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Does a Liability of Foreignness in Liquidity Apply to US IPOs?*

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Abstract

We provide evidence regarding two unanswered and consequential questions regarding share trading liquidity, a primary motive for US listings, for the prominent listing cohort of foreign-firm US initial public offerings (FIPOs). First, we test whether FIPOs exhibit a 'liability of foreignness (Bell et al. 2012) in liquidity' (LFL) compared with matched domestic-firm IPOs (DIPOs), despite listing requirements that are more stringent than for the mature cross-listed foreign firms studied previously. Second, we test whether US IPO LFL is moderated by FIPO home country institutional attributes that promote liquidity. Our findings for 327 FIPOs from 36 countries between 1990 and 2012 reveal that US IPO LFL is moderated, but not eliminated, by FIPO home country attributes, thus indicating incomplete bonding with US institutions. These findings extend prior research and serve to inform foreign firms considering US IPOs, exchanges competing for them, listing facilitators, regulators, and investors regarding a salient listing consideration.

Keywords: Foreign Listings, Initial Public Offerings, Liquidity, Liability of Foreignness

1. Introduction

Foreign-firm US initial public offerings (FIPOs) comprised over 25% of US IPOs during the five-year period 2017-2021 (Figure 1) despite incurring 'liability of foreignness' costs compared with domestic peers.[1] Bell et al. (2012) and Filatotchev et al. (2016) argue that liability of foreignness costs extend to US capital markets despite financial disclosures, investor protections, and exchange listing requirements that mitigate information asymmetries and enhance liquidity. In particular, mature foreign firms cross-listed in the US have been found to exhibit less share trading liquidity compared with US domestic peers (Bacidore and Sofianos 2002; Bacidore et al. 2005) even though liquidity is a primary motive for foreign-firm US stock exchange listings (Saudagaran 1988; Saudagaran and Biddle 1995; Fanto and Karmel 1997; Bancel and Mittoo 2001; Blass and Yafeh 2001; Doidge et al. 2004; Karolyi 2006).[2][3]

Yet unanswered and addressed by this study is whether FIPOs exhibit a 'liability of foreignness in liquidity' (LFL) compared with matched domestic-firm US IPOs (DIPOs) given that they differ in several salient respects from the cross-listed foreign firms studied previously. Notably, Security and Exchange Commission (SEC) registration and disclosure requirements are identical for FIPOs

[1] Zaheer (1995, p. 343) defines liability of foreignness as 'all additional costs a firm operating in a market overseas incurs that a local firm would not incur' that include transportation and coordination costs, reduced perceived legitimacy, and costs arising from information asymmetries regarding products, brands, management practices, home country institutions and cultural attributes (for a comprehensive review see Rugman et al. 2011).

[2] In the New York Stock Exchange (NYSE) "International Listings" website, the first reason listed under "Why Companies List in the US" is "More Liquidity" (https://www.nyse.com/listings/international-listings). Following Kyle (1985) and Amihud and Mendelson (1986), we interpret liquidity as the ability to trade a desired quantity of a specific financial asset quickly and at low cost, with liquidity measures detailed below. Liquidity as a listing benefit reflects the expression 'liquidity begets liquidity' (Brown 2011, p. 278), describing the attraction of investors to invest and companies to list in more liquid markets resulting in even higher liquidity in those markets. Liquidity is also a primary determinant of IFRS adoptions (Brown 2011) in combination with strong country institutions (Daske et al. 2008; Wysocki 2011).

[3] Saudagaran (1988), Saudagaran and Biddle (1995), and Blass and Yafeh (2001) empirically document determinants of foreign stock exchange listing choices, Fanto and Karmel (1997) and Bancel and Mittoo (2001) present corroborative managerial perceptions, Doidge et al. (2004) considers cross-exchanges valuation determinants including liquidity, and Karolyi (2006) reviews findings on liquidity and other exchange choice influences. Complementary evidence indicates that accounting information plays a key role in mitigating information asymmetry in US capital markets (e.g., Brown 2011; Sadka 2011; Zimmerman 2015) via enhanced transparency (Lang and Maffett 2011) and information quality (Ng 2011).

and DIPOs, thus potentially reducing LFL in contrast with the limited public disclosures and expedited exchange reviews available to cross-listers (Aharony et al. 1993; Ball and Shivakumar 2008; Venkataraman et al. 2008; Leuz 2010; Bell et al. 2012; Bell et al. 2014; Filatotchev et al. 2020). FIPOs also typically trade on only one US exchange initially, thus facilitating empirical identification of LFL compared with cross-listers trading on more than one exchange (O'Hara and Ye 2011).[4] In addition, IPOs by nature lack prior financial and trading data available for cross-listers and exhibit different initial share trading dynamics than non-IPO shares that could influence LFL (Ellis et al. 2002; Corwin et al. 2004).

Coffee (1999, 2002), Stulz (1999) and Siegel (2005) further assert that by voluntarily listing their shares on US stock exchanges, foreign firms from less robust home country institutional environments can signal quality and lower information asymmetry by "bonding" (functionally converging) with US institutional environment exchange vetting, disclosure requirements, regulatory oversight, legal recourse, auditors, analysts, and institutional investors. Consistent with the bonding hypothesis, prior evidence indicates that US listings promote lower capital costs (Pagano et al. 2001), improved corporate governance (Peng and Su 2014), higher accounting information quality (Ball 2006), more strategic decision making (Markovitch et al. 2005; Bakke and Whited 2010; Foucault and Frésard 2012; Peng and Su 2014), enhanced product scope, growth, and valuation (Gande et al. 2009), and enhanced cross-listed firm share trading liquidity (Stulz 1999; Doidge et al. 2004; Stulz 2009; Gagnon and Karolyi 2010; Halling et al. 2013). Even so, Filatotchev et al. (2020) observe that most prior studies of bonding 'report mixed results.[5] In particular, findings of lower liquidity for

[4] We study simultaneous IPOs on more than one foreign exchange in section 5.3 with qualitatively similar findings.
[5] In comparison to the present study that examines US IPO LFL, finding it *moderated* by FIPO home country institutions that promote liquidity, Filatotchev et al. (2020) examine US IPO earnings management, finding it is *enhanced* by FIPO home country institutions that promote liquidity by the reasoning that they lower SEC enforcement and US private litigation threats. Thus, both studies find incomplete bonding for FIPOs and moderating effects for FIPO home country institutions promoting liquidity, with opposite directionality for LFL and earnings management.

cross-listed versus domestic US-listed firms by Bacidore and Sofianos (2002) and Bacidore et al. (2005) indicate incomplete bonding. Filatotchev et al. (2020) further argue that investor unfamiliarity with FIPOs compared with mature foreign cross-listed firms reduces bonding effectiveness, potentially offsetting FIPO liquidity arising from more stringent registration and disclosure requirements, converged trading, and differing share trading dynamics. Given consequential implications for firms considering IPOs, exchanges competing for them, listing facilitators (investment banks, auditors and legal professionals), financial market regulators, and investors, this study provides evidence regarding both whether US IPOs exhibit LFL and whether it is moderated by FIPO home country institutional attributes as previously found for foreign firms cross-listed in the US.

We test for US IPO LFL by examining differences in share trading liquidity (measured by bid-ask spread illiquidity per literature norms) between 327 FIPOs from 36 countries, 5 geographic regions, and 12 Fama-French two-digit industry classifications and DIPOs (matched by IPO year, Fama-French industry and smallest prior-year absolute difference in total assets) listed on US stock exchanges between 1990 and 2012 inclusive.[6] We then test for moderating effects on LFL of robust FIPO home country institutions that promote liquidity with two primary findings. First, US IPOs exhibit LFL in both univariate comparisons and in multivariate tests that control for other liquidity influences. Second, robust FIPO home country institutions moderate but do not eliminate US IPO LFL, consistent with incomplete bonding as found for foreign firms cross-listed in the US (Bacidore and Sofianos 2002; Bacidore et al. 2005). These main findings are robust to Heckman (1979) two-step estimation to control for potential selection bias, propensity-score matching of DIPOs with FIPOs following Gao et al. (2013), the use of an illiquidity measure due to Amihud (2002),

[6] Our study period reflects that before 1990, FIPOs comprised less than 5% of US IPOs and is comparable with liquidity study periods used in prior studies of mature cross-listed foreign firms.

alternative proxies for FIPO home country institutional attributes found previously to relate to share trading liquidity, and to IPO underpricing. Additional findings indicate that US IPO LFL is insensitive to stock market upturns (downturns) that attract (dissuade) FIPOs, as evidenced by the dot.com bubble (1999-2000) and Global Financial Crisis (GFC) (2008-2009) periods, respectively. LFL is marginally lower for global FIPO listings from strong home institutions on non-US exchanges, consistent with increased information asymmetry (Domowitz et al. 1998), and smaller following the passage of the Sarbanes-Oxley Act (2002), consistent with its purported information asymmetry mitigation.

These findings are contributory in two main ways. First, they extend prior research to provide initial evidence that US IPOs exhibit LFL that is moderated by FIPO home country institutional attributes that promote liquidity, with implications for three research streams. Augmenting prior findings that liquidity is a primary motive for US listings (Saudagaran 1988; Biddle and Saudagaran 1991; Fanto and Karmel 1997; Bancel and Mittoo 2001; Blass and Yafeh 2001; Doidge et al. 2004; Karolyi 2006), our results indicate that even so, FIPOs do not achieve the same share trading liquidity as DIPOs. Augmenting prior studies hypothesizing that foreign firms voluntarily list on US stock exchanges to signal quality and reduce information asymmetries and agency problems by 'bonding' with the US institutional environment (Coffee 1999; Stulz 1999; Coffee 2002; Siegel 2005), our results indicate incomplete bonding for FIPOs. While prior studies that have found LFL for foreign firms cross-listed on US stock exchanges (Bacidore and Sofianos 2002; Bacidore et al. 2005; Halling et al. 2013), our results address the unanswered question of whether LFL applies to FIPOs, given that they differ from cross-listed firms in several salient respects potentially contributory to the mitigation of information asymmetries and LFL. Despite these differences between FIPOs and the cross-listed firms studied previously, our results indicate that FIPOs, like more mature cross-listed

foreign firms, exhibit LFL and that FIPO LFL is moderated by FIPO home country institutional attributes that promote liquidity.[7]

A second main contribution of our findings is to inform foreign firms considering US IPOs, exchanges competing for them, listing facilitators (including investment banks, auditors and legal professionals), financial market regulators, and investors that US IPOs exhibit LFL. We further document the degree and determinants of FIPO LFL, including that it is moderated but not eliminated by FIPO home country institutional attributes that promote liquidity, insensitive to stock market upturns and downturns, and became smaller after the passage of the Sarbanes-Oxley Act (2002). Thus, our findings regarding FIPO LFL and its determinants can help to inform consequential decisions by foreign firms to list initially on US exchanges. Our findings also go further and contribute to the more general understanding of the impact of stock exchange vetting and listing requirements, IPO facilitator advice, and regulations regarding FIPOs on IPOs outcomes.

The paper is structured as follows. The next section reviews the literature. The following section provides a description of the data. The empirical analysis and robustness tests appear in following sections, with the final section providing a discussion and summary.

[Figure 1 about here]

2. Literature review and hypotheses

2.1 *Foreign-firm US IPO liquidity*

Among factors identified in prior research as influencing firms' decisions to list their shares on a foreign exchange, a key motivator is enhanced liquidity (Saudagaran 1988; Fanto and Karmel 1997; Bancel and Mittoo 2001; Doidge et al. 2004; Karolyi 2006). Other foreign listing benefits potentially

[7] Our results are consistent with a domestic investor information disadvantage vis-à-vis home-country investors, irrespective of foreign home locale (Van Nieuwerburgh and Veldkamp 2009) and irrespective of additional liquidity costs that might arise from imperfectly connected trading venues (Domowitz et al. 1998) per our global trading test.

related to share liquidly include reduced capital constraints and costs, more informative feedback from share prices, enhanced strategy, investment and growth options (Pagano et al. 2001; Doidge et al. 2004; Helwege et al. 2007; Hail and Leuz 2009; Francis et al. 2010; Foucault and Frésard 2012; Mortal and Reisel 2013), and value-enhancing shareholder activism and monitoring (Faure-Grimaud and Gromb 2004; Edmans et al. 2013; Norli et al. 2015), notably for cross-listing firms (Frésard and Salva 2010). However, Bell et al. (2012) argue that foreign listers are subject to a 'capital market liability of foreignness' (also see Zaheer 1995) arising from investor unfamiliarity with foreign firms and their home country institutional and cultural characteristics. Resulting adverse selection and moral hazard risk arising from these information asymmetries have been found to manifest in lower share trading liquidity for foreign firms listing in the US (Bacidore and Sofianos 2002; Bacidore et al. 2005), which we term 'liability of foreignness in liquidity' (LFL) in the spirit of Bell et al. (2012).[8]

Potentially offsetting LFL for US share listings is a 'bonding' hypothesis due to Coffee (1999, 2002), Stulz (1999) and Siegel (2005) that foreign firms from home countries with less robust institutional environments signal quality and reduce information asymmetries and agency problems by voluntarily committing to US exchange vetting, disclosure requirements, regulatory oversight, legal recourse, auditors, analysts and institutional investors.[9] These effects continue following listings both because US underwriters tend to become market makers following a price stabilization role (Ellis et al. 2002), and US specialists' portfolios tend to focus on certain types of firms, thereby improving ability to extract information and provide assurance, further reducing information asymmetries (Korczak and Phylaktis 2010). Corroborating evidence indicates that firms are more likely to list in a foreign market that has the largest peer presence from the same industry and country

[8] Zaheer (1995), Domowitz et al. (1998), Bacidore and Sofianos (2002) and Bacidore et al. (2005) examine US listings by non-US firms that are by nature primarily mature cross-listers, and they do not separately examine FIPOs.
[9] Blass and Yafeh (2001) argue that Israeli firms conduct IPOs in the US to access a larger and more sophisticated investor pool relative to their domestic market but do not consider the influence of home country institutions.

(e.g., Caglio et al. 2016). Yet evidence is limited regarding bonding benefits for FIPOs. This is despite IPOs having come to dominate as a listing mode for prominent classes of foreign-firm US listers[10] and despite potentially larger benefits to FIPOs from bonding compared with mature foreign-firm US cross-listers with prior financial disclosures and trading histories (Moulton and Wei 2009; Halling et al. 2013).

Prior studies of FIPOs confirm that they differ significantly and in several regards from mature foreign-firm US cross-listers, even beyond having no prior trading data and more limited prior disclosures. First, when foreign firms transition from private to public ownership via a US IPO, they must follow the same SEC registration procedures as domestic-firm IPOs and abide by the same stock exchange listing requirements.[11] By comparison, foreign firms cross-listing in the US can file preliminary registration statements confidentially with the SEC, resolve many issues without public disclosure, and list with expedited exchange reviews (Aharony et al. 1993; Ball and Shivakumar 2008; Venkataraman et al. 2008; Leuz 2010; Bell et al. 2012; Bell et al. 2014; Filatotchev et al. 2020). As such, FIPOs have been argued to 'bond' more closely to US institutions relative to foreign cross-listed firms, thereby helping to alleviate agency and asymmetric information problems and reduce their costs of capital (Stulz 1999; Bell et al. 2012). Second, FIPO share trading is typically consolidated on one exchange initially, thereby facilitating the empirical identification of liquidity differences compared with matched DIPOs as they reflect US liquidity influences (O'Hara and Ye 2011). This contrasts with cross-listed firms whose shares trade simultaneously on two or more exchanges with related effects on share liquidity in the US (Domowitz et al. 1998; Moulton and Wei 2009; Halling et al. 2013). Third, IPOs by nature lack prior financial and trading data and exhibit

[10] Baker et al. (2018) observe that 'whereas Chinese firm U.S. listings via reverse merger (CRMs) have dominated prior media, regulator and research attention regarding financial reporting quality, CRMs have effectively ceased, leaving listings via initial public offering (CIPOs) the relevant remaining class of Chinese firms on the U.S. exchanges.'

[11] This includes publishing preliminary and subsequent amendments to the registration statements. For more details see SEC website https://www.sec.gov/divisions/corpfin/internatl/foreign-private-issuers-overview.shtml.

different initial share trading dynamics than non-IPO shares (Ellis et al. 2002; Corwin et al. 2004) that could influence their trading liquidity differentials (where below we provide evidence regarding these dynamics for FIPOs vs DIPOs). Whether more complete bonding for FIPOs more than offsets LFL thus remains an open question.

Extending these prior findings, we provide initial evidence regarding the still open and consequential question of whether FIPOs exhibit LFL. Reflecting prior evidence that bonding is insufficient to overcome LFL for mature foreign firms cross-listing in the US, we state our first hypothesis in alternative form as follows:

H1: Foreign-firm US IPOs (FIPOs) have lower share trading liquidity (higher illiquidity as measured) than matched domestic-firm US IPOs (DIPOs).

2.2 *The influence of home country institutions*

We further provide evidence regarding whether LFL for US IPOs is smaller for FIPOs with more robust home country institutions that promote liquidity, as motivated by three related research streams. One research stream provides evidence that share trading liquidity across countries, beyond being influenced by firm-specific characteristics, is related to home country institutional characteristics that include reporting requirements, investor protections, enforcement, and legal systems. For example, Lesmond (2005) finds that countries with stronger political and legal systems exhibit greater share trading liquidity that persists even to the exclusion of legal origin or insider trading enforcement. Lang et al. (2012) find a stronger association between firm transparency and liquidity in countries with weaker investor protections, disclosure requirements, media penetration, and when ownership is more concentrated. Christensen et al. (2013) find that liquidity benefits associated adoptions of International Financial Reporting Standards (IFRS) are limited to countries with adequate reporting enforcement, even when legal and regulatory systems are relatively robust.

Huang et al. (2020) find a stronger association between liquidity and firm value in countries with more effective investor protections. Considered altogether, this stream of research provides foundational evidence that home country institutional characteristics influence share trading liquidity, which we test and control for as described below.

A second stream of research examines whether home country institutional influences on liquidity extend to shares listed on foreign stock exchanges. These studies confirm that home country institutions can influence the share trading liquidity of foreign-firm listings, where firms from home countries with more (less) robust home country institutions exhibit higher (lower) liquidity.[12] However, these studies examine primarily or exclusively the share trading liquidity of foreign-firm US cross-listed firms. This begs whether the influence of home country institutions on share trading liquidity extends to FIPOs that differ from foreign-firm US cross-listings in terms of prior disclosure availability, trading data availability, investor familiarity, registration and disclosure requirements, and consolidated trading that could influence the effects of home country institutions on their US share trading liquidity as described above. Filatotchev et al. (2020, p. 308) further argue that perceptions of legal institutions of the foreign firm's home country are 'particularly salient in the US IPO market, because foreign IPOs are relatively unknown entities when entering US capital markets' (see also Schnyder et al. 2021). Thus, we extend prior findings by also providing initial evidence regarding the still open and consequential question of whether liquidity-related attributes of home country institutions influence the share trading liquidity of FIPOs compared with DIPOs. Mirroring our reasoning for H1 in reflecting prior findings, we state our second hypothesis in alternative form as follows:

[12] See Domowitz et al. (1998); Bacidore and Sofianos (2002); Shleifer and Wolfenzon (2002); Bacidore et al. (2005); Siegel (2005); Chung (2006); Eleswarapu and Venkataraman (2006); Fernandes and Ferreira (2008); Stulz (2009); Doidge et al. (2010) cited above.

H2: Foreign-firm US IPOs (FIPOs) with more robust home country institutions have less share trading illiquidity (higher illiquidity as measured) relative to those with less robust home country institutions when compared with matched domestic-firm US IPOs (DIPOs).

Hypotheses H1 and H2 thus extend prior research to complementary considerations of whether LFL applies to FIPOs and whether it is moderated by the robustness of home country institutions. Evidence that LFL applies to FIPOs is salient for firms considering US IPOs, exchanges competing for them, listing facilitators including investment banks, auditors and legal professionals, financial market regulators, and investors, especially since liquidity has been found in prior research to be a primary motive for US listings. Evidence regarding the moderation of LFL by home country institutional characteristics is further relevant regarding features influencing LFL and that can facilitate more complete bonding, to which we next turn.

3. Samples and model development

3.1 *Samples and matching procedure*

We identify a FIPO sample of first-time foreign issuers of ordinary shares in US capital markets between 1990 and 2012 inclusive using the Security Data Corporation (SDC) New Issues database.[13] To ensure that our FIPO sample includes only non-US firms with no prior listing in any market inside or outside of the US, we follow Bruner et al. (2006) by first defining foreign firms as those incorporated and whose primary executive offices are located outside the US. We then exclude warrant, unit, and rights offerings, as well as utility and financial firms following prior studies. We further exclude listings in the form of spinoffs from mergers and acquisitions and firms based in the

[13] As noted above, our sample period reflects that there were relatively few FIPOs before 1990 (Figure 1) and our interest in comparability with prior study findings regarding liquidity for mature foreign firms cross-listed on US exchanges. For example, Filatotchev et al. (2020) examine FIPOs between 1990 and 2009 inclusive. Our sample includes both direct stock listings and Level-III ADRs subject to like listing requirements.

Bahamas, Cayman Islands, and Bermuda, as they are often US firms registering in these locations for tax reasons. Finally, we exclude all firms with incomplete financial data. Financial data are sourced from the CRSP, Compustat and Refinitiv SDC Platinum databases. Institutional ownership holdings are obtained from Thomson Reuters. Selected variables are manually extracted from each foreign firm's prospectus obtained from the SEC Edgar and Perfect Filing databases, with foreign currency figures translated into US dollars using exchange rates disclosed in the prospectuses. To enhance intertemporal data comparability, we index US dollar data to 2005 values based on the Consumer Price Index (CPI) as reported by the International Monetary Fund.

Table 1 presents our sample development profile that provides 327 FIPO observations (Panel A) and their distribution by Fama-French industry classification (Panel B). The largest industry representation is for business equipment firms that comprise 46% of the FIPO sample. To isolate the effects of related regulatory and reporting changes, Table 2 presents numbers of FIPOs by home country for each of two partition windows, the dot.com period (1990-2001) and the post-SOX period (2002-2012) that we further examine below. Most sample FIPOs (71%) are from before 2001, reflecting a dot.com bubble rise in IPOs and a subsequent hiatus in line with US domestic IPOs. FIPOs then recover in frequency only to slow again during the GFC. Consistent with prior findings for foreign listings in the US, the largest number of FIPOs are from Israel (74), followed by China (57), Canada (29), and the UK (27).[14] We then match each FIPO with a DIPO in the same IPO year, two-digit Fama-French industry classification and with the smallest absolute difference in total assets at the end of the fiscal year preceding their IPOs (e.g., Eckbo and Norli 2005; Kao et al. 2009; Gao et al. 2013; Tourani-Rad et al. 2016; Lee et al. 2019).[15]

[14] As robustness checks, we include in untabulated regressions indicator variables for FIPOs from Israel, China, UK and Canada. We find no change in our main results with results available from the authors on request.
[15] The additional analysis section below also presents robustness test results using a propensity score matching procedure with qualitatively similar findings.

[Table 1 about here]

[Table 2 about here]

3.2 *Measuring liquidity*

Following prior studies (e.g., Ellul and Pagano 2006; Mantecon and Poon 2009; Chung and Zhang 2014), we measure liquidity using the bid-ask spreads, an illiquidity metric. Bid-ask spreads are a measure of transaction costs that captures the cost of immediacy. They are widely used liquidity benchmarks in the finance literature (Goyenko et al. 2009). As is standard, we compute bid-ask spreads by subtracting bid from ask prices and scaling the difference by the mid-price calculated as the average of bid and ask prices, as follows: (ask price - bid price)/[(ask price + bid price)/2] (Bacidore et al. 2005). We obtain bid and ask prices from CRSP.

3.3 *Measuring home country institutions*

We measure the regulatory and reporting rigor of home country institutions that may influence FIPO illiquidity using the product of two measures employed in prior related research. The first is the La Porta et al. (1998) index of anti-director rights as adjusted by Spamann (2010).[16] The second is the International Country Risk Guide (ICRG) Law and Order index.[17] Following Durnev and Kim (2005), Bruno and Claessens (2010), and Bell et al. (2014), we use the product of these two indices as our main measure of FIPO home country institutional rigor by the reasoning that the anti-director rights index measures *de-jure* regulation regarding the letter of the law and not its enforcement in practice. By comparison, the Law and Order index measures *de-facto* law and order traditions including enforcement and attributes of the legal system. Their product reflecting interaction is then

[16] Spamann (2010) shows that his revised index markedly differs from both the La Porta et al. (1998) original index as well as its later revision that is provided in Djankov et al. (2008).

[17] Retrieved from http://www.prsgroup.com/icrg.aspx. Since both Spamann (2010) and La Porta et al. (2006) do not provide measures for China, for the first and second measures we use the values for China from Ding et al. (2010).

assigned to each FIPO by year and home country to reflect both *de-jure* and *de-facto* dimensions that may influence liquidity. We then divide our sample into strong (weak) home country institution sub-samples using the indicator variable *HOME* set equal to one if the country's product score is above/at the sample median and zero otherwise.[18] Figure 2 plots numbers of FIPOs by year together with the numbers with strong home country institutions indicated by *HOME*. Most FIPOs with strong home country institutions (88%) occur before 2001. This percentage declines dramatically after 2001 when only 14% of FIPOs are from countries with strong home country institutions.[19]

[Figure 2 about here]

3.4 *Model development*

Our research design employs two sets of tests: 1) univariate comparisons of trading liquidity between matched FIPOs and DIPOs by month during the year following each FIPO, and 2) multivariate regression comparisons of liquidity differentials between matched FIPOs and DIPOs (testing H1) and FIPO home country effects (testing H2) after controlling for control variables shown by prior studies to influence share trading liquidity. Specifically, we estimate the following pooled regression over the first twelve months (*MONTH*) after listing with cross-sectional, industry (using the Fama-French 12-industry classification, *IND*) and year fixed effects (*YEAR*):

$$\begin{aligned} ILLIQ_{i,m} = {} & CONSTANT + \beta_1 HOME_i + \beta_2 PROC_i + \beta_3 INSIDER_i + \beta_4 UW_i + \beta_5 AUD_i + \beta_6 UP_i + \\ & \beta_7 HOT_i + \beta_8 LSALES_i + \beta_9 BtoM_i + \beta_{10} LEV_i + \beta_{11} ROA_i + \beta_{12} NASDAQ_i + \beta_{13} RET_{i,m} + \\ & \beta_{14} VOL_{i,m} + \beta_{15} HOLD_{i,m} + \beta_{16} VOLUME_{i,m} + \sum MONTH_i + \sum YEAR_i + \sum IND_i + \varepsilon_{i,m} \end{aligned} \quad (1)$$

where $ILLIQ_{i,m}$ is the difference between matched FIPO and DIPO firm pair i daily bid-ask spreads averaged over post-listing month m = [1, 2, …, 12], *HOME* is as described above, and control

[18] An alternative approach is to calculate the median product score by year and set *HOME* equal to one if above the year's product score and zero otherwise. However, country product scores are very stable and thus there is little difference between the approaches.

[19] See additional analysis section for robustness results using alternative home country institution measures.

variables are described below and in the Appendix. For consistency with the dependent variable, control variables are measured as differences between matched FIPO and DIPO firms, with the exclusion of indicator variables. Firm and IPO characteristics are annual values at the time of the IPO. Stock characteristics are calculated as monthly averages and thus they change during the twelve months post IPOs. In our models we include year (*YEAR*) and industry (*IND*) fixed effects, as well as number of months post-IPO (*MONTH*) fixed effects. Main coefficients of interest are the intercept *CONSTANT* that tests for illiquidity differences between matched FIPOs and DIPOs (H1), and β_1, that tests for the effect of home country institutions on FIPO-DIPO illiquidity differences (H2).

Because illiquidity differences between matched FIPOs and DIPOs may originate from information asymmetries between the foreign firm and US investors, we include as controls in equation (1) variables found in prior studies to influence share trading liquidity. Following Booth and Chua (1996), we include IPO proceeds (*PROC*) as larger IPOs tend to exhibit lower bid-ask spreads due to the ease of price discovery relative to smaller issues. Because insider ownership hinders information dissemination and creates more scope for price manipulation, we include insider ownership (*INSIDER*) (Hahn et al. 2013). Because more reputable underwriters and auditors are better able to mitigate information asymmetries, we also include underwriter quality (*UW*) and auditor quality (*AUD*) in equation (1) (Corwin et al. 2004; Mantecon and Poon 2009).

A large stream of research on the relationship between underpricing and secondary market liquidity finds that firms underprice IPOs in part to offset information asymmetry by increasing market liquidity, institutional investor interest, and analyst coverage (Booth and Chua 1996; Hahn et al. 2013). These findings imply a positive relationship between underpricing and liquidity. Contrary to these findings, Ellul and Pagano (2006) document a positive relationship between underpricing and the probability of informed trading, a proxy for illiquidity, arguing that large first-day returns provide investors compensation for the risk of holding shares with lower expected liquidity. A possible reason

for these differing inferences may be different market settings. As Ellul and Pagano (2006) observe, UK underwriters are less likely to provide market-making services following IPOs (see also Ljungqvist 2003) compared with US context, where underwriters often serve as post-IPO market makers and may use underpricing to facilitate profitable post-IPO underwriter trading (Ellis et al. 2002). Ellis (2006) argues that the active involvement of lead US underwriters in post-IPO trading helps account for the growing importance of alternative trading venues and communication networks. Following from the observation that IPO shares are on average more liquid than non-IPO shares, Ligon and Liu (2011) argue that the liquidity risk premium documented in Ellul and Pagano (2006) is less likely for less liquid US IPOs, presenting evidence that less liquid IPOs exhibit less underpricing following improved liquidity conditions on the NASDAQ following a change in trading regulation.[20] Another explanation for the differing inferences regarding underpricing may relate to liquidity proxies employed (Hahn et al. 2013). Ellul and Pagano (2006) focus on the probability of informed trading and the adverse selection component of the bid-ask spread, but because liquidity is a broad concept (Kyle 1985), it is possible other studies reflect different dimensions (Hahn et al. 2013). Considering these findings altogether, we include underpricing (*UP*) in our model.[21] Finally, as market returns during the month of listing are associated with transaction costs (Hahn et al. 2013), our model includes the average market returns in the 30 days prior the IPOs (*HOT*).

We also control for the effects on liquidity of firm characteristics. Specifically, we include prior fiscal-year revenues (*LSALES*)[22] as larger firms are expected to exhibit lower bid-ask spreads, as are firms with larger book-to-market equity ratios (*BtoM*) (e.g., Corwin et al. 2004; Liu 2006). *LEV*

[20] As discussed later, to account for different trading protocols across US stock exchanges, we control for NASDAQ listings.
[21] Given the inconclusive evidence in the literature, we excluded underpricing from all tests in an untabulated robustness exercise with qualitatively similar findings available from the authors on request.
[22] In robustness tests we use the log of total assets as an alternative measure for firm size (*LSALES*) with qualitatively similar results that are available on request from the authors.

controls for a possible relation between firm leverage and liquidity levels (e.g., Corwin et al. 2004; Lipson and Mortal 2009) and since shares of more profitable firms are more liquid, we also control for the return on assets (*ROA*).

In addition to firm characteristics, stock price characteristics may also affect illiquidity. To control for different trading protocols across US stock exchanges, *NASDAQ* takes the value 1 if the IPO is on the NASDAQ exchange, and 0 otherwise. Several studies have documented that shares with higher returns and lower volatility are more liquid (Stoll 1978; Amihud 2002, among others). Other recent evidence indicates a positive relationship between liquidity and institutional ownership (Zheng and Li 2008; Hahn et al. 2013). Thus, we include average share returns (*RET*), share volatility (*VOL*) and institutional investor share holdings (*HOLD*) in our model. Moreover, we include trading volume (*VOLUME*). Whereas trading volume can be considered a proxy for liquidity, trading volume is also a proxy for uncertainty and is higher during episodes of market turmoil, leading to higher bid-ask spreads (Barinov 2014).

3.5 *Descriptive statistics*

Table 3 presents summary statistics and univariate tests comparing the means of each variable for matched FIPO and DIPO firms. The mean illiquidity difference (*ILLIQ*) between matched FIPO and DIPO firms is positive and significant, consistent with LFL (H1) before controlling for other influences on share trading liquidity. FIPOs also exhibit significantly larger means than DIPOs for issue proceeds (*PROC*), return on assets (*ROA*), and share volatility (*VOL*). FIPOs exhibit significantly smaller means than DIPOs for stock returns (*RET*) and institutional ownership (*HOLD*).

[Table 3 about here]

Table 4 reports correlation coefficients for test and control variables. For each variable we calculate the correlation coefficients between each FIPO and matched DIPO firms, and we report the

average correlation coefficients. The illiquidity difference (*ILLIQ*) between matched FIPO and DIPO firms is significantly negatively correlated with the *HOME* indicator, consistent with H2. *ILLIQ* is also significantly negatively correlated with IPO proceeds (*PROC*), firm size measured by revenues (*LSALES*), leverage (*LEV*), and share monthly returns (*RET*), and significantly positively correlated with market returns in the 30 days prior IPO (*HOT*) and NASDAQ (*NASDAQ*) listings. *HOME* is significantly positively correlated with IPO proceeds (*PROC*) and leverage (*LEV*).

[Table 4 about here]

4. Main findings

4.1 *Univariate tests for liability of foreignness in liquidity (LFL)*

We test whether US IPOs exhibit a liability of foreignness in liquidity (LFL) using both univariate and multivariate tests. Initial descriptive evidence is presented in Figure 3 that plots median bid-ask spreads for FIPOs and DIPOs in the post-IPO year by month (*M1* - *M12*).[23] FIPOs exhibit larger illiquidity than DIPOs throughout, consistent with LFL (H1), and especially in the first two months following their IPOs.[24]

[Insert Figure 3 about here]

Figure 4 reports the evolution of average illiquidity differentials between matched FIPOs and DIPOs (*ILLIQ*) in the first year of trading across the sample period. The plot shows the illiquidity differential changing through time, rising during years preceding the dot.com bubble, dipping after, spiking with the GFC, and falling sharply after. Comparing these liquidity differential dynamics with the percentage of foreign-firm IPOs in the US shows a close correspondence. For instance, larger

[23] We statistically test the significance of these liquidity differences below.
[24] This declining illiquidity pattern for FIPOs is consistent with prior findings regarding IPO trading volumes (Ellis et al. 2002; Corwin et al. 2004; Ellis 2006; Ellul and Pagano 2006).

liquidity differentials are seen in 2000 and 2007, when foreign firms are 24% and 26% of the total listings in the US, respectively. This suggests that LFL is not significantly affected by "hot" foreign US IPO markets. Augmenting Figure 4, Panel A of Table 5 presents average mean and median differences between the bid-ask spreads of paired FIPO and DIPOs by post IPO month. All differences are significant, with FIPOs exhibiting less liquidity than DIPOs, consistent with LFL (H1).[25]

[Insert Figure 4 about here]

[Insert Table 5 about here]

4.2 *Multivariate tests for LFL (H1) and effects of robust home country institutions (H2)*

Panel B of Table 5 presents multivariate results for equation (1) regressing the difference in bid-ask spreads *between* paired FIPO and DIPO firms (*ILLIQ*) on *HOME* and control variables for the combined pooled sample. Column (1) reports results using this baseline model, where the positive and significant intercept (*CONSTANT*) indicates that FIPOs have higher bid-ask spreads than matched DIPOs, and thus less liquidity, consistent with LFL (H1).[26] The negative and statistically significant coefficient for *HOME* is consistent with prior univariate findings by indicating that FIPOs from countries with more robust institutions have smaller illiquidity differentials than those from countries with weaker institutions. Thus, these multivariate results are consistent with univariate findings above in lending support to LFL for US IPOs (H1) and that this additional illiquidity for FIPOs compared with matched DIPOs is moderated by robust home country institutions as predicted by H2, with this incomplete moderation indicative of incomplete bonding. The documented liquidity

[25] As our focus is on IPOs, we restrict the reported results to the first 12 months of trading. LFL persists when we extend the univariate analysis to five years post IPO (untabulated), with results available from the authors on request.
[26] Given the multifaceted nature of liquidity and to assess the robustness of our findings, we also examine the Amihud (2002) ratio as an alternative proxy for illiquidity, with qualitatively similar findings. In comparison to the bid-ask spread that reflects transaction costs and the price for immediacy provided by dealers, the Amihud ratio reflects the price impact of transactions. We do not report these results for brevity, but they are available from the authors on request.

differential is significant both statistically and economically since, on average, the illiquidity of FIPOs is 1.26 times that of the matched DIPOs.[27] The moderating effect of home institutions that promote liquidity is also economically significant as it reduces US IPO LFL by 10%, on average.

Coefficients and significance levels for control variables indicate that LFL is smaller for FIPOs with greater proceeds (*PROC*), higher leverage (*LEV*), and higher monthly share returns (*RET*) and trading volume (*VOLUME*). LFL is larger for FIPOs with greater insider ownership (*INSIDE*), more underpricing (*UP*), larger market returns in the 30 days prior to listing (*HOT*), NASDAQ listings (*NASDAQ*), more variable returns (*VOL*), and larger institutional ownership (*HOLD*).

4.3 *Sub-period findings*

We next consider the impact on the liquidity differential (*ILLIQ*) of selected events that affected share trading during our sample period. Of particular interest is whether US IPO LFL is robust to share market upturns (downturns) that attract (dissuade) FIPOs. As noted above in Figure 2, the largest number of FIPOs occurred prior to the dot.com bubble of 1999-2000 that exhibited relatively stronger home country institutions relative to the post-dot.com period. In Table 5 (Panel B, column 2) we report results from augmenting the baseline model in column (1) to include an indicator variable for the dot.com period (*DOTCOM*), indicating qualitatively similar LFL findings during the dot.com bubble period.[28]

As also seen in Figure 2 above, FIPOs fell dramatically with the onset of the GFC as did the percentage of FIPOs from home countries with robust home institutions. To determine the effect of the GFC on our results, we augment the baseline model in column (1) with an indicator variable

[27] We compare the ratio of coefficient of the constant (0.058) with the median bid-ask spreads of FIPOs in the first year of listing (0.046).
[28] We estimate model 1 without the 1999 and 2000 year fixed effects as these are captured in the indicator variable *DOTCOM*.

(*GFC*) that equals 1 if the FIPO occurred during 2008-2009 and 0 otherwise.[29] Results reported in Table 5, Panel B, column (3) again indicate that LFL was not significantly affected. Specifically, while *CONSTANT* continues to be positive and highly significant, consistent with LFL (H1), indicator variable *GFC*, although negative, is statistically insignificant. Thus, findings in Table 5, columns (2) and (3) indicate that US IPO LFL is not significantly affected by market upturns and downturns.

The Sarbanes-Oxley Act of 2002 (SOX) imposed new requirements on IPOs with the aim of reducing valuation uncertainty through enhanced transparency (Johnston and Madura 2009). To determine whether SOX influenced liquidity differentials between FIPOs and DIPOs, we augment the baseline model in column (1) to include an indicator variable that equals 1 if an IPO occurred in 2002 or after, and 0 otherwise. Results reported in Table 5, Panel B, column (4) indicate that post-SOX FIPOs experienced less LFL than beforehand, consistent with its purported mitigation by SOX (e.g., Moore et al. 2012; Nahata et al. 2014).

Univariate and multivariate findings above thus document a significant illiquidity difference between FIPOs and DIPOs throughout the study period that is consistent with a LFL for US IPOs (H1). Our univariate and multivariate findings further document LFL is moderated by robust FIPO home country institutions consistent with H2 and incomplete bonding.[30] These findings apply to both pre- and post-dot.com periods and during the GFC, and moderate in the post-SOX period consistent with lower information asymmetry, a purported SOX benefit.

[29] We estimate model 1 without the 2008 and 2009 year fixed effects as these are captured in the indicator variable *GFC*.
[30] This finding is consistent with the theoretical model of Van Nieuwerburgh and Veldkamp (2009) predicting that a foreign listing will not completely overcome the information disadvantage of domestic investors in the host country, resulting in a home bias irrespective of the home country of the foreign firm.

5. Additional analysis

5.1 *Self-selection*

If the decision of firms to list in the US is determined both by firm characteristics and home country institutional attributes, our estimations could result in inconsistent coefficients due to selection bias. To address this possibility, we apply a two-step estimation procedure following Heckman (1979) to the combined pooled sample subject to data availability. In the first step, we estimate the probability of listing in the US, where *US_Listing* = 1 for a FIPO and for a simultaneous US and home country listing (*N*=327), and 0 for IPOs conducted exclusively outside of the US (*N*=1,654). Specifically, we identify and select from Refinitiv SDC Platinum all IPOs conducted only in the home country of the foreign IPOs in our sample in the same year and industry (using a Fama-French 12-industry (FF12) classification). In the second step we repopulate Table 5 after including the inverse Mills ratios (*IMR*) computed from the first step. The model in the first step includes previously identified determinants of a decision to list in the US, several of which are excluded from the second step (Lennox et al. 2012). Following Doidge et al. (2004), Doidge et al. (2010) and Filatotchev et al. (2020) we include home country GDP (*GDP*). We add a measure of home enforcement (*HOME_ENF*)[31] to control for Licht's (2003) suggestion that strict home regulation can cause local firms to conduct an IPO in the US. Following Filatotchev et al. (2020) we also add measures of SEC enforcement and private litigation threats (*PLIT*) that may either deter a US listing or attract one by firms motivated by bonding and/or to signal their commitment to good governance. Several first-step regressors are also included in the second step because they are likely related to the listing abroad and liquidity: *LTA*, *PROC* measuring intended IPO size, and *HiTECH* high-technology firms likely find a US exchange more attractive (Caglio et al. 2016). The resulting (first step) selection model is:

[31] We use a home country enforcement index as measured and presented in Brown et al. (2014).

$$\Pr(US\_Listing) = \alpha + \beta_1 LTA + \beta_2 PROC + \beta_3 HiTECH + \beta_4 HOME\_ENF + \beta_5 SEC\_ENF + \beta_6 PLIT + \beta_7 GDP + \varepsilon. \quad (2)$$

Table 6 (Panel A) presents Heckman (1979) estimation results for equation (2) indicating that the likelihood of a US listing by a foreign firm increases in firm size (*LTA*) and expected proceeds (*PROC*). High-tech firms (*HiTECH)* are also more likely to list their IPOs in the US (Caglio et al. 2016). The size of the home country's economy (*GDP*) is negatively related to the listing probability. Home country enforcement (*HOME_ENF*) and SEC enforcement (*SEC_ENF*) are positively related to the probability of US listing. We find no evidence the threat of private litigation (*PLIT*) in the US influences a US listing. Table 6 (Panel B) presents stage 2 results for equation (1) after including inverse Mills ratios from stage 1. Results are qualitatively similar to column (1) of Table 5. Specifically, the coefficient on *HOME* is negative and statistically significant at the 1% level. The coefficient for *IMR* is statistically insignificant, suggesting that prior findings do not suffer from selection bias.

[Insert Table 6 about here]

5.2 *Alternative measures of home country institutions*

Results presented in Section 4 indicate that home country *de jure* and *de facto* institutional characteristics that jointly promote liquidity (*HOME*) attenuate US IPO LFL. In this section, we provide added evidence regarding the effects of home country institutions on LFL by estimating equation (1) using alternative measures *HOME*. Table 7 reports results by column for alternative *HOME* measures where for brevity, we only report the coefficient and statistical significance for test variables *CONSTANT* and *HOME*. First, we consider in columns (1) and (2) the two components of our previous *HOME* measure individually to determine whether their effect is more related to *de jure* or *de facto* aspects of the home country regulatory environment. Following Griffin et al. (2007), column (3) measures *HOME* as country risk using the Country Risk Index by *Euromoney*. We then

measure *HOME* in column (4) (column 5) using home country geographic (cultural) distance to proxy for information asymmetry between firms and US investors. Because the geographical and cultural distance measures indicate distance from the US following convention prior studies, we expect positive coefficients in contrast to the other *HOME* proxies. Columns (6)-(12) present results for *HOME* proxied by seven indicators developed by Cumming et al. (2011) related to stock market regulation: price manipulation index (column 6), volume manipulation index (column 7), spoofing index (column 8), false disclosure index (column 9), market manipulation index (column 10), insider trading index (column 11), and broker-agency index (column 12).[32] The statistically significant findings for ten of twelve alternative proxies for *HOME* presented in Table 7 are consistent with lower LFL for firms from home countries with more robust institutions, lending support to main test findings for H2.

[Insert Table 7 about here]

5.3 *Global IPOs and multiple trading venues*

We next consider the effects of global FIPOs that list on multiple exchanges simultaneously. These global IPO are generally larger in size and in terms of IPO proceeds[33] and have been argued to reduce information asymmetries among market participants (e.g., dealers and investors) resulting in lower transaction costs and higher liquidity (Bacidore and Sofianos 2002). Other studies counter that the presence of alternative and imperfectly connected trading venues may increase information asymmetry among market participants and impose additional liquidity costs for cross-listed shares (Domowitz et al. 1998). To provide evidence on whether global FIPOs face lower or greater liquidity

[32] These indexes are available for both 2007 and 2008. To account for regulatory changes, we consider the indexes for the periods before and after the adoption in November 2007 of the Markets in Financial Instruments Directive (MiFID). We report the results for 2008. The results for 2007 are qualitatively similar and we do not report them for brevity, but we make them available upon request.

[33] We confirm these differences for our sample in untabulated tests available from the authors on request.

relative to DIPOs, we extend our baseline model in equation (1) to include an indicator variable (*MULTILIST*) equal to 1 for FIPOs that list in multiple exchanges simultaneously, and 0 otherwise. As reported in Table 8 (Panel A), our sample of FIPOs includes 90 global FIPOs that exhibit in univariate comparisons greater illiquidity than solo FIPOs in the first seven months post listing (Panel A). The coefficient for *MULTILIST* is insignificant, indicating that global FIPOs do not exhibit higher liquidity differentials on average than solo FIPOs. The negative and significant interaction term suggests that LFL is smaller for the global IPOs from countries with strong institutions, where approximately 50% (43 out of 90) of global FIPOs in our sample originate from countries with strong home institutions.

[Insert Table 8 about here]

5.4 *Propensity-score matching*

In our analysis, we establish a significant differential in liquidity between FIPOs and DIPOs matched by firm size, industry and year of the IPO. As standard in matching exercises, it is not implausible that the systematic positive liquidity differential that we find originates from confounding factors not accounted for by our matching method.[34] To assess the robustness of our findings to matching criteria, we apply propensity score matching following Heckman et al. (1997), Gao et al. (2013), and Shipman et al. (2017).

First, we estimate a probit model of the probability of an IPO listing based on total assets, book-to-market ratio, and leverage. We then match each FIPO with a DIPO with the closest score within a caliper constraint of 0.01 to yield 229 matched pairs given the added data requirements. Results

[34] We believe this to be implausible in our case since there are no significant differences in the two sample of firms before the matching, aside from marginally larger IPO proceeds (*PROC*) and larger (median) *ROA* for FIPOs than for DIPOs. We nonetheless follow this literature and test the robustness of our results using PSM techniques. For completeness, we do not find significant differences in the two sample of firms before the matching procedure. Tests are not reported for brevity but available from the authors upon request.

reported in Table 9 confirm LFL using propensity score matching (H1) and a mitigation of LFL for FIPO from home countries with home institutions more conducive to share trading liquidity (H2), consistent with findings presented above.

[Insert Table 9 about here]

6. Conclusion

Prior studies document a 'liability of foreignness in liquidity' (LFL) for mature foreign firm cross-listed shares on US stock exchanges compared with domestic US peers (Bacidore and Sofianos 2002; Bacidore et al. 2005). This is despite liquidity being a primary motive for foreign-firm US stock exchange listings (Saudagaran 1988; Saudagaran and Biddle 1995; Blass and Yafeh 2001; Doidge et al. 2004; Karolyi 2006). Unaddressed by prior research is whether LFL extends to foreign-firm US IPOs (FIPOs) that are subject to more rigorous registration and disclosure requirements identical to those of domestic peers (Aharony et al. 1993; Ball and Shivakumar 2008; Venkataraman et al. 2008; Leuz 2010; Bell et al. 2012; Bell et al. 2014; Filatotchev et al. 2020). FIPOs also typically trade on only one US exchange initially, thus facilitating empirical identification of LFL compared with cross-listers (O'Hara and Ye 2011), and by nature FIPOs lack prior data and exhibit different initial share trading dynamics than non-IPO shares that also could influence LFL (Ellis et al. 2002; Corwin et al. 2004).

This study provides evidence regarding two related and consequential open questions regarding share trading liquidity for foreign-firm IPOs, which comprised over 25% of US IPOs during the most recent five-year period 2017-2021. First, whether foreign-firm US IPOs (FIPOs) exhibit a 'liability of foreignness in liquidity' (LFL) compared with domestic-firm US IPOs (DIPOs) given that liquidity is a primary motive for foreign-firm US listings. Second, whether LFL for US IPOs is moderated by FIPO home country institutions that promote share trading liquidity as found

previously for foreign US cross-listed firms. We address these questions by examining post-IPO illiquidity differences between 1990 and 2012 inclusive measured by bid-ask spreads between 327 FIPOs from 36 countries, 5 geographic regions, and 12 Fama-French two-digit industry classifications and DIPOs matched by IPO year, Fama-French industry, and smallest prior-year absolute difference in total assets. We then test for moderating effects on LFL of FIPO home country institutions that promote liquidity (measured by above-median product of International Country Risk Guide Law and Order index and anti-director index of La Porta et al. (1998) as adjusted by Spamann (2010) following Durnev and Kim (2005), Bruno and Claessens (2010) and Bell et al. (2014)) as found previously for cross-listed firms.

Our tests reveal that US IPOs exhibit LFL in both univariate comparisons and in multivariate tests that control for other liquidity influences. Second, robust FIPO home country institutions that promote liquidity moderate but do not eliminate US IPO LFL, consistent with incomplete bonding as found for foreign US cross-listers (Bacidore and Sofianos 2002; Bacidore et al. 2005). These main findings are robust to Heckman (1979) two-step estimation to control for potential selection bias, propensity-score matching of DIPOs with FIPOs following Gao et al. (2013), the use of an illiquidity measure due to Amihud (2002), alternative proxies for FIPO home country institutional attributes found previously to relate to share trading liquidity, and to IPO underpricing. Additional findings indicate that US IPO LFL is insensitive to stock market upturns (downturns) that attract (dissuade) FIPOs, as evidenced by the dot.com bubble period (1999-2000) (Global Financial Crisis (GFC) (2008-2009) period), that LFL is marginally lower for global FIPO listings on non-US exchanges from strong home country institutions, consistent with increased information asymmetry (Domowitz et al. 1998), is moderated by home country institutions that promote liquidity consistent with H2, and is smaller following the passage of the Sarbanes-Oxley Act (2002), consistent with its purported information asymmetry mitigation.

These findings extend prior research regarding LFL to a prominent listing cohort and provide new insights into the effects of FIPO home country institutional attributes on their US share trading liquidity, how market conditions influence US IPO LFL, and the degree to which the bonding hypothesis applies to US FIPOs. Our findings indicate that FIPOs do not achieve liquidity parity with DIPOs even though liquidity has been found to be a primary motive for US listings, and that IPOs achieved only incomplete bonding despite US disclosure and listing requirements identical to DIPOs and more stringent than for cross-listers. Evidence regarding which FIPO home country institutional attributes moderate LFL can also help inform related decisions by foreign firms considering US IPOs, exchanges competing for them, listing facilitators, regulators, and investors.

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Appendix: Variable Definitions

Variable	Definition	Source
Illiquidity measures		
ILLIQ	Differential between BID-ASK SPREAD (AMIHUD) of matched foreign and domestic IPO.	CRSP
BID-ASK SPREAD	Difference between ask and bid share prices, scaled by the mid-price, averaged over the month (Ellul and Pagano 2006).	CRSP
AMIHUD	Ratio of daily absolute returns over dollar trading volume, averaged in the month (Amihud 2002).	CRSP
Main variables of interest		
HOME	Indicator variable set equal to 1 if the product of the law enforcement index (International Country Risk Guide – ICRG – Law and Order index) and the revised anti-director index of La Porta et al. (1998) for the home country is above the sample median, 0 otherwise.	ICRG and Spamann (2010)
***Control variables* (*variables indicated in * are measured as the difference between the matched foreign and domestic IPO*).**		
AUD*	Indicator variable equal to 1 if the auditing firm is a Big-6, Big-5 or Big-4 in 1990–1997, 1998–2001, and 2002 onwards, respectively; 0 otherwise (Filatotchev et al. 2020).	IPO Prospectus, Refinitiv SDC Platinum
BtoM*	Ratio of total asset at year end prior to listing over market capitalization at issue date (Corwin et al. 2004).	Compustat and IPO Prospectus
DOTCOM	Indicator variable equal to 1 if the IPO was completed during dot.com bubble period (1999-2000), 0 otherwise (Hahn et al. 2013).	IPO Prospectus, Refinitiv SDC Platinum
HOLD*	Institutional investors holding of shares over total share outstanding available on a quarterly basis (Hahn et al. 2013).	Institutional (13F) Holdings, Thomson Reuters
HOT	Market returns in the 30 days prior to the IPO (Hahn et al. 2013).	CRSP
INSIDER*	Ownership of insiders as a percentage of total shares outstanding (Hahn et al. 2013).	Compustat, Refinitiv SDC Platinum and IPO Prospectus
GFC	Indicator variable equal to 1 if the IPO was completed during the Global Financial Crisis period (2008-2009), 0 otherwise.	IPO Prospectus, Refinitiv SDC Platinum
LEV*	Ratio of total debt over total assets at year-end prior to listing (Corwin et al. 2004).	Compustat and IPO Prospectus
LSALES*	Log of total sales at the end of fiscal year preceding the IPO. The value of total sales is indexed to the 2005 value of US dollars (Hahn et al. 2013).	Compustat and IPO Prospectus
MULTILIST	Indicator for simultaneous IPO in a country other than the US (Colak et al. 2014).	IPO Prospectus, Refinitiv SDC Platinum
NASDAQ	Indicator variable equal to 1 if the stock is listed on the NASDAQ exchange, 0 otherwise (Hahn et al. 2013).	CRSP
PROC*	Natural logarithm of 1 plus total proceeds of IPO, where proceeds are indexed to the 2005 value of US dollars (Booth and Chua 1996).	IPO Prospectus, Refinitiv SDC Platinum
RET*	Monthly averages of daily share returns (Amihud 2002).	CRSP
ROA*	Lagged return on assets measured at the end of fiscal year preceding the IPO (Mantecon and Poon 2009).	Compustat and IPO Prospectus
SOX	Indicator variable equal to 1 if the IPO was completed after the enactment of SOX in 2002, 0 otherwise (Peng and Su 2014).	IPO Prospectus, Refinitiv SDC Platinum
UP*	First day of trading returns (underpricing) defined as the percentage difference between the closing stock price and the offer price at the first day of trading adjusted to market returns (Hahn et al. 2013).	CRSP, Refinitiv SDC Platinum and IPO Prospectus
UW*	Underwriter Rank obtained from Jay Ritter's website (Corwin et al. 2004).	Refinitiv SDC Platinum, IPO Prospectus and Jay Ritter's website
VOL*	Monthly standard deviation of daily returns (Amihud 2002).	CRSP
VOLUME*	Share price multiplied by number of shares traded in the month (Mantecon and Poon 2009).	CRSP
Heckman first stage		
GDP	GDP per capita in home country indexed to the 2005 value of US dollars.	IMF database
HiTECH	Indicator variable equal to 1 if the firm operates in a hi-tech industry, 0 otherwise.	IPO Prospectus, Refinitiv SDC Platinum, Compustat
HOME_ENF	Country-specific index that scores enforcement of compliance with each country's accounting standards as measured and presented in Brown et al. (2014).	Brown et al. (2014)
LTA	Log of total assets at the end of fiscal year preceding the IPO. The value of total assets is indexed to the 2005 value of US dollars.	Compustat and IPO Prospectus
PLIT	Percent of firm-years with lawsuits in home country as reported in Cheng et al. (2014).	Cheng et al. (2014)
SEC_ENF	Percent of firm-years with SEC enforcement in home country as reported in Silvers (2016).	Silvers (2016)
US_Listing	Indicator variable equal to 1 if IPO is in the US, or both in the US and home country, and 0 if the IPO has been conducted exclusively in firm's home country.	Refinitiv SDC Platinum

Table 1: Sample description.

Panel A: Sample Development

	Total Foreign IPOs
All Refinitiv SDC Platinum US and foreign IPOs in years 1990–2012	732
Less observations:	
For which prospectus not available	136
With offering other than common/ordinary shares	124
Exclusion due to financial and utilities industry	104
Insufficient data for control variables	41
Foreign-firm US IPO (FIPO) Sample	**327**

Panel B: FIPO Sample by Fama-French 12-Industry Classification

		Total Foreign IPOs
FF1	Consumer Non-Durables	10
FF2	Consumer Durables	8
FF3	Manufacturing	24
FF4	Oil, Gas, and Coal Extraction and Products	4
FF5	Chemicals and Allied Products	5
FF6	Business Equipment	151
FF7	Telephone and Television Transmission	39
FF8	Utilities	-
FF9	Wholesale, Retail, and Some Services	10
FF10	Healthcare, Medical Equipment, and Drugs	31
FF11	Finance	-
FF12	Other	45
Total		**327**

Table 1 presents a description of test sample development (Panel A) and the distribution of FIPOs by Fama-French 12-digit industries (Panel B), where IPO is an acronym for Initial Public Offering and FIPO is an acronym for foreign-firm US IPO.

Table 2: Foreign-firm US IPOs by time period, home country and geographic region.

	1990-2001	2002-2012		1990-2001	2002-2012
Africa	***1***	***1***	***Europe***	***162***	***25***
South Africa	1	1	Belgium	2	0
			Denmark	1	0
Americas	***32***	***7***	France	10	0
Argentina	1	1	Germany	6	0
Brazil	1	0	Greece	3	2
Canada	23	6	Iceland	1	0
Chile	2	0	Ireland	8	2
Mexico	3	0	Israel	62	12
Panama	2	0	Italy	4	1
			Luxembourg	2	0
Asia	***36***	***60***	Netherlands	23	4
China	6	51	Portugal	1	0
Hong Kong	15	0	Russia	2	2
India	2	2	Spain	2	0
Indonesia	1	0	Sweden	3	0
Japan	1	0	Switzerland	5	0
Jordan	1	0	United Kingdom	24	3
Philippines	1	0			
Singapore	5	1			
South Korea	2	4			
Taiwan	2	2			
Oceania	***5***	***0***			
Australia	2	0			
New Zealand	3	0	**Total**	**233**	**94**

Table 2 reports the number of foreign-firm US IPO (FIPO) sample firms by time period, country, and region.

Table 3: Descriptive statistics for test and control variables.

	FIPOs (*N* = 327)			Matched DIPOs (*N* = 327)			All domestic IPOs (*N* = 2,156)		
	Mean	**Median**	**SD**	**Mean**	**Median**	**SD.**	**Mean**	**Median**	**SD**
ILLIQ	0.06***	0.05***	0.06	0.02	0.01	0.02	0.03	0.02	0.02
HOME	0.38	0.00	0.48	-	-	-	-	-	-
PROC	18.24**	18.29***	1.78	18.07	17.97	0.93	17.81	17.78	0.87
INSIDER	0.73	0.76	0.08	0.74	0.75	0.14	0.71	0.73	0.14
UW	7.67	9.00*	2.34	7.91	8.88	1.76	7.76	8.00	1.74
AUD	0.83	1.00	0.35	0.86	1.00	0.35	0.87	1.00	0.34
UP	0.23	0.08	0.48	0.25	0.14	0.45	0.24	0.11	0.44
HOT	0.03	0.02	0.08	0.03	0.03	0.07	0.03	0.03	0.06
LSALES	17.34	17.45	3.18	17.21	17.52	2.97	16.70	17.48	4.02
BtoM	0.45	0.13	1.14	0.37	0.14	0.82	0.39	0.19	0.59
LEV	0.18	0.03	0.28	0.19	0.05	0.28	0.26	0.11	0.43
ROA	-0.04*	0.02***	2.89	-0.32	0.00	1.07	-0.33	0.00	1.06
NASDAQ	0.75	1.00	0.43	0.74	1.00	0.44	0.85	1.00	0.36
RET	-0.20***	-0.20***	1.19	-0.10	-0.04	1.38	-0.09	-0.01	1.01
VOL	4.63***	4.19***	3.38	4.55	3.82	2.87	4.55	3.81	2.65
HOLD	0.13***	0.04***	0.19	0.18	0.14	0.18	0.32	0.28	0.22
VOLUME	5.44	0.70*	20.8	5.26	1.26	14.2	4.81	0.61	27.2

Table 3 reports descriptive statistics for test and control variables for all matched FIPOs and DIPOs in our sample, where FIPO is an acronym for foreign-firm US IPO and DIPO is an acronym for domestic-firm US IPO. The results of tests for the differences in the means and medians of FIPOs and DIPOs are reported under the FIPOs block. *, **, *** denote differences that are significant at the 10%, 5%, and 1% levels, respectively. *ILLIQ* is the difference between the bid-ask spreads of matched FIPOs and DIPOs. *HOME* is an indicator variable equal to 1 for FIPOs with robust home institutions. *PROC* is log of the proceeds from the IPO. *INSIDER* is ratio of shares owned by insiders over total shares outstanding. *UW* is an indicator variable for underwriter quality. *AUD* is an indicator variable for auditor quality. *UP* is the underpricing in the first day of listing. *HOT* is market returns in the 30 days prior to listing. *LSALES* is total sales of firms at year-end prior to listing. *BtoM* is book-to-market ratio at year-end prior to listing. *LEV* is total debt over total assets at year-end prior to listing. *ROA* is the return on total assets. *NASDAQ* is an indicator variable equal to 1 for stocks traded on the NASDAQ exchange and 0 otherwise. *RET* is the percentage monthly average returns of the shares. *VOL* is percentage monthly standard deviation of daily returns. *HOLD* is share of institutional ownership. *VOLUME* is monthly share trading volume. SD is standard deviation. See Appendix for more detailed variable definitions.

Table 4: Correlation matrix for test and control variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
ILLIQ																
HOME	-0.22															
PROC	-0.25	0.17														
INSIDER	0.08	-0.07	-0.08													
UW	-0.06	0.09	0.58	0.07												
AUD	0.09	0.06	0.29	-0.07	0.37											
UP	0.04	0.03	0.03	0.11	-0.08	-0.15										
HOT	0.12	0.05	-0.15	-0.17	-0.20	-0.08	0.20									
LSALES	-0.14	0.06	0.30	-0.07	0.13	0.07	-0.05	0.05								
BtoM	-0.04	-0.02	0.10	-0.23	0.03	-0.08	0.11	0.11	0.28							
LEV	-0.11	0.10	0.15	-0.08	0.06	0.00	-0.06	0.06	0.17	0.05						
ROA	0.07	-0.01	0.03	-0.03	0.14	-0.01	0.04	-0.06	0.05	0.03	0.04					
NASDAQ	0.12	0.09	-0.27	0.02	-0.01	-0.05	-0.07	-0.04	-0.26	-0.09	-0.05	0.03				
RET	-0.11	0.05	-0.02	0.10	0.01	-0.04	-0.05	0.10	0.13	0.11	0.06	-0.01	0.02			
VOL	0.09	-0.04	-0.26	0.01	-0.20	-0.06	0.02	0.01	-0.19	-0.02	-0.11	0.00	0.04	-0.17		
HOLD	0.03	-0.01	0.13	-0.12	0.10	0.02	0.03	0.09	0.18	0.17	0.15	0.07	0.00	0.06	-0.13	
VOLUME	-0.08	-0.03	0.13	0.07	0.07	-0.01	0.19	-0.07	-0.02	-0.05	0.01	-0.02	-0.12	0.09	0.02	0.01

Table 4 reports correlation coefficients for test and control variables, averaged across FIPOs and matched DIPOs, where FIPO is an acronym for foreign-firm US IPO and DIPO is an acronym for domestic-firm US IPO. We have 327 FIPO firms in our sample. *ILLIQ* is the average difference between the bid-ask spreads of FIPOs and DIPOs. *HOME* is an indicator variable equal to 1 for FIPOs with robust home institutions. *PROC* is the log of the proceeds from the IPO. *INSIDER* is ratio of shares owned by insiders over total shares outstanding. *UW* is an indicator variable for underwriter quality. *AUD* is an indicator variable for auditor quality. *UP* is the underpricing in the first day of listing. *HOT* is market returns in the 30 days prior to listing. *LSALES* is total sales of firms at year-end prior to listing. *BtoM* is book-to-market ratio at year-end prior to listing. *LEV* is total debt over total assets at year-end prior to listing. *ROA* is the return on total assets. *NASDAQ* is an indicator variable equal to 1 for stocks traded on the NASDAQ exchange and 0 otherwise. *RET* is the monthly average returns of the shares. *VOL* is monthly standard deviation of daily returns. *HOLD* is share of institutional ownership. *VOLUME* is monthly share trading volume. Correlations equal or above 0. 11 and equal or below -0.11 are significant at the 5% level. See Appendix for more detailed variable definitions.

Table 5: Illiquidity differences between foreign-firm and domestic-firm US IPOs.

Panel A:				**Panel B:**	**(1)**	**(2)**	**(3)**	**(4)**
	Mean	**Median**	**SD**	***CONSTANT***	0.058***	0.030***	0.059***	0.061***
1M	0.066***	0.047***	0.075		(8.931)	(3.076)	(9.017)	(9.255)
2M	0.052***	0.041***	0.064	***HOME***	-0.006***	-0.007***	-0.006***	-0.006***
3M	0.042***	0.026***	0.067		(-2.735)	(-2.944)	(-2.810)	(-2.913)
4M	0.040***	0.028***	0.064	***PROC***	-0.004***	-0.005***	-0.005***	-0.005***
5M	0.038***	0.024***	0.060		(-4.681)	(-5.291)	(-4.812)	(-5.006)
6M	0.035***	0.025***	0.053	***INSIDER***	0.026***	0.027***	0.026***	0.027***
7M	0.036***	0.023***	0.058		(4.419)	(4.671)	(4.431)	(4.561)
8M	0.037***	0.025***	0.059	***UW***	-0.001	-0.001	-0.001	-0.001
9M	0.035***	0.021***	0.065		(-1.417)	(-0.971)	(-1.29)	(-1.17)
10M	0.035***	0.025***	0.057	***AUD***	0.002	0.002	0.002	0.002
11M	0.033***	0.022***	0.058		(1.068)	(0.704)	(1.037)	(0.847)
12M	0.033***	0.024***	0.056	***UP***	0.004*	0.004**	0.004**	0.004**
					(1.946)	(2.138)	(2.017)	(2.052)
				HOT	0.022**	0.020*	0.021**	0.02**
					(2.146)	(1.933)	(2.115)	(2.009)
				LSALES	0.000	0.000	0.000	0.000
					(-0.607)	(-0.650)	(-0.625)	(-0.622)
				BtoM	0.001	0.001	0.001	0.001
					(0.547)	(0.646)	(0.566)	(0.591)
				LEV	-0.007***	-0.006***	-0.007***	-0.007***
					(-2.870)	(-2.767)	(-2.864)	(-2.826)
				ROA	0.000	0.000	0.000	0.000
					(1.376)	(1.131)	(1.318)	(1.232)
				NASDAQ	0.014***	0.011***	0.013***	0.012***
					(5.521)	(4.264)	(5.055)	(4.678)
				RET	-0.17***	-0.166***	-0.17***	-0.168***
					(-3.442)	(-3.377)	(-3.44)	(-3.411)
				VOL	0.112***	0.113***	0.113***	0.113***
					(4.272)	(4.323)	(4.311)	(4.307)
				HOLD	0.017***	0.017***	0.016***	0.017***
					(4.33)	(4.284)	(4.244)	(4.313)
				VOLUME	0.000*	0.000*	0.000	0.000*
					(-1.645)	(-1.705)	(-1.644)	(-1.683)
				DOTCOM		0.033***		
						(3.799)		
				GFC			-0.012	
							(-1.260)	
				SOX				-0.021***
								(-2.454)
				Month FE	Yes	Yes	Yes	Yes
				Industry FE	Yes	Yes	Yes	Yes
				Year FE	Yes	Yes	Yes	Yes
				Adj. R²	0.33	0.32	0.33	0.33
				N	3,320	3,320	3,320	3,320

Table 5 Panel A reports the mean, median and standard deviation (SD) of differences in bid-ask spreads of matched FIPOs and DIPOs at each month (M) post listing, where FIPO is an acronym for foreign-firm US IPO and DIPO is an acronym for domestic-firm US IPO. *** indicates statistically significant differences at the 1% confidence level. Panel B presents results of pooled regressions where column (1) reports the results from estimating equation (1). Columns

(2), (3) and (4) present results for augmented estimations as indicated. The dependent variable *ILLIQ* is the difference between the bid-ask spreads of matched FIPOs and DIPOs. *CONSTANT* tests for LFL (H1) after controlling for other determinants of illiquidity, where *HOME* is an indicator variable equal to 1 for FIPOs with robust home institutions that tests H2. *PROC* is the log of proceeds from the IPO. *INSIDER* is ratio of shares owned by insiders over total shares outstanding. *UW* is an indicator variable for underwriter quality. *AUD* is an indicator variable for auditor quality. *UP* is the underpricing in the first day of listing. *HOT* is market returns in the 30 days prior to listing. *LSALES* is total sales of firms at year-end prior to listing. *BtoM* is book-to-market ratio at year-end prior to listing. *LEV* is total debt over total assets at year-end prior to listing. *ROA* is the return on total assets. *NASDAQ* is an indicator variable equal to 1 for stocks traded on the NASDAQ exchange and 0 otherwise. *RET* is the monthly average returns of the shares. *VOL* is monthly standard deviation of daily returns. *HOLD* is share of institutional ownership. *VOLUME* is monthly share trading volume. *DOTCOM* is an indicator variable equal to 1 for the dot.com bubble period of 1999 and 2000, and 0 otherwise. *GFC* is an indicator variable equal to 1 for the 2008-2009 Global Financial Crisis period, and 0 otherwise. *SOX* is an indicator variable that takes the value of 1 if the IPO took place post SOX act and 0 otherwise. All models include cross-sectional (month), industry and year fixed effects. *N* is the number of firm-month observations. For consistency with the dependent variable, all variables, except for indicator variables, are the differences between matched FIPOs and DIPOs. *t*-stats are reported in parenthesis below the coefficients. ***, **, and * indicate statistical significance at 1%, 5%, and 10% confidence level. See Appendix for more detailed variable definitions.

Table 6: Heckman two-step estimation procedure.

Panel A:	**(1)**	**Panel B:**	**(1)**
CONSTANT	-6.197***	***CONSTANT***	0.064***
	(0.000)		(8.855)
LTA	0.109***	***HOME***	-0.006***
	(0.000)		(-2.571)
PROC	0.122***	***IMR***	0.000
	(0.007)		(0.002)
HiTECH	0.952***	***Controls***	Yes
	(0.000)	***Month FE***	Yes
GDP	-56.232***	***Industry FE***	Yes
	(0.000)	***Year FE***	Yes
HOME_ENF	0.015**		
	(0.027)		
SEC_ENF	0.038**		
	(0.026)		
PLIT	0.039		
	(0.153)		
Pseudo R^2	0.37	***Adj. R^2***	0.35
N	2,322	***N***	3,086

Table 6 presents results using a Heckman two-stage selection model to address potential selection bias. Panel A presents binary probit estimation results for US listings (IPOs in the US, or in the US and home country, are assigned the value 1, while IPOs conducted exclusively in firm's foreign country are assigned 0). *LTA* is log total assets. *PROC* is log of the proceeds from the IPO. *HiTECH* is an indicator variable that is set equal to 1 if the firm operates in a hi-tech industry and 0 otherwise, as defined by Refinitiv SDC Platinum and Thomson Reuters. We also include home enforcement measure (*HOME_ENF*), SEC enforcement (*SEC_ENF*) and private litigation (*PLIT*). *p*-values are reported in parenthesis below the coefficients. Panel B reports the second stage and the results of regression model (1) with the inclusion of *IMR* generated in step 1 (Panel A). For brevity, we report only the coefficients on the variables of interest *CONSTANT, HOME* and *IMR*. Control variables are as per equation (1). All models include cross-sectional (month), industry and year fixed effects. *N* is the number of firm-month observations. *t*-stats are reported in parenthesis below the coefficients. ***, **, and * indicate statistical significance at 1%, 5%, and 10% confidence level. See Appendix for more detailed variable definitions.

Table 7: Alternative proxies for home country institutions influencing US IPO illiquidity.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CONSTANT	0.060***	0.058***	0.071***	0.046***	0.049***	0.062***	0.060***	0.060***	0.059***	0.062***	0.059***	0.058***
	(9.246)	(8.997)	(8.958)	(6.239)	(7.255)	(9.477)	(9.222)	(9.221)	(8.631)	(9.452)	(9.068)	(8.983)
HOME	-0.008***	-0.008***	-0.000***	0.000***	0.016***	-0.002***	-0.004***	-0.004***	-0.002	-0.001***	-0.002*	-0.002
	(-3.873)	(-3.807)	(-2.745)	(3.507)	(4.511)	(-4.829)	(-3.108)	(-4.403)	(-0.635)	(-4.319)	(-1.809)	(-1.589)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R²	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
N	3,320	3,320	3,320	3,284	3,284	3,284	3,284	3,284	3,284	3,284	3,284	3,284

Table 7 reports the results of the pooled regression (1) with alternative measures of home country institutions, *HOME*. Columns 1 and 2 present results when the indicator variable *HOME* equals 1 if the FIPO is from a country that is above the sample median country score in the anti-director index (La Porta et al. 1998 index of anti-director rights as adjusted by Spamann 2010) or the International Country Risk Guide Law and Order index, respectively, and zero otherwise. Column 3 estimates *HOME* based on the Country Risk Index. Columns 4 and 5 present results where *HOME* is measured by geographic distance and cultural distance of the FIPO country of origin and the US, respectively. Columns 6 – 12 report results with *HOME* being proxied by a set of indicators developed by Cumming et al. (2011) related to domestic stock market regulation including: (6) the price manipulation index, (7) the volume manipulation index, (8) the spoofing index, (9) the false disclosure index, (10) the market manipulation index, (11) the insider trading index, and (12) the broker-agency index. The dependent variable is the difference between matched FIPOs and DIPOs of the bid-ask spreads. For brevity, we report only the coefficients on the variable of interest *CONSTANT* and *HOME*. The control variables are as specified in equation (1). All models include cross-sectional (month), industry and year fixed effects. *N* is the number of firm-month observations. *t*-stats are reported in parenthesis below the coefficients. FIPO is an acronym for foreign-firm US IPO and DIPO is an acronym for domestic-firm US IPO. ***, **, and * indicate statistical significance at 1%, 5%, and 10% confidence level. See Appendix for more detailed variable definitions.

Table 8: Illiquidity differences and global IPOs.

Panel A:				***Panel B:***	
	Global FIPOs (N=90)	***Other FIPOs (N=237)***	***p-values***		
1M	0.08**	0.03	0.05	***CONSTANT***	0.057***
2M	0.07***	0.02	0.00		(11.041)
3M	0.07***	0.01	0.00	***HOME***	-0.006***
4M	0.06**	0.01	0.01		(-2.505)
5M	0.06***	0.01	0.00	***MULTILIST***	-0.002
6M	0.05***	0.00	0.00		(-0.610)
7M	0.05***	0.00	0.00	***HOME*MULTILIST***	-0.018***
8M	0.04	0.01	0.14		(-3.508)
9M	0.04	0.01	0.12	***Controls***	YES
10M	0.04	0.01	0.16	***Month FE***	YES
11M	0.04	0.00	0.31	***Industry FE***	YES
12M	0.05**	0.01	0.01	***Year FE***	YES
				Adj. R^2	0.33
				N	3,320

Table 8 Panel A reports the mean difference between the bid-ask spreads of foreign and domestic US stocks at each month (M) post listing, calculated for the subsamples of foreign firms that list in more exchanges (global IPOs) and those that only list in the US (Other foreign IPOs). The last column reports the *p*-values of the univariate test of differences in means between the two subsamples. Panel B reports the results of the pooled regression (2) for the twelve months post listing, including *MULTILIST*, an indicator that takes the value 1 if the firms went public in multiple exchanges at the same time, and 0 otherwise. The dependent variable is the difference between the bid-ask spreads of the foreign and domestic stocks. *HOME* is the home country institutions indicator. For brevity, we report only the coefficients on the variables of interest *CONSTANT, HOME, MULTILIST* and the interaction *HOME*MULTILIST*. The control variables are as specified in Model (1). For consistency with the dependent variable, all variables, except for indicator variables, are the differences between foreign US IPO and the matched domestic US IPO with respect to the variable in question. *N* is the number of firm-month observations. *t*-stats are reported in parenthesis below the coefficients. ***, **, and * indicate statistical significance at 1%, 5%, and 10% confidence level. See Appendix for more detailed variable definitions.

Table 9: Illiquidity differences between foreign-firm and domestic-firm US IPOs using propensity score matching

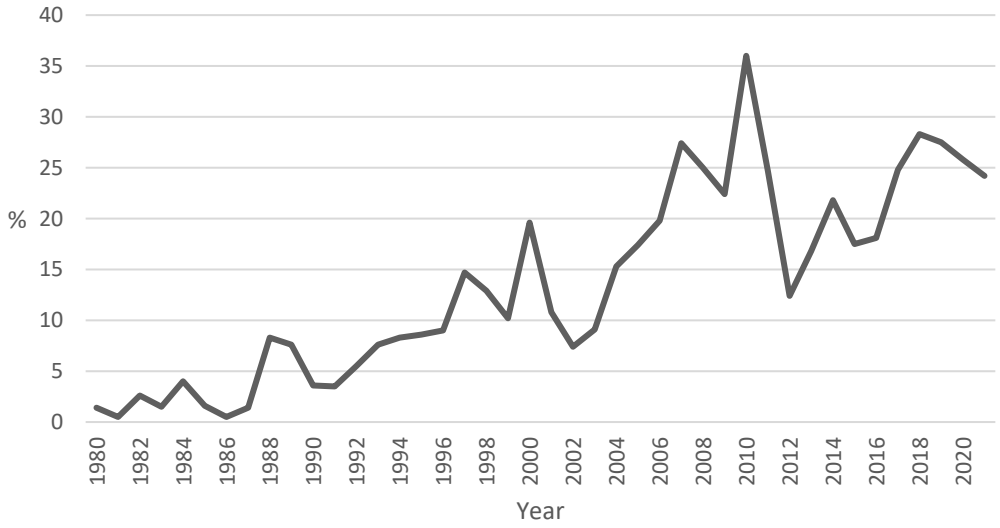
Panel A:			
	Mean	**Median**	**SD**
1M	0.07***	0.05***	0.07
2M	0.05***	0.04***	0.06
3M	0.04***	0.03***	0.06
4M	0.05***	0.03***	0.07
5M	0.04***	0.03***	0.06
6M	0.03***	0.03***	0.05
7M	0.03***	0.03***	0.05
8M	0.03***	0.02***	0.06
9M	0.04***	0.02***	0.06
10M	0.03***	0.03***	0.06
11M	0.03***	0.03***	0.06
12M	0.03***	0.03***	0.06

Panel B:	**(1)**	**(2)**	**(3)**	**(4)**
CONSTANT	0.038***	0.051***	0.038***	0.062***
	(4.584)	(8.405)	(4.584)	(3.456)
HOME	-0.010***	-0.010***	-0.01***	-0.011***
	(-4.156)	(-4.101)	(-4.156)	(-4.301)
PROC	-0.006***	-0.006***	-0.006***	-0.006***
	(-4.812)	(-5.070)	(-4.812)	(-4.855)
INSIDER	0.003	0.005	0.003	0.002
	(0.463)	(0.788)	(0.463)	(0.339)
UW	-0.001	-0.001	-0.001	-0.001*
	(-1.581)	(-1.227)	(-1.581)	(-1.768)
AUD	0.011***	0.009***	0.011***	0.011***
	(4.178)	(3.499)	(4.178)	(4.327)
UP	0.013***	0.012***	0.013***	0.013***
	(5.574)	(5.549)	(5.574)	(5.583)
HOT	-0.008	-0.008	-0.008	-0.008
	(-0.676)	(-0.696)	(-0.676)	(-0.67)
LSALES	-0.001**	-0.001**	-0.001**	-0.001**
	(-2.070)	(-2.265)	(-2.07)	(-2.041)
BtoM	0.002**	0.002**	0.002**	0.002**
	(2.007)	(2.188)	(2.007)	(2.012)
LEV	0.006***	0.007***	0.006***	0.006***
	(2.839)	(3.042)	(2.839)	(2.600)
ROA	-0.001	-0.001	-0.001	-0.001
	(-0.598)	(-0.704)	(-0.598)	(-0.654)
NASDAQ	0.011***	0.009***	0.011***	0.010***
	(3.168)	(2.825)	(3.168)	(3.093)
RET	-0.178***	-0.184***	-0.177***	-0.179***
	(-3.040)	(-3.161)	(-3.04)	(-3.074)
VOL	0.070**	0.074***	0.07**	0.072***
	(2.302)	(2.425)	(2.302)	(2.36)
HOLD	-0.006	-0.005	-0.006	-0.006
	(-1.342)	(-1.234)	(-1.342)	(-1.47)
VOLUME	0.000***	0.000***	0.000***	0.000***
	(4.185)	(4.021)	(4.185)	(4.268)
DOTCOM		0.016***		
		(3.378)		
GFC			0.028	
			(1.560)	
SOX				-0.025
				(-1.499)
Month FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adj. R^2	0.30	0.30	0.30	0.30
N	2,562	2,562	2,562	2,562

This table re-estimates Table 5 using a propensity score matching. Panel A reports the mean, median and standard deviation (SD) of the illiquidity difference between matched FIPOs and DIPOs at each month (M) post listing, where

FIPO is an acronym for foreign-firm US IPO and DIPO is an acronym for domestic-firm US IPO. *** indicates statistically significant differences. Panel B reports the results of the pooled regression analysis. In particular, column (1) reports results from estimating equation (1). Columns (2), (3) and (4) present the results of the augmented baseline equation (1). The dependent variable *ILLIQ* is the difference between the bid-ask spreads of matched FIPOs and DIPOs. *CONSTANT* tests for LFL (H1) after controlling for other determinants of illiquidity, where *HOME* is an indicator variable equal to 1 for FIPOs with robust home institutions that tests H2. *PROC* is the log of proceeds from the IPO. *INSIDER* is ratio of shares owned by insiders over total shares outstanding. *UW* is an indicator variable for underwriter quality. *AUD* is an indicator variable for auditor quality. *UP* is the underpricing in the first day of listing. *HOT* is market returns in the 30 days prior to listing. *LSALES* is total sales of firms at year-end prior to listing. *BtoM* is book-to-market ratio at year-end prior to listing. *LEV* is total debt over total assets at year-end prior to listing. *ROA* is the return on total assets. *NASDAQ* is an indicator variable equal to 1 for stocks traded on the NASDAQ exchange and 0 otherwise. *RET* is the monthly average returns of the shares. *VOL* is monthly standard deviation of daily returns. *HOLD* is share of institutional ownership. *VOLUME* is monthly traded volume. *DOTCOM* is an indicator variable equal to 1 for the dot.com bubble period of 1999 and 2000, and 0 otherwise. *GFC* is an indicator variable equal to 1 for the 2008-2009 Global Financial Crisis period, and 0 otherwise. *SOX* is an indicator variable that takes the value of 1 if the IPO took place post SOX act and 0 otherwise. All models include cross-sectional (month), industry and year fixed effects. *N* is the number of firm-month observations. *t*-stats are reported in parenthesis below the coefficients. ***, **, and * indicate statistical significance at 1%, 5%, and 10% confidence level. See Appendix for more detailed variable definitions.

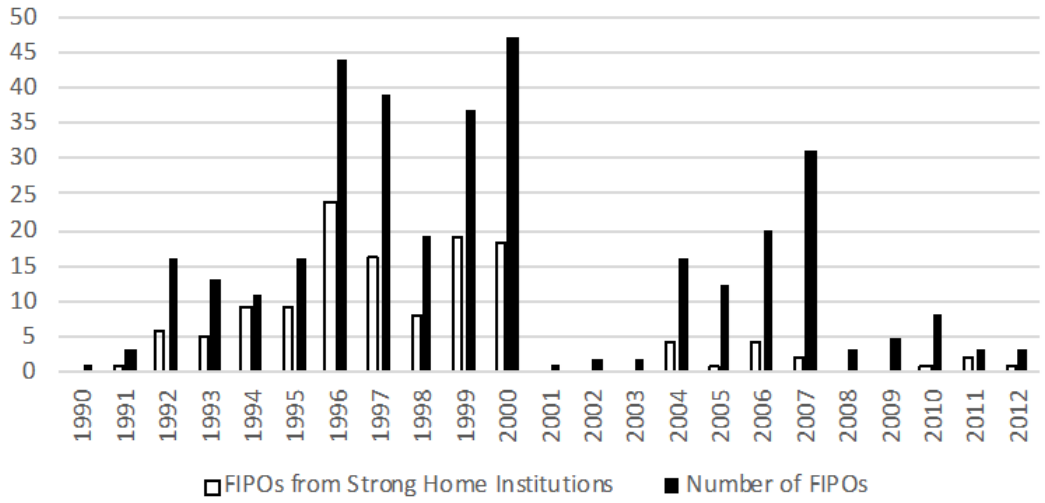
Figure 1: Foreign-firm US IPOs (FIPOs) percentage of total IPOs in the US by year.



This figure graphs Ritter (2022) Table 14, column "% Foreign" (updated to February 21, 2022). These data "exclude IPOs with an offer price below $5.00 per share, unit offers, SPACs, REITs, closed-end funds, natural resource limited partnerships, small best efforts IPOs, banks and S&Ls, and IPOs not listed on CRSP (this last screen limits the sample to NASDAQ, Amex, and NYSE-listed issues) within six months of the offer date."

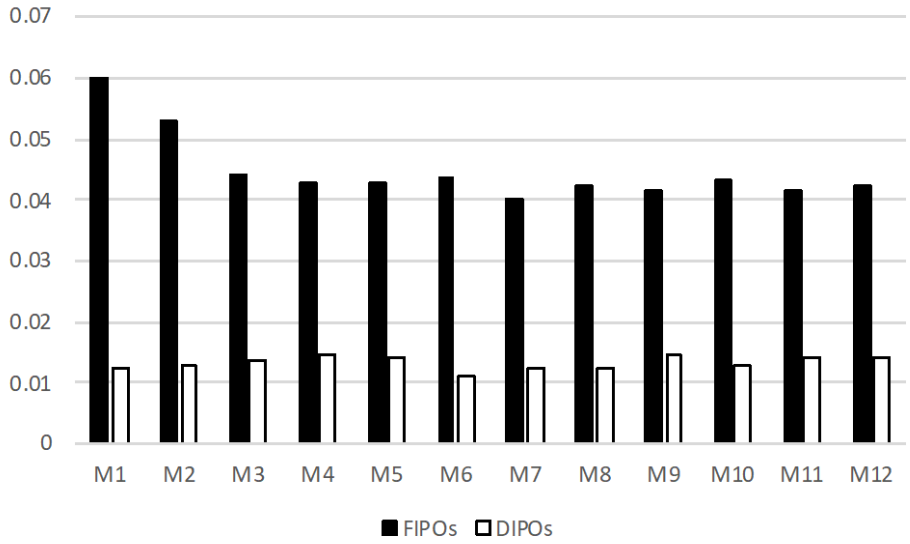
In numbers, after reaching a peak of 82 in 2000, FIPOs dropped to 5 in 2002 with the implementation of Sarbanes-Oxley provisions, then rose to a new record of 84 in 2021 before slowing in early 2022 on geopolitical tensions (Driebusch 2021, 2022).

Figure 2: Foreign-firm US IPOs by year and numbers with strong home country institutions.



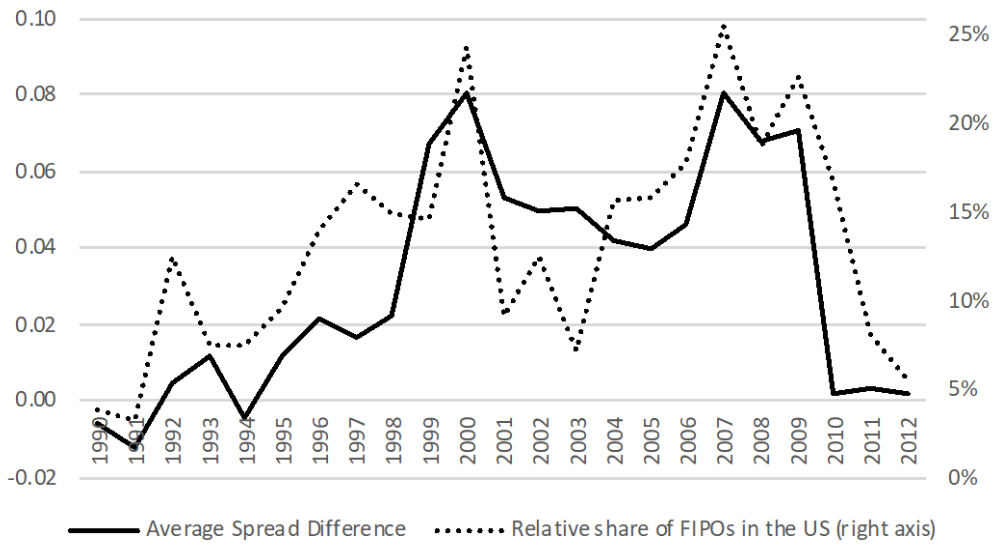
The black bars plot the number of FIPOs for each year in the sample period from 1990 to 2012, where FIPO is an acronym for foreign-firm US IPO. The white bars plot the number of these FIPOs from countries with home country institutions that promote liquidity as measured by *HOME*.

Figure 3: Illiquidity of foreign and matching domestic US IPOs.



This figure plots illiquidity levels measured by median bid-ask spreads for shares for FIPOs and matched DIPOs at monthly horizons after listing, where FIPO is an acronym for foreign-firm US IPO and DIPO is an acronym for domestic-firm US IPO.

Figure 4: Liquidity differences between matched foreign and domestic US IPOs by year.



This figure plots average liquidity differentials between matched FIPOs and DIPOs by year (solid line, left scale) and the percentage of FIPOs in the same year (dotted line, right axis), where FIPO is an acronym for foreign-firm US IPO and DIPO is an acronym for domestic-firm US IPO.