptions and, ultimately, to direct the overall process and decide on the offering price and specific timing of the IPO."

[3]Importantly, regulators do not emphasize tightening control over underpricing of the new issues as a part of board reforms' objectives (see Kim and Lu (2013) for details). Accordingly, there is no ex ante reason to expect that board reforms would affect IPO underpricing through channels other than increased board oversight.

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that underpricing generates significant economic benefits for the issuing firms by boosting secondary market liquidity, increasing analyst coverage, and creating valuable publicity (Demers and Lewellen (2003), Pham, Kalev, and Steen (2003), and Cliff and Denis (2004)). Because stronger board oversight encourages management to undertake activities that enhance firm value (Fama and Jensen (1983)), these insights suggest that board reforms could result in greater IPO underpricing. The potential confounding effects of these factors suggest that whether global board reforms increase or reduce IPO underpricing is an empirical question.

We test this research question using a comprehensive sample of 17,066 IPOs across 38 countries over the period from 1990 to 2016. We use the global board reforms database compiled by Fauver et al. (2017) to identify the year when board reforms became effective in each country in our sample. We measure IPO underpricing using the IPO first-day return, calculated as the difference between the first-trading-day closing price of an IPO and its offer price, scaled by the offer price. The results of our baseline analysis provide strong evidence that IPO first-day returns significantly decline following the implementation of board reforms, consistent with the view that global board reforms lead to less underpriced IPOs. The documented effect is economically meaningful: In our sample, the implementation of board reforms is, on average, associated with a reduction of 15.7 percentage points in IPO first-day return. We carry out an array of sensitivity tests (discussed in the Supplementary Material), which confirm the robustness of our core findings.

Next, we explore cross-sectional variations in the documented effect. We first examine the influence of agency costs on the relationship between global board reforms and IPO underpricing. As discussed, we reason that board reforms strengthen the board oversight of management and enhance corporate financial transparency, resulting in less underpriced IPOs. If our reasoning is valid, the documented effect of board reforms on IPO first-day returns should be amplified for IPO firms in which agency concerns are more salient. Employing multiple proxies of agency costs suggested in prior literature (Jensen (1986), Ang, Cole, and Lin (2000)), we find support for our predictions.[4]

We further examine the roles of IPO certification and the specificity of IPO disclosure as potential moderators of the documented relationship. Previous studies suggest that reputable underwriters and Big 4 auditing firms act as "certifying" intermediaries that produce information about the intrinsic value of the new issue, thus alleviating informational frictions among investors (Carter and Manaster (1990), Michaely and Shaw (1994), and Weber and Willenborg (2003)). Prior

[4]Following the same line of reasoning, we would expect the effect of board reforms to be amplified for IPO firms without majority board independence and/or IPO firms where the CEO served as chairperson during the pre-reform period because these IPOs are likely to be most affected by the reforms. However, testing this conjecture would not be feasible for two reasons. First, because IPO firms typically make most of their governance decisions shortly before going public (Lowry et al. (2017)), the majority of IPOs that were listed in the postreform period in our sample would have no data on their pre-reform governance structures. Second, databases commonly used in governance research (e.g., Institutional Shareholder Services (ISS) and ASSET4) predominantly cover listed firms only and thus contain scant information on firm-level governance attributes prior to the firms' listings. We therefore did not pursue this line of inquiry.

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research also suggests that the information asymmetry among IPO investors is mitigated for IPOs that provide specific use-of-proceeds disclosures (Leone, Rock, and Willenborg (2007)). Therefore, we reason that the role of global board reforms in reducing information asymmetry through more transparent financial reporting, and thus the documented effect of board reforms on IPO underpricing, is mitigated for IPOs certified by reputable intermediaries and IPOs that disclose their intended use of proceeds. The results of our analysis are consistent with these expectations.

We also explore the roles of country-level external governance mechanisms and financial reporting quality in shaping the documented relationship. The legal rules of jurisdictions in which securities are issued and the quality of their enforcement are important determinants of investors' willingness to provide financing to firms (La Porta, Lopez-De-Silanes, Shleifer, Vishny (1998), Leuz, Nanda, and Wysocky (2003), and DeFond, Hung, and Trezevant (2007)). Prior studies also show that higher-quality financial reporting systems mitigate informational frictions among IPO investors (Boulton et al. (2011), Hong et al. (2014)). Therefore, we expect the role of board reforms in enhancing monitoring and financial reporting transparency in IPO firms, and thus the impact of board reforms on IPO underpricing, to be mitigated in countries where strong external governance mechanisms and stringent financial reporting regulations are already in place. Lending support to these predictions, we find that the documented effect of board reforms is mitigated in countries with stronger shareholder-rights protection, more restrictive insider-trading regulations, and more effective legal institutions, whereas it is amplified in countries with more opaque financial reporting practices and emerging-market countries.

We conduct four sets of supplementary tests to provide additional evidence for the mechanism causing our findings. First, we examine the effects of three key components of global board reforms on IPO underpricing: greater board independence, separation of the CEO and chair-of-the-board positions, and greater audit committee and auditor independence. Focusing on board independence and the separation of the CEO and chairperson positions is intended to strengthen a board's oversight of corporate insiders (Fama and Jensen (1983), Jensen (1993)), whereas focusing on auditor and audit-committee independence is intended to enhance the integrity and transparency of corporate financial reporting (Frankel, Johnson, and Nelson (2002), Klein (2002)). Our findings suggest that all three reform components reduce IPO underpricing and that the effect is more pronounced for the reform components of board independence and CEO–chairperson separation. These results suggest that both the monitoring and financial transparency channels cause the documented effect of board reforms, with the monitoring channel playing a stronger role.

Second, we study the effect of global board reforms on the long-term market performance of IPOs. Previous studies provide evidence that IPO firms tend to underperform the market in the long run and highlight the role of agency-related frictions in causing this underperformance (Teo, Welch, and Wong (1998), Darrough and Rangan (2005), and Brau, Couch, and Sutton (2012)). We reason that by strengthening board oversight, board reforms should mitigate agency-related frictions and thus should be positively associated with long-term IPO returns. The results of our analysis lend support to this prediction.

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Third, we examine the influence of board reforms on other aspects of IPO performance, such as the number of new shares issued (FLOAT), whether the new shares are oversubscribed (OVERSUBSCRIPTION), and the amount of proceeds raised (PROCEEDS). Prior research (e.g., Alavi, Pham, and Pham (2008)) suggests that IPO firms' management may opportunistically reduce the float to retain control. To the extent that board reforms strengthen board oversight, we expect to find an increase in IPO float following the implementation of reforms. We also reason that by mitigating agency concerns, board reforms raise investor demand for IPOs, thereby increasing IPO proceeds and the probability of an IPO being oversubscribed. Our results are consistent with these expectations.

Finally, we cross-validate our reliance on board reforms as an exogenous shock to corporate board practices. Using a subsample of IPOs for which we are able to obtain data on board characteristics, we examine whether board characteristics of IPO firms i) change following board reforms and ii) are associated with IPO underpricing in a manner consistent with agency-based predictions. We document that following board reforms, IPO firms tend to have stronger outside representation on boards and separation of the CEO and chair-of-the-board positions. We further show that stronger outside representation on boards (CEO/chairperson duality) is associated with lower (higher) IPO first-day returns. These results lend further support to strengthened board oversight as the mechanism behind our findings.

Our study makes several contributions. First, it contributes to the broad governance research that examines the influence of boards on corporate outcomes and practices (see Hermalin and Weisbach (2003) for a review). Recent studies within this field exploit global board reforms as a shock-based research design to examine the impact of board governance on the corporate practices and performance of listed firms (Fauver et al. (2017), Bae et al. (2021), and Hu, Taboada, and Zhang (2020)).[5] However, the governance demands of IPO firms, which are typically young and informationally opaque, are likely to be very different from those of their listed (more mature) counterparts (Johnson et al. (2015), Lowry et al. (2017)). Reflecting this notion, Lowry et al. emphasize that governance research should also consider newly listed companies. We answer this research call by studying the impact of board reforms on the outcomes of an IPO, a critical juncture in a firm's life cycle.

Second, our study sheds further light on the role of board governance in the pricing of new issues. A line of studies notes agency frictions as important determinants of IPO underpricing (Brennan and Franks (1997), Ljungqvist and Wilhelm (2003), and Smart and Zutter (2003)), suggesting that strong internal governance

[5]A brief discussion of our findings within the context of Fauver et al. (2017) is warranted. Fauver et al. reason that by improving board governance, board reforms should encourage firm management to invest in projects that benefit all shareholders, therefore improving investment efficiency. In our setting, such an effect would result in an upward revision of projected cash flows by investors, leading to an increase of the same magnitude in both the offer and first-day closing prices. Accordingly, in the absence of agency-related IPO underpricing, the effect of board reforms documented by Fauver et al. should have no impact on underpricing of the new issues. In contrast, if agency-based motives do play a role in shaping IPO underpricing, board reforms, by strengthening board oversight, would constrain the management teams of IPO firms from opportunistically underpricing new issues. Lending support to the latter scenario, we show that that board reforms are associated with a significant reduction in IPO underpricing.

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mechanisms should reduce the underpricing discount. Relatedly, Ritter and Welch (2002) emphasize agency-based explanations as a promising avenue in IPO research. However, the ability to provide causal inferences on this matter is plagued by the inherent endogeneity of corporate board structures (Aggarwal, Erel, Stulz, and Williamson (2009), Adams, Hermalin, and Weisbach (2010), and Wintoki, Linck, and Netter (2012)).[6] We tackle this challenge by using global board reforms as an exogenous shock to firms' board practices. Although board reforms are not the sole mechanism for improving board practices, these reforms, nonetheless, may benefit board governance. Corporate insiders may prevent firms from investing in good board practices that can increase shareholder value because they bear the full cost of losing private benefits but reap only part of the benefits from increased firm value (Jensen and Meckling (1976), Jensen (1993)).[7] Board reforms can help overcome these frictions by requiring firms to make changes to improve board practices that they would not otherwise adopt (Fauver et al. (2017)). Our findings suggest that stronger board oversight arising from board reforms reduces the underpricing discount, lending support to agency-based explanations of IPO underpricing.

Third, our study contributes to the literature examining the role of legal institutions as external governance mechanisms and their impact on the efficacy of internal governance structures (Leuz et al. (2003), DeFond et al. (2007), Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2008), and Chahine, Filatotchev, and Hoskisson (2012)). Increasingly, institutional differences are recognized as having a material impact on the roles played by internal governance mechanisms (Filatotchev and Allcock (2013)). Our findings suggest that the impact of board reforms on IPO underpricing is magnified in countries with weak legal institutions, furthering our understanding of the interplay between the institutional environment and internal governance structures in shaping corporate outcomes.

## II. Sample and Variables

### A. Sample Selection

Data for this study are obtained from multiple sources. We obtain the board-reform data for 41 countries from the database compiled by Fauver et al. (2017), who collect information about international governance reforms from Kim and Lu (2013),

[6]Board characteristics are endogenously molded by the firm's business and managerial characteristics (Boone, Casares Field, Karpoff, and Raheja (2007)); thus, regression analysis of corporate outcomes and board characteristics is prone to major endogeneity concerns because both the dependent variable (in our setting, IPO first-day return) and explanatory variables (i.e., board characteristics) could be driven by some omitted firm-level attribute (or attributes) (e.g., Hermalin and Weisbach (2003)). Staggered implementation of global board reforms provides a powerful setting to circumvent these endogeneity issues by allowing a shock-based research design (i.e., a research setting in which board characteristics change due to an exogenous shock that is orthogonal to firm-level attributes) (Fauver et al. (2017), Bae et al. (2021), and Hu et al. (2020)).

[7]Prior studies point out that the appointments of board directors are heavily influenced by the very executives these directors are supposed to monitor (Demb and Neubauer (1992), Jensen (1993)). Consistent with this, prior research shows that boards of directors do not operate at arm's length from corporate insiders' influence, allowing them to pursue their private interests at the expense of firms' shareholders (Hallock (1997), Shivdasani and Yermack (1999), and Coles, Daniel, and Naveen (2014)).

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the World Bank, the European Corporate Governance Institute (ECGI), local stock exchange regulators, and the Web sites of the countries' primary regulators. Board reforms typically cover three key components of board practices: board independence, separation of the CEO and chair-of-the-board positions, and auditor and audit-committee independence. Fauver et al. further classify board reforms into two types based on the implementation approach: comply-or-explain reforms (best code practices), which typically involve the publication of governance codes that firms can either comply with or explain why they do not, and rule-based reforms, which typically involve the enactment of company laws or securities regulations that require firms to follow specific governance practices.

We identify the year in which the board reforms became effective for each country in our sample using the board-reform database of Fauver et al. (2017). For countries with multiple board reforms, Fauver et al. identify both the year of the first board reform and the year of the major board reform. Following Bae et al. (2021), we use the year of the major board reform for these countries in the main analysis. In robustness tests, we verify that our findings hold in a subsample of countries for which we are able to obtain exact dates of when board reforms became effective. We obtain details of IPOs (e.g., listing date, offer price, proceeds, etc.) from the Thomson Financial SDC Platinum database. The financial information of IPO firms is from Worldscope, and their post-IPO stock return information is from Datastream. The data on country-level economic development indicators and the characteristics of the listing stock exchanges are obtained from the World Bank's World Development Indicator database.

Consistent with prior studies (e.g., Lin, Pukthuanthong, and Walker (2013)), we exclude rights offerings, spin-offs, private placements, closed-end funds, real estate investment trusts, and limited partnerships. We also require firms to have IPO year data, as a minimum, available in Worldscope and Datastream. Last, we follow previous studies (e.g., Chen, Goyal, Veeraraghavan, and Zolotoy (2020)) and exclude countries with fewer than 10 IPOs.[8] Our final sample consists of 17,066 IPOs from 38 countries between 1990 and 2016.

## B. Variables

Our dependent variable is the IPO first-day return (FIRST_DAY_RETURN). Following prior studies (e.g., Cook, Kieschnick, and Van Ness (2006), Ellul and Pagano (2006)), we calculate FIRST_DAY_RETURN as the difference between the first-trading-day closing price of an IPO and its offer price, divided by the offer price. Following Fauver et al. (2017) and Bae et al. (2021), we define BOARD_REFORM as a dummy variable equal to 1 for IPOs taking place during or after the year of major board reform in the country of issuance, and 0 otherwise.

We follow prior literature in our selection of control variables (e.g., Ellul and Pagano (2006), Çolak, Durnev, and Qian (2017), and Chen et al. (2020)).

[8]Applying these selection criteria results in the exclusion of Colombia, Czech Republic, and Peru from our sample. In an untabulated analysis, we find that adding these countries to our sample leaves our results intact.

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We control for the size of the issuing firm with FIRM_SIZE, calculated as the natural logarithm of the total assets of the firm at the time of listing. We also include PROFITABILITY and ASSET_TURNOVER to control for a firm's performance and efficacy of asset utilization, respectively. We calculate PROFITABILITY as earnings before interest and taxes divided by total assets at the time of listing, and we define ASSET_TURNOVER as sales divided by total assets at the time of listing. We control for the issuing firm's capital structure with LEVERAGE, calculated as the ratio of total debt over total assets at the time of listing. We also include MARKET_TO_BOOK, calculated as the market value of assets divided by the book value of assets at the time of listing, to control for a firm's growth opportunities. To control for IPO pricing method, we include BOOKBUILDING, defined as a dummy variable equal to 1 if the IPO is conducted using a bookbuilding method, and 0 otherwise. In addition, we control for the level of economic growth and capital market development in the country where an IPO takes place with GDP_PER_CAPITA_GROWTH, MARKET_SIZE, and MARKET_TURNOVER. We calculate GDP_PER_CAPITA_GROWTH as the annual growth in GDP per capita, MARKET_SIZE as the ratio of the annual total value of stocks traded to the GDP, and MARKET_TURNOVER as the aggregate stock-market-turnover ratio. The details of the variable definitions are provided in the Appendix. Following prior articles (e.g., Liu and Ritter (2010), Hong et al. (2014)), we winsorize all nonbinary variables at both the upper and lower 1st percentiles to mitigate the effect of outliers.

## C. Sample Distribution and Descriptive Statistics

Table 1 presents the sample distribution by country. Among the 38 countries in our sample, the United Kingdom is the first country in our sample that adopted board reforms, followed by South Korea and Israel. Indonesia is the most recent country to adopt reforms. China has the largest number of IPOs, followed by the United States and Japan, whereas Hungary and Portugal have the smallest numbers. Pakistan has the highest average IPO first-day return, followed by China and Egypt, whereas Brazil has the lowest. The distribution and statistics are broadly consistent with those reported in other international IPO studies. For each country, we also calculate the average IPO first-day return in the pre-and postreform periods, the difference between the two values, and the *t*-statistic of the difference test. Among the 38 countries in our sample, the difference between average first-day return before versus after board reforms is negative for 36 countries. Further, notwithstanding a major reduction in the sample size used to conduct this country-level analysis, the difference is significant at the 10% level or better in 26 countries. The results of this univariate analysis also suggest that Turkey had the largest reduction in IPO first-day return in the postreform period, followed by Norway, Pakistan, and Finland.

Panel A of Table 2 presents the summary statistics of the variables in the baseline analysis. The mean value of FIRST_DAY_RETURN is 0.289 (28.9 percentage points). The mean value of BOARD_REFORM is 0.67, suggesting that 67% of the IPOs in our sample have issuance dates after the implementation of

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TABLE 1

Sample Distribution

Table 1 presents the sample distribution by country. Our baseline sample consists of 17,066 initial public offerings (IPOs) across 38 countries spanning the period 1990–2016. Variable definitions are presented in the Appendix.

| | | Full Sample | | Pre-Reform Period | | Postreform Period | | | |
|---|---|---|---|---|---|---|---|---|---|
| Country | Major Board-Reform Year | No. of IPOs | Average First-Day Return | No. of IPOs | Average First-Day Return | No. of IPOs | Average First-Day Return | Difference Between Columns 7 and 5 | *t*-Statistic |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Argentina | 2001 | 31 | 0.092 | 19 | 0.131 | 12 | 0.052 | −0.079 | −0.21 |
| Australia | 2004 | 1,083 | 0.164 | 231 | 0.264 | 852 | 0.146 | −0.118 | −1.74 |
| Austria | 2004 | 37 | 0.100 | 25 | 0.121 | 12 | 0.071 | −0.051 | −0.39 |
| Belgium | 2005 | 61 | 0.112 | 21 | 0.219 | 40 | 0.055 | −0.164 | −1.93 |
| Brazil | 2002 | 123 | 0.035 | 10 | 0.216 | 113 | 0.019 | −0.196 | −1.76 |
| Canada | 2004 | 956 | 0.287 | 310 | 0.367 | 646 | 0.249 | −0.118 | −1.74 |
| Chile | 2001 | 35 | 0.174 | 15 | 0.303 | 20 | 0.083 | −0.220 | −0.67 |
| China | 2001 | 2,191 | 0.602 | 390 | 0.770 | 1,801 | 0.574 | −0.196 | −3.44 |
| Denmark | 2001 | 49 | 0.032 | 17 | 0.096 | 32 | 0.002 | −0.094 | −0.76 |
| Egypt | 2002 | 39 | 0.385 | 23 | 0.469 | 16 | 0.288 | −0.181 | −0.30 |
| Finland | 2004 | 44 | 0.194 | 20 | 0.359 | 24 | 0.056 | −0.303 | −2.00 |
| France | 2003 | 498 | 0.089 | 255 | 0.113 | 243 | 0.064 | −0.049 | −2.15 |
| Germany | 2002 | 317 | 0.100 | 213 | 0.130 | 104 | 0.060 | −0.070 | −1.97 |
| Greece | 2002 | 128 | 0.119 | 84 | 0.160 | 44 | 0.039 | −0.121 | −1.86 |
| Hong Kong | 2005 | 756 | 0.239 | 253 | 0.394 | 503 | 0.161 | −0.233 | −2.44 |
| Hungary | 2003 | 15 | 0.229 | 11 | 0.264 | 4 | 0.161 | −0.104 | −0.20 |
| India | 2002 | 1,242 | 0.247 | 695 | 0.303 | 547 | 0.156 | −0.148 | −2.86 |
| Indonesia | 2007 | 315 | 0.273 | 148 | 0.363 | 167 | 0.194 | −0.168 | −2.21 |
| Israel | 2000 | 93 | 0.324 | 41 | 0.438 | 52 | 0.234 | −0.204 | −1.86 |
| Italy | 2006 | 174 | 0.092 | 98 | 0.060 | 76 | 0.111 | 0.051 | 0.51 |
| Japan | 2002 | 1,983 | 0.363 | 895 | 0.405 | 1,088 | 0.317 | −0.088 | −2.32 |
| Malaysia | 2001 | 672 | 0.210 | 265 | 0.347 | 407 | 0.121 | −0.227 | −2.63 |
| Mexico | 2001 | 67 | 0.160 | 23 | 0.290 | 44 | 0.100 | −0.190 | −1.67 |
| Netherlands | 2004 | 65 | 0.150 | 36 | 0.211 | 29 | 0.087 | −0.124 | −1.06 |
| Norway | 2005 | 104 | 0.285 | 36 | 0.649 | 68 | 0.093 | −0.556 | −1.82 |
| Pakistan | 2002 | 100 | 0.773 | 71 | 0.896 | 29 | 0.443 | −0.452 | −1.72 |
| Philippines | 2002 | 94 | 0.243 | 45 | 0.283 | 49 | 0.207 | −0.076 | −0.40 |
| Poland | 2002 | 255 | 0.110 | 24 | 0.241 | 231 | 0.106 | −0.135 | −1.65 |
| Portugal | 2001 | 15 | 0.096 | 8 | 0.022 | 7 | 0.180 | 0.158 | 0.81 |
| Singapore | 2003 | 431 | 0.265 | 136 | 0.321 | 295 | 0.239 | −0.082 | −1.70 |
| South Korea | 1999 | 865 | 0.300 | 63 | 0.442 | 802 | 0.286 | −0.156 | −2.34 |
| Spain | 2006 | 69 | 0.119 | 22 | 0.185 | 47 | 0.088 | −0.097 | −0.45 |
| Sweden | 2006 | 132 | 0.081 | 47 | 0.200 | 85 | 0.016 | −0.184 | −2.09 |
| Switzerland | 2002 | 70 | 0.087 | 32 | 0.145 | 38 | 0.053 | −0.092 | −0.51 |
| Thailand | 2002 | 457 | 0.389 | 123 | 0.482 | 334 | 0.354 | −0.127 | −1.76 |
| Turkey | 2002 | 123 | 0.205 | 22 | 0.724 | 101 | 0.092 | −0.631 | −1.84 |
| United Kingdom | 1998 | 1,204 | 0.140 | 205 | 0.264 | 999 | 0.110 | −0.154 | −2.34 |
| United States | 2003 | 2,173 | 0.283 | 694 | 0.348 | 1,479 | 0.253 | −0.095 | −2.53 |
| Total | | 17,066 | 0.289 | 5,626 | 0.357 | 11,440 | 0.258 | −0.099 | −5.26 |

board reforms. The average IPO firm in our sample has FIRM_SIZE equal to 4.844 ($127 million), LEVERAGE equal to 0.224, and MARKET_TO_BOOK equal to 3.216. These summary statistics are consistent with those reported in other international IPO studies.

Panel B of Table 2 reports the correlation matrix of these variables. The panel shows that FIRST_DAY_RETURN is negatively correlated with BOARD_REFORM, FIRM_SIZE, LEVERAGE, and BOOKBUILDING and positively correlated with PROFITABILITY, ASSET_TURNOVER, MARKET_TO_BOOK, GDP_PER_CAPITA_GROWTH, MARKET_SIZE, and MARKET_TURNOVER. The largest variance inflation factor among the independent variables is 1.32, suggesting that multicollinearity is not a concern in our setting (O'Brien (2007)).

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TABLE 2

Descriptive Statistics

Table 2 presents the summary statistics and correlation matrix of the variables in the analysis. Our baseline sample consists of 17,066 initial public offerings (IPOs) across 38 countries spanning the period 1990–2016. Variable definitions are presented in the Appendix.

*Panel A. Summary Statistics*

| | Mean | Std. Dev. | 5% | Median | 95% |
|---|---|---|---|---|---|
| FIRST_DAY_RETURN | 0.289 | 0.599 | −0.310 | 0.090 | 1.940 |
| BOARD_REFORM | 0.670 | 0.470 | 0.000 | 1.000 | 1.000 |
| FIRM_SIZE | 4.844 | 1.970 | 2.304 | 4.729 | 7.335 |
| PROFITABILITY | 0.046 | 0.558 | −0.432 | 0.063 | 0.418 |
| LEVERAGE | 0.224 | 0.220 | 0.000 | 0.170 | 0.660 |
| ASSET_TURNOVER | 0.973 | 0.996 | 0.000 | 0.712 | 2.602 |
| MARKET_TO_BOOK | 3.216 | 4.355 | 0.580 | 1.980 | 9.370 |
| BOOKBUILDING | 0.553 | 0.497 | 0.000 | 1.000 | 1.000 |
| GDP_PER_CAPITA_GROWTH | 0.034 | 0.031 | −0.001 | 0.026 | 0.094 |
| MARKET_SIZE | 1.007 | 1.067 | 0.054 | 0.710 | 2.645 |
| MARKET_TURNOVER | 1.002 | 0.711 | 0.269 | 0.788 | 2.151 |

*Panel B. Correlation Matrix*

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | FIRST_DAY_RETURN | 1.000 | | | | | | | | | | |
| 2 | BOARD_REFORM | −0.011 | 1.000 | | | | | | | | | |
| 3 | FIRM_SIZE | −0.062 | −0.091 | 1.000 | | | | | | | | |
| 4 | PROFITABILITY | 0.038 | −0.005 | 0.053 | 1.000 | | | | | | | |
| 5 | LEVERAGE | −0.032 | −0.029 | 0.226 | −0.043 | 1.000 | | | | | | |
| 6 | ASSET_TURNOVER | 0.004 | −0.011 | −0.045 | 0.248 | 0.000 | 1.000 | | | | | |
| 7 | MARKET_TO_BOOK | 0.101 | 0.070 | −0.221 | −0.038 | −0.062 | 0.023 | 1.000 | | | | |
| 8 | BOOKBUILDING | −0.047 | 0.185 | 0.220 | 0.006 | 0.072 | 0.040 | 0.088 | 1.000 | | | |
| 9 | GDP_PER_CAPITA_GROWTH | 0.037 | 0.032 | 0.073 | 0.057 | 0.020 | 0.009 | −0.023 | −0.037 | 1.000 | | |
| 10 | MARKET_SIZE | 0.032 | 0.330 | 0.075 | −0.007 | −0.048 | −0.006 | 0.061 | 0.300 | −0.069 | 1.000 | |
| 11 | MARKET_TURNOVER | 0.029 | 0.314 | 0.079 | 0.016 | −0.009 | 0.007 | 0.063 | 0.286 | 0.166 | 0.375 | 1.000 |

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# III. Board Reforms and IPO First-Day Returns

## A. Baseline Regression Analysis

In this section, we examine the effect of board reforms on IPO first-day returns using regression analysis. Our baseline regression specification is as follows:

$$\begin{aligned}(1)\quad \text{FIRST_DAY_RETURN}_i = {} & \alpha + \beta_1 \text{BOARD_REFORM}_i + \beta_2 \text{FIRM_SIZE}_i \\ & + \beta_3 \text{PROFITABILITY}_i + \beta_6 \text{LEVERAGE}_i + \beta_4 \text{ASSET_TURNOVER}_i \\ & + \beta_5 \text{MARKET_TO_BOOK}_i + \beta_7 \text{BOOKBUILDING}_i \\ & + \beta_8 \text{GDP_PER_CAPITA_GROWTH}_i + \beta_9 \text{MARKET_SIZE}_i \\ & + \beta_{10} \text{MARKET_TURNOVER}_i + \text{INDUSTRY} + \text{YEAR} + \text{COUNTRY} + \varepsilon_i,\end{aligned}$$

where $i$ denotes the IPO firm, INDUSTRY denotes the IPO firm's industry fixed effects based on the Fama–French 12-industry classification, YEAR denotes year fixed effects, COUNTRY denotes the IPO firm's country fixed effects, and $\varepsilon$ is the error term. The model is estimated using OLS with standard errors adjusted for heteroscedasticity and clustering at the industry-year level (Liu and Ritter (2011)) to account for potential effects of industry waves and time waves of IPOs (Pástor and Veronesi (2005), Chemmanur and He (2011)).[9]

We report the results of this analysis in Table 3 using a set of nested models. Column 1 reports the results with industry, year, and country fixed effects but without control variables, column 2 reports the results after controlling for IPO-level control

TABLE 3

Board Reforms and IPO First-Day Returns: Baseline Regression Analysis

Table 3 presents the regression results for the relationship between board reforms and initial public offering (IPO) first-day returns. Our baseline sample consists of 17,066 IPOs across 38 countries spanning the period 1990–2016. The regressions are performed by OLS, with *t*-statistics computed using standard errors robust to heteroscedasticity and clustering at the industry-year level. Constant, industry fixed effects (FE) based on Fama–French 12-industry classification, year-of-listing FE, and country-of-listing FE are included in all the regressions. Variable definitions are presented in the Appendix.

| Dependent Variable: | FIRST_DAY_RETURN | | | | | |
|---|---|---|---|---|---|---|
| | 1 | | 2 | | 3 | |
| | Coefficient | *t*-Statistic | Coefficient | *t*-Statistic | Coefficient | *t*-Statistic |
| BOARD_REFORM | −0.117 | −2.18 | −0.122 | −2.26 | −0.157 | −2.88 |
| FIRM_SIZE | | | −0.031 | −6.51 | −0.033 | −6.92 |
| PROFITABILITY | | | 0.031 | 1.93 | 0.030 | 1.95 |
| LEVERAGE | | | −0.138 | −3.71 | −0.127 | −3.45 |
| ASSET_TURNOVER | | | −0.004 | −1.82 | −0.004 | −1.73 |
| MARKET_TO_BOOK | | | 0.024 | 8.42 | 0.023 | 8.42 |
| BOOKBUILDING | | | −0.080 | −2.98 | −0.098 | −3.65 |
| GDP_PER_CAPITA_GROWTH | | | | | 0.008 | 1.13 |
| MARKET_SIZE | | | | | 0.108 | 5.16 |
| MARKET_TURNOVER | | | | | 0.033 | 1.21 |
| Industry FE | Yes | | Yes | | Yes | |
| Year FE | Yes | | Yes | | Yes | |
| Country FE | Yes | | Yes | | Yes | |
| No. of obs. | 17,066 | | 17,066 | | 17,066 | |
| Adjusted $R^2$ | 0.168 | | 0.187 | | 0.191 | |

[9]In an untabulated analysis, we confirm that using standard errors adjusted for clustering at the industry-country or country-year level has no material impact on our core findings.

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variables, and column 3 reports the results of the fully specified baseline model in equation (1) with both IPO-level and economy-wide controls included. In all 3 columns, the coefficient of BOARD_REFORM is significantly negative (largest $p$-value = 0.03), suggesting that IPO first-day return declined following the implementation of board reforms. This finding is consistent with the view that the stronger board oversight arising from board reforms reduces IPO underpricing. The effect is economically meaningful: The coefficient of BOARD_REFORM in column 3 suggests that after controlling for known determinants of IPO underpricing, IPO first-day returns in the postreform period are on average 0.157 (15.7 percentage points) lower than those in the pre-reform period.

The coefficients of the control variables are generally consistent with those reported in prior articles (e.g., Ellul and Pagano (2006), Çolak et al. (2017), and Chen et al. (2020)). IPO firms with higher profitability and a higher market-to-book ratio tend to have higher first-day returns, whereas those with a larger firm size, a higher leverage ratio, and greater asset turnover tend to have lower first-day returns. IPOs using the bookbuilding method tend to have lower first-day returns, and those in countries with a larger market size tend to have higher first-day returns.

## B. Robustness Tests

To assess the robustness of our baseline results, we carry out an array of sensitivity tests. In this section, we provide a summary of these tests; for details, the reader is referred to the Supplementary Material. First, we consider the possibility that our results are caused by the potential confounding effects of regulatory changes other than board reforms. To mitigate this concern, we control for the implementation of non-board reforms, the adoption of International Financial Reporting Standards (IFRS), and the passage of international takeover laws, respectively (Hong et al. (2014), Lel and Miller (2015), and Fauver et al. (2017)). Second, we address the possibility that the documented effect of board reforms is caused by changes in the composition of IPO firms in the postreform period by performing analysis on a propensity-score-matched sample of IPOs taking place within 1 year before or after the implementation of board reforms. Third, we control for potential noise in our BOARD_REFORM measure induced by IPOs that take place in the board-reform years by focusing on a subsample of IPOs in countries in which the exact board-reform dates are available from Kim and Lu (2013). Further, we perform country-by-country and industry-by-industry regressions to verify that our main results are not confined to a specific country or industry and run a series of placebo tests to ensure that that our results are not spuriously caused by features of the underlying data. Our baseline results remain robust in all these tests.

Last, we consider the possibility that regulators' decision to implement board reforms in a specific country could be partly caused by the performance indicators of the IPO market, such as the average first-day return of the country's IPOs, which could affect our inferences. To examine this issue, we use proportional hazard models to model the time until reform implementation. The results of this analysis provide no evidence that the timing of board reform is related to country-level IPO first-day return, reaffirming that board reforms are plausibly exogenous in our setting.

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# IV. Cross-Sectional Tests

## A. The Moderating Effects of Agency Problems

As discussed, prior studies consider agency frictions between the management of newly listed firms and investors to be an important factor causing IPO underpricing (Brennan and Franks (1997), Ljungqvist and Wilhelm (2003), and Smart and Zutter (2003)). Drawing on this line of research, we advance the argument that global board reforms strengthen board oversight of management, leading to lower IPO underpricing. Thus, we would expect the effect of board reforms on IPO first-day returns to be amplified among IPOs in which agency concerns are more prominent.

Following prior studies (Jensen (1986), Ang et al. (2000)), we employ 3 proxies for potential agency problems in IPO firms. Our first measure is FREE_CASH_FLOW, calculated as operating income before depreciation minus taxes, interest expenses, and any dividends (both common and preferred), then divided by total assets at the time of listing (Lehn and Poulsen (1989)). More resources are under the discretion of managers when free cash flow is high, so a higher variable value indicates greater agency problems (Jensen). Our second measure is EXPENSE_RATIO, calculated as operating expense divided by total assets at the time of listing. A higher expense ratio indicates inefficient cost management and hence greater agency problems (Ang et al.). Our third measure is ASSET_ TURNOVER, calculated as total annual sales divided by total assets at the time of listing. A higher asset-turnover value indicates a more efficient use of the firm's assets and hence lower agency problems (Ang et al.). We interact the three variables with BOARD_REFORM and include the corresponding interaction terms in the baseline regression.

The results of this analysis are reported in Table 4, which shows that the coefficients of BOARD_REFORM × FREE_CASH_FLOW and BOARD_REFORM × EXPENSE_RATIO are both significantly negative (largest $p$-value $< 0.01$), whereas the coefficient of BOARD_REFORM × ASSET_TURNOVER is significantly positive ($p$-value = 0.022).[10] These results support our expectation that the effect of board reforms on IPO first-day returns is amplified for IPO firms in which agency concerns are more prominent.

## B. The Moderating Effects of Certification and Disclosure Specificity

Next, we examine the effects of IPO certification and disclosure specificity on the relationship between board reforms and IPO first-day returns. Prior research suggests that reputable underwriters and auditors play an important "certification" role in the IPO process by providing better-quality information about the intrinsic value of the new issue, which alleviates informational frictions among investors (Carter and Manaster (1990), Michaely and Shaw (1994), and

[10]Ang et al. (2000) document that the expense-ratio and asset-turnover measures both contain a significant industry component. To verify that the documented findings are not spuriously caused by industry effects, in untabulated tests, we repeat the tests in columns 2 and 3 of Table 4 using industry-adjusted expense-ratio and asset-turnover measures. Our results still hold.

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TABLE 4

Board Reforms and IPO First-Day Returns: The Moderating Effects of Agency Problems

Table 4 presents the regression results for the effects of agency problems on the relationship between board reforms and initial public offering (IPO) first-day returns. Our baseline sample consists of 17,066 IPOs across 38 countries spanning the period 1990–2016. The regressions are performed by OLS, with *t*-statistics computed using standard errors robust to heteroscedasticity and clustering at the industry-year level. Constant, industry fixed effects (FE) based on Fama–French 12-industry classification, year-of-listing FE, and country-of-listing FE are included in all the regressions. Variable definitions are presented in the Appendix.

| Dependent Variable: | FIRST_DAY_RETURN | | | | | |
|---|---|---|---|---|---|---|
| | 1 | | 2 | | 3 | |
| | Coefficient | *t*-Statistic | Coefficient | *t*-Statistic | Coefficient | *t*-Statistic |
| BOARD_REFORM | −0.143 | −2.72 | −0.098 | −1.93 | −0.163 | −2.95 |
| BOARD_REFORM × FREE_CASH_FLOW | −0.311 | −2.63 | | | | |
| FREE_CASH_FLOW | −0.223 | −1.93 | | | | |
| BOARD_REFORM × EXPENSE_RATIO | | | −0.186 | −3.05 | | |
| EXPENSE_RATIO | | | 0.116 | 2.04 | | |
| BOARD_REFORM × ASSET_TURNOVER | | | | | 0.010 | 2.30 |
| FIRM_SIZE | −0.036 | −7.15 | −0.038 | −6.84 | −0.033 | −6.93 |
| PROFITABILITY | 0.045 | 2.88 | 0.062 | 3.12 | 0.029 | 1.90 |
| LEVERAGE | −0.129 | −3.43 | −0.129 | −3.42 | −0.127 | −3.45 |
| ASSET_TURNOVER | −0.005 | −2.10 | −0.008 | −2.49 | −0.009 | −2.53 |
| MARKET_TO_BOOK | 0.024 | 8.22 | 0.023 | 7.52 | 0.023 | 8.43 |
| BOOKBUILDING | −0.099 | −3.65 | −0.089 | −3.12 | −0.098 | −3.66 |
| GDP_PER_CAPITA_GROWTH | 0.007 | 0.89 | 0.007 | 0.93 | 0.008 | 1.12 |
| MARKET_SIZE | 0.102 | 4.94 | 0.099 | 4.65 | 0.108 | 5.15 |
| MARKET_TURNOVER | 0.030 | 1.11 | 0.030 | 1.09 | 0.033 | 1.22 |
| Industry FE | Yes | | Yes | | Yes | |
| Year FE | Yes | | Yes | | Yes | |
| Country FE | Yes | | Yes | | Yes | |
| No. of obs. | 16,769 | | 15,335 | | 17,066 | |
| Adjusted $R^2$ | 0.195 | | 0.198 | | 0.191 | |

Weber and Willenborg (2003)). There is also evidence suggesting that investors face less information asymmetry when IPO firms provide specific use-of-proceeds disclosures (Leone et al. (2007)). As discussed, we propose improved integrity and transparency of financial reporting as one of the channels through which global board reforms reduce IPO underpricing. Under this scenario, we would expect the role of board reforms in mitigating information asymmetry among investors, and thus the effect of board reforms on IPO underpricing, to be mitigated for IPOs certified by reputable intermediaries and IPOs that disclose their intended use of proceeds.

Following prior literature (Carter and Manaster (1990), Michaely and Shaw (1994), and Weber and Willenborg (2003)), we use two measures of IPO certification to capture underwriter and audit-firm reputation. Our first measure is REPUTABLE_UNDERWRITER, a dummy variable equal to 1 if the investment bank underwriting the IPO is in the top quartile based on combined IPO proceeds, and 0 otherwise. Our second measure is BIG_4_AUDITOR, a dummy variable equal to 1 if the IPO firm is audited by one of the Big 4 auditors, and 0 otherwise. We follow Leone et al. (2007) and construct PROCEEDS_USE as a dummy variable equal to 1 if the IPO prospectus discloses a specific purpose or rationale behind using IPO proceeds (e.g., investments, paying off debt, corporate restructure/expansion), and 0 if the firm discloses only "General Corporate Purpose" in describing its use of IPO proceeds. We interact the 3 variables with BOARD_REFORM and include the corresponding interaction terms in the baseline regression model.

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TABLE 5

Board Reforms and IPO First-Day Returns: The Moderating Effects of Certification and Disclosure Specificity

Table 5 presents the regression results for the effects of certification and disclosure specificity on the relationship between board reforms and initial public offering (IPO) first-day returns. Our baseline sample consists of 17,066 IPOs across 38 countries spanning the period 1990–2016. The regressions are performed by OLS, with *t*-statistics computed using standard errors robust to heteroscedasticity and clustering at the industry-year level. Constant, industry fixed effects (FE) based on Fama–French 12-industry classification, year-of-listing FE, and country-of-listing FE are included in all the regressions. Variable definitions are presented in the Appendix.

| Dependent Variable: | FIRST_DAY_RETURN | | | | | |
|---|---|---|---|---|---|---|
| | 1 | | 2 | | 3 | |
| | Coefficient | *t*-Statistic | Coefficient | *t*-Statistic | Coefficient | *t*-Statistic |
| BOARD_REFORM | −0.143 | −2.65 | −0.103 | −1.89 | −0.226 | −3.94 |
| BOARD_REFORM × REPUTABLE_UNDERWRITER | 0.105 | 2.38 | | | | |
| REPUTABLE_UNDERWRITER | −0.109 | −2.84 | | | | |
| BOARD_REFORM × BIG_4_AUDITOR | | | 0.130 | 2.25 | | |
| BIG_4_AUDITOR | | | −0.181 | −3.04 | | |
| BOARD_REFORM × PROCEEDS_USE | | | | | 0.141 | 3.66 |
| PROCEEDS_USE | | | | | −0.112 | −3.28 |
| FIRM_SIZE | −0.015 | −2.73 | −0.031 | −6.33 | −0.032 | −6.87 |
| PROFITABILITY | 0.030 | 1.98 | 0.030 | 1.95 | 0.030 | 1.94 |
| LEVERAGE | −0.131 | −3.55 | −0.125 | −3.40 | −0.124 | −3.35 |
| ASSET_TURNOVER | −0.003 | −1.58 | −0.004 | −1.76 | −0.004 | −1.67 |
| MARKET_TO_BOOK | 0.024 | 8.80 | 0.023 | 8.54 | 0.023 | 8.45 |
| BOOKBUILDING | −0.079 | −2.99 | −0.104 | −3.80 | −0.103 | −3.93 |
| GDP_PER_CAPITA_GROWTH | 0.009 | 1.22 | 0.008 | 1.07 | 0.009 | 1.25 |
| MARKET_SIZE | 0.112 | 5.39 | 0.114 | 5.36 | 0.110 | 5.24 |
| MARKET_TURNOVER | 0.032 | 1.17 | 0.032 | 1.16 | 0.022 | 0.84 |
| Industry FE | Yes | | Yes | | Yes | |
| Year FE | Yes | | Yes | | Yes | |
| Country FE | Yes | | Yes | | Yes | |
| No. of obs. | 17,066 | | 17,066 | | 17,001 | |
| Adjusted $R^2$ | 0.194 | | 0.192 | | 0.192 | |

The results of this estimation are reported in Table 5. Columns 1 and 2 show that the coefficients of BOARD_REFORM × REPUTABLE_UNDERWRITER and BOARD_REFORM × BIG_4_AUDITOR are both significantly positive (largest $p$-value = 0.025), suggesting that the effect of board reforms on IPO first-day returns is mitigated for IPOs that are underwritten by reputable underwriters or audited by Big 4 auditors. Column 3 shows that the coefficient of BOARD_REFORM × PROCEEDS_USE is significantly positive ($p$-value < 0.01), suggesting that the effect of board reforms on IPO first-day returns is mitigated for IPOs that disclose their intended use of proceeds. Collectively, these results support our conjecture that the effect of board reforms on IPO underpricing is mitigated for IPOs certified by reputable intermediaries and IPOs with more specific disclosure.[11]

[11] In an untabulated analysis, we also explore the role of backing from venture capitalist (VCs) in the relationship between board reforms and IPO underpricing. Insights from the prior literature offer competing predictions regarding the moderating effect of VC backing. On the one hand, early IPO studies (e.g., Megginson and Weiss (1991), Lin and Smith (1998)) suggest that VCs play a certification role at the time of IPOs, suggesting that VC backing should mitigate the documented effect of board reforms on IPO underpricing. On the other hand, more recent studies emphasize the potential conflicts of interest between VC firms and the IPO firm, maintaining that VCs may seek to extract rents through deliberate underpricing (Lee and Wahal (2004), Loughran and Ritter (2004)). This perspective suggests that the role of strong board oversight should be more prominent, and thus the effect of board reforms on

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## C. The Moderating Effects of Country-Level Institutions

In this section, we examine the effects of country-level external governance mechanisms and financial reporting regulations on the relationship between board reforms and IPO first-day returns. Previous studies (La Porta et al. (1998), Leuz et al. (2003), and DeFond et al. (2007)) document that the specific legal rules of jurisdiction and the quality of their enforcement are important determinants of the ability of firm insiders to acquire private control, which in turn influences the willingness of investors to provide new financing to the firms. Prior research also suggests that a higher-quality financial reporting system makes firm financial reporting more transparent, which in turn mitigates informational frictions in the IPO market (Boulton et al. (2011), Hong et al. (2014)). Applying insights from these studies in our setting, we expect the role of board reforms in enhancing monitoring and financial reporting transparency in IPO firms, and thus the effect of board reforms on IPO underpricing, to be mitigated in countries where strong external governance mechanisms and stringent financial reporting regulations are already in place.

We use several measures of external governance suggested in prior literature. Our first measure is a country-specific shareholder rights index (SHAREHOLDER_RIGHTS) (Djankov et al. (2008), Spamann (2010)). This index measures the extent to which minority shareholders are legally protected against expropriation by corporate insiders. The focus is on private enforcement mechanisms, such as disclosure, approval, and litigation, that govern a specific self-dealing transaction. A higher index value indicates stronger shareholder protection. Our second measure is a country-specific internal trading restriction index (INTERNAL_TRADING_RESTRICTION) (Denis and Xu (2013)). This index is based on a survey of executives in the Annual Global Competitiveness Report that assesses the likelihood of insider trading in the respective countries.[12] A higher index value indicates a more restrictive insider-trading environment in the country. Our third measure is a country-specific legality index (LEGALITY) (La Porta et al. (1998), Berkowitz, Pistor, and Richard (2003)). This index assesses the efficiency of the judicial system, rule of law, absence of corruption, risk of expropriation, and contract repudiation. A higher index value indicates a stronger legal system with better investor protection. Our fourth measure is CIVIL_LAW, a dummy variable equal to 1 if the IPO firm is listed in a civil law country, and 0 otherwise.[13] Civil law countries generally have weaker legal investor protection than common law countries (La Porta et al. (1998)). We measure financial reporting quality

IPO underpricing should be amplified, for IPOs backed by VC firms. To examine which of these two channels is dominant in our setting, we interact BOARD_REFORM with VC_BACK, a dummy variable equal to 1 if the IPO firm is backed by venture capital, and 0 otherwise. The coefficient of the interaction term is significantly positive ($p$-value < 0.01), suggesting that VC backing mitigates the effect of board reforms on IPO underpricing, which is consistent with the certification perspective.

[12]The survey is conducted among approximately 4,000 corporate executives in 59 countries. The specific survey question is *"Insider trading is not common in the domestic market (1 for strongly disagree to 7 for strongly agree)."*

[13]Civil law countries in our sample include Argentina, Austria, Belgium, Brazil, Chile, China, Denmark, Finland, France, Germany, Greece, Indonesia, Italy, Japan, Mexico, Netherland, Norway, Philippines, Poland, Portugal, South Korea, Spain, Sweden, Switzerland, and Turkey.

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using a country-specific earnings-opacity score (EARNINGS_OPACITY) (Boulton et al. (2011)), which captures the extent of earnings aggressiveness, loss avoidance, and earnings smoothing. A higher value for this score reflects a lower quality of financial disclosure to investors. We interact these 5 variables with BOARD_REFORM and include the corresponding interaction terms in the baseline regression.

The results of this analysis are presented in columns 1–5 of Table 6. The table shows that the coefficients of BOARD_REFORM × SHAREHOLDER_RIGHTS, BOARD_REFORM × INTERNAL_TRADING_RESTRICTION, and BOARD_REFORM × LEGALITY are all positive and significant, whereas the coefficient of BOARD_REFORM × CIVIL_LAW is negative and significant (largest $p$-value < 0.01). These findings support our conjecture that the effect of board reforms on IPO first-day returns is mitigated for IPOs in countries with strong external governance mechanisms. The table also shows that the coefficient of BOARD_REFORM × EARNINGS_OPACITY is negative and significant ($p$-value < 0.01). Because a higher value of EARNINGS_OPACITY indicates more opaque financial reporting, this result is consistent with our expectation that the effect of board reforms on IPO first-day returns is mitigated for IPOs in countries with more stringent financial reporting regulations.

We also examine the role of emerging-market status because emerging markets typically have poorer investor protection and less stringent financial disclosure regulations than developed markets (Chen, Hope, Li, and Wang (2011)). To that end, we define the dummy variable EMERGING as equal to 1 if the IPO firm is listed in an emerging market, and 0 otherwise, and we modify our baseline model to include an interaction term between BOARD_REFORM and EMERGING.[14] The results of this estimation are reported in column 6 of Table 6 and show that the coefficient of BOARD_REFORM × EMERGING is significantly negative ($p$-value = 0.029), suggesting that the effect of board reforms on IPO first-day returns is amplified for IPOs in emerging markets. This finding further supports our conjecture that the effect of board reforms is mitigated for IPOs in countries with strong external governance mechanisms and stringent financial reporting regulations.[15]

## V. Supplemental Analysis

### A. Composition and Implementation Approaches of Board Reforms

In this section, we examine whether the effect of global board reforms on IPO underpricing varies across reform components and implementation approaches. Global board reforms typically cover the following key components: board independence, separation of the CEO and chair–of-the-board positions, and auditor and audit-committee independence (Kim and Lu (2013), Fauver et al. (2017)). Focusing

[14]Emerging markets in our sample include Argentina, Brazil, Chile, China, India, Indonesia, Malaysia, Mexico, Pakistan, the Philippines, Thailand, and Turkey.

[15]We do not include country fixed effects in the regression models reported in Table 6 because this would result in perfect collinearity between the stand-alone effects of country-specific time-invariant moderators and country-specific fixed-effect dummies.

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TABLE 6

## Board Reforms and IPO First-Day Returns: The Moderating Effects of Country-Level Institutions

Table 6 presents the regression results for the effects of country-level institutions on the relationship between board reforms and initial public offering (IPO) first-day returns. Our baseline sample consists of 17,066 IPOs across 38 countries spanning the period 1990–2016. The regressions are performed by OLS, with *t*-statistics computed using standard errors robust to heteroscedasticity and clustering at the industry-year level. Constant, industry fixed effects (FE) based on Fama–French 12-industry classification and year-of-listing FE are included in all the regressions. Variable definitions are presented in the Appendix.

| Dependent Variable: | FIRST_DAY_RETURN | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | |
| | Coeff. | *t*-Stat. | Coeff. | *t*-Stat. | Coeff. | *t*-Stat. | Coeff. | *t*-Stat. | Coeff. | *t*-Stat. | Coeff. | *t*-Stat. |
| BOARD_REFORM | −0.052 | −1.96 | −0.195 | −1.73 | −0.647 | −4.14 | −0.310 | −4.88 | −0.640 | −5.44 | −0.159 | −2.75 |
| BOARD_REFORM × SHAREHOLDER_RIGHTS | 0.056 | 2.71 | | | | | | | | | | |
| SHAREHOLDER_RIGHTS | −0.023 | −1.22 | | | | | | | | | | |
| BOARD_REFORM × INTERNAL_TRADING_RESTRICTION | | | 0.065 | 2.86 | | | | | | | | |
| INTERNAL_TRADING_RESTRICTION | | | −0.059 | −2.62 | | | | | | | | |
| BOARD_REFORM × LEGALITY | | | | | 0.242 | 2.97 | | | | | | |
| LEGALITY | | | | | −0.331 | −4.14 | | | | | | |
| BOARD_REFORM × CIVIL_LAW | | | | | | | −0.119 | −2.69 | | | | |
| CIVIL_LAW | | | | | | | 0.340 | 6.56 | | | | |
| BOARD_REFORM × EARNINGS_OPACITY | | | | | | | | | −0.050 | −3.07 | | |
| EARNINGS_OPACITY | | | | | | | | | 0.087 | 4.89 | | |
| BOARD_REFORM × EMERGING | | | | | | | | | | | −0.117 | −2.20 |
| EMERGING | | | | | | | | | | | 0.205 | 3.90 |
| FIRM_SIZE | −0.027 | −5.42 | −0.028 | −5.64 | −0.025 | −5.09 | −0.027 | −5.48 | −0.030 | −5.72 | −0.026 | −5.16 |
| PROFITABILITY | 0.035 | 2.09 | 0.031 | 2.01 | 0.033 | 2.07 | 0.032 | 2.04 | 0.029 | 1.94 | 0.034 | 2.07 |
| LEVERAGE | −0.091 | −2.42 | −0.103 | −2.76 | −0.112 | −2.88 | −0.102 | −2.72 | −0.088 | −2.36 | −0.107 | −2.78 |
| ASSET_TURNOVER | −0.004 | −1.81 | −0.004 | −1.82 | −0.004 | −1.72 | −0.005 | −2.19 | −0.004 | −1.96 | −0.004 | −1.74 |
| MARKET_TO_BOOK | 0.021 | 7.65 | 0.022 | 8.07 | 0.022 | 7.93 | 0.022 | 8.04 | 0.022 | 7.97 | 0.022 | 7.83 |
| BOOKBUILDING | −0.072 | −3.39 | −0.055 | −2.54 | −0.054 | −2.49 | −0.104 | −4.75 | −0.108 | −4.63 | −0.057 | −2.60 |
| GDP_PER_CAPITA_GROWTH | 0.013 | 3.01 | 0.007 | 1.32 | 0.010 | 1.77 | 0.010 | 2.44 | −0.003 | −0.61 | 0.006 | 0.97 |
| MARKET_SIZE | 0.059 | 4.79 | 0.056 | 4.92 | 0.062 | 5.09 | 0.082 | 6.08 | 0.054 | 4.77 | 0.065 | 5.14 |
| MARKET_TURNOVER | 0.016 | 0.85 | 0.052 | 3.10 | 0.030 | 1.84 | 0.007 | 0.42 | 0.045 | 2.51 | 0.038 | 2.28 |
| Industry FE | Yes | | Yes | | Yes | | Yes | | Yes | | Yes | |
| Year FE | Yes | | Yes | | Yes | | Yes | | Yes | | Yes | |
| Country FE | No | | No | | No | | No | | No | | No | |
| No. of obs. | 17,066 | | 16,966 | | 17,031 | | 17,066 | | 16,757 | | 17,066 | |
| Adjusted $R^2$ | 0.161 | | 0.162 | | 0.163 | | 0.167 | | 0.166 | | 0.162 | |

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on board independence and the separation of the CEO and chairperson positions is intended to strengthen a board's oversight of corporate insiders (Fama and Jensen (1983), Jensen (1993)), whereas focusing on auditor and audit-committee independence is intended to enhance the integrity and transparency of corporate financial reporting (Frankel et al. (2002), Klein (2002)). As discussed, we propose two possible channels through which board reforms can reduce IPO underpricing: i) the increased monitoring of management and ii) improved integrity and transparency of financial reporting. Therefore, distinguishing the specific effects of board-reform components helps us to assess the relative importance of these two channels in causing the documented relationship.

To conduct this analysis, we construct 3 dummy variables: BOARD_INDEPENDENCE_REFORM, AUDIT_COMMITTEE_REFORM, and CEO_DUALITY_REFORM. We define BOARD_INDEPENDENCE_REFORM as a dummy variable equal to 1 for IPOs taking place during or after the year of major board reforms that focus on board independence in the country of issuance, and 0 otherwise. Similarly, we define CEO_DUALITY_REFORM (AUDIT_COMMITTEE_REFORM) as a dummy variable equal to 1 for IPOs taking place during or after the year of major board reforms that focus on CEO/chairperson separation (audit committee) in the country of issuance, and 0 otherwise. We then reestimate our baseline regression model after replacing BOARD_REFORM with these 3 variables. The results of this analysis are reported in column 1 of Table 7 and show that the coefficients of all 3 reform components are negative and significant (largest $p$-value = 0.023), suggesting that all 3 reform components reduce IPO underpricing. We also find that the coefficients of BOARD_INDEPENDENCE_REFORM and CEO_DUALITY_REFORM are both significantly larger (in absolute terms) than the coefficient of AUDIT_COMMITTEE_REFORM (largest $p$-value < 0.01). These results suggest that both monitoring and financial transparency channels cause the documented effect of board reforms on IPO underpricing, and the monitoring channel appears to play a stronger role.

Next, we examine whether the effect of board reforms varies with the implementation approach. As outlined earlier, prior research (Kim and Lu (2013), Fauver et al. (2017)) classifies board reforms into two types: comply-or-explain reforms and rule-based reforms. Comply-or-explain reforms typically involve the publication of governance codes, with firms choosing to either comply with the codes or explain why they do not comply. In contrast, rule-based reforms usually involve the enactment of company laws or securities regulations that require firms to follow specified governance practices. Ex ante, it is not clear which of the two reform types has a stronger effect on IPO underpricing: The comply-or-explain approach may not be enforceable due to the flexibility it offers to firms, whereas the rule-based approach may overregulate due to its one-size-fits-all nature. Therefore, we treat this test as an exploratory analysis.

To conduct this test, we construct two variables: COMPLY_OR_EXPLAIN_REFORM and RULE_BASED_REFORM. COMPLY_OR_EXPLAIN_REFORM is a dummy variable equal to 1 for IPOs taking place during or after the year of major board reforms with a comply-or-explain approach in the country of issuance, and 0 otherwise. RULE_BASED_REFORM is a dummy variable equal to 1 for IPOs taking place during or after the year of major board reforms with a rule-based

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TABLE 7

Board Reforms and IPO First-Day Returns: Components and Implementation Approaches of Reforms

Table 7 presents the regression results for the relationship between the components and implementation approaches of board reforms and initial public offering (IPO) first-day returns. Our baseline sample consists of 17,066 IPOs across 38 countries spanning the period 1990–2016. The regressions are performed by OLS, with *t*-statistics computed using standard errors robust to heteroscedasticity and clustering at the industry-year level. Constant, industry fixed effects (FE) based on Fama–French 12-industry classification, year-of-listing FE, and country-of-listing FE are included in all the regressions. Variable definitions are presented in the Appendix.

| Dependent Variable: | FIRST_DAY_RETURN | | | |
|---|---|---|---|---|
| | 1 | | 2 | |
| | Coefficient | *t*-Statistic | Coefficient | *t*-Statistic |
| BOARD_INDEPENDENCE_REFORM | −0.340 | −6.30 | | |
| CEO_DUALITY_REFORM | −0.162 | −2.39 | | |
| AUDIT_COMMITTEE_REFORM | −0.117 | −2.28 | | |
| COMPLY_OR_EXPLAIN_REFORM | | | −0.249 | −4.48 |
| RULE_BASED_REFORM | | | −0.082 | −1.92 |
| FIRM_SIZE | −0.031 | −6.73 | −0.032 | −6.84 |
| PROFITABILITY | 0.030 | 1.95 | 0.030 | 1.94 |
| LEVERAGE | −0.135 | −3.71 | −0.129 | −3.51 |
| ASSET_TURNOVER | −0.004 | −1.67 | −0.004 | −1.71 |
| MARKET_TO_BOOK | 0.023 | 8.28 | 0.023 | 8.30 |
| BOOKBUILDING | −0.121 | −4.54 | −0.107 | −4.04 |
| GDP_PER_CAPITA_GROWTH | 0.008 | 1.04 | 0.005 | 0.73 |
| MARKET_SIZE | 0.121 | 5.68 | 0.116 | 5.58 |
| MARKET_TURNOVER | 0.017 | 0.63 | 0.018 | 0.64 |
| Industry FE | Yes | | Yes | |
| Year FE | Yes | | Yes | |
| Country FE | Yes | | Yes | |
| No. of obs. | 17,066 | | 17,066 | |
| Adjusted $R^2$ | 0.195 | | 0.192 | |

approach in the country of issuance, and 0 otherwise. Next, we reestimate our baseline regression model after replacing the BOARD_REFORM variable with these 2 variables. The results of this analysis are reported in column 2 of Table 7, which shows that the coefficient of COMPLY_OR_EXPLAIN_REFORM is negative and significant ($p$-value < 0.01), and so is the coefficient of RULE_BASED_REFORM ($p$-value = 0.056). We also find that the coefficient of COMPLY_OR_EXPLAIN_REFORM is significantly larger (in absolute terms) than that of RULE_BASED_REFORM ($p$-value < 0.01), suggesting that the effect of board reforms on IPO underpricing is stronger for reforms implemented using the comply-or-explain approach.

## B. Board Reforms and IPO Long-Term Market Performance

The focus of our analysis has thus far been on IPO first-day returns. In this section, we attempt to provide further evidence for the relationship between board reforms and IPO pricing by examining the impact of reforms on the long-term market performance of new issues. Prior literature (Ritter (1991), Loughran and Ritter (1995), (2000), and Ang, Gu, and Hochberg (2007)) shows that IPO firms tend to underperform the market in the long run, and a line of research regards agency-related issues as important determinants of IPO long-term underperformance. For example, Teo et al. (1998) and Darrough and Rangan (2005) find that issuing firms opportunistically manage earnings and curtail investment activities in

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TABLE 8

Board Reforms and IPO Long-Term Market Performance

Table 8 presents the regression results for the relationship between board reforms and initial public offering (IPO) long-term market performance. Our baseline sample consists of 17,066 IPOs across 38 countries spanning the period 1990–2016. The regressions are performed by OLS, with *t*-statistics computed using standard errors robust to heteroscedasticity and clustering at the industry-year level. Constant, industry fixed effects (FE) based on Fama–French 12-industry classification, year-of-listing FE, and country-of-listing FE are included in all the regressions. Variable definitions are presented in the Appendix.

| Dependent Variable: | 1_YEAR_BHAR | | 2_YEAR_BHAR | | 3_YEAR_BHAR | |
|---|---|---|---|---|---|---|
| | 1 | | 2 | | 3 | |
| | Coefficient | *t*-Statistic | Coefficient | *t*-Statistic | Coefficient | *t*-Statistic |
| BOARD_REFORM | 0.040 | 1.69 | 0.077 | 2.46 | 0.076 | 2.06 |
| FIRM_SIZE | 0.020 | 8.69 | 0.031 | 11.47 | 0.036 | 11.81 |
| PROFITABILITY | 0.008 | 1.73 | 0.011 | 1.95 | 0.013 | 2.50 |
| LEVERAGE | −0.036 | −2.20 | −0.032 | −1.80 | 0.002 | 0.07 |
| ASSET_TURNOVER | 0.002 | 1.64 | 0.003 | 2.18 | 0.002 | 1.52 |
| MARKET_TO_BOOK | 0.007 | 6.44 | 0.004 | 3.67 | 0.002 | 2.18 |
| BOOKBUILDING | 0.010 | 1.03 | 0.001 | 0.07 | 0.015 | 1.07 |
| GDP_PER_CAPITA_GROWTH | −0.011 | −4.35 | −0.009 | −3.03 | −0.002 | −0.78 |
| MARKET_SIZE | 0.001 | 0.10 | −0.011 | −1.28 | −0.008 | −0.80 |
| MARKET_TURNOVER | 0.094 | 4.90 | 0.070 | 3.55 | 0.022 | 1.49 |
| Industry FE | Yes | | Yes | | Yes | |
| Year FE | Yes | | Yes | | Yes | |
| Country FE | Yes | | Yes | | Yes | |
| No. of obs. | 15,941 | | 15,941 | | 15,941 | |
| Adjusted $R^2$ | 0.081 | | 0.059 | | 0.057 | |

the IPO year, to the detriment of their long-run performance. Brau et al. (2012) attribute the long-run underperformance of IPO firms to managerial overinvestment in acquisition activities in the post-IPO period. We reason that by strengthening the board oversight of management, board reforms mitigate these agency-related issues, leading to an improvement in IPO long-term market performance.

In line with prior studies (Carter, Dark, and Singh (1998), Gao, Ritter, and Zhu (2013), and Çolak et al. (2017)), we measure IPO long-term market performance using market-adjusted buy-and-hold abnormal stock returns (BHARs) over 1 year (1_YEAR_BHAR), 2 years (2_YEAR_BHAR), and 3 years (3_YEAR_BHAR) after the IPO listing date. We reestimate the baseline regression 3 times, using each of these 3 abnormal-return measures as the dependent variable, respectively. The results of this analysis are reported in Table 8 and show that the coefficient of BOARD_REFORM is positive and significant in all three regressions ($p$-value < 0.05 for 2_YEAR_BHAR and 3_YEAR_BHAR; $p$-value = 0.09 for 1_YEAR_BHAR). Prior research shows that long-run abnormal returns are significantly skewed (Lyon, Barber, and Tsai (1999)). To account for the potential impact of this empirical pattern on our findings, we reestimate our regression models using log-transformed BHARs (Carter et al. (1998)). The (untabulated) results of this analysis show that our findings remain intact ($p$-value < 0.02 for 2_YEAR_BHAR and 3_YEAR_BHAR; $p$-value = 0.06 for 1_YEAR_BHAR). These results support our conjecture that board reforms lead to an improvement in IPO long-term market performance.

## C. Board Reforms and Other IPO Outcomes

In this section, we extend our analysis beyond IPO stock returns by examining the impact of board reforms on a set of alternative IPO performance measures:

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TABLE 9

Board Reforms and Other IPO Outcomes

Table 9 presents the regression results for the relationship between board reforms and other IPO outcomes. Our baseline sample consists of 17,066 initial public offerings (IPOs) across 38 countries spanning the period 1990–2016. The regressions in columns 1 and 3 are performed by OLS, and the regression in column 2 is performed by logit. *t*- and *z*-statistics are computed using standard errors robust to heteroscedasticity and clustering at the industry-year level. Constant, industry fixed effects (FE) based on Fama–French 12-industry classification, year-of-listing FE, and country-of-listing FE are included in all the regressions. Variable definitions are presented in the Appendix.

| Dependent Variable: | FLOAT | | OVERSUBSCRIPTION | | PROCEEDS | |
|---|---|---|---|---|---|---|
| | 1 | | 2 | | 3 | |
| | Coefficient | *t*-Statistic | Coefficient | *t*-Statistic | Coefficient | *t*-Statistic |
| BOARD_REFORM | 0.035 | 2.26 | 0.403 | 1.89 | 0.418 | 6.31 |
| FIRM_SIZE | 0.000 | 0.04 | 0.152 | 7.16 | −0.520 | −21.53 |
| PROFITABILITY | 0.000 | 0.03 | 0.009 | 0.42 | −0.058 | −0.97 |
| LEVERAGE | 0.003 | 0.24 | −0.430 | −2.85 | 0.138 | 1.37 |
| ASSET_TURNOVER | −0.003 | −2.45 | 0.007 | 1.22 | 0.017 | 1.44 |
| MARKET_TO_BOOK | −0.004 | −6.21 | −0.007 | −0.64 | 0.084 | 13.20 |
| BOOKBUILDING | 0.013 | 2.11 | −1.702 | −14.07 | 0.494 | 9.28 |
| GDP_PER_CAPITA_GROWTH | −0.001 | −0.75 | 0.079 | 2.46 | 0.049 | 5.19 |
| MARKET_SIZE | 0.003 | 0.57 | −0.581 | −7.40 | 0.128 | 3.40 |
| MARKET_TURNOVER | 0.012 | 1.40 | −0.486 | −5.06 | −0.038 | −0.87 |
| Industry FE | Yes | | Yes | | Yes | |
| Year FE | Yes | | Yes | | Yes | |
| Country FE | Yes | | Yes | | Yes | |
| No. of obs. | 15,607 | | 17,066 | | 17,066 | |
| Adjusted/pseudo-$R^2$ | 0.140 | | 0.669 | | 0.382 | |

IPO float, oversubscription, and proceeds (e.g., Benveniste and Wilhelm (1990), Chowdhry and Sherman (1996), Jenkinson and Jones (2004), Cook et al. (2006), and Alavi et al. (2008)). The management of an IPO firm may opportunistically reduce the number of new shares issued in the IPO to retain control over the firm (Alavi et al. (2008)). Accordingly, to the extent that board reforms curb managerial opportunism, we expect to observe an increase in IPO float following the implementation of reforms. Further, we reason that by reducing investors' concerns over agency issues, board reforms increase investor demand for IPO shares and hence the likelihood of an IPO being oversubscribed (Jenkinson and Jones (2004)). Following the same reasoning, we expect to observe an increase in IPO proceeds following the implementation of board reforms.

The construction of the variables used in this analysis follows prior literature. We define FLOAT as the number of common shares issued to the public divided by the total number of outstanding shares. OVERSUBSCRIPTION is defined as a dummy variable equal to 1 if the total volume of orders in the underwriting book exceeds the number of shares offered, and 0 otherwise. PROCEEDS is defined as the total IPO proceeds divided by total assets at the time of listing. We reestimate the baseline regression 3 times, using each of these 3 variables as the dependent variable, respectively. The results of this analysis are reported in Table 9 and show that the coefficient of BOARD_REFORM is positive and significant in all 3 regressions ($p$-value < 0.03 for FLOAT and PROCEEDS; $p$-value = 0.059 for OVERSUBSCRIPTION), lending support to our predictions.

## D. Confirmatory Analysis of the Mechanism Behind Board Reforms' Effect

As discussed, we build on prior literature (Fauver et al. (2017), Bae et al. (2021)) by exploiting global board reforms as an exogenous shock to IPO firms'

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board practices. In this section, we conduct a series of tests to reaffirm the validity of this approach in our setting. Specifically, we reason that if the documented effect of board reforms on IPO underpricing stems from an improvement in board governance, we should observe the following patterns in our sample: i) following board reforms, IPO firms tend to have stronger outside representation on boards and separation of the CEO/chairperson positions, and ii) IPO underpricing is negatively related to board and audit-committee independence and positively related to CEO/chairperson duality.[16] To test these predictions, we collect data on board characteristics in the issue year for the IPO firms in our sample from ISS (formerly RiskMetrics), ASSET4, and BoardEx. This results in a sample of 1,468 IPOs from 26 countries between 1996 and 2016.[17,18] Using these data, we construct 3 variables: BOARD_INDEPENDENCE, defined as the proportion of independent directors in the board; CEO_DUALITY, a dummy variable equal to 1 if the CEO and the chair of the board are the same person, and 0 otherwise; and AUDIT_COMMITTEE_INDEPENDENCE, defined as the proportion of independent directors on the audit committee of the board.

Panel A of Table 10 reports the distribution of IPOs in this sample. In line with prior studies (e.g., Fauver et al. (2017)), we find that firms from emerging markets, countries that were characterized by weak board governance structures and investor protection in the pre-reform period (Kim and Lu (2013)), are under-represented in this sample due to limited availability of board-characteristics data for these countries. Particularly notable (compared with our baseline sample) is the reduction in the number of IPOs from China and India, countries where the supervisory role of boards has traditionally been weak (Goswami (2002), Jiang and Kim (2020)). Therefore, an analysis using this subsample of IPOs is likely to yield a conservative estimate of the true impact of board reforms on IPO firms' board structures, which would bias against finding supportive evidence for strengthened board oversight as the mechanism behind our findings.

We begin by conducting a univariate analysis of changes in board characteristics around board reforms. We report the results of this analysis in Panel B of Table 10. The panel shows that the average value of BOARD_INDEPENDENCE

[16]We thank John McConnell for suggesting these tests.

[17]We exclude countries for which the data on IPO firms' board characteristics are not available. These countries are Argentina, Brazil, Denmark, Egypt, Finland, Hong Kong, Hungary, Japan, South Korea, Mexico, Portugal, and Turkey.

[18]The ISS data start in 1996 and cover Standard & Poor's (S&P)1500 firms, which are mainly U.S. firms. The ASSET4 data start in 2002, and the BoardEx data start in 1999; both databases cover publicly listed firms globally. Therefore, similar to prior studies (e.g., Fauver et al. (2017), Bae et al. (2021)), the sample size used in this analysis is considerably smaller. The magnitude of reduction in sample size is comparable to that reported in prior studies. For example, Fauver et al. find that firms with available board-characteristics data constitute only 9.4% of the firms in their baseline sample. In a similar vein, Bae et al. find that only 7.7% of firms in their baseline sample have available board-characteristics data. We acknowledge that as opposed to archival researchers, investors may obtain information about IPO firms' boards from other sources as well (e.g., from discussions with firms' executives or through connections with sell-side analysts covering the issuing firms). Relatedly, investors may garner knowledge about the board-governance attributes of the issuing firms by attending roadshow presentations. However, due to the confidential nature of such interactions, using these data sources in a large-scale archival study such as ours would not be feasible.

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TABLE 10

## Board Reforms, Board Characteristics of IPO Firms, and IPO First-Day Returns

Table 10 presents the results for the relationships between board reforms, board characteristics of initial public offering (IPO) firms, and IPO first-day returns. The sample consists of 1,468 IPOs across 26 countries spanning the period 1996–2016. The regression in column 2 of Panel C is performed by logit, and all other regressions are performed by OLS. *t*- and *z*-statistics are computed using standard errors robust to heteroscedasticity and clustering at the industry-year level. Constant, industry fixed effects (FE) based on Fama–French 12-industry classification, year-of-listing FE, and country-of-listing FE are included in all the regressions. Variable definitions are presented in the Appendix.

*Panel A. Sample Distribution*

| Country | No. of IPOs |
|---|---|
| Australia | 229 |
| Austria | 3 |
| Belgium | 4 |
| Canada | 149 |
| Chile | 2 |
| China | 5 |
| France | 35 |
| Germany | 27 |
| Greece | 7 |
| India | 16 |
| Indonesia | 11 |
| Israel | 3 |
| Italy | 38 |
| Malaysia | 19 |
| Netherlands | 8 |
| Norway | 12 |
| Pakistan | 6 |
| Philippines | 11 |
| Poland | 68 |
| Singapore | 9 |
| Spain | 12 |
| Sweden | 11 |
| Switzerland | 2 |
| Thailand | 54 |
| United Kingdom | 189 |
| United States | 538 |
| Total | 1,468 |

*Panel B. Board Reforms and Board Characteristics of IPO Firms: Univariate Analysis*

| | Pre-Reform Period | Postreform Period | Difference Between Columns 2 and 1 | *t*-Statistic |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| Average BOARD_INDEPENDENCE | 0.606 | 0.746 | 0.140 | 14.11 |
| % of majority independent board | 0.788 | 0.922 | 0.134 | 7.18 |
| Average CEO_DUALITY | 0.782 | 0.529 | −0.254 | −8.75 |
| Average AUDIT_COMMITTEE_INDEPENDENCE | 0.783 | 0.898 | 0.115 | 7.34 |
| % of majority independent audit committee | 0.860 | 0.928 | 0.068 | 3.97 |
| No. of obs. | 363 | 1,105 | | |

*Panel C. Board Reforms and Board Characteristics of IPO Firms: Regression Analysis*

| Dependent Variable: | BOARD_INDEPENDENCE | | CEO_DUALITY | | AUDIT_COMMITTEE_INDEPENDENCE | |
|---|---|---|---|---|---|---|
| | 1 | | 2 | | 3 | |
| | Coefficient | *t*-Statistic | Coefficient | *t*-Statistic | Coefficient | *t*-Statistic |
| BOARD_REFORM | 0.062 | 3.28 | −0.999 | −3.30 | 0.075 | 2.13 |
| FIRM_SIZE | −0.005 | −2.10 | 0.018 | 0.53 | −0.006 | −1.84 |
| PROFITABILITY | −0.002 | −0.68 | −0.044 | −0.71 | −0.002 | −0.53 |
| LEVERAGE | 0.003 | 0.12 | −0.055 | −0.22 | 0.022 | 0.85 |
| ASSET_TURNOVER | 0.004 | 1.48 | 0.063 | 1.20 | 0.007 | 2.01 |
| MARKET_TO_BOOK | 0.000 | −0.16 | 0.012 | 1.16 | −0.004 | −2.25 |
| BOOKBUILDING | 0.002 | 0.10 | 0.088 | 0.46 | −0.026 | −1.28 |
| GDP_PER_CAPITA_GROWTH | 0.000 | 0.10 | −0.124 | −2.03 | 0.003 | 0.36 |
| MARKET_SIZE | −0.037 | −1.36 | 0.317 | 0.92 | −0.012 | −0.31 |
| MARKET_TURNOVER | 0.041 | 1.70 | −0.244 | −0.78 | −0.002 | −0.05 |
| Industry FE | Yes | | Yes | | Yes | |
| Year FE | Yes | | Yes | | Yes | |
| Country FE | Yes | | Yes | | Yes | |
| No. of obs. | 1,468 | | 1,468 | | 1,468 | |
| Adjusted/pseudo-$R^2$ | 0.181 | | 0.090 | | 0.089 | |

*(continued on next page)*

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TABLE 10 (continued)

Board Reforms, Board Characteristics of IPO Firms, and IPO First-Day Returns

*Panel D. Board Characteristics of IPO Firms and IPO First-Day Returns*

| Dependent Variable: | FIRST_DAY_RETURN | | | | | |
|---|---|---|---|---|---|---|
| | 1 | | 2 | | 3 | |
| | Coefficient | *t*-Statistic | Coefficient | *t*-Statistic | Coefficient | *t*-Statistic |
| BOARD_INDEPENDENCE | −0.281 | −2.00 | | | | |
| CEO_DUALITY | | | 0.103 | 2.69 | | |
| AUDIT_COMMITTEE_INDEPENDENCE | | | | | −0.199 | −2.27 |
| FIRM_SIZE | −0.016 | −1.49 | −0.015 | −1.41 | −0.016 | −1.44 |
| PROFITABILITY | 0.046 | 1.96 | 0.047 | 2.00 | 0.046 | 1.95 |
| LEVERAGE | −0.180 | −2.30 | −0.178 | −2.26 | −0.176 | −2.22 |
| ASSET_TURNOVER | −0.030 | −1.20 | −0.032 | −1.31 | −0.029 | −1.20 |
| MARKET_TO_BOOK | 0.015 | 2.09 | 0.015 | 2.05 | 0.014 | 2.02 |
| BOOKBUILDING | 0.000 | 0.00 | −0.001 | −0.02 | −0.005 | −0.05 |
| GDP_PER_CAPITA_GROWTH | −0.025 | −0.93 | −0.022 | −0.82 | −0.025 | −0.91 |
| MARKET_SIZE | 0.157 | 0.82 | 0.161 | 0.85 | 0.164 | 0.85 |
| MARKET_TURNOVER | 0.032 | 0.21 | 0.026 | 0.17 | 0.022 | 0.14 |
| Industry FE | Yes | | Yes | | Yes | |
| Year FE | Yes | | Yes | | Yes | |
| Country FE | Yes | | Yes | | Yes | |
| No. of obs. | 1,468 | | 1,468 | | 1,468 | |
| Adjusted $R^2$ | 0.094 | | 0.095 | | 0.095 | |

increases from 0.606 in the pre-reform period to 0.746 in the postreform period, and the percentage of IPO firms with a majority of independent directors on the board (i.e., firms in which the proportion of independent directors exceeds 50%) increases from 0.788 in the pre-reform period to 0.922 in the postreform period. Further, the average value of CEO_DUALITY decreases from 0.782 in the pre-reform period to 0.529 in the postreform period. In addition, the average value of AUDIT_COMMITTEE_INDEPENDENCE increases from 0.783 in the pre-reform period to 0.898 in the postreform period, and the percentage of firms with a majority of independent directors on the audit committee (i.e., firms in which the proportion of independent directors in the audit committee exceeds 50%) increases from 0.860 in the pre-reform period to 0.928 in the postreform period. The differences are all statistically significant (largest $p$-value < 0.01), providing preliminary evidence that IPO firms tend to have stronger outside representation on boards and separation of the CEO/chairperson positions in the postreform period.

Next, we formally assess the impact of board reforms on the board characteristics of IPO firms using regression analysis. Specifically, we regress each of the 3 board characteristics (i.e., BOARD_INDEPENDENCE, CEO_DUALITY, and AUDIT_COMMITTEE_INDEPENDENCE) against BOARD_REFORM and control variables from our baseline model (equation (1)). The results of this estimation are reported in Panel C of Table 10, which shows that the coefficient of BOARD_REFORM is significantly positive for both BOARD_INDEPENDENCE and AUDIT_COMMITTEE_INDEPENDENCE (largest $p$-value = 0.035) and is significantly negative for CEO_DUALITY ($p$-value < 0.01).[19] These results confirm our findings from the univariate analysis that following board reforms, IPO

[19]As an additional validity check, we regress each of the 3 board characteristics against the corresponding board-reform components; that is, we regress BOARD_INDEPENDENCE against BOARD_INDEPENDENCE_REFORM, CEO_DUALITY against CEO_DUALITY_REFORM, and

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firms tend to have stronger outside representation on boards and separation of the CEO/chairperson positions.

Finally, we examine the relationship between board characteristics and IPO underpricing. To that end, we regress the IPO first-day return against each of the 3 board characteristics and control variables from our baseline model. The results of this estimation are reported in Panel D of Table 10, which shows that the coefficients of BOARD_INDEPENDENCE and AUDIT_COMMITTEE_INDEPENDENCE are both significantly negative (largest $p$-value = 0.047), whereas the coefficient of CEO_DUALITY is significantly positive ($p$-value < 0.01). These results suggest that IPO firms with stronger outside representation on boards (CEO/chairperson duality) are, on average, less (more) underpriced. Collectively, these findings lend further support to strengthened board oversight as the mechanism behind our findings.

## VI. Conclusions

We study the impact of global board reforms on the pricing of IPOs. We document that board reforms are associated with a significant reduction in IPO first-day returns. In cross-sectional tests, we find that the effect of board reforms is amplified for IPOs with greater agency concerns, whereas it is mitigated for IPOs certified by reputable intermediaries and IPOs that provide specific use-of-proceeds disclosures. We also find that the effect of board reforms is mitigated in countries with stronger shareholder-rights protection, more effective legal institutions, and more stringent financial reporting regulations. Furthermore, board reforms lead to an improvement in IPO long-run market performance. Further, we document an increase in IPO float, IPO proceeds, and the likelihood of an IPO being oversubscribed following the implementation of board reforms. We also show that after board reforms, IPO firms tend to have stronger outside representation on boards and separation of the CEO and chair-of-the-board positions, and that stronger outside representation on boards (CEO/chairperson duality) is associated with lower (higher) IPO first-day returns. We conclude that board reforms strengthen the board oversight of the issuing firms, leading to less underpriced IPOs.

Our study contributes to the corporate-governance literature, which has, to date, focused on the implications of global board reforms for the listed firms by providing evidence on the role of board reforms in shaping IPO outcomes. Our study also adds to the IPO pricing literature, which has so far offered competing insights regarding the role of board reforms in shaping the pricing of the new issues. On the one hand, a stream of research regards agency frictions as important determinants of IPO underpricing (Brennan and Franks (1997), Ljungqvist and Wilhelm (2003), Smart and Zutter (2003)), suggesting that by strengthening board oversight, board reforms should reduce the underpricing discount. On the other hand, several studies maintain that underpricing generates significant economic benefits for the issuing firms (Stoughton and Zechner (1998), Demers and Lewellen (2003), Pham et al. (2003), and Cliff and Denis (2004)), implying that stronger

AUDIT_COMMITTEE_INDEPENDENCE against AUDIT_COMMITTEE_REFORM. The results are consistent with those reported using BOARD_REFORM.

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board governance in the postreform period should result in greater IPO underpricing. Our findings are consistent with the view that stronger board oversight arising from board reforms reduces the underpricing discount, lending support to agency-based explanations of IPO underpricing (Brennan and Franks, Ljungqvist and Wilhelm, and Smart and Zutter). Finally, we contribute to the literature examining the interplay between external and internal governance structures by documenting how the institutional environment affects the impact of board reforms on the pricing of new issues.

## Appendix. Variable Definitions

*Variables in the Baseline Analysis in Table 3*

ASSET_TURNOVER: Sales divided by total assets of the IPO firm at the time of listing.

BOARD_REFORM: Dummy variable equal to 1 for IPOs taking place during or after the year of major board reform in the country of issuance, and 0 otherwise.

BOOKBUILDING: Dummy variable equal to 1 if the IPO is conducted using a bookbuilding method, and 0 otherwise.

FIRM_SIZE: Log transformation of the total assets of the IPO firm ($millions) at the time of listing.

FIRST_DAY_RETURN: IPO first-trading-day closing price minus offer price, divided by offer price.

GDP_PER_CAPITA_GROWTH: Country-specific annual growth in GDP per capita in the IPO year.

LEVERAGE: Total debt divided by total assets of the IPO firm at the time of listing.

MARKET_SIZE: Country-specific annual total value of stock traded divided by GDP in the IPO year.

MARKET_TO_BOOK: Market value of assets divided by the book value of assets of the IPO firm at the time of listing.

MARKET_TURNOVER: Country-specific annual aggregate stock-market-turnover ratio in the IPO year.

PROFITABILITY: Earnings before interest and taxes divided by total assets of the IPO firm at the time of listing.

*Additional Variables in Table 4*

EXPENSE_RATIO: Operating expense divided by total assets of the IPO firm at the time of listing.

FREE_CASH_FLOW: Operating income before depreciation minus taxes, interest expenses, and any dividend payment (both preferred and common), then divided by total assets of the IPO firm at the time of listing.

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*Additional Variables in Table 5*

BIG_4_AUDITOR: Dummy variable equal to 1 if the IPO firm is audited by one of the Big 4 auditors, and 0 otherwise.

PROCEEDS_USE: Dummy variable equal to 1 if the IPO prospectus discloses a specific purpose or rationale behind using IPO proceeds (e.g., investments, pay off debt, corporate restructure/expansion), and 0 if the firm discloses only a "General Corporate Purpose."

REPUTABLE_UNDERWRITER: Dummy variable equal to 1 if the investment bank underwriting the IPO is in the top quartile based on combined IPO proceeds, and 0 otherwise.

*Additional Variables in Table 6*

CIVIL_LAW: Dummy variable equal to 1 if the IPO firm is listed in a civil law country as defined by La Porta et al. (1998), and 0 otherwise.

EARNINGS_OPACITY: Country-specific earnings-opacity score based on Boulton et al. (2011).

EMERGING: Dummy variable equal to 1 if the IPO firm is listed in an emerging market, and 0 otherwise.

INTERNAL_TRADING_RESTRICTION: Country-specific internal-trading-restriction index based on Denis and Xu (2013).

LEGALITY: Country-specific legality index based on Berkowitz et al. (2003).

SHAREHOLDER_RIGHTS: Country-specific shareholder-rights index based on Djankov et al. (2008) and Spamann (2010).

*Additional Variables in Table 7*

AUDIT_COMMITTEE_REFORM: Dummy variable equal to 1 for IPOs taking place during or after the year of board reforms that involve audit-committee reform in the country of issuance, and 0 otherwise.

BOARD_INDEPENDENCE_REFORM: Dummy variable equal to 1 for IPOs taking place during or after the year of board reforms that involve board-independence reform in the country of issuance, and 0 otherwise.

CEO_DUALITY_REFORM: Dummy variable equal to 1 for IPOs taking place during or after the year of board reforms that involve CEO/chairperson separation reform in the country of issuance, and 0 otherwise.

COMPLY_OR_EXPLAIN_REFORM: Dummy variable equal to 1 for IPOs taking place during or after the year of board reforms with a comply-or-explain approach in the country of issuance, and 0 otherwise.

RULE-BASED REFORM: Dummy variable equal to 1 for IPOs taking place during or after the year of board reforms with a rule-based approach in the country of issuance, and 0 otherwise.

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*Additional Variables in Table 8*

1_YEAR_BHAR: Market-adjusted buy-and-hold abnormal stock returns over 1 year after the IPO listing date.

2_YEAR_BHAR: Market-adjusted buy-and-hold abnormal stock returns over 2 years after the IPO listing date.

3_YEAR_BHAR: Market-adjusted buy-and-hold abnormal stock returns over 3 years after the IPO listing date.

*Additional Variables in Table 9*

FLOAT: Number of common shares issued to the public divided by total number of outstanding shares.

OVERSUBSCRIPTION: Dummy variable equal to 1 if the total volume of orders in the underwriting book exceeds the number of shares offered, and 0 otherwise.

PROCEEDS: Total IPO proceeds divided by total assets of the IPO firm at the time of listing.

*Additional Variables in Table 10*

AUDIT_COMMITTEE_INDEPENDENCE: Proportion of independent directors in the audit committee of the board.

BOARD_INDEPENDENCE: Proportion of independent directors in the board.

CEO_DUALITY: Dummy variable equal to 1 if the CEO and the chair of the board are the same person, and 0 otherwise.

## Supplementary Material

To view supplementary material for this article, please visit http://dx.doi.org/10.1017/S0022109021000223.

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