Financial Literacy and IPO Underpricing

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Abstract

Using an international sample of IPO firms and two country-level measures of financial literacy, we find strong evidence that financial literacy is negatively associated with IPO underpricing. In cross-sectional analyses, we find that the effect of financial literacy in reducing IPO underpricing is more pronounced when the information environment is less transparent. Employing path analysis, we document that information friction, firm transparency, and stock market participation are mechanisms that mediate this relationship. Our study contributes to and extends the literature by providing strong evidence that citizens' financial literacy has an important and consistent influence on IPO underpricing.

I.   Introduction

Financial literacy is defined as the knowledge and ability to manage financial resources to improve lifetime financial security/well-being (OECD (2013)), and is considered essential for informed individual investment decision-making and important for the efficient functioning of financial markets (e.g., Lusardi and Mitchell (2014), Klapper and Lusardi (2020)). Studies find that financially literate individuals participate more in financial markets and stock investments (Christelis, Jappelli, and Padula (2010), Van Rooij, Lusardi, and Alessie (2011), Yoong (2011), Almenberg and Dreber (2015), Hsiao and Tsai (2018), and Klapper and Lusardi (2020)) and are more likely to invest in mutual funds and diversify their savings (Hastings and Tejeda-Ashton (2008), Hastings and Mitchell (2011), and Hastings, Mitchell, and Chyn (2011)). Financially literate individuals possess relatively advanced financial knowledge (Lusardi and Mitchell (2014)) and hence are better able to seek out higher-level financial news and analyst reports, which may disclose additional information. Given that IPO underpricing is attributed to the presence

of information frictions and that financial literacy has the potential to mitigate information frictions in capital markets, we examine the implications of financial literacy for IPO underpricing.

Pervasive and persistent across the world (Krigman, Shaw, and Womack (1999), Ritter and Welch (2002), and Chambers and Dimson (2009)), IPO underpricing is considered a significant cost of going public for many firms (Ritter (1987)). The magnitude of IPO underpricing varies across countries (Loughran, Ritter, and Rydqvist (1994), Ritter (2003)) and over time (Ljungqvist (2007)). Research indicates that the information frictions between the issuer, the underwriter, and the IPO investors can have a first-order effect on underpricing (Baron (1982), Rock (1986), Welch (1989), and Ljungqvist (2007)). This suggests that IPO underpricing can be reduced by mitigating the information frictions between informed and uninformed investors (Ljungqvist (2007)) and/or by reducing the ex ante valuation uncertainty of IPO issuers (Ritter (1984), Beatty and Ritter (1986), and Ljungqvist (2007)). Prior studies suggest that variations in international IPO underpricing can be explained by formal institutions such as legal and governance frameworks (Boulton, Smart, and Zutter (2010), Engelen and van Essen (2010), Banerjee, Dai, and Shrestha (2011), and Lin, Pukthuanthong, and Walker (2013)), informal institutions such as national culture (Costa, Crawford, and Jakob (2013)), and differences in disclosure quality (Boulton, Smart, and Zutter (2011), (2017)). However, little attention has been paid to whether and how citizens' financial literacy influences IPO underpricing. Notably, the lack of financial literacy is prevalent worldwide, with only one in three adults being considered financially literate, according to the S&P Global Financial Literacy Survey (Klapper and Lusardi (2020)). Additionally, the level of financial literacy varies widely across countries (Klapper and Lusardi (2020)), thus making it ideal for cross-country analysis and for designing more powerful tests.

The level of citizens' financial literacy is likely to be negatively associated with IPO underpricing for three main reasons. First, financial literacy can decrease the information frictions between informed and uninformed investors in IPO transactions, thereby reducing underpricing. The information asymmetry theory of IPO underpricing suggests that underpricing is required to compensate uninformed investors (or retail investors) for their information disadvantage (Beatty and Ritter (1986), Rock (1986), and Carter and Manaster (1990)).[1] We reason that because more financially literate uninformed investors possess better financial knowledge and higher capacity to perform financial calculations (Alessie, Van Rooij, and Lusardi (2011), Fornero and Monticone (2011), Klapper and Panos (2011), Lusardi and Mitchell (2011b), (2014), and Sekita (2011)), they are more likely to read and understand higher-level financial news, prospectus filings, and analyst reports, making them less informationally disadvantaged. The reduced information disadvantage will reduce IPO firms' need to underprice their shares to attract uninformed investors. Second, research shows that financial literacy is positively related to stock market participation (Hastings and Tejeda-Ashton (2008), Van Rooij et al. (2011)), which can reduce the equity risk premium required by

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[1]Consistent with Michaely and Shaw (1994), we associate informed investors with institutional investors and uninformed or less informed investors with retail investors.

investors (Brav, Constantinides, and Geczy (2002), Hong, Kubik, and Stein (2004)). Hence, firms in a high financial literacy environment will have less need to underprice their shares to attract investment. Third, the level of financial literacy can be associated with higher financial disclosure transparency. Since financially literate citizens are more likely to read and understand higher-level financial news and analyst reports, they are more likely to monitor and limit managers' involvement in opportunistic earnings manipulation (Jin, Kanagaretnam, Liu, and Cheng (2021)). The increased disclosure transparency will encourage more mutual fund investment (Gelos and Wei (2005)) and reduced firm-specific uncertainties (Jin and Myers (2006)), thus reducing the level of IPO underpricing (Boulton et al. (2011)).

We examine the relationship between financial literacy and IPO underpricing for a large sample of 14,831 IPOs from 34 countries over the 1998 to 2020 period. We use two measures of financial literacy. The first measure is a static measure from Klapper, Lusardi, and van Oudheusden (2015), who construct a country-level index of financial literacy based on the results of the 2014 Standard & Poor's Global Financial Literacy Survey. This index is based on four fundamental concepts of financial decision-making: risk diversification, inflation, numeracy, and compound interest. They construct the financial literacy index (FINLIT) by calculating the proportion of 1,000 people surveyed in a country who answer questions on at least three of the four concepts correctly. The second measure of financial literacy is a time-varying measure, which is the first principal component extracted using principal components analysis of four variables (public education, tertiary enrollment, non-life insurance, and bank branches) that cover the four dimensions of financial literacy identified in Huston (2010). In line with prior research, we calculate IPO underpricing as the first-day secondary market closing price divided by the IPO offer price, minus 1. Consistent with our prediction, we find robust evidence that financial literacy is negatively associated with the extent of IPO underpricing. This effect is also economically significant. Using the static (time-varying) measure of financial literacy, a 1-standard-deviation increase in financial literacy is associated with a 38.5% to 42.0% (20.0% to 49.7%) decrease in IPO underpricing.

We conduct several additional analyses to strengthen the validity of our main findings. First, we employ instrumental variable estimation to control for potential endogeneity. We employ the ratio of secondary school enrollment to the population of individuals in the same age group for the country as an instrumental variable for our measures of financial literacy in a two-stage least squares (2SLS) analysis and find consistent results. Second, we conduct a battery of sensitivity tests to ascertain the robustness of our findings. Specifically, our results remain robust to using weighted-least squares regression, excluding IPOs from the United States and China, estimating the model at the country-year level, controlling for the four international factors identified by Isidro, Nanda, and Wysocki (2020) that influence disclosure transparency, controlling for cultural differences and additional corporate governance factors, and using different trading windows to measure underpricing. In addition, we find that IPO firms in countries with higher financial literacy outperform those in countries with lower financial literacy starting from 4 weeks after the IPO and up to a 1-year horizon, and that financial literacy

moderates the negative relation between IPO underpricing and post-listing stock returns.

To support our main reasoning that financial literacy reduces IPO underpricing through the mitigation of information asymmetry, we perform cross-sectional tests and find that the influence of financial literacy on IPO underpricing is weaker when the level of information friction is lower. More specifically, we explore the interactions between financial literacy and proxies of both firm-level and country-level information frictions, and their joint effects on IPO underpricing. At the firm level, we find that the relationship between financial literacy and IPO underpricing is weaker for IPO firms that are larger, are more profitable, are backed by venture capital, and have Big N auditors (all of these are proxies for higher information quality). At the country level, we find that the relationship between financial literacy and IPO underpricing is weaker in countries with a higher level of institutional ownership, a lower level of informed trading, a higher proportion of domestically traded shares, and a larger number of exchange-listed firms. In additional tests, we conduct path analyses to provide more direct evidence of the channels through which financial literacy reduces IPO underpricing. The results of these analyses support our conjecture that information friction, firm transparency, and stock market participation mediate the relationship between financial literacy and IPO underpricing.

Our study contributes to the literature in several important ways. First, it extends the stream of literature on the relationship between financial literacy and economic outcomes (e.g., Behrman, Mitchell, Soo, and Bravo (2012), Lusardi and Mitchell (2014)) by being one of the first to document the relationship between citizens' financial literacy and IPO underpricing. Second, we contribute to the literature that examines financial literacy and capital market efficiency. Prior studies document that financial literacy is positively associated with financial market participation (e.g., Christelis et al. (2010), Van Rooij et al. (2011), and Hsiao and Tsai (2018)). Extending this research, our study provides cross-country evidence to emphasize the role of financial literacy in mitigating capital market inefficiencies. Our findings suggest that the role of financial literacy in IPO underpricing is particularly pronounced in environments in which the level of information friction is greater. Third, considering the increasing share of global IPO activity by non-U.S. firms (Doidge, Karolyi, and Stulz (2013)), studies have shown a growing interest in understanding the determinants of international IPO underpricing (e.g., Banerjee et al. (2011), Boulton et al. (2017)). We contribute to this literature by documenting that financial literacy is a significant cross-country determinant of IPO underpricing.

Regarding policy implications, our study is in line with the growing worldwide initiatives in financial literacy policies since the 2007–2008 financial crisis. The recent outbreak of COVID-19 emphasizes once more the importance of ensuring that citizens are financially literate to be prepared for and resilient to unexpected financial shocks (OECD (2021)). Despite being an essential part of the policy mix for financial stability, it is speculated that financial literacy may not be significant enough to have detectable implications at the macro-level (OECD (2018)). Our study corroborates the potential importance of financial literacy policy initiatives by

providing evidence of a significant economic implication: the reduction of IPO underpricing.

The rest of this study is organized as follows: We develop our hypothesis in Section II, present the research design in Section III, describe the data in Section IV, discuss the empirical results in Section V, and make concluding remarks in Section VI.

II.   Hypothesis Development

The existing literature on financial literacy has primarily focused on the relations between financial literacy and the beneficial behavior changes of individuals and households. For example, research shows that financially literate individuals are more likely to plan and save for retirement (Cole, Sampson, and Zia (2011), Lusardi and Mitchell (2011a), (2011b)), to accumulate more wealth (Stango and Zinman (2009), Behrman et al. (2012)), to be financially resilient (Gerardi, Goette, and Meier (2013), Lusardi and Tufano (2015)), and to participate more in capital markets (Van Rooij et al. (2011), Almenberg and Dreber (2015), and Klapper and Lusardi (2020)), and are less likely to be prone to "errors" in financial decisions (Calvet, Campbell, and Sodini (2007), (2009), Agarwal, Driscoll, Gabaix, and Laibson (2009)).

IPO underpricing, a ubiquitous worldwide phenomenon that was once called a "mystery" in early studies (Ibbotson (1975), Ibbotson and Jaffe (1975)), has since received extensive attention from both theoretical and empirical researchers (Ljungqvist (2007)). Varying widely across countries (Loughran et al. (1994), Ritter (2003)) and over time (Ljungqvist (2007)), IPO underpricing is considered a significant cost of young firms going public (Ritter (1987)). Theoretical research often attributes IPO underpricing to information asymmetries among IPO participants. For example, in the well-known Rock (1986) "winner's curse" model, IPO underpricing is required to compensate uninformed investors for trading with information disadvantages to induce them to participate in IPO biddings. Based on the asymmetric information model, underpricing should be reduced when information across investor groups is less heterogeneous (Michaely and Shaw (1994), Ljungqvist (2007)), when ex ante uncertainty of the realized value of issuing IPOs is less (Ritter (1984), Beatty and Ritter (1986), and Ljungqvist (2007)), and when information frictions between informed and uninformed investors are reduced (e.g., Ljungqvist (2007)).

We posit that financial literacy is negatively associated with IPO underpricing for three main reasons. First, in high financial literacy countries, there can be less information asymmetry between informed and uninformed investors. Consistent with Michaely and Shaw (1994), we associate informed investors with institutional investors as they are typically large and established customers of the IPO underwriters, and we associate uninformed investors with retail investors who, in general, lack the specialized knowledge of issuing firms. One fundamental gap in prior IPO underpricing studies is that they do not further differentiate within the group of uninformed investors. We argue that the level of financial literacy of uninformed investors can vary. Prior financial literacy studies find that two components of financial literacy, namely the "advanced financial knowledge" and the "capacity to

do calculations," are what matter most in individual financial decision-making (Alessie et al. (2011), Lusardi and Mitchell (2011b), (2014)). Hence, it is reasonable to conjecture that more financially literate uninformed investors have a higher ability to read and understand high-level financial news, analyst reports, and prospectus filings, making them less informationally disadvantaged. As information asymmetry theory implies that IPO underpricing should be less when there is less information asymmetry between informed and uninformed investors (e.g., Ljungqvist (2007)), the level of IPO underpricing should be lower in more financially literate countries.

Second, individuals in high financial literacy countries are more likely to participate in the capital market, increasing the supply of capital from uninformed investors. High capital market participation rates can reduce equity risk premium, making uninformed investors require lower discounts on their equity investments. Several studies document a positive effect of financial literacy on financial market participation. For example, Hastings and Tejeda-Ashton (2008) document that financially literate citizens are more likely to invest in mutual funds with lower fees. Hsiao and Tsai (2018) suggest that financially literate individuals face lower entry barriers to participate in the purchase of complex derivative products. Van Rooij et al. (2011) find that financially literate individuals invest more actively in the stock market and tend to perform better. Indeed, higher capital market participation rates reduce the equity risk premium required by investors (Brav et al. (2002)). Hence, in more financially literate countries, uninformed investors will require a lower risk premium on their equity investment, decreasing the issuing firms' need to provide high discounts to attract IPO investment. Therefore, the level of IPO underpricing should be lower in high financial literacy countries.

Third, managers in high financial literacy countries have greater incentives to provide more transparent disclosures, thus decreasing information asymmetry and reducing underpricing. Since financially literate citizens are more likely to read and understand higher-level financial news and analyst reports, managers have an incentive to disclose more. Additionally, to the extent that financially literate citizens are involved in monitoring public firms' financial reporting process, managers will have weaker incentives to engage in opportunistic earnings manipulation. This is consistent with the findings of Jin et al. (2021) that citizens' financial literacy positively influences bank financial reporting transparency through more stable funding, more predictable loan loss provisions, and more effective monitoring of managers' opportunistic actions. Widdowson and Hailwood (2007) also highlight the importance for citizens to understand financial disclosures and exercise market discipline. Research shows that higher country-level disclosure transparency is associated with more mutual fund investment (Gelos and Wei (2005)), lower firm-specific uncertainties (Jin and Myers (2006)), and less IPO underpricing (Boulton et al. (2011)).

Based on the above discussion and prior findings, we propose the following hypothesis:

Hypothesis 1. IPO underpricing decreases with financial literacy.

We note that this prediction is not clear-cut. First, financial literacy can be positively related to the proportion of informed (or institutional) investors, as opposed to uninformed (or retail) investors. Studies show that financially literate citizens are more likely to choose mutual funds (Hastings and Mitchell (2011)), which suggests that the proportion of informed investors may be greater in more financially literate countries. However, theoretical insights from Carter and Manaster (1990) suggest that the greater the proportion of informed investors, the greater the IPO underpricing. Their intuition is that when more informed investors invest in information acquisition, they specialize in more uncertain investment projects, leading to the capital of informed investors migrating to highly uncertain IPOs and making the manifested underpricing greater (Carter and Manaster (1990)). Second, IPO underpricing can be positively related to the level of overall rationality of local capital markets. As implied by the information asymmetry theory of IPO underpricing (Rock (1986)), the required compensation to uninformed investors for their trading against investors with superior information is ultimately a rational decision based on individuals' awareness of the information environment and the evaluation of the risk–reward tradeoffs. However, if less financially literate individuals are not aware of their information disadvantages, they may not make the "rational" decision by requiring sufficient underpricing to compensate for their information disadvantages.

III.   Research Design

A.   Measures of Financial Literacy

We use two measures of financial literacy. The first is a static measure, which comes from Klapper et al. (2015), who provide a direct cross-country comparison of financial literacy levels by analyzing responses to the Standard & Poor's Ratings Services Global Financial Literacy Survey (S&P Global FinLit Survey) conducted in 2014. The survey asks questions on four concepts (risk diversification, inflation, interest rate, and interest compounding) to 1,000 adults in each of 143 countries. The financial literacy for a country is computed as the proportion of the 1,000 people surveyed in the country who correctly answer questions on at least three of the four concepts. Though parsimonious, these questions have been commonly used in the literature to measure financial literacy (e.g., Xu and Zia (2012), Lusardi and Mitchell (2014)).[2]

The second measure of financial literacy is a time-varying (annual) measure, which is the first principal component extracted using principal components analysis of the following four variables: public spending on education as a percentage of GDP (PUBLIC_EDU), the gross enrollment ratio of tertiary education to the population from the corresponding age group (TERTIARY_ENROLL), the ratio of non-life insurance premium volume to GDP (NONLIFE_INSURANCE), and the

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[2]We acknowledge that this measure is not perfect. Ideally, we would like to know more about individuals' financial literacy, including questions that take into account the institutional circumstances in each country. However, the measurement error would bias against finding the predicted relation.

number of commercial bank branches per 100,000 adults (BANK_BRANCHES).[3] We use this method for the following reasons. We define financial literacy as the knowledge and ability in using financial knowledge to make informed decisions (OECD (2013), Lusardi and Mitchell (2014)). Consistent with this definition, Huston (2010) summarizes that a good proxy for financial literacy should cover four dimensions, which capture i) individuals' basic financial knowledge such as understanding of the time value of money; ii) individuals' ability to use credit cards, consumer loans, or mortgages; iii) individuals' ability to invest in savings, stocks, bonds, or mutual funds, and iv) individuals' use of insurance or other risk management instruments. The variables PUBLIC_EDU and TERTIARY_ENROLL capture the first dimension because individuals receiving more education should have a better knowledge of finance. The variable BANK_BRANCHES captures both the second and the third dimensions, because commercial bank branches provide a physical venue for individuals to apply for bank credit, mortgages, and invest in stocks and bonds. Lastly, the variable NONLIFE_INSURANCE captures the fourth dimension, as it reflects individuals' use of risk management instruments. We use the first principal component of the above four variables as our alternate measure of financial literacy (FINLIT_ALT). We compute FINLIT_ALT annually using the four variables standardized with mean values equal to 0 and standard deviation equal to 1. From the principal component analysis, we derive the first principal component score as follows: FINLIT_ALT = 0.211 × PUBLIC_EDU + 0.338 × TERTIARY_ENROLL + 0.356 × NONLIFE_INSURANCE + 0.190 × BANK_BRANCHES. The eigenvalue of the first principal component is 1.425, which accounts for 67.2% of the standardized variance. Kaiser's overall MSA measure of sampling adequacy is reasonably good at 0.713.[4]

B.   Empirical Models

To test Hypothesis 1, we estimate the following cross-sectional regression, with standard errors of the estimates clustered by country:

$$(1) \quad \text{UNDERPRICING} = \alpha_0 + \alpha_1 \text{FINLIT or FINLIT\_ALT} + \alpha_2 V$$
$$+ \alpha_3 W + \text{YR\_FE} + \text{IND\_FE} + \text{C\_FE} + \varepsilon.$$

The dependent variable is UNDERPRICING. FINLIT or FINLIT_ALT is the measure of financial literacy, V is a vector of firm characteristics, W is a vector of country characteristics, and YR_FE is year fixed effects. We include industry fixed effects (IND_FE) because underpricing can vary significantly across IPOs from different industries (e.g., Ljungqvist and Wilhelm (2003)). We use the industry classification based on Frankel, Johnson, and Nelson (2002). We also include country fixed effects (C_FE) only when we use the time-varying measure (FINLIT_ALT). We provide detailed definitions of all the variables in the Appendix. Hypothesis 1

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[3]PUBLIC_EDU, TERTIARY_ENROLL, NONLIFE_INSURANCE, and BANK_BRANCHES data are downloaded from https://www.theglobaleconomy.com/download-data.php.

[4]Values of 0.8 or 0.9 are considered good, while MSAs below 0.5 are unacceptable (https://documentation.sas.com/doc/en/pgmsascdc/9.4_3.4/statug/statug_factor_examples03.htm).

hypothesizes that financial literacy is negatively associated with IPO underpricing; hence, we expect α_1 to be negative.

We select firm-level controls that prior studies document are associated with IPO underpricing. Prior research finds that information asymmetry is less for larger firms and thus underpricing is reduced for larger IPO firms (Beatty and Ritter (1986), Mauer and Senbet (1992), Lowry (2003), and Boulton et al. (2010)). We control for firm size using proceeds raised in millions of U.S. dollars (OFFER_SIZE). We control for IPO issues in high-tech industries (HITECH) because Ljungqvist and Wilhelm (2003) find that high-tech firms tend to exhibit greater underpricing than firms in other industries. We control for the presence of a venture capital investor (VENTURE),[5] the characteristics of the offer such as whether the IPO is a firm commitment offering (FC), whether the offering is based on the book building method (BOOKBUILD), and whether the IPO contains lockup provisions (LOCKUP).[6] We also control for underwriter reputation following Boulton et al. (2011), which we measure using an indicator variable for whether the IPO is underwritten by an investment bank appearing in the top 25 of Refinitiv SDC's league table in the issue year (TOPTIER).[7] We include PRICE_STBL to control for underwriters' tendency to provide price support in the aftermarket (Boulton et al. (2011), (2020)). We measure price stabilization as the difference between the number of IPOs with initial returns between 0% and 1% and the number of IPOs with initial returns between 0% and −1%. A disproportionate number of first-day returns equal to or slightly greater than 0 relative to the number of first-day returns just below 0 is indicative of price stabilization.

Next, we include a comprehensive set of country-level controls because prior studies find that cross-country variation in IPO underpricing is associated with country-level institutions. We control for legal origin (COMMON) because it is associated with both IPO activity (La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997), Doidge et al. (2013)) and IPO performance (Engelen and van Essen (2010)). We control for two different corporate governance factors from Boulton et al. (2010), namely, anti-director rights and anti-self-dealing. The anti-director index (ANTIDIRECTOR) measures how strongly the legal system protects minority shareholders, particularly minority shareholders' voting rights, while the anti-self-dealing index (ANTI_SELF_DEALING) focuses on enforcement mechanisms, including litigation and disclosure surrounding self-dealing

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[5]Barry, Muscarella, Peavy, and Vetsuypens (1990), Megginson and Weiss (1991), and Gompers (1996) find a negative association, whereas Lee and Wahal (2004), Loughran and Ritter (2004), and Elston and Yang (2010) find a positive association between venture-backed IPOs and underpricing.

[6]Ritter (1987) finds that firm commitment offerings are underpriced less than best efforts IPOs. Sherman (2005) notes that the book building method is quickly becoming the method of choice for taking firms public worldwide, but she argues that the effect on underpricing is uncertain. The impact of lockups on underpricing is ambiguous since lockups may either alleviate moral hazard problems surrounding IPOs (Brav and Gompers (2003)) or exacerbate short sale constraints (Ofek and Richardson (2003)). We control for equity carveouts (CARVEOUT), which tend to exhibit less underpricing (Schipper and Smith (1986), Prezas, Tarimcilar, and Vasudevan (2000)).

[7]Carter and Manaster (1990) and Megginson and Weiss (1991) report a negative correlation, whereas Beatty and Welch (1996) and Loughran and Ritter (2004) find a positive relation between underwriter reputation and underpricing.

transactions.[8] As in Boulton et al. (2020), we control for legal institutions, measured by RULE_OF_LAW and CORRUPTION based on Kaufmann, Kraay, and Mastruzzi (2010). The RULE_OF_LAW variable measures the extent to which agents have confidence in and abide by the rules of society, while the CORRUPTION variable measures the exercise of public power for private gain.[9] Following Ellul and Pagano (2006) and Doidge et al. (2013), we control for the level of capital market development in the country where an IPO takes place, measured by the stock market turnover (SMTURN). We also control for hot market effects, measured by overall stock market returns (SMRET) (Boulton et al. (2020)). In addition, we include International Financial Reporting Standards (IFRS) to control for disclosure quality, since prior findings document that IFRS adoption is associated with higher country-level reporting quality (e.g., Barth, Landsman, and Lang (2008), Hong, Hung, and Lobo (2014), and Christensen, Lee, Walker, and Zeng (2015)). Lastly, we control for financial market integration (MKT_INTEGRATION) and economic development (LGDP) because Marcato, Milcheva, and Zheng (2018) find a negative relationship between financial market integration and IPO underpricing, and Vassalou (2003) argues that GDP growth plays an important role in explaining cross-sectional equity returns.

IV.   Results

A.   Sample

We obtain data on new share issues by firms for the period 1998 to 2020 from the Refinitiv SDC Platinum database. Following prior literature (e.g., Cook, Kieschnick, and van Ness (2006), Boulton et al. (2011), (2020)), we exclude financial firms, rights offerings, unit offerings, closed-end funds, trusts, limited partnerships, and depository receipts. We exclude IPOs that have no listing day returns in the SDC Platinum database. We have a total of 60 countries in our sample period. We calculate the magnitude of IPO underpricing (UNDERPRICING) as the first-day secondary market closing price divided by the IPO offer price, minus 1. To reduce the influence of extreme values, we winsorize the top and bottom 1% of the variable UNDERPRICING. We exclude eight countries where our main variable of interest, FINLIT, is not available in Klapper et al. (2015).[10] We exclude countries for which we are not able to obtain country-level institutional variables (such as the anti-director index) used in the regression model. Lastly, we drop countries with five or fewer IPOs during our sample period. These data screening steps result in a final sample of 14,831 IPOs from 34 countries where the shares are listed on stock exchanges.[11]

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[8]Engelen and van Essen (2010) and Banerjee et al. (2011) find that underpricing is reduced in countries with institutions that prevent self-dealing, whereas Boulton et al. (2010) report greater underpricing in countries that offer better shareholder protection.

[9]Engelen and van Essen (2010) and Autore, Boulton, Smart, and Zutter (2014) offer conflicting evidence on the association between IPO underpricing and both the rule of law and the corruption index.

[10]These eight countries are Bermuda, British Virgin Islands, Cayman Island, Guernsey, Isle of Man, Jersey, Macau, and Morocco. We further exclude the United States when FINLIT_ALT is used in the analysis due to missing data.

[11]When FINLIT_ALT is used, our sample contains 11,772 IPOs from 33 countries.

B.   Descriptive Statistics

Table 1 reports the sample composition and the mean characteristics for each of the 34 countries. The number of IPOs in each country ranges widely, from six in Bulgaria and Egypt to 3,058 in the United States. Our main test variables are FINLIT and FINLIT_ALT. As shown in Table 1, the levels of financial literacy vary widely across countries. More than 65% of adults in Canada, Germany, Great Britain, Israel, Norway, and Sweden are classified as being financially literate. By contrast, the percentage of financially literate adults is less than 30% for some countries in Africa and Asia (China, Egypt, Jordan, Pakistan, Philippines, Thailand, and Turkey). Consistent with prior studies (e.g., Boulton et al. (2011), (2020)), there is wide variation in the extent of underpricing between countries. The mean underpricing is highest in Japan (82%) and lowest in Egypt (−6%).

Table 2 presents descriptive statistics and correlations of the regression variables for the full sample. As reported in Panel A of Table 2, the mean (median) percentage of underpricing is 41.4% (18.6%). The mean (median) value of the FINLIT is 47.05 (43.00) and the mean (median) value of FINLIT_ALT is 0.00 (−0.10). Panel B of Table 2 reports Spearman correlations between the variables in our analyses. As predicted by Hypothesis 1, we observe a significant and negative correlation of −0.29 (−0.28) between FINLIT (FINLIT_ALT) and UNDERPRICING. FINLIT and FINLIT_ALT are positively correlated (0.69), indicating that they capture similar dimensions of the underlying construct of interest (financial literacy). Because these are pairwise univariate correlations, we defer inferences to the multivariate tests reported in the following section.

C.   Empirical Results

1.   Main Analysis

In this section, we report the results for the test of Hypothesis 1, which examines the association between financial literacy and the extent of IPO underpricing. In columns 1–3 of Table 3, we report the results using the static measure of financial literacy (FINLIT) with year and industry fixed effects. In column 1, we regress underpricing on financial literacy without the firm- and country-level control variables. In column 2, we report the results including only firm-level control variables, and in column 3, we report the results including both firm- and country-level control variables. In columns 4–6, we report the results using the time-varying measure of financial literacy (FINLIT_ALT) and include year, industry, and country fixed effects. In column 4, we regress underpricing on FINLIT_ALT without firm- and country-level control variables. In column 5, we report the results including firm-level control variables, and in column 6, we report the results including both firm- and country-level control variables. In column 7, we report the results with all control variables with standard errors clustered by country. In all seven columns, we report a negative and significant coefficient on FINLIT or FINLIT_ALT, indicating that IPO underpricing decreases with the level of financial literacy in a country. The relation between financial literacy and the degree of underpricing is also economically significant. Using column 3 (column 7) as an illustration, a 1-standard-deviation increase in FINLIT (FINLIT_ALT) is

TABLE 1

Sample Composition and Mean Characteristics by Country

Table 1 provides the sample composition and selected mean characteristics by country. The detailed definitions of the variables are provided in the Appendix.

Country	No. of Obs.	UNDERPRICING	FINLIT	FINLIT_ALT	OFFER_SIZE	HITECH	VENTURE	FC	BOOKBUILT	LOCKUP	CARVEOUT	TOPTIER	PRICE_STBL	COMMON	ANTIDIRECTOR
Australia	1,219	0.24	64	1.45	1.87	0.20	0.03	0.43	0.04	0.06	0.09	0.01	0.03	1	4
Brazil	74	0.08	35	−0.22	5.04	0.19	0.07	0.85	0.95	0.73	0.23	0.16	0.11	0	5
Bulgaria	6	0.01	35	1.40	1.73	0.33	0.00	0.00	0.67	0.00	0.00	0.00	−0.17	0	3
Canada	482	0.28	68	0.72	1.66	0.11	0.04	0.28	0.02	0.24	0.03	0.10	0.05	1	4
Chile	13	0.06	41	−0.02	4.16	0.23	0.00	0.38	0.31	0.00	0.23	0.00	0.12	0	4
China	2,763	0.70	28	−1.08	3.72	0.35	0.47	1.00	0.84	0.79	0.17	0.27	0.16	0	1
Egypt	6	−0.06	27	−1.31	3.08	0.00	0.00	0.50	0.33	0.00	0.00	0.00	0.17	0	3
Finland	32	0.06	63	0.86	2.67	0.44	0.03	0.63	0.41	0.38	0.28	0.00	0.17	0	3.5
France	234	0.06	52	1.06	2.59	0.53	0.38	0.24	0.84	0.43	0.17	0.07	0.02	0	3.5
Germany	136	0.11	66	0.08	3.78	0.41	0.20	0.30	0.84	0.51	0.21	0.15	−0.02	0	3.5
Great Britain	1,046	0.18	67	0.81	2.62	0.37	0.09	0.32	0.56	0.25	0.07	0.02	0.04	1	5
Hong Kong	1,403	0.35	43	−0.33	2.63	0.22	0.08	0.95	0.80	0.62	0.34	0.02	0.03	1	5
Indonesia	197	0.42	32	−1.46	2.76	0.10	0.01	0.84	0.39	0.09	0.21	0.01	0.23	0	4
Israel	13	0.73	68	0.49	3.12	0.69	0.23	0.31	0.15	0.08	0.23	0.08	−0.08	1	4
Italy	138	0.15	37	0.71	2.55	0.34	0.04	0.38	0.68	0.33	0.25	0.05	0.14	0	2
Japan	1,332	0.82	43	−0.14	1.65	0.99	0.47	1.00	1.00	0.68	0.14	0.34	0.08	0	4.5
Jordan	10	0.15	24	−0.04	1.99	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0	1
Korea South	1,060	0.42	33	1.05	2.26	0.53	0.24	0.93	0.58	0.58	0.07	0.00	0.06	0	4.5
Malaysia	334	0.30	36	−0.47	0.95	0.33	0.04	0.92	0.07	0.11	0.07	0.00	0.08	1	5
Mexico	16	0.04	32	−0.97	4.73	0.13	0.19	0.56	0.56	0.13	0.06	0.38	−0.08	0	3
New Zealand	40	0.10	61	1.24	2.86	0.35	0.03	0.55	0.35	0.10	0.20	0.03	0.03	1	4
Norway	103	0.07	71	0.87	3.23	0.34	0.16	0.50	0.64	0.46	0.21	0.01	−0.06	0	3.5
Pakistan	9	0.22	26	−2.32	1.65	0.00	0.00	1.00	0.67	0.00	0.11	0.00	0.33	1	4
Philippines	41	0.26	25	−1.64	2.86	0.20	0.02	1.00	0.63	0.88	0.37	0.02	−0.09	0	4
Poland	77	0.27	42	0.40	2.49	0.30	0.03	0.22	0.71	0.21	0.18	0.01	0.14	0	2
Russia	10	0.04	38	0.20	4.68	0.10	0.00	0.30	0.70	0.30	0.30	0.20	0.04	0	4
Singapore	394	0.24	59	−0.71	2.15	0.20	0.05	0.93	0.45	0.22	0.08	0.01	0.03	1	5
South Africa	21	0.09	42	−0.12	4.03	0.19	0.00	0.76	0.62	0.19	0.29	0.14	0.00	1	5
Spain	19	0.18	49	1.94	3.95	0.26	0.11	0.32	0.53	0.47	0.37	0.11	0.28	0	5
Sweden	131	0.20	71	1.03	2.41	0.60	0.08	0.46	0.21	0.51	0.23	0.01	0.06	0	3.5
Switzerland	32	0.12	57	0.95	4.55	0.56	0.28	0.41	0.88	0.59	0.16	0.25	0.01	0	3
Thailand	338	0.36	27	−0.93	2.42	0.15	0.02	0.80	0.20	0.14	0.12	0.00	0.05	1	4
Turkey	44	0.29	24	−0.75	2.14	0.16	0.02	0.05	0.14	0.02	0.09	0.07	0.18	0	3
United States	3,058	0.33	57	–	4.28	0.67	0.52	0.99	0.99	0.78	0.14	0.25	0.12	1	3

TABLE 1 (continued)

Sample Composition and Mean Characteristics by Country

Country	ANTI_SELF_DEALING	RULE_OF_LAW	CORRUPTION	SMTURN	SMRET	MKT_INTEGRATION	LGDP	IFRS	BIGN	SMALL	LOW_PROFIT	INST	PIN	LISTED
Australia	0.76	1.77	1.93	77.13	0.25	67.60	10.86	0.84	0.21	0.19	0.19	0.11	0.28	7.50
Brazil	0.27	−0.22	−0.13	63.56	0.32	42.18	9.20	0.53	0.76	0.19	0.19	0.33	0.29	5.89
Bulgaria	0.65	−0.06	−0.20	17.89	0.16	76.34	8.84	1.00	0.00	0.20	0.20	−	−	5.93
Canada	0.64	1.75	1.92	70.29	0.19	68.35	10.74	0.37	0.77	0.21	0.19	0.52	0.27	8.21
Chile	0.63	1.32	1.45	17.32	0.07	73.04	9.49	0.77	0.75	0.18	0.17	0.01	0.32	5.44
China	0.76	−0.35	−0.36	218.33	0.72	47.35	8.68	0.90	0.04	0.21	0.20	0.17	0.18	7.87
Egypt	0.20	−0.29	−0.66	40.19	−1.26	53.18	7.94	0.00	0.40	0.00	0.20	−	0.34	5.56
Finland	0.46	2.04	2.25	102.72	0.62	82.62	10.75	1.00	0.76	0.18	0.14	0.47	0.24	4.90
France	0.38	1.44	1.38	75.04	0.02	76.40	10.62	0.93	0.40	0.19	0.19	0.27	0.24	6.40
Germany	0.28	1.71	1.81	114.89	0.28	79.75	10.65	0.96	0.43	0.20	0.20	0.24	0.21	6.45
Great Britain	0.95	1.70	1.83	93.47	−0.08	79.85	10.61	0.74	0.36	0.20	0.20	0.24	0.25	7.76
Hong Kong	0.96	1.63	1.72	50.31	0.54	86.97	10.46	0.88	0.73	0.19	0.18	0.12	0.28	7.39
Indonesia	0.65	−0.51	−0.59	29.71	−1.68	51.73	8.13	0.83	0.04	0.19	0.20	−	0.39	6.22
Israel	0.73	0.94	0.81	37.37	1.09	73.74	10.39	0.62	0.10	0.10	0.10	0.34	0.27	6.26
Italy	0.42	0.36	0.29	283.86	−0.73	69.44	10.43	0.93	0.42	0.19	0.20	0.19	0.22	5.67
Japan	0.50	1.38	1.37	108.34	0.26	59.24	10.67	0.46	0.00	0.19	0.20	0.08	0.23	7.92
Jordan	0.16	0.37	0.28	57.52	0.05	77.55	8.23	1.00	0.29	0.20	0.14	−	0.35	5.56
Korea South	0.47	1.02	0.54	163.72	0.03	60.62	10.03	0.49	0.13	0.20	0.19	0.16	0.24	7.52
Malaysia	0.95	0.51	0.22	30.80	−0.60	75.09	9.09	0.30	0.37	0.19	0.20	0.06	0.31	6.85
Mexico	0.17	−0.49	−0.42	27.22	0.22	55.89	9.16	0.44	0.50	0.15	0.19	0.34	0.32	4.93
New Zealand	0.95	1.91	2.30	12.18	0.96	71.26	10.46	0.68	0.81	0.17	0.17	0.12	0.36	5.02
Norway	0.42	1.96	2.09	69.84	−0.68	76.41	11.36	0.94	0.74	0.20	0.19	0.23	0.28	5.24
Pakistan	0.41	−0.73	−0.82	46.55	0.09	35.46	7.17	0.89	0.25	0.13	0.14	−	0.31	6.34
Philippines	0.22	−0.45	−0.58	16.52	−0.65	56.73	7.78	0.66	0.03	0.18	0.19	0.08	0.33	5.53
Poland	0.29	0.56	0.45	38.17	−1.72	68.20	9.41	0.96	0.23	0.18	0.18	0.32	0.30	6.15
Russia	0.44	−0.85	−0.96	50.86	1.43	50.63	9.25	0.40	0.60	0.13	0.10	−	0.29	5.96
Singapore	1.00	1.67	2.20	50.24	−0.24	94.17	10.70	0.45	0.50	0.18	0.20	0.12	0.30	6.18
South Africa	0.81	0.10	0.07	28.71	0.14	55.99	8.91	0.95	0.67	0.19	0.17	0.17	0.31	5.80
Spain	0.37	1.02	0.83	94.97	−4.23	75.46	10.29	1.00	0.92	0.18	0.15	0.16	0.21	8.07
Sweden	0.33	1.92	2.18	69.00	0.74	83.53	10.91	0.97	0.56	0.20	0.19	0.38	0.24	5.63
Switzerland	0.27	1.90	2.06	50.25	0.78	83.93	11.25	0.88	0.75	0.19	0.16	0.29	0.28	5.53
Thailand	0.81	−0.02	−0.34	79.64	−0.59	65.59	8.54	0.40	0.47	0.19	0.19	0.05	0.31	6.34
Turkey	0.43	−0.03	−0.04	186.53	2.04	54.06	9.39	1.00	0.05	0.18	0.15	−	0.22	5.61
United States	0.65	1.57	1.48	149.26	1.36	65.27	10.79	1.00	0.81	0.20	0.19	0.74	0.19	8.59

associated with a 42.0% (49.7%) decrease in UNDERPRICING.[12] Overall, the results reported in Table 3 indicate that financial literacy plays an economically significant role in mitigating the degree of IPO underpricing.

The signs of the coefficients of the control variables are generally consistent with prior literature. Consistent with Beatty and Ritter (1986), Mauer and Senbet (1992), and Boulton et al. (2010), we find that offer size is negatively associated with underpricing. We find that high-tech firms exhibit greater underpricing, as do Ljungqvist and Wilhelm (2003). Similar to Beatty and Welch (1996), Loughran and Ritter (2004), and Boulton et al. (2020), we find a positive relation between underwriter reputation and underpricing, and a negative relation between lockup provision and underpricing.

For the country-level controls, we find that countries with common law traditions exhibit less underpricing. We also find that countries with more developed stock markets exhibit less underpricing, whereas countries with hot markets exhibit greater underpricing (Ellul and Pagano (2006), Doidge et al. (2013), and Boulton et al. (2020)). As in Marcato, Milcheva, and Zheng (2018), we find a negative relationship between a country's financial market integration and IPO underpricing.

TABLE 2

Descriptive Statistics and Correlations

Table 2 provides the descriptive statistics (Panel A) and Spearman's correlations (Panel B) of the main variables used in this study. The detailed definitions of the variables are provided in the Appendix. All correlations with absolute values greater than 0.02 are statistically significant at the 0.01 level or better (2-tailed).

Panel A. Descriptive Statistics

	No. of Obs.	Mean	Q1	Median	Q3	Std. Dev.
UNDERPRICING	14,831	0.414	0.008	0.186	0.582	0.728
FINLIT	14,831	47.053	33.000	43.000	57.000	14.497
FINLIT_ALT	11,772	0.000	−0.083	−0.104	0.883	0.999
OFFER_SIZE	14,831	2.944	1.705	3.006	4.174	1.678
HITECH	14,831	0.445	0.000	0.000	1.000	0.497
VENTURE	14,831	0.288	0.000	0.000	1.000	0.453
FC	14,831	0.811	1.000	1.000	1.000	0.391
BOOKBUILT	14,831	0.686	0.000	1.000	1.000	0.464
LOCKUP	14,831	0.545	0.000	1.000	1.000	0.498
CARVEOUT	14,831	0.149	0.000	0.000	0.000	0.356
TOPTIER	14,831	0.146	0.000	0.000	0.000	0.353
PRICE_STBL	14,831	0.088	0.006	0.010	0.078	0.182
COMMON	14,831	0.563	0.000	1.000	1.000	0.496
ANTIDIRECTOR	14,831	3.478	3.000	4.000	4.500	1.398
ANTI_SELF_DEALING	14,831	0.703	0.642	0.757	0.763	0.184
RULE_OF_LAW	14,831	1.068	0.440	1.540	1.640	0.835
CORRUPTION	14,831	1.053	0.230	1.400	1.790	0.913
SMTURN	14,831	124.909	65.300	108.510	167.090	78.474
SMRET	14,831	0.452	−0.021	0.120	0.223	3.428
MKT_INTEGRATION	14,831	65.752	55.300	65.620	74.840	13.143
LGDP	14,831	10.120	9.247	10.616	10.764	0.920
IFRS	14,831	0.777	1.000	1.000	1.000	0.417
BIGN	10,224	0.349	0.000	0.000	1.000	0.477
SMALL	13,362	0.197	0.000	0.000	0.000	0.398
LOW_PROFIT	10,141	0.195	0.000	0.000	0.000	0.396
INST	13,926	0.294	0.116	0.169	0.518	0.255
PIN	14,825	0.233	0.190	0.233	0.278	0.048
LISTED	14,831	7.640	7.348	7.730	8.237	0.829

(continued on next page)

[12]The impact of a 1-standard-deviation increase in FINLIT on underpricing is computed as −0.012 (the coefficient of FINLIT) × 14.497 (the sample standard deviation of FINLIT) ÷ 0.414 (the sample mean of UNDERPRICING) × 100% = 42.0%. Analogously, the economic significance in columns 1, 2, 4–6 is 42.0%, 38.5%, 47.5%, 22.9%, and 20.0%, respectively.

TABLE 2 (continued)

Descriptive Statistics and Correlations

Panel B. Correlations

		1	2	3	4	5	6	7	8	9	10	11	12
1	UNDERPRICING	1.00											
2	FINLIT	−0.29	1.00										
3	FINLIT_ALT	−0.28	0.69	1.00									
4	OFFER_SIZE	−0.03	−0.08	−0.28	1.00								
5	HITECH	0.09	0.02	0.03	0.03	1.00							
6	VENTURE	0.16	−0.14	−0.20	0.21	0.33	1.00						
7	FC	0.15	−0.42	−0.43	0.25	0.17	0.22	1.00					
8	BOOKBUILT	0.06	−0.20	−0.21	0.34	0.22	0.32	0.32	1.00				
9	LOCKUP	0.03	−0.22	−0.17	0.29	0.12	0.26	0.32	0.52	1.00			
10	CARVEOUT	−0.03	−0.07	−0.05	0.09	−0.10	−0.10	0.08	0.14	0.13	1.00		
11	TOPTIER	0.09	−0.11	−0.20	0.24	0.11	0.17	0.16	0.21	0.22	0.04	1.00	
12	PRICE_STBL	0.05	0.11	−0.04	0.22	0.19	0.19	0.28	0.35	0.25	0.09	0.11	1.00
13	COMMON	−0.27	0.64	0.30	0.02	−0.11	−0.15	−0.15	−0.19	−0.18	−0.01	−0.13	0.27
14	ANTIDIRECTOR	−0.22	0.36	0.33	−0.42	−0.04	−0.30	−0.18	−0.22	−0.27	0.01	−0.23	−0.07
15	ANTI_SELF_DEALING	0.02	−0.06	−0.36	0.00	−0.27	−0.13	0.06	−0.09	−0.07	0.06	−0.09	0.06
16	RULE_OF_LAW	−0.29	0.88	0.68	−0.14	−0.04	−0.17	−0.34	−0.19	−0.17	0.02	−0.13	0.15
17	CORRUPTION	−0.28	0.87	0.64	−0.19	−0.04	−0.18	−0.35	−0.20	−0.24	−0.03	−0.16	0.11
18	SMTURN	0.23	−0.36	−0.20	0.33	0.16	0.36	0.26	0.33	0.38	−0.04	0.25	0.15
19	SMRET	0.06	0.11	0.03	0.07	0.07	0.07	−0.02	0.01	−0.04	−0.03	0.00	0.14
20	MKT_INTEGRATION	−0.34	0.64	0.41	−0.22	−0.13	−0.29	−0.31	−0.23	−0.21	0.03	−0.22	0.04
21	LGDP	−0.24	0.79	0.70	0.00	0.15	0.02	−0.18	−0.01	0.02	0.00	0.01	0.33
22	IFRS	−0.02	0.04	0.03	0.27	−0.03	0.14	0.07	0.30	0.38	0.14	0.08	0.36
23	BIGN	−0.24	0.32	0.18	0.21	0.01	−0.05	0.01	0.04	0.03	0.09	−0.01	0.16
24	SMALL	0.06	0.00	−0.02	−0.24	0.10	−0.02	−0.04	−0.08	−0.06	−0.08	−0.11	0.00
25	LOW_PROFIT	0.00	0.00	−0.02	−0.06	0.05	0.05	0.00	−0.06	−0.02	−0.01	−0.02	−0.01
26	INST	−0.08	0.32	0.10	0.51	0.07	0.20	−0.02	0.28	0.22	−0.02	0.10	0.27
27	PIN	0.28	0.37	0.34	−0.43	−0.21	−0.41	−0.34	−0.48	−0.44	0.00	−0.30	−0.22
28	LISTED	−0.11	0.15	−0.03	0.32	0.25	0.37	0.22	0.47	0.38	0.02	0.24	0.53

		13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
13	COMMON	1.00															
14	ANTIDIRECTOR	0.35	1.00														
15	ANTI_SELF_DEALING	0.44	0.20	1.00													
16	RULE_OF_LAW	0.67	0.44	0.05	1.00												
17	CORRUPTION	0.63	0.53	0.11	0.89	1.00											
18	SMTURN	−0.40	−0.65	−0.23	−0.39	−0.47	1.00										
19	SMRET	0.06	−0.01	−0.14	0.12	0.07	0.00	1.00									
20	MKT_INTEGRATION	0.63	0.69	0.30	0.71	0.74	−0.65	0.03	1.00								
21	LGDP	0.53	0.18	−0.26	0.77	0.70	−0.17	0.17	0.45	1.00							
22	IFRS	0.08	−0.30	0.06	0.10	0.01	0.23	0.00	0.04	0.16	1.00						
23	BIGN	0.44	0.28	0.10	0.37	0.33	−0.25	0.07	0.41	0.33	0.03	1.00					
24	SMALL	0.00	−0.01	0.00	0.00	−0.02	−0.03	0.02	−0.02	−0.03	−0.05	−0.12	1.00				
25	LOW_PROFIT	−0.01	−0.01	0.00	0.00	−0.02	−0.02	0.01	−0.01	−0.01	−0.04	−0.01	0.10	1.00			
26	INST	0.22	−0.48	−0.21	0.15	0.03	0.38	0.11	−0.08	0.24	0.33	0.20	0.01	0.00	1.00		
27	PIN	0.43	0.78	0.14	0.46	0.52	−0.80	0.01	0.67	0.20	−0.25	0.24	−0.02	−0.01	−0.54	1.00	
28	LISTED	0.20	−0.39	−0.12	0.08	−0.01	0.48	0.12	−0.30	0.33	0.31	−0.02	−0.01	−0.01	0.57	−0.61	1.00

2. Instrumental Variables (2SLS) Estimation

As with most studies that examine the impact of country-level institutional variables on economic outcomes, our results and inferences may be biased due to omitted correlated variables because it is difficult to control for all plausible institutional characteristics that are potentially related to both the establishment and the growth of financial literacy as well as to IPO underpricing. To mitigate potential endogeneity concerns, we employ instrumental variable (2SLS) estimation.

We use the ratio of secondary school enrollment to the population of the corresponding age group (SECONDARY_ENROLL) as an external instrument for both measures of financial literacy. A good instrument should be highly correlated with financial literacy, but not have a direct effect on the extent of IPO underpricing (Roberts and Whited (2013)). Studies document that high school financial education programs are positively associated with the financial literacy

TABLE 3

Relation Between Underpricing and Financial Literacy

Table 3 reports the regression results of the relation between financial literacy and underpricing. The dependent variable is UNDERPRICING. Columns 1–3 show the results when financial literacy is proxied by FINLIT and columns 4–7 show the results when financial literacy is proxied by FINLIT_ALT. Columns 1 and 4 show the results without control variables; columns 2 and 5 show the results including firm-level control variables, and columns 6 and 7 show the results including both firm- and country-level control variables. The detailed definitions of all variables are provided in the Appendix. Coefficients of the year, industry, and country indicator variables are not tabulated for brevity. *, **, and *** indicate significance at the 10%, 5%, and 1% levels (2-tailed), respectively. The main variable and coefficients of interest are shown in bold.

	FINANCIAL_LITERACY = FINLIT			FINANCIAL_LITERACY = FINLIT_ALT			
	1	2	3	4	5	6	7
FINANCIAL_LITERACY	**−0.012***** **(−4.66)**	**−0.011***** **(−3.89)**	**−0.012***** **(−6.08)**	**−0.197***** **(−7.97)**	**−0.095***** **(−3.52)**	**−0.083***** **(−3.86)**	**−0.206***** **(−5.48)**
OFFER_SIZE		−0.059** (−2.52)	−0.061*** (−4.64)		−0.061*** (−12.67)	−0.057*** (−12.07)	−0.072*** (−6.38)
HITECH		0.086*** (3.00)	0.052** (2.32)		−0.030 (−1.60)	0.031** (2.02)	0.016 (0.41)
VENTURE		0.077* (1.85)	0.042 (1.01)		−0.038** (−2.19)	−0.023 (−1.30)	−0.001 (−0.03)
FC		0.033 (0.59)	0.027 (0.54)		−0.057*** (−2.68)	−0.037* (−1.76)	0.027 (0.94)
BOOKBUILT		−0.039 (−0.49)	−0.066 (−0.99)		−0.129*** (−6.44)	−0.141*** (−7.01)	−0.068 (−1.00)
LOCKUP		−0.089* (−1.98)	−0.099** (−2.14)		−0.110*** (−6.12)	−0.126*** (−7.02)	−0.057* (−1.71)
CARVEOUT		−0.030 (−0.95)	−0.027 (−0.86)		−0.060*** (−3.13)	−0.029 (−1.56)	−0.061 (−1.69)
TOPTIER		0.125*** (4.02)	0.099*** (3.16)		−0.002 (−0.09)	−0.008 (−0.36)	0.035** (2.56)
PRICE_STBL		0.608*** (4.62)	0.469*** (3.43)		0.527*** (8.26)	0.494*** (11.71)	0.374** (2.27)
COMMON			−0.316*** (−3.53)				−0.375*** (−3.39)
ANTIDIRECTOR			−0.068** (−2.46)				−0.028 (−0.93)
ANTI_SELF_DEALING			0.691*** (4.97)				0.653*** (4.14)
RULE_OF_LAW			0.343** (2.09)			0.506*** (6.75)	0.499*** (3.63)
CORRUPTION			0.044 (0.32)			−0.032 (−0.57)	−0.263** (−2.12)
SMTURN			−0.001* (−1.79)			−0.000* (−1.92)	−0.001 (−1.69)
SMRET			0.019*** (4.50)			0.014*** (7.14)	0.019*** (3.27)
MKT_INTEGRATION			−0.010*** (−2.90)			0.003 (0.95)	−0.012*** (−5.34)
LGDP			−0.094 (−1.35)			−0.117** (−2.34)	0.048 (0.63)
IFRS			0.016 (0.22)			0.060*** (2.78)	0.092 (1.04)
CONSTANT	0.672*** (4.37)	0.675*** (3.37)	2.070*** (2.89)	0.265 (0.58)	0.467 (1.03)	0.710 (1.22)	0.388 (0.53)
No. of obs.	14,831	14,831	14,831	11,772	11,772	11,772	11,772
R^2	0.097	0.130	0.160	0.152	0.181	0.159	0.174
Year and industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country clustering	Yes	Yes	Yes	No	No	No	Yes
Country FE	No	No	No	Yes	Yes	Yes	No

of young adults, who are also found to have fewer defaults and higher credit scores (Lusardi, Mitchell, and Curto (2010), Lusardi (2012), Urban, Schmeiser, Collins, and Brown (2020)). Also, secondary school education is the foundation for higher-level education, which affects financial literacy because more educated individuals can better access and process information than less educated individuals (Atkinson and Messy (2012)). Therefore, SECONDARY_ENROLL is likely to be a valid instrument.

Moreover, we reason that SECONDARY_ENROLL only affects IPO underpricing through financial literacy for two main reasons. First, the students enrolled in secondary schools are typically aged between 12 and 18 years old. It is unlikely that individuals in this age range are active in stock investments, especially IPO investments. Second, financial understanding is needed in addition to education for the decision, for example, to invest in newly issued shares. Across the countries examined by Lusardi and Mitchell (2014), being better educated is always associated with having more financial knowledge, yet they also found that education is not enough. That is, even well-educated individuals are not necessarily savvy and knowledgeable about investment. In other words, SECONDARY_ENROLL is unlikely to be directly related to IPO underpricing and therefore meets the exclusion criterion.

We report the results of the first-stage regressions in columns 1 and 3 of Table 4. Consistent with our expectation, SECONDARY_ENROLL is significantly and positively associated with FINLIT and FINLIT_ALT.[13] We then use the predicted values of financial literacy from the first-stage regressions as our instrument in the second stage and test our prediction in Hypothesis 1. We present the results in columns 2 and 4 of Table 4. The results show that the predicted values of financial literacy (PRED_FINLIT and PRED_FINLIT_ALT) are significantly negatively associated with underpricing, which is consistent with the results of the test of Hypothesis 1 reported in Table 3. Overall, the results from the instrumental variable estimation mitigate concerns that our main results are driven by potential omitted correlated variable problems.

3.   Alternative Model Specifications

We also estimate several alternative model specifications to assess the robustness of the relation between financial literacy and IPO underpricing, and report the results for both measures of financial literacy in Table 5. First, in columns 1 and 6, we employ a weighted least squares (WLS) approach so that each country in the sample receives equal weight in the regression estimation and no single country drives the result (Dittmar, Mahrt-Smith, and Servaes (2003)). Second, because the

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[13]As suggested by Roberts and Whited (2013), we formally test the strength of our instrumental variable by computing the partial F-statistic for the instrument used in the first-stage regressions. The partial F-statistic is 25.30 and 131.10, considerably higher than the suggested minimum benchmark of 8.96 for a model with one instrument, as reported by Stock and Yogo (2005). In addition, Bound, Jaeger, and Baker (1995) and Shea (1997) suggest that partial R^2 is another useful indicator of the quality of IV, which measures the marginal contribution of the instrumental variable. We report a partial R^2 of 0.17 in column 1 and 0.02 in column 3. Overall, it is likely that our analyses do not suffer from a weak instrument problem.

TABLE 4

Relation Between Underpricing and Financial Literacy
(Instrumental Variable (2SLS) Estimation)

Table 4 reports the regression results of the relation between financial literacy and underpricing, based on an instrumental variable (2SLS) approach. In columns 1 and 3, we report the results of the first-stage regression in which we regress FINLIT and FINLIT_ALT on the SECONDARY_ENROLL as the instrument, and other control variables in the main regression. In columns 2 and 4, we report the second-stage results using the predicted value of FINLIT and FINLIT_ALT from the first stage. The detailed definitions of all variables are provided in the Appendix. Coefficients of the year, industry, and country indicator variables are not tabulated for brevity. *, **, and *** indicate significance at the 10%, 5%, and 1% levels (2-tailed), respectively. The main variable and coefficients of interest are shown in bold.

	FINANCIAL LITERACY = FINLIT		FINANCIAL LITERACY = FINLIT_ALT	
	First Stage	Second Stage	First Stage	Second Stage
	FINLIT	UNDERPRICING	FINLIT_ALT	UNDERPRICING
Dependent Variables	1	2	3	4
PRED_FINLIT/PRED_FINLIT_ALT		**−0.012*** **		**−0.506** **
		(−6.11)		**(−2.02)**
SECONDARY_ENROLL	0.421***		0.003***	
	(5.03)		(11.45)	
OFFER_SIZE	0.321**	−0.061***	−0.007***	−0.067***
	(2.67)	(−4.71)	(−4.86)	(−13.24)
HITECH	−0.210	0.052**	0.010*	−0.027
	(−0.60)	(2.37)	(1.83)	(−1.44)
VENTURE	−0.377	0.042	−0.001	−0.015
	(−1.61)	(1.03)	(−0.26)	(−0.86)
FC	−3.517***	0.027	−0.008	−0.051**
	(−4.63)	(0.54)	(−1.32)	(−2.33)
BOOKBUILT	0.141	−0.067	0.125***	−0.058
	(0.35)	(−1.00)	(21.06)	(−1.48)
LOCKUP	−0.632	−0.099**	0.041***	−0.092***
	(−1.56)	(−2.16)	(7.82)	(−4.56)
CARVEOUT	0.293	−0.027	−0.008	−0.046**
	(1.14)	(−0.88)	(−1.46)	(−2.36)
TOPTIER	−0.240	0.099***	0.006	0.001
	(−0.91)	(3.23)	(0.91)	(0.05)
PRICE_STBL	−9.954***	0.469***	−0.514***	0.343**
	(−3.47)	(3.49)	(−25.09)	(2.37)
COMMON	8.386***	−0.316***		
	(4.03)	(−3.58)		
ANTIDIRECTOR	−1.865***	−0.068***		
	(−2.86)	(−2.49)		
ANTI_SELF_DEALING	0.171	0.691***		
	(0.03)	(5.00)		
RULE_OF_LAW	1.675	0.342***	−0.166***	0.218**
	(0.68)	(2.12)	(−7.18)	(2.46)
CORRUPTION	11.505***	0.044	−0.199***	−0.162**
	(5.04)	(0.33)	(−11.12)	(−2.16)
SMTURN	−0.017***	−0.001*	−0.000	−0.001***
	(−6.67)	(−1.82)	(−0.70)	(−5.76)
SMRET	−0.143	0.019***	0.001	0.021***
	(−1.25)	(4.60)	(0.90)	(9.39)
MKT_INTEGRATION	0.009	−0.010***	0.025***	0.008
	(0.13)	(−2.94)	(25.15)	(1.13)
LGDP	0.926	−0.094	1.049***	0.267
	(0.47)	(−1.39)	(60.41)	(1.01)
IFRS	−0.011	0.016	0.146***	0.169***
	(−0.01)	(0.23)	(17.76)	(3.81)
CONSTANT	−15.577	2.070***	−10.988***	−2.324
	(−0.65)	(2.94)	(−47.29)	(−0.84)
No. of obs.	14,831	14,831	11,772	11,772
R^2	0.942	0.160	0.962	0.179
Partial F-statistic (partial R^2)	25.3 (0.17)		131.10 (0.02)	
Year and industry FE	Yes	Yes	Yes	Yes
Country clustering	Yes	Yes	No	No
Country FE	No	No	Yes	Yes

TABLE 5

Relation Between Underpricing and Financial Literacy (Alternative Model Specifications)

Table 5 reports the regression results of the relation between financial literacy and underpricing. The dependent variable is UNDERPRICING. Columns 1–5 show the results when financial literacy is proxied by FINLIT and columns 6–10 show the results when financial literacy is proxied by FINLIT_ALT. Columns 1 and 6 show the results using the weighted least squares regression. Columns 2 and 7 show the results after removing U.S. and China samples. Columns 3 and 8 show the results when the regression is run at the country-year level, for which we use the country-year average of each variable in the model. Columns 4 and 9 show the results when the regression is run after controlling for the four factors in Isidro et al. ((2020). Columns 5 and 10 show the results when the regression is run after controlling for DISCLOSURE, PDI, and UAI. The detailed definitions of all variables are provided in the Appendix. Coefficients of the year, industry, and country indicator variables are not tabulated for brevity. *, **, and *** indicate significance at the 10%, 5%, and 1% levels (2-tailed), respectively. The main variable and coefficients of interest are shown in bold.

	FINANCIAL_LITERACY = FINLIT					FINANCIAL_LITERACY = FINLIT_ALT				
	1	2	3	4	5	6	7	8	9	10
FINANCIAL_LITERACY	**−0.008*****	**−0.011*****	**−0.006****	**−0.005***	**−0.012*****	**−0.033***	**−0.066*****	**−0.163*****	**−0.070****	**−0.178*****
	(−3.82)	**(−5.57)**	**(−2.56)**	**(−1.84)**	**(−2.79)**	**(−1.68)**	**(−2.82)**	**(−3.30)**	**(−2.35)**	**(−4.42)**
OFFER_SIZE	−0.047***	−0.078***	−0.045***	−0.065***	−0.069***	−0.046***	−0.068***	−0.017	−0.078***	−0.075***
	(−4.53)	(−7.39)	(−2.89)	(−5.32)	(−6.54)	(−10.72)	(−12.79)	(−0.85)	(−13.95)	(−7.56)
HITECH	0.050**	0.003	0.134	−0.013	0.009	−0.046***	−0.061***	0.082	−0.053**	−0.051
	(2.19)	(0.08)	(1.57)	(−0.28)	(0.24)	(−2.63)	(−2.65)	(1.04)	(−2.02)	(−0.92)
VENTURE	0.044	0.040	−0.086	0.094***	0.083***	−0.033	−0.001	−0.035	0.038	0.016
	(1.20)	(1.20)	(−0.91)	(3.19)	(2.81)	(−1.59)	(−0.06)	(−0.32)	(1.40)	(0.54)
FC	0.016	−0.003	0.040	−0.039	−0.024	−0.088***	−0.024	−0.056	0.007	0.009
	(0.48)	(−0.08)	(0.65)	(−0.67)	(−0.46)	(−5.81)	(−1.09)	(−0.76)	(0.31)	(0.27)
BOOKBUILT	−0.020	−0.005	−0.001	−0.038	−0.020	−0.000	−0.057**	−0.068	−0.038*	−0.031
	(−0.63)	(−0.10)	(−0.02)	(−0.67)	(−0.41)	(−0.00)	(−2.57)	(−1.04)	(−1.66)	(−0.76)
LOCKUP	0.007	−0.041*	0.012	−0.100*	−0.097**	−0.079***	−0.058***	0.066	−0.040*	−0.040**
	(0.34)	(−1.98)	(0.28)	(−1.93)	(−2.14)	(−5.13)	(−2.90)	(1.47)	(−1.92)	(−2.13)
CARVEOUT	0.012	−0.053	0.043	−0.039	−0.015	−0.141***	−0.036	−0.108	−0.081***	−0.058
	(0.51)	(−1.14)	(0.64)	(−0.85)	(−0.42)	(−8.61)	(−1.59)	(−1.38)	(−3.29)	(−1.27)
TOPTIER	0.021	0.090**	0.092	0.090***	0.128***	−0.035	−0.010	0.046	0.025	0.014
	(0.79)	(2.38)	(1.26)	(3.33)	(4.79)	(−1.53)	(−0.31)	(0.48)	(0.79)	(0.54)
PRICE_STBL	−0.092	0.399*	−0.045	0.550**	0.471*	−0.397***	0.128**	−0.009	0.432***	0.279
	(−1.36)	(1.74)	(−0.15)	(2.27)	(1.96)	(−11.11)	(1.97)	(−0.07)	(4.22)	(1.27)
COMMON	−0.093	−0.224**	−0.195***	0.146	−0.320***			−0.149	0.239***	−0.233***
	(−1.62)	(−2.11)	(−2.72)	(1.26)	(−3.29)			(−1.63)	(2.80)	(−4.42)
ANTIDIRECTOR	0.000	0.047	−0.031	0.045	0.045			−0.049	0.053*	0.083**
	(0.02)	(1.20)	(−1.01)	(1.67)	(0.99)			(−1.64)	(1.87)	(2.50)
ANTI_SELF_DEALING	0.275**	0.336	0.572***	−0.873***	0.254			0.599***	−0.489**	0.334**
	(2.26)	(1.44)	(4.09)	(−3.65)	(0.98)			(4.85)	(−2.38)	(2.63)
RULE_OF_LAW	0.069	0.020	0.298***	0.096	0.027	0.259	0.349***	0.611***	−0.032	0.120
	(1.07)	(0.16)	(2.75)	(0.56)	(0.20)	(3.94)***	(4.26)	(3.71)	(−0.40)	(0.88)

(continued on next page)

	FINANCIAL_LITERACY = FINLIT					FINANCIAL_LITERACY = FINLIT_ALT				
	1	2	3	4	5	6	7	8	9	10
CORRUPTION	0.058 (0.84)	0.202 (1.22)	−0.033 (−0.45)	−0.088 (−0.68)	0.163 (1.08)	0.091 (1.77)*	−0.203*** (−3.13)	−0.451*** (−2.75)	−0.129** (−2.30)	−0.052 (−0.36)
SMTURN	0.000 (0.54)	−0.000 (−0.81)	0.001 (1.26)	0.000 (0.44)	−0.000 (−0.97)	0.000 (1.47)	−0.001*** (−3.27)	−0.000 (−0.19)	−0.001*** (−2.59)	−0.000 (−0.71)
SMRET	−0.000 (−0.06)	0.011** (2.30)	0.406*** (3.41)	0.014*** (4.21)	0.013*** (4.31)	0.011*** (5.64)	0.002 (0.95)	0.012 (1.19)	0.015*** (4.13)	0.013** (2.32)
MKT_INTEGRATION	−0.005** (−2.21)	−0.008** (−2.54)	−0.009*** (−3.69)	−0.012*** (−3.65)	−0.009** (−2.45)	−0.013*** (−5.82)	0.003 (1.10)	−0.012*** (−4.38)	−0.010*** (−6.56)	−0.006 (−1.55)
LGDP	−0.002 (−0.07)	−0.011 (−0.14)	−0.118** (−2.41)	−0.092 (−1.01)	−0.017 (−0.18)	−0.269*** (−4.61)	−0.214*** (−2.78)	0.090 (0.92)	−0.017 (−0.31)	0.078 (0.86)
IFRS	0.032 (0.59)	−0.059 (−1.61)	−0.057 (−1.42)	0.047 (0.95)	−0.019 (−0.49)	0.006 (0.24)	0.056** (2.32)	0.000 (0.01)	0.024 (0.77)	0.033 (0.72)
FACTOR1				0.236** (2.45)					0.328*** (6.04)	
FACTOR2				0.230*** (3.24)					0.067 (1.29)	
FACTOR3				−0.075** (−2.23)					−0.086*** (−4.13)	
FACTOR4				−0.132*** (−6.05)					−0.131*** (−5.96)	
DISCLOSURE					0.688*** (3.29)					0.406*** (3.61)
PDI					−0.004 (−1.47)					−0.003* (−1.76)
UAI					−0.001 (−0.38)					0.005** (2.70)
CONSTANT	0.812** (2.41)	0.766 (0.96)	1.891*** (3.50)	2.328** (2.35)	0.944 (1.28)	3.606*** (4.13)	2.094** (2.29)	0.048 (0.06)	1.081 (1.55)	−0.899 (−1.01)
No. of obs.	14,831	9,010	496	10,752	11,959	11,772	9,009	472	7,693	8,900
R^2	0.121	0.118	0.285	0.140	0.124	0.186	0.126	0.166	0.142	0.130
Year and industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country clustering	Yes	Yes	No	Yes	Yes	No	No	No	Yes	Yes
Country FE	No	No	No	No	No	Yes	Yes	No	No	No

United States and China IPOs constitute a large proportion of our sample and therefore could have an undue influence on our results, we exclude these firms from the overall sample and report the results in columns 2 and 7. Third, in columns 3 and 8, we re-estimate the regression at the country-year level by using the country-year average of each variable in the model. The country-year aggregate analysis, therefore, treats each country-year as one observation, regardless of the number of IPO observations in that country. Fourth, Isidro et al. (2020) report that many country attributes are correlated. They show that four underlying country factors largely subsume the individual explanatory power of 72 country attributes in explaining reporting quality levels across countries. Hence, in columns 4 and 9, we control for the four factors reported in Isidro et al. (2020) to check the robustness of our results. Fifth, we include additional controls for disclosure regulation and national culture in our regression model because prior studies (e.g., Costa et al. (2013), Shi, Pukthuanthong, and Walker (2013), and Cai and Zhu (2015)) document that IPO disclosure requirements mandated by countries' securities laws and cross-cultural differences between countries could play a key role in determining IPO underpricing. Hence, in columns 5 and 10, we control for the disclosure regulation index from La Porta, Lopez-de-Silanes, and Shleifer (2006) and the measures of power distance and uncertainty avoidance from Hofstede (2001).[14] As indicated in Table 5, we find a robust, negative, and statistically significant coefficient on FINLIT and FINLIT_ALT in all columns, which is consistent with our prediction in Hypothesis 1.

4.   Alternative Measurement Windows for Underpricing

We explore the robustness of our findings to the use of alternative time windows over which IPO underpricing is measured. Ljungqvist (2007) notes that in less developed capital markets, or in the presence of daily volatility limits, aftermarket prices may take some time before they equilibrate supply and demand. In our setting, these insights suggest that using first-day IPO underpricing may underestimate the impact of financial literacy. Following Ellul and Pagano (2006) and Lin et al. (2013), we re-estimate our baseline model twice: first, using IPO underpricing measured over 1 week following the listing day (UNDERPRICING_1_WEEK), and second, using IPO underpricing measured over 2 weeks following the listing day (UNDERPRICING_2_WEEKS). We report the results in Table 6 with FINLIT as the measure of financial literacy.[15] Panel A shows the descriptive statistics for the two alternative underpricing variables, and Panel B shows the regression results. Consistent with our main results in Table 3, we find a significantly negative relationship between UNDERPRICING_1_WEEK and FINLIT (column 1 in Panel B of Table 6) and between UNDERPRICING_2_WEEKS and FINLIT (column 2 in Panel B of Table 6).

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[14]Because some countries do not have data for disclosure requirement and national culture, we do not include these variables in our main regression to increase sample size and the generalizability of our findings.

[15]The results using FINLIT_ALT as the alternative measure of financial literacy are qualitatively similar to those reported in Tables 6–8. For parsimony, we only report results based on FINLIT.

TABLE 6

Relation Between Underpricing and Financial Literacy
(Alternative Windows for Underpricing)

Table 6 reports the regression results on the relation between financial literacy proxied by FINLIT and underpricing measured over 1 week and 2 weeks after listing. The detailed definitions of all variables are provided in the Appendix. Coefficients of the year and industry indicator variables are not tabulated for brevity. *, **, and *** indicate significance at the 10%, 5%, and 1% levels (2-tailed), respectively. The main variable and coefficients of interest are shown in bold.

Panel A. Descriptive Statistics

	N	Mean	Q1	Median	Q3	Std. Dev.
UNDERPRICING_1_WEEK	14,705	0.446	−0.002	0.175	0.654	0.750
UNDERPRICING_2_WEEKS	14,677	0.506	−0.016	0.172	0.675	0.887

Panel B. Regression Results

	Dependent Variable	
	UNDERPRICING_1_WEEK	UNDERPRICING_2_WEEKS
	1	2
FINLIT	**−0.010*****	**−0.010*****
	(−4.61)	**(−3.21)**
OFFER_SIZE	−0.066***	−0.078***
	(−5.75)	(−5.68)
HITECH	0.013	−0.011
	(0.51)	(−0.33)
VENTURE	0.075**	0.113***
	(2.52)	(4.46)
FC	0.014	−0.003
	(0.35)	(−0.08)
BOOKBUILT	−0.012	0.031
	(−0.21)	(0.55)
LOCKUP	−0.105**	−0.113*
	(−2.22)	(−2.03)
CARVEOUT	−0.026	−0.018
	(−0.88)	(−0.51)
TOPTIER	0.088***	0.071**
	(3.33)	(2.26)
PRICE_STBL	0.448***	0.210
	(2.88)	(0.97)
COMMON	−0.282***	−0.262***
	(−4.18)	(−2.79)
ANTIDIRECTOR	−0.058***	−0.066***
	(−2.84)	(−2.76)
ANTI_SELF_DEALING	0.734***	0.868***
	(6.53)	(5.13)
RULE_OF_LAW	0.089	−0.191
	(0.73)	(−0.92)
CORRUPTION	0.236**	0.478***
	(2.19)	(3.28)
SMTURN	0.000	0.002**
	(0.54)	(2.31)
SMRET	0.012***	0.006
	(3.54)	(0.83)
MKT_INTEGRATION	−0.013***	−0.016***
	(−3.80)	(−3.20)
LGDP	−0.115	−0.123
	(−1.69)	(−1.13)
IFRS	−0.004	−0.048
	(−0.07)	(−0.84)
CONSTANT	2.284***	2.518**
	(3.30)	(2.38)
No. of obs.	14,705	14,677
R^2	0.223	0.303
Year and industry FE	Yes	Yes
Country clustering	Yes	Yes

5.   Financial Literacy and Post-Listing Stock Returns

Thus far, we have shown that financial literacy is negatively associated with underpricing or initial stock returns. In this section, we trace the changes in market-adjusted stock returns from the initial period to subsequent periods. Specifically, we compare percentage changes in stock price from $t - 1$ to t to percentage changes in stock price from t to $t + n$, where t represents the IPO issue date. To do so, we use the same model specification in equation (1) but replace UNDERPRICING with the market-adjusted stock returns after listing. We measure market-adjusted stock returns as the stock returns of IPO firms minus the corresponding market returns over the same interval.[16] In Panel A of Table 7, we report the market-adjusted stock returns of the IPO firms over 1 week, 2 weeks, 4 weeks, 60 days, 90 days, 180 days, and 1 year. In Panel B, we show the regression results as specified in equation (1) but with market-adjusted post-listing stock returns as the dependent variable. Interestingly, we find that market-adjusted stock returns are not associated with FINLIT in the first 2 weeks after trading in the secondary market (columns 1 and 2 of Panel B). However, we find that market-adjusted returns from after the 4-week period, up to the 1-year horizon are significantly positively associated with FINLIT (columns 3–7 of Panel B). Overall, the evidence in Table 7 is consistent with the interpretation that investors in high financial literacy countries possess better financial knowledge and enjoy higher post-listing returns than investors in low financial literacy countries.

6.   Financial Literacy, Underpricing, and Post-Listing Stock Returns

Prior studies suggest that IPO underpricing is associated with lower post-listing returns (e.g., Ritter (1991), Loughran and Ritter (1995)). In this section, we explore whether financial literacy moderates the relation between IPO underpricing and 1-year post-listing stock return. We present the results of this exploratory investigation in Table 8.

Panel A of Table 8 shows the univariate analysis for subsamples based on the sample median to define high/low financial literacy and high/low IPO underpricing. The dependent variable is the 1-year market-adjusted stock return. As expected, the mean market-adjusted returns are significantly lower for firms with high IPO underpricing compared with firms with low IPO underpricing. We then examine how financial literacy affects this relation. When the level of IPO underpricing is low, there is no significant difference in post-listing stock returns between high and low financial literacy countries. However, when the level of IPO underpricing is high, we find that the stock returns of firms in high financial literacy countries are significantly higher than those in low financial literacy countries. Moreover, we find that the difference in returns between firms in high/low financial literacy countries with high underpricing is significantly higher than the difference in returns between firms in high/low financial literacy countries but with low underpricing. This evidence suggests that financial literacy moderates the relation between IPO underpricing and subsequent stock market performance.

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[16]We obtain the non-U.S. market returns from the Daily WRDS World Indices, and U.S. market returns from CRSP. The sample size is smaller for the tests using the market-adjusted returns because market returns for some countries are not available.

TABLE 7

Relation Between Post-Listing Stock Price Performance and Financial Literacy

Table 7 reports the regression results on the relation between financial literacy proxied by FINLIT and market-adjusted stock returns over 1 week, 2 weeks, 4 weeks, 60 days, 90 days, 180 days, and over a 1-year horizon after trading in the secondary market. Panel A provides descriptive statistics for the market-adjusted stock returns after IPO. Panel B shows the regression results when the dependent variable is market-adjusted stock returns. Coefficients of the year and industry indicator variables are not tabulated for brevity. The detailed definitions of all variables are provided in the Appendix. *, **, and *** indicate significance at the 10%, 5%, and 1% levels (2-tailed), respectively. The main variable and coefficients of interest are shown in bold.

Panel A. Descriptive Statistics

	N	Mean	Q1	Median	Q3	Std. Dev.
ADJRET_1_WEEK	11,168	0.000	−0.076	−0.014	0.042	0.152
ADJRET_2_WEEKS	11,114	0.005	−0.110	−0.022	0.058	0.232
ADJRET_4_WEEKS	11,114	0.011	−0.143	−0.031	0.083	0.299
ADJRET_60_DAYS	11,114	0.007	−0.206	−0.050	0.122	0.377
ADJRET_90_DAYS	11,114	0.007	−0.247	−0.068	0.137	0.450
ADJRET_180_DAYS	10,869	−0.038	−0.377	−0.138	0.146	0.568
ADJRET_1_YEAR	10,291	−0.114	−0.566	−0.261	0.128	0.715

Panel B. Regression Results Relating Post-Listing Stock Price Performance and Financial Literacy

	Dependent Variable						
	ADJRET_ 1_WEEK	ADJRET_ 2_WEEKS	ADJRET_ 4_WEEKS	ADJRET_ 60_DAYS	ADJRET_ 90_DAYS	ADJRET_ 180_DAYS	ADJRET_ 1_YEAR
	1	2	3	4	5	6	7
FINLIT	**0.001**	**0.001**	**0.002****	**0.003*****	**0.003****	**0.004****	**0.005*****
	(1.32)	**(1.54)**	**(2.16)**	**(3.39)**	**(2.59)**	**(2.50)**	**(3.48)**
OFFER_SIZE	0.000	−0.001	−0.002	0.001	−0.000	0.000	−0.001
	(0.00)	(−0.22)	(−0.54)	(0.20)	(−0.03)	(0.06)	(−0.11)
HITECH	−0.008***	−0.015***	−0.016**	−0.008	−0.005	−0.020	−0.020
	(−2.92)	(−4.58)	(−2.27)	(−0.93)	(−0.48)	(−1.47)	(−1.11)
VENTURE	0.003	0.013	0.020**	0.019**	0.019*	−0.011	−0.043***
	(0.45)	(1.49)	(2.36)	(2.41)	(1.89)	(−0.71)	(−5.16)
FC	−0.007	−0.003	0.003	−0.002	−0.003	−0.004	−0.002
	(−1.15)	(−0.39)	(0.22)	(−0.12)	(−0.21)	(−0.23)	(−0.08)
BOOKBUILT	0.012***	0.016***	0.026***	0.024**	0.012	0.001	−0.009
	(3.29)	(2.83)	(2.91)	(2.29)	(1.02)	(0.05)	(−0.69)
LOCKUP	0.004	0.004	0.001	0.004	0.003	−0.018	0.002
	(1.11)	(0.73)	(0.11)	(0.26)	(0.14)	(−0.71)	(0.06)
CARVEOUT	−0.003	0.004	0.009	0.003	−0.002	0.016	0.039*
	(−0.70)	(0.65)	(1.39)	(0.48)	(−0.17)	(1.02)	(1.92)
TOPTIER	0.003	−0.004	0.008	0.022*	0.026**	0.047***	0.078**
	(0.67)	(−0.57)	(0.82)	(1.98)	(2.58)	(2.89)	(2.63)
PRICE_STBL	0.066*	0.114**	0.103	0.185**	0.251*	0.308**	0.390**
	(1.93)	(2.18)	(1.62)	(2.09)	(1.97)	(2.19)	(2.70)
COMMON	−0.022*	−0.055**	−0.053*	−0.020	0.007	0.064	0.131
	(−1.80)	(−2.39)	(−1.97)	(−0.69)	(0.17)	(1.03)	(1.68)
ANTIDIRECTOR	−0.009*	−0.022**	−0.021*	−0.015	−0.010	0.002	−0.023
	(−1.71)	(−2.31)	(−1.97)	(−1.20)	(−0.59)	(0.11)	(−0.80)
ANTI_SELF_DEALING	0.096***	0.192***	0.194***	0.082	0.015	−0.169	−0.243
	(3.04)	(3.20)	(2.86)	(1.14)	(0.15)	(−1.14)	(−1.25)
RULE_OF_LAW	−0.027	−0.043	−0.071	−0.064	−0.043	−0.082	−0.055
	(−1.10)	(−1.14)	(−1.55)	(−1.70)	(−0.90)	(−1.38)	(−0.52)
CORRUPTION	0.015	0.009	−0.016	−0.048*	−0.088**	−0.093	−0.200**
	(1.26)	(0.55)	(−0.78)	(−1.87)	(−2.66)	(−1.55)	(−2.07)
SMTURN	−0.000	−0.000	−0.000**	−0.000***	−0.000**	−0.000*	−0.001**
	(−0.65)	(−1.22)	(−2.13)	(−3.12)	(−2.69)	(−1.73)	(−2.12)
SMRET	−0.001	−0.001	−0.000	−0.001	0.001	0.004	−0.002
	(−0.47)	(−0.40)	(−0.03)	(−0.27)	(0.24)	(0.84)	(−0.26)
MKT_INTEGRATION	−0.001*	−0.001	−0.001	0.001	0.002*	0.005***	0.008***
	(−2.03)	(−1.53)	(−0.62)	(1.12)	(1.74)	(3.24)	(4.25)
LGDP	−0.009	0.008	0.036	0.031	0.037	0.011	0.042
	(−0.79)	(0.44)	(1.26)	(1.08)	(1.17)	(0.24)	(0.67)
IFRS	0.011	0.016*	0.029***	0.033***	0.059***	0.080**	0.110*
	(1.51)	(1.76)	(3.21)	(3.38)	(4.07)	(2.14)	(2.04)
CONSTANT	0.199*	0.122	−0.027	−0.221	−0.515	−0.611	−0.654
	(1.96)	(0.69)	(−0.08)	(−0.57)	(−1.60)	(−1.21)	(−1.05)
No. of obs.	11,168	11,114	11,114	11,114	11,114	10,869	10,291
R^2	0.048	0.060	0.056	0.043	0.046	0.042	0.042
Year and industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country clustering	Yes	Yes	Yes	Yes	Yes	Yes	Yes

We next provide the formal regression results in Panel B of Table 8. In column 1, as expected, we find that UNDERPRICING is negatively associated with stock market returns (Ritter (1991), Loughran and Ritter (1995)). In column 2, we add FINLIT and its interaction with UNDERPRICING (i.e., FINLIT × UNDERPRICING) to the model. The coefficient of FINLIT × UNDERPRICING is positive and significant, suggesting that financial literacy attenuates the negative relation between IPO underpricing and stock market returns. Overall, both our univariate and multivariate analyses suggest that the negative effect of underpricing on stock market performance is less pronounced when financial literacy is high.

V.   Cross-Sectional Analyses

In our main analysis, we find robust evidence that financial literacy is negatively associated with the extent of IPO underpricing. Next, we examine whether the influence of financial literacy on IPO underpricing is systematically related to the level of information friction. Specifically, we explore the interactions between financial literacy and proxies of firm-level and country-level information frictions, and their joint effects on IPO underpricing. To do so, we modify equation (1) to include the conditioning variable (CONDITIONING_VAR) and its interaction with FINLIT or FINLIT_ALT, and estimate the following cross-sectional regression:

$$
\begin{aligned}
(2)\quad \text{UNDERPRICING} = {} & \alpha_0 + \alpha_1 \text{FINLIT}\,(\text{or FINLIT\_ALT}) \\
& + \alpha_2 \text{FINLIT}\,(\text{or FINLIT\_ALT}) \times \text{CONDITIONING\_VAR} \\
& + \alpha_3 \text{CONDITIONING\_VAR} + \alpha_4 \mathbf{V} + \alpha_5 \mathbf{W} \\
& + \text{YR\_FE} + \text{IND\_FE} + \text{C\_FE} + \varepsilon.
\end{aligned}
$$

TABLE 8
The Effect of Financial Literacy on the Relation Between Underpricing and 1-Year Post-Listing Stock Price Performance

Panel A of Table 8 shows the mean market-adjusted stock returns measured by ADJRET_1_YEAR for the subsample of firms based on high/low financial literacy proxied by FINLIT and high/low IPO underpricing using the sample median as the benchmark. The sample size for each cell is indicated in brackets. The panel also reports the *t*-statistic for the mean difference and difference-in-differences between groups. Panel B shows the regression results on the relation between financial literacy, IPO underpricing, and market-adjusted stock returns over a 1-year horizon after trading in the secondary market. Coefficients of the year and industry indicator variables are not tabulated for brevity. The detailed definitions of all variables are provided in the Appendix. Coefficients on the year indicator variables are not tabulated for brevity. *, **, and *** indicate significance at the 10%, 5%, and 1% levels (2-tailed), respectively. The main variable and coefficients of interest are shown in bold.

Panel A. Mean Post-Listing Stock Price Performance for Subsamples Based on Financial Literacy and Underpricing

	Low Financial Literacy	High Financial Literacy	Difference (*t*-Value)
Low underpricing		−0.058 (5,146)	
High underpricing		−0.170 (5,145)	
Difference (*t*-value)		0.112*** (7.97)	
Low underpricing	−0.053 (2,011)	−0.062 (3,135)	0.009 (0.45)
High underpricing	−0.234 (2,640)	−0.103 (2,505)	−0.131*** (−6.43)
Difference in differences (*t*-value)			0.140*** (4.99)

TABLE 8 (continued)

The Effect of Financial Literacy on the Relation Between Underpricing and
1-Year Post-Listing Stock Price Performance

Panel B. Moderating Effect of Financial Literacy on the Relation Between the Post-Listing Stock Price Performance and IPO Underpricing

	1	2
FINLIT	0.003**	0.003*
	(2.36)	(1.85)
UNDERPRICING	−0.146***	−0.295***
	(−7.27)	(−5.44)
FINLIT × UNDERPRICING		**0.003***
		(3.06)
OFFER_SIZE	−0.011	−0.010
	(−1.57)	(−1.48)
HITECH	−0.020	−0.021
	(−1.21)	(−1.31)
VENTURE	−0.032***	−0.035***
	(−3.54)	(−3.65)
FC	−0.002	−0.000
	(−0.09)	(−0.02)
BOOKBUILT	−0.007	−0.008
	(−0.49)	(−0.50)
LOCKUP	−0.011	−0.008
	(−0.38)	(−0.30)
CARVEOUT	0.036	0.036
	(1.61)	(1.60)
TOPTIER	0.095***	0.093***
	(3.05)	(2.93)
PRICE_STBL	0.505***	0.514***
	(3.66)	(3.82)
COMMON	0.087	0.062
	(1.17)	(0.88)
ANTIDIRECTOR	−0.026	−0.031
	(−0.94)	(−1.11)
ANTI_SELF_DEALING	−0.158	−0.105
	(−0.82)	(−0.56)
RULE_OF_LAW	−0.027	−0.013
	(−0.26)	(−0.12)
CORRUPTION	−0.181*	−0.178*
	(−2.03)	(−1.99)
SMTURN	−0.001**	−0.001**
	(−2.15)	(−2.08)
SMRET	0.000	0.001
	(0.05)	(0.18)
MKT_INTEGRATION	0.007***	0.007***
	(4.39)	(4.10)
LGDP	0.038	0.026
	(0.69)	(0.47)
IFRS	0.109**	0.109**
	(2.07)	(2.07)
CONSTANT	−0.492	−0.333
	(−0.88)	(−0.58)
No. of obs.	10,291	10,291
R^2	0.062	0.064
Year and industry FE	Yes	Yes
Country clustering	Yes	Yes

A.   Information Frictions at the Firm Level

When investors have greater access to high quality information about an upcoming IPO, the opinions of more and less financially literate investors may not differ as much as they would when information is difficult to acquire. Previous studies suggest that information asymmetry is one of the most important driving forces behind IPO underpricing (Beatty and Ritter (1986), Rock (1986), Welch (1989), and Michaely and Shaw (1994)). Hence, we expect the incremental impact of financial literacy on underpricing to be more pronounced when investors have limited access to firm-level information.

Prior research indicates that the presence of prestigious intermediaries such as Big N auditors and venture capitalist investors plays an important "certification" role for a new issue, reducing information uncertainty faced by the market (Booth and Smith (1986), Carter and Manaster (1990), Megginson and Weiss (1991), Menon and Williams (1991), and Michaely and Shaw (1994)). The IPO literature also documents that smaller firms are underpriced more at the time of the IPO (e.g., Beatty and Ritter (1986), Ljungqvist (1997)). Smaller firms receive less attention from equity analysts and less coverage in the financial press, and hence information asymmetries increase as firm size declines. In addition, Baker and Wurgler (2006), (2007)) suggest that the stocks of firms with low profitability are more difficult to value because of greater information asymmetry, making biases more insidious and valuation mistakes more likely.

If financial literacy influences underpricing through its effect on firm-level information asymmetry, then we expect the incremental impact of financial literacy on underpricing to be larger for IPO firms that are not audited by a Big N auditor, are not backed by venture capitalists, are smaller, and are less profitable. We use four indicators to measure the information frictions at the firm level. NONBIGN equals 1 if the IPO firm's auditor is not a Big N auditor, NOVENTURE equals 1 if the IPO is not venture capital-backed, SMALL equals 1 if the IPO firm's total assets are in the lowest quintile for the country, and LOWPROFIT equals 1 if the IPO firm's ROA is in the lowest quintile for the country, and 0 otherwise.

We expect the implications of financial literacy for IPO underpricing to be more pronounced when firm-level information frictions are greater. Specifically, we expect the coefficient on the interaction between FINLIT and NONBIGN/NOVENTURE/SMALL/LOWPROFIT to be negative. We report the results in Table 9 for both measures of financial literacy. Consistent with our expectations, we find that the coefficients of the interaction terns are negative and significant in seven of the eight columns, indicating that the negative association between financial literacy and underpricing is significantly more pronounced when the IPO firms are not audited by a Big N auditor, are not backed by venture capitalists, are smaller, and are less profitable. These findings are consistent with financial literacy being more influential in reducing underpricing when the firm-level information frictions are higher.

B.   Information Frictions at the Country Level

High-quality information plays a crucial role in reducing information asymmetries and mitigating potential agency conflicts (Bushman, Chen, Engel, and

TABLE 9

Relation Between Underpricing and Financial Literacy
(Information Frictions at the Firm Level)

Table 9 reports the regression results of the role of information friction at the firm-level (FRICTION) on the relation between financial literacy and underpricing. FRICTION is proxied by NONBIGN, NOVENTURE, SMALL, and LOWPROFIT. Columns 1–4 show the results when financial literacy is proxied by FINLIT and columns 5–8 show the results when financial literacy is proxied by FINLIT_ALT. The detailed definitions of all variables are provided in the Appendix. Coefficients of the year, industry, and country indicator variables are not tabulated for brevity. *, **, and *** indicate significance at the 10%, 5%, and 1% levels (2-tailed), respectively. The main variable and coefficients of interest are shown in bold.

	FINANCIAL_LITERACY = FINLIT				FINANCIAL_LITERACY = FINLIT_ALT			
	NONBIGN	NOVENTURE	SMALL	LOWPROFIT	NONBIGN	NOVENTURE	SMALL	LOWPROFIT
FRICTION	1	2	3	4	5	6	7	8
FINANCIAL_LITERACY	−0.006**	−0.008**	−0.008**	−0.004	−0.024	−0.072**	−0.032	0.013
	(−2.22)	(−2.52)	(−2.38)	(−1.36)	(−0.70)	(−2.31)	(−0.93)	(0.39)
FINANCIAL_ LITERACY × FRICTION	**−0.003***	**−0.006***	**−0.008***	**−0.005***	**−0.068***	**−0.012**	**−0.086***	**−0.046***
	(−1.81)	**(−3.34)**	**(−2.72)**	**(−4.68)**	**(−3.62)**	**(−0.63)**	**(−5.27)**	**(−2.78)**
FRICTION	0.202*	0.216***	0.512***	0.251***	0.056***	0.024	0.175***	0.037**
	(1.83)	(3.11)	(3.12)	(4.02)	(3.02)	(1.34)	(9.87)	(2.16)
OFFER_SIZE	−0.041***	−0.064***	−0.045***	−0.046***	−0.049***	0.061***	−0.044***	−0.052***
	(−3.47)	(−4.75)	(−3.08)	(−3.53)	(−9.41)	(−12.86)	(−8.30)	(−10.02)
HITECH	0.067***	0.054**	0.045**	0.069***	0.020	−0.030	−0.048**	0.022
	(4.07)	(2.51)	(2.53)	(4.07)	(1.04)	(−1.57)	(−2.43)	(1.13)
VENTURE	0.020		0.042	0.019	−0.011		−0.026	−0.013
	(0.49)		(0.96)	(0.45)	(−0.60)		(−1.45)	(−0.67)
FC	0.064	0.024	0.055	0.066	−0.028	−0.051**	−0.030	−0.027
	(1.47)	(0.49)	(1.17)	(1.50)	(−1.22)	(−2.44)	(−1.28)	(−1.18)
BOOKBUILT	−0.122*	−0.081	−0.075	−0.119*	−0.150***	−0.117***	−0.119***	−0.150***
	(−1.82)	(−1.13)	(−0.99)	(−1.80)	(−7.09)	(−5.62)	(−5.41)	(−7.06)
LOCKUP	−0.094**	−0.110**	−0.109***	−0.094**	−0.133***	−0.116***	−0.116***	−0.137***
	(−2.70)	(−2.51)	(−2.93)	(−2.77)	(−7.04)	(−6.39)	(−6.20)	(−7.20)
CARVEOUT	−0.034*	−0.034	−0.028	−0.039*	−0.033*	−0.048**	−0.046**	−0.036*
	(−1.79)	(−1.13)	(−0.92)	(−1.97)	(−1.72)	(−2.50)	(−2.35)	(−1.83)
TOPTIER	0.064**	0.095***	0.103***	0.063**	0.004	−0.002	0.012	0.003
	(2.65)	(3.24)	(3.63)	(2.39)	(0.18)	(−0.10)	(0.54)	(0.12)
PRICE_STBL	0.595***	0.524***	0.505***	0.598***	0.718***	0.659***	0.677***	0.717***
	(4.42)	(3.17)	(3.04)	(4.33)	(9.83)	(8.93)	(8.87)	(9.74)
COMMON	−0.302***	−0.355***	−0.311***	−0.338***				
	(−3.55)	(−3.99)	(−3.46)	(−3.78)				
ANTIDIRECTOR	−0.052**	−0.039*	−0.025	−0.052**				
	(−2.27)	(−1.80)	(−1.17)	(−2.35)				
ANTI_SELF_DEALING	0.520***	0.619***	0.517***	0.579***				
	(4.79)	(5.76)	(4.89)	(4.77)				
RULE_OF_LAW	0.314	0.284	0.268	0.330	0.414***	0.314***	0.354***	0.421***
	(1.56)	(1.62)	(1.50)	(1.66)	(5.07)	(3.98)	(4.25)	(5.12)
CORRUPTION	−0.078	0.067	0.103	−0.082	−0.333***	−0.184***	−0.156**	−0.338***
	(−0.48)	(0.45)	(0.70)	(−0.51)	(−5.06)	(−3.06)	(−2.48)	(−5.10)
SMTURN	0.000***	0.000***	0.000*	0.000***	0.000***	0.000***	0.000***	0.000***
	(4.21)	(2.84)	(1.94)	(3.92)	(4.82)	(4.97)	(4.71)	(4.89)
SMRET	0.018***	0.018***	0.019***	0.019***	0.019***	0.019***	0.017***	0.019***
	(4.76)	(5.18)	(4.87)	(4.88)	(8.28)	(8.52)	(7.45)	(8.24)
MKT_INTEGRATION	−0.003	−0.010***	−0.010***	−0.004	0.012***	0.002	0.003	0.012***
	(−1.12)	(−3.25)	(−3.27)	(−1.51)	(2.87)	(0.49)	(0.83)	(2.95)
LGDP	−0.137**	−0.145*	−0.144*	−0.139**	−0.186***	−0.260***	−0.196***	−0.194***
	(−2.14)	(−1.82)	(−1.98)	(−2.18)	(−2.64)	(−3.93)	(−2.82)	(−2.73)
IFRS	−0.001	−0.008	−0.004	0.003	0.071**	0.104***	0.080***	0.069**
	(−0.02)	(−0.11)	(−0.06)	(0.04)	(2.18)	(3.67)	(2.62)	(2.10)
CONSTANT	1.913***	2.352***	2.184***	1.861***	1.152	2.951***	2.002**	1.590
	(3.11)	(3.05)	(2.77)	(2.95)	(1.23)	(3.41)	(1.97)	(1.64)
No. of obs.	10,224	14,831	13,362	10,141	9,066	11,772	10,483	8,987
R^2	0.195	0.162	0.176	0.197	0.218	0.192	0.210	0.219
Year and industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country clustering	Yes	Yes	Yes	Yes	No	No	No	No
Country FE	No	No	No	No	Yes	Yes	Yes	Yes

Smith (2004)). Boulton et al. (2011) examine the impact of country-level earnings quality on IPO underpricing and find that IPOs are underpriced less in countries where public firms produce higher quality earnings information. Therefore, the impact of financial literacy on IPO underpricing is likely to be more salient in a less transparent and poorer information environment in which investors are more likely to rely on their financial knowledge when they assess the information in the IPO prospectus.

Stock market development benefits the financial economy by improving firm operating performance (Mitton (2006)), reducing the cost of equity capital (Bekaert and Harvey (2000)), and increasing stock market liquidity (Levine and Zervos (1998)). Demirgüç-Kunt and Levine (1996) argue that a better-developed market enjoys greater transparency and information quality. Huang, Li, and Chen (2019) find that firms located in better-developed financial markets experience less underpricing and better long-run performance due to greater market transparency and less information asymmetry. The reduction in information asymmetry brought by financial market development mitigates the need for issuers to signal their quality by underpricing (Allen and Faulhaber (1989), Chemmanur (1993), and Neupane and Poshakwale (2012)). We therefore conjecture that financial literacy has a stronger (weaker) effect on underpricing when the stock market is less (more) developed.

We use two proxies for transparency and richness of the information environment. The first proxy is the mean country-level institutional ownership (INST) from Ferreira, Massa, and Matos (2010), with higher institutional ownership indicating a better information environment. The second measure is the probability of informed trading (PIN) derived from the market microstructure model of Easley, Hvidkjaer, and O'Hara (2002), which represents the level of information asymmetry among market participants. Higher values of PIN indicate a poorer information environment. We obtain the country-level PIN measure from Lai, Ng, and Zhang (2014). We also use two proxies for stock market development. The first measure reflects the stock market turnover (SMTURN), which we use in our main regression. The second measure is the natural logarithm of the number of firms listed on the exchanges of a country (LISTED), with higher values indicating stronger stock market development.

We expect the negative relation between financial literacy and IPO underpricing to be stronger when the country-level information environment is poorer and when the stock market is less developed. Specifically, we expect the coefficient of the interaction between our measures of financial literacy (FINLIT and FINLIT_ALT) and INST and the proxies of stock market development (SMTURN and LISTED) to be positive, and the coefficient of the interaction between FINLIT/FINLIT_ALT and PIN to be negative. We report the results in Table 10. We find that the coefficient of the interaction terns is significant in the expected direction in seven of eight columns, indicating that the negative relation between financial literacy and IPO underpricing is significantly more pronounced in countries with a lower level of institutional ownership, higher probability of informed trading, and a less developed stock market. These findings are consistent with financial literacy being more influential in reducing underpricing when the country-level information frictions are greater.

TABLE 10

Relation Between Underpricing and Financial Literacy
(Information Frictions at the Country Level)

Table 10 reports the regression results of the role of information friction at the country-level (FRICTION) on the relation between financial literacy and underpricing. FRICTION is proxied by INST, PIN, SMTURN, and LISTED. Columns 1–4 show the results when financial literacy is proxied by FINLIT and columns 5–8 show the results when financial literacy is proxied by FINLIT_ALT. The detailed definitions of all variables are provided in the Appendix. Coefficients of the year, industry, and country indicator variables are not tabulated for brevity. *, **, and *** indicate significance at the 10%, 5%, and 1% levels (2-tailed), respectively. The main variable and coefficients of interest are shown in bold.

	FINANCIAL_LITERACY = FINLIT				FINANCIAL_LITERACY = FINLIT_ALT			
	INST	PIN	SMTURN	LISTED	INST	PIN	SMTURN	LISTED
FRICTION =	1	2	3	4	5	6	7	8
FINANCIAL_LITERACY	−0.021***	−0.071**	−0.017***	−0.014***	−0.173***	−0.257***	−0.007	−0.078**
	(−6.28)	(−2.44)	(−4.94)	(−5.48)	(−3.89)	(−5.74)	(−0.22)	(−2.13)
FINANCIAL_ LITERACY × FRICTION	**0.035****	**−0.095***	**0.000***	**0.011****	**0.324**	**−2.191****	**0.001****	**0.239****
	(2.37)	**(−1.99)**	**(1.86)**	**(2.75)**	**(1.18)**	**(−3.10)**	**(5.84)**	**(3.79)**
FRICTION	−1.557*	−0.722	−0.003***	−0.345*	−0.126	0.962*	−0.001***	−0.201***
	(−1.73)	(−0.35)	(−2.75)	(−1.96)	(−0.44)	(1.71)	(−7.53)	(−3.92)
OFFER_SIZE	−0.062***	−0.068***	−0.062***	−0.063***	−0.075***	−0.075***	−0.063***	−0.068***
	(−5.68)	(−6.94)	(−4.76)	(−6.55)	(−6.95)	(−7.26)	(−13.23)	(−13.69)
HITECH	0.029	−0.005	0.045	0.005	−0.011	−0.000	−0.033*	−0.074***
	(0.94)	(−0.11)	(1.63)	(0.14)	(−0.23)	(−0.00)	(−1.77)	(−3.67)
VENTURE	0.051	0.023	0.041	0.031	0.011	−0.001	−0.020	−0.002
	(1.47)	(0.68)	(0.98)	(1.02)	(0.49)	(−0.06)	(−1.15)	(−0.12)
FC	−0.003	−0.008	0.006	−0.025	−0.008	0.011	−0.037*	−0.038*
	(−0.05)	(−0.18)	(0.12)	(−0.53)	(−0.30)	(0.38)	(−1.73)	(−1.75)
BOOKBUILT	−0.104	−0.089**	−0.072	−0.103	−0.085	−0.058	−0.124***	−0.107***
	(−1.39)	(−2.16)	(−1.12)	(−1.66)	(−1.15)	(−1.02)	(−5.97)	(−4.99)
LOCKUP	−0.139**	−0.135***	−0.104**	−0.159***	−0.086**	−0.067**	−0.106***	−0.134***
	(−2.65)	(−3.17)	(−2.25)	(−3.48)	(−2.34)	(−2.63)	(−5.88)	(−7.24)
CARVEOUT	−0.014	−0.004	−0.029	0.003	−0.052	−0.058*	−0.042**	−0.013
	(−0.42)	(−0.14)	(−0.94)	(0.10)	(−1.27)	(−1.71)	(−2.18)	(−0.64)
TOPTIER	0.097***	0.066	0.091***	0.071**	0.032***	0.025**	−0.006	−0.005
	(3.42)	(1.62)	(3.57)	(2.23)	(2.92)	(2.38)	(−0.26)	(−0.25)
PRICE_STBL	0.547*	−0.059	0.428***	2.412***	0.460*	0.527***	0.575***	2.840***
	(1.94)	(−0.07)	(2.75)	(2.16)	(1.75)	(3.24)	(8.02)	(5.21)
COMMON	−0.511***	−0.312***	−0.369***	−0.631***	−0.432***	−0.296***		
	(−3.82)	(−2.92)	(−4.28)	(−3.61)	(−3.97)	(−3.47)		
ANTIDIRECTOR	−0.029	−0.045	−0.072***	−0.032	0.019	0.083*		
	(−1.43)	(−1.58)	(−3.12)	(−1.13)	(0.65)	(1.88)		
ANTI_SELF_DEALING	1.017***	0.978***	0.799***	1.261***	0.621***	0.284		
	(4.62)	(3.73)	(6.53)	(4.06)	(3.16)	(1.44)		
RULE_OF_LAW	0.224	0.229	0.275*	0.258	0.421***	0.319**	0.330***	0.287***
	(1.40)	(1.25)	(1.70)	(1.59)	(2.85)	(2.37)	(4.16)	(3.43)
CORRUPTION	0.114	0.095	0.109	0.007	−0.193	−0.227*	−0.115*	−0.262***
	(0.86)	(0.70)	(0.74)	(0.05)	(−1.47)	(−1.87)	(−1.90)	(−3.90)
SMTURN	−0.001**	−0.002***		−0.001**	−0.001*	−0.001**		−0.001***
	(−2.19)	(−3.93)		(−2.11)	(−2.04)	(−2.14)		(−6.15)
SMRET	0.017***	0.788***	0.020***	0.164*	0.017***	0.021***	0.022***	0.159***
	(3.42)	(10.29)	(4.83)	(1.91)	(2.13)	(3.60)	(9.90)	(8.48)
MKT_INTEGRATION	−0.012***	−0.013***	−0.010***	−0.009***	−0.013***	−0.008***	0.000	−0.011***
	(−4.13)	(−3.29)	(−3.23)	(−2.98)	(−5.70)	(−3.87)	(0.08)	(−2.84)
LGDP	−0.041	0.009	−0.085	−0.000	0.010	0.044	−0.150**	−0.108
	(−0.55)	(0.10)	(−1.21)	(−0.00)	(0.12)	(0.61)	(−2.24)	(−1.16)
IFRS	0.077	−0.021	−0.003	0.045	0.122	0.118	0.105***	0.107***
	(0.98)	(−0.51)	(−0.04)	(0.76)	(1.26)	(1.18)	(3.71)	(3.81)
CONSTANT	1.606**	1.170	2.263***	0.933	0.742	0.241	1.777**	2.619**
	(2.13)	(1.52)	(3.09)	(1.44)	(0.74)	(0.27)	(2.03)	(2.37)
No. of obs.	13,926	12,339	14,831	12,448	10,867	11,766	11,772	9,769
R^2	0.143	0.181	0.162	0.160	0.154	0.184	0.195	0.185
Year and industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country clustering	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Country FE	No	No	No	No	No	No	Yes	Yes

C. Potential Economic Channels Through Which Financial Literacy Could Influence IPO Underpricing

In developing our prediction, we reason that financial literacy could affect IPO underpricing through three channels, that is, reducing information friction, improving stock market participation, and improving financial disclosure transparency. In this section, we provide preliminary empirical evidence on the influence of these economic channels. We proxy information friction by the probability of informed trading (PIN) and the opacity index (OPACITY) developed by Kurtzman, Yago, and Phumiwasana (2004). We view information friction in a country as being greater if the probability of informed trading is lower and if the opacity index is higher. We use two proxies for stock market participation: a measure of investors' demand for and over-subscription of IPO stocks (OVESUB) from the SDC Platinum database, and the country-level stock market participation rate (SMRATE) from Giannetti and Koskinen (2005). Lastly, we use Big N association and financial reporting quality (FRQ) [17] to proxy for firms' transparency since prior studies suggest that firms audited by Big N auditors and firms with better financial reporting quality are more transparent (e.g., Becker, DeFond, Jiambalvo, and Subramanyam (1998), Armstrong, Core, and Guay (2014)).

We report the results of the path analysis in Table 11. Panels A–C show the results when the mediating path is information friction, stock market participation, and firm transparency, respectively. There are three important observations from the path analysis. First, we find that both measures of financial literacy are negatively and significantly associated with proxies of information friction, and positively and significantly associated with proxies of stock market participation and firm transparency. These results lend support to our argument that financial literacy mitigates information friction and enhances stock market participation and firm transparency. Second, we find that the information friction proxies are positively and significantly associated with IPO underpricing, while the proxies of stock market participation and firm transparency are negatively and significantly associated with IPO underpricing. Third, we find that the magnitude of the mediated paths through the information friction, stock market participation, and firm transparency channels are statistically significant for both measures of financial literacy. Overall, the results from the path analysis provide more direct evidence of the channels through which financial literacy reduces IPO underpricing, consistent with the reasoning provided for our main hypothesis.

VI.   Conclusion

Financial literacy is essential for informed individual investment decision-making and is important for the efficient functioning of the financial market (Lusardi and Mitchell (2014), Klapper and Lusardi (2020)). This study investigates how the financial literacy of citizens can affect IPO underpricing in a

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[17]We restrict the sample to IPOs for which we are able to obtain back-filled, pre-IPO data from Compustat Global. The database reports back-filled pre-IPO data for some firms based on the financial statements in the IPO prospectuses. Hence, FRQ captures a firm's financial reporting quality prior to the IPO.

TABLE 11

Path Analysis of the Relation Between Underpricing and Financial Literacy,
Mediated by Information Frictions, Stock Market Participation

Table 11 reports the results of a path analysis that examines the effect of financial literacy on IPO underpricing through three channels. Panel A reports the results for the information frictions channel, Panel B reports the results for the stock market participation channel, and Panel C reports the results for the firm transparency channel. ρ(X1, X2) stands for the standardized path coefficient. The t-statistics of the coefficients are reported in parentheses. We estimate the following model:

$$\text{FRICTION/PARTICIPATION/TRANSPARENCY} = \alpha_0 + \alpha_1\text{FINLIT} + \alpha'X + \varepsilon$$
$$\text{UNDERPRICING} = \beta_0 + \beta_1\text{FRICTION/PARTICIPATION/TRANSPARENCY} + \alpha'X + \varepsilon.$$

The path coefficient $\alpha_1 \times \beta_1$ is the magnitude of the path from financial literacy to IPO underpricing mediated through information friction, stock market participation, or firm transparency. The significance of the mediated effect is estimated using the Sobel (1982) test statistics. X is the set of controls used in the main regressions. The table reports the path coefficients of interest. The detailed definitions of all variables are provided in the Appendix. *, **, and *** indicate significance at the 10%, 5%, and 1% levels (2-tailed), respectively. The t-statistics reported in parentheses are based on heteroscedasticity robust standard errors.

Panel A. Mediated Path of Information Frictions

	FINANCIAL_LITERACY = FINLIT		FINANCIAL_LITERACY = FINLIT_ALT	
Information Frictions (FRICTIONS)	PIN	OPACITY	PIN	OPACITY
ρ(FINANCIAL_LITERACY, FRICTIONS) = α_1	−0.208*** (−26.49)	−0.847*** (−350.50)	−0.314*** (−37.72)	−0.588*** (−96.91)
ρ(FRICTIONS, UNDERPRICING) = β_1	0.128*** (16.42)	0.073*** (5.06)	0.143*** (15.87)	0.032*** (2.95)
Total mediated path of information frictions = ($\alpha_1 \times \beta_1$)	−0.027*** (−13.92)	−0.061*** (−26.95)	−0.045*** (−15.22)	−0.012*** (−3.46)
No. of obs.	14,825	14,672	11,766	11,613

Panel B. Mediated Path of Stock Market Participation

	FINANCIAL_LITERACY = FINLIT		FINANCIAL_LITERACY = FINLIT_ALT	
Stock Market Participation (PARTICIPATION)	OVERSUB	SMRATE	OVERSUB	SMRATE
ρ(FINANCIAL_LITERACY, PARTICIPATION) = α_1	0.066*** (8.08)	0.443*** (54.64)	0.025*** (2.75)	0.644*** (90.60)
ρ(PARTICIPATION, UNDERPRICING) = β_1	−0.025*** (−3.22)	−0.052*** (−4.88)	−0.020** (−2.26)	−0.198*** (−13.22)
Total mediated path of stock market participation = ($\alpha_1 \times \beta_1$)	−0.002*** (−2.88)	−0.023*** (−6.34)	−0.001* (−1.74)	−0.128*** (−23.38)
No. of obs.	14,831	9,824	11,772	6,765

Panel C. Mediated Path of Firm Transparency

	FINANCIAL_LITERACY = FINLIT		FINANCIAL_LITERACY = FINLIT_ALT	
Firm Transparency (TRANSPARENCY)	BIGN	FRQ	BIGN	FRQ
ρ(FINANCIAL_LITERACY, TRANSPARENCY) = α_1	0.322*** (36.39)	0.304*** (21.78)	0.139*** (13.55)	0.235*** (14.85)
ρ(TRANSPARENCY, UNDERPRICING) = β_1	−0.053*** (−5.46)	−0.073*** (−4.73)	−0.067*** (−6.83)	−0.052*** (−3.14)
Total mediated path of firm transparency = ($\alpha_1 \times \beta_1$)	−0.017*** (−5.79)	−0.022*** (−5.06)	−0.009*** (−5.90)	−0.012*** (−3.209)
No. of obs.	10,224	4,214	9,066	3,580

cross-country setting. IPOs around the world are underpriced on average and the magnitude of underpricing varies widely across countries and time (Ritter (1987), (2003), Loughran et al. (1994), and Ljungqvist (2007)). This underpricing is largely induced by ex ante uncertainty about an IPO firm's value arising from information frictions (Ritter (1984), Beatty and Ritter (1986), and Ljungqvist (2007)).

We posit that financial literacy reduces international IPO underpricing because it decreases the information frictions between informed and uninformed investors in IPO transactions. Moreover, investors in high financial literacy countries are

more likely to participate in the stock market, which reduces the equity risk premium and the extent of underpricing (Brav et al. (2002), Hong et al. (2004), Hastings and Tejeda-Ashton (2008), and Van Rooij et al. (2011)). Lastly, financial literacy improves financial disclosure transparency and reduces IPO underpricing (Boulton et al. (2011)).

Using a large sample of IPO firms from 34 countries for the issue years 1998 to 2020, we find robust evidence of a negative relation between financial literacy and the extent of underpricing, after controlling for factors that have been documented to be associated with IPO underpricing. Our inferences are robust to the use of a static as well as a time-varying measure of financial literacy, various model specifications, instrumental variable estimation to mitigate endogeneity concerns, and two alternative windows to measure underpricing. We find that stock returns in high financial literacy countries are higher than stock returns in low financial literacy countries, beginning from 4 weeks after the IPO and up to a 1-year horizon after trading starts in the secondary market. Moreover, we find that financial literacy moderates the relation between IPO underpricing and post-listing stock returns. In additional cross-sectional analyses, we find that the effect of financial literacy in reducing IPO underpricing is more prominent when both the firm- and country-level information frictions are greater. Lastly, path analyses support our conjecture that information friction, stock market participation, and firm transparency mediate the relationship between financial literacy and IPO underpricing.

Our study contributes to the stream of literature on the relationship between financial literacy and economic outcomes (e.g., Lusardi and Mitchell (2007a), (2007b), (2011a), (2011c), (2014), Hastings and Tejeda-Ashton (2008), Hastings and Mitchell (2011), Hastings et al. (2011), Behrman et al. (2012), Gerardi et al. (2013), and Hasler, Lusardi, and Oggero (2018)). We document novel evidence that financial literacy is negatively associated with IPO underpricing. Our findings also suggest that the role of financial literacy in IPO underpricing is particularly pronounced when the level of information friction is greater. Our study has important policy implications because it documents that financial literacy can have significant consequences on stock markets.

Appendix: Variable Definitions

UNDERPRICING: The first-day secondary market closing price divided by the final offer price, minus 1.

UNDERPRICING_I_WEEK: The secondary market closing price at the end of week I divided by the final offer price, minus 1.

FINLIT: Country-level measure of financial literacy reported by Klapper et al. (2015).

FINLIT_ALT: Alternative annual measure of financial literacy, which is the first principal component extracted from a principal component analysis of the following variables: PUBLIC_EDUCATION, TERTIARY_ENROLLMENT, NON_LIFE_INSURANCE, and BANK_BRANCHES.

PUBLIC_EDU: Public spending on education, as percentage of GDP. Available at https://www.theglobaleconomy.com/download-data.php.

TERTIARY_ENROLL: Ratio of gross enrollment of tertiary education to the population of the age group that officially corresponds to the level of education. Available at https://www.theglobaleconomy.com/download-data.php.

NONLIFE_INSURANCE: Ratio of non-life insurance premium volume to GDP. Available at https://www.theglobaleconomy.com/download-data.php.

BANK_BRANCHES: Number of commercial bank branches per 100,000 adults. Available at https://www.theglobaleconomy.com/download-data.php.

OFFER_SIZE: Offer value of the IPO in millions of U.S. dollars

HITECH: An indicator variable that equals 1 for firms in high-tech industries identified by SDC, and 0 otherwise.

VENTURE: An indicator variable that equals 1 for venture capital-backed IPOs, and 0 otherwise.

FC: An indicator variable that equals 1 if the offering technique is provided by firm commitment offerings, and 0 otherwise.

BOOKBUILD: An indicator variable that equals 1 if the method of pricing IPO shares uses book built offers, and 0 otherwise.

LOCKUP: Lockup provision flag, coded 1 when there is an agreement between managers of the issue and existing shareholders, including directors and officers, under which shareholders agree not to sell their holdings for a prescribed period after the date of the offer without prior written consent of the managers, and 0 otherwise.

CARVEOUT: An indicator variable that equals 1 for equity carve-out IPOs, and 0 otherwise.

TOPTIER: An indicator variable that equals 1 for IPOs underwritten by an investment bank appearing in the top 25 of Refinitiv SDC's league table in the issue year, and 0 otherwise.

PRICE_STBL: Price stabilization is the difference of the number of IPOs with initial returns between 0% and 1% and the number of IPOs with initial returns between 0% and −1%, divided by the total number of IPOs in each country.

COMMON: An indicator variable that equals 1 for IPOs issued in common law countries, and 0 otherwise.

ANTIDIRECTOR: A measure of the legal protection afforded to corporate shareholders, as reported in Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2008).

ANTI_SELF_DEALING: A measure of private control of self-dealing by controlling shareholders, as reported in Djankov et al. (2008).

RULE_OF_LAW: Confidence in the rules of society as reported in Kaufmann et al. (2010).

CORRUPTION: Measure of the use of public power for private benefit, as reported in Kaufmann et al. (2010).

SMTURN: Value of domestic shares traded divided by their market capitalization. The value is annualized by multiplying the monthly average by 12. Available at https://www.theglobaleconomy.com/download-data.php.

SMRET: Growth rate of annual average stock market index. Annual average stock market index is constructed by taking the average of the daily stock market indexes

available at Bloomberg. Available at https://www.theglobaleconomy.com/download-data.php.

MKT_INTEGRATION: Economic Globalization Index constructed by the KOF Swiss Economic Institute.

LGDP: Gross domestic product divided by population. Data are in constant 2010 U.S. dollars. Available at https://www.theglobaleconomy.com/download-data.php.

IFRS: An indicator variable that equals 1 if the country adopts International Financial Reporting Standards in a year, and 0 otherwise.

SECONDARY_ENROLL: Gross ratio of secondary school enrollment to the population of the age group that officially corresponds to the level of education. Available at https://www.theglobaleconomy.com/download-data.php.

FACTORI: The four factors derived from a factor analysis of 72 country variables and reported in Table 4 of Isidro et al. (2020).

DISCLOSURE: Disclosure requirements index in a country's IPO prospectus. Data from La Porta et al. (2006).

PDI: Measure of power distance from Hofstede (2001).

UAI: Measure of uncertainty avoidance from Hofstede (2001).

ADJRET_I_WEEKS: Market-adjusted stock returns measured by stock returns minus the corresponding market returns in I weeks after IPO.

ADJRET_I_DAYS: Market-adjusted stock returns measured by stock returns minus the corresponding market returns in I days after IPO.

ADJRET_1_YEAR: Market-adjusted stock returns measured by stock returns minus the corresponding market returns 1 year after IPO.

NOVENTURE: An indicator variable that equals 1 if the IPO firm's auditor is not backed by a venture capitalist, and 0 otherwise.

NONBIGN: An indicator variable that equals 1 if the IPO firm's auditor is not a Big N auditor, and 0 otherwise.

SMALL: An indicator variable that equals 1 if the IPO firm's total assets are in the lowest quintile in the country, and 0 otherwise.

LOWPROFIT: An indicator variable that equals 1 if the IPO firm's ROA is in the lowest quintile in the country, and 0 otherwise.

INST: Mean country-level institutional ownership from Ferreira et al. (2010).

PIN: PIN score, which measures the probability of informed trading. It is derived from the market microstructure model of Easley et al. (2002) and reported in Lai et al. (2014).

LISTED: The natural logarithm of the number of firms listed in the exchange of a country.

OPACITY: An opacity index created by Kurtzman et al. (2004), which measures the degree to which there is a lack of clear, accurate, easily discernible, and widely accepted practices governing the relationships among businesses, investors, and governments. Higher scores indicate higher opacity.

OVERSUB: An indicator variable that equals 1 when the demand for the offer exceeds expected amounts, and 0 otherwise. Data from SDC Platinum.

SMRATE: Country-level stock market participation rate originally reported by Giannetti and Koskinen (2005).

BIGN: An indicator variable that equals 1 if the IPO firm's auditor is a Big N auditor, and 0 otherwise.

FRQ: Financial reporting quality proxied by the logarithm of absolute performance-matched discretionary accruals as in Kothari, Leone, and Wasley (2005) multiplied by −1, with higher values indicating higher financial reporting quality.

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