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June 18, 2020
Via Electronic Mail
Hon. W. Jay Clayton, Chairman
Securities and Exchange Commission
100 F Street, NE
Washington, DC 20549-1090
RE: Roundtable on Emerging Markets Risks July 9, 2020

Dear Chairman Clayton,

I am grateful to the Chairman, Commission, and organizers of the upcoming Roundtable on Risks for Investors in Emerging Markets for taking up this important issue and for inviting comments from the public.[1] The purpose of this letter is to offer commentary relevant to deliberations regarding the risks that investors face when investing abroad.

I am an accounting professor at the University of Utah and have previously worked for the Commission as a visiting economist in the Division of Economic Risk and Analysis. My research program is focused on international securities law, cooperation between securities regulators, and economic geography. My remarks draw on empirical tests from my studies on the effects of cross-border cooperation between securities regulators. They also leverage my extensive consultation and interaction with securities regulators and stock exchanges around the world (including the SEC, CFTC, World Bank, IOSCO, World Federation of Exchanges, and securities regulators in Israel, the Netherlands, and Singapore).

My studies indicate that cross-border cooperation is *the* defining issue in foreign investment. Cooperation provides numerous benefits, including enhanced enforcement, increased market integration, greater cross-border ownership, improved liquidity, and more transparent financial reporting. Cooperation policy is therefore central in shaping and understanding the risks that U.S. investors face when investing abroad.

Key Recommendations:

1. Continue to disclose cooperation failures and define expectations for market participants
2. Broaden the current dialogue to consider other types of malfeasance (e.g., insider trading, cyber-attacks, touting, or market manipulation schemes).
3. Revisit the "waiver by conduct" doctrine (initially proposed several decades ago).
4. Seek creative solutions to complex problems (in China and beyond).
5. Approach solutions multilaterally.

Background

Interconnected capital markets disperse assets, conduct, records, claimants, and relevant legal entities across multiple jurisdictions where *no single regulator* has the authority to

[1] The views expressed herein are my own and do not necessarily reflect those of the University of Utah, David Eccles School of Business, or School of Accounting.

investigate or enforce compliance with local securities laws. Therefore, the quality of protection provided by the SEC depends (in part) on foreign counterparts' cooperation to acquire information and execute tactics on behalf of the SEC.[2] Indeed, the SEC has been a pioneer in building cooperative relationships, which have enhanced enforcement capacity, improved regulatory decisions, and reduced administrative costs, ultimately building investor confidence in foreign investment. The Commission was the first to develop cooperative arrangements such as bilateral memoranda of understanding (MoUs), and is a signatory to the 2002 Multilateral Memorandum of Understanding (MMoU) and the 2018 enhanced MMoU.[3] These arrangements are the workhorse mechanisms for addressing cross-border deficiencies, since the alternatives to them (ad hoc requests, letters rogatory, and Mutual Legal Assistance Treaties) are generally cumbersome and inefficient. However, because the arrangements are not legally binding, there is an ever-present risk that counterparts will renege on their commitments to assist the SEC.

Key Research Findings

Cooperation leads to better enforcement capacity—My first study, "Cross-border cooperation between securities regulators," demonstrates that cross-border cooperation via the MMoU (and through bilateral arrangements) increases publicly observable enforcement at the SEC. **Cooperation improves market liquidity, reducing the transaction costs borne by investors.** The enhanced liquidity I observe is consistent with cooperation improving investor protection and curtailing investment risks.

Cooperation impacts both firms and investors—A follow-up study, "Does regulatory cooperation help integrate equity markets?," shows that the **adoption of cooperative arrangements is associated with an 11% increase in cross-border equity investment**. Again, this implies that investors believe that adverse selection and other risks in foreign assets are partially resolved through better cross-border oversight. Cooperation also benefits firms by allowing them to more safely integrate with global capital markets, which in turn gains them higher valuations and lower cost of capital.

U.S.-listed foreign firms' accounting quality and transparency improve when their home regulators cooperate with the SEC—Finally, my study entitled "The effects of cross-border cooperation on disclosure enforcement and earnings attributes" shows that issuers and auditors use less discretion in preparing financial statements when a firm's home country securities regulator cooperates with the SEC.

In practice, investors' level of protection depends on interactive coordination between securities regulators. Overall, cooperative arrangements have been effective instruments in advancing such coordination, but there are also some counterexamples. In these instances, *investors must be made aware of systematic cooperation failures with counterparts*.

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[2] As examples of tactics requiring assistance, consider acquiring records (banking, beneficial ownership, brokerage, telephone, purchase, travel); serving a defendant; contacting witnesses and deposing them or compelling their testimony; pursuing restraining orders that prohibit destruction of documents or halt flight risks; and identifying, freezing, and repatriating ill-gotten assets.

[3] The SEC has entered into 23 enforcement arrangements and dozens of supervisory arrangements with individual foreign regulators, as well as the 2002 IOSCO *Multilateral* Memorandum of Understanding (MMoU). The Commission was among the first to be admitted to the *enhanced* MMoU (*e*MMoU) last May.

Cooperation failures are not easy issues to resolve, because they strike at the heart of national sovereignty for both the U.S. and foreign counterparts. U.S. regulators want their rules to govern in their territory; foreign officials want their laws, which sometimes include secrecy and preemptive jurisdiction laws, to govern in their territories. The veracity of national sovereignty (in both directions) is self-evident. But because most nations are now deeply enmeshed in globally interconnected capital markets, the U.S. and its foreign counterparts must make concessions, while acknowledging sovereignty in both countries.

Implications and Recommendations for the Roundtable

1. Continue to disclose failures of cooperation—There will always be some variation in the quality of cooperation the SEC receives and, in turn, in the quality of investor protection that the SEC can provide in cross-border contexts. Investors need not be privy to every successful or failed interaction with foreign regulators. But when a particular jurisdiction presides over persistent cooperation failures that prevent the SEC from meeting a minimum threshold for investor protection, the SEC must act. At a minimum, **disclose these risks to investors**.

I applaud the SEC's recent decision to disclose the existence of heterogeneity in its oversight of foreign issuers. Note that, in the near term, this disclosure is costly not only in a political sense. Secure in the knowledge that regulators are incapable of pursuit, wrongdoers may be emboldened to use this information as a roadmap for concealing fraud, resulting in more expropriation of U.S. investors from abroad. That being said, it is likely that many criminals are already aware of these issues.

In addition, there are instances where the SEC cannot resolve problems with foreign counterparts via conventional negotiations. In such instances, congressional assistance is required (as was recently illustrated by The Holding Foreign Companies Accountable Act). Without an official acknowledgement of these problems, Congress cannot resolve them. Thus, I believe it is the correct decision to **disclose recurring problems to the public**.

Systematic cooperation failures have important consequences for investors. Sophisticated investors are no doubt already aware of these issues (e.g., the problems with China and, to some extent, other jurisdictions). But individual investors are not, and they deserve to understand the added layers of risk before making investment decisions. In addition, **the SEC should clarify its expectations for investment advisors, fund managers, broker-dealers, and others in terms of characterizing and disclosing such risks to their clients.**

2. Broaden the current dialogue—The SEC and PCAOB recently made public their inability to provide inspections of auditors for US-listed foreign issuers (notably, China). However, I believe this discussion of cross-border regulatory shortcomings has been construed too narrowly on auditor oversight. No doubt, audit inspections serve a critical function; as an accounting professor, I appreciate the necessity of high-quality financial information and the critical role of audit oversight in properly functioning capital markets. Yet markets can partially resolve known risks by pricing them into assets. With full knowledge that financial information is from countries with no auditor oversight (e.g., China), **investors are free to accept this known risk at their peril**

(caveat emptor), and can price-protect by discounting the amount they are willing to pay for affected stocks. Leaving it to investors to "price" these risks is a sub-optimal solution, but a feasible one.

In terms of expropriation risks from abroad for U.S. investors, I urge the Commission to broaden the scope of the public discussions from their current focus on corporate entities producing poor-quality or fraudulent financial information. Almost anyone on the planet who has an internet connection—even individuals who have no affiliation with corporate entities—can now engage in insider trading, cyber-attacks, touting, or market manipulation schemes (pump-and-dump, spoofing, layering, etc.). Although these activities menace U.S. investors, the **investors may never be aware of them**, much less understand, quantify, and price the risks into assets. Thus, despite the bureaucratic reasons to prioritize audit oversight, I believe the discussion should also encompass strategies targeting other risks.

3. Revisit the "waiver by conduct" doctrine—The problems faced by the SEC are not new—the Commission has grappled with these same issues, or similar ones, for at least four decades. And, to its credit, the SEC has made profound progress in recent decades. However, one castoff idea—a powerful proposal for a legal doctrine called "waiver by conduct"—should be resurrected. Proposed by SEC staff almost four decades ago, waiver by conduct is the idea that "when a foreign financial institution and its customer enter into a securities transaction in the United States, they deliberately avail themselves of the privilege of conducting activities within the United States" and "invoke the benefits and protections" of U.S. laws, and submit to U.S. jurisdiction" (Fedders et al., 1984). Under waiver by conduct, foreign entities participating in U.S. markets would waive their right to secrecy, which would otherwise be enjoined in their local jurisdiction. **Although waiver by conduct would require congressional approval, I believe it remains a viable strategy for dealing with cross-border activities that threaten U.S. investors.**

Similarly, it would be prudent to contemplate more systematic and proactive ways of dealing with US-listed foreign issuers and their leadership (*before* misconduct occurs). For example, the Commission could **institute a comprehensive registry for corporate officers and directors of US-listed foreign issuers, and designate a pre-arranged agent for service of a complaint, petition, or summons**.[4] Seemingly basic tasks like serving a foreign defendant can be extremely challenging when they require service via the Hague Evidence Convention or local modalities that are technical and cumbersome. Furthermore, many foreign nationals, especially ones from

[4] A similar (but narrower) provision exists in the The Holding Foreign Companies Accountable Act, but its scope is limited to *the name of each Chinese Communist Party official who is a member of the board of directors of the issuer and operating entity of the issuer.*

Asia and Africa, use U.S. names that do not match their given names from their home countries.[5] Service becomes unnecessarily complicated in such circumstances. A registry would signal to foreign officers and directors that they are not beyond the reach of U.S. regulators.

Furthermore, other rules already at the SEC's disposal could serve as stop-gap measures. Notably, Rule 102(e) confers broad power to the SEC to sanction professionals, including auditors, who do not meet thresholds for professional standards. The SEC should consider new and creative ways to deploy this rule when audit firms refuse inspection or decline to provide audit work papers to U.S. regulators.

4. Seek creative solutions to complex problems (in China, and beyond)—Finally, I encourage the SEC to prudently reassert its authority in cross-border contexts. For example, alongside disclosure of the incremental risks in China, the SEC should consider creative solutions that create a "race to the top" with respect to the quality of Chinese issuers. Since stringent regulation is infeasible through traditional means, it should consider the following: (i) **Stipulate that Chinese firms have "skin in the game."** This could occur via Chinese equity or debt (or insider wealth) that is held through a US (or neutral) financial institution. It could also occur through novel specialized financial instruments or fintech. (ii) **Restrict the number of US listings apportioned to China**. Provide a mechanism whereby the US gets only the highest-quality Chinese firms. Require the firms to compete for self-registrations in ways that crowd out the lowest-quality issuers. For example, reward Chinese whistleblower firms with eligibility for a new listing. (iii) **Encourage individual investors to hold ETFs** (or other diversified products). This is one way to reduce risks. (iv) **Tie market access (or market failures) to other economic outcomes** (e.g., trade, side payments).

Realize that, in spite of these risks, US investors probably still benefit from portfolio exposure to China. The Commission needs to carefully study the performance of US-listed Chinese firms. For example, imagine investing $1 in a market-weighted portfolio of US stocks every day for the last decade. How would that investment compare to a market-weighted portfolio of domestic companies (on both a raw and risk-adjusted basis)? This would be an important indicator of the magnitude of the problem or risks faced by US investors.

Finally, as I mentioned in a recent op-ed for *Barron's*, should the SEC pursue a more draconian approach by refusing to "recognize the legitimacy of financial reports from China altogether," it would likely "set off a chain of events that would inflict considerable damage on the Chinese economy." This option inflicts serious collateral damage with geopolitical ramifications, and should be avoided at virtually all costs.

[5] Consider the feasibility of going to China, a country of 1.4 billion people, to find and serve a defendant known in the US as "John Wang."

5. Approach solutions multilaterally—The SEC needs to work closely with other securities regulators across the world. It is undesirable to chase legitimate Chinese listings to foreign venues like Hong Kong, only to have US investors pursue those markets at greater expense and potentially higher risk. Policy coordination with regulatory counterparts can prevent this problem, by establishing. In my consultations with international regulators, I've often sensed frustration from international regulatory communities that certain jurisdictions (namely China) have agreed to memorandums of understanding but have not kept up with the agreed-upon information-sharing and cooperation protocols. Our regulatory counterparts could serve as allies that promote more constructive negotiations (as opposed to tense bilateral ones).

The SEC should exhort international organizations like IOSCO to leverage their authority by serving as disciplining mechanisms and impartial arbitrators for cooperation failures. For more than a decade, cooperation failures have been hidden, and counterparts have ceased to ask countries like China for assistance. This only encourages uncooperative counterparts to continue being recalcitrant. And as global regulators discontinue their efforts to acquire information, they lose any empirical basis for complaint. No assistance is requested, and none is given. Uncooperative signatories to these arrangements should be given a chance to remediate, and should be removed if they cannot abide by the arrangement.

Conclusion

I appreciate the opportunity to share my views with the Commission and its staff. If you have additional questions, please do not hesitate to reach out.

Sincerely,
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Attachment 1: Academic study - *Cross-border cooperation between securities regulators*
Attachment 2: Academic study - *Does regulatory cooperation help integrate equity markets?*
Attachment 3: Academic study - *The effects of cross-border cooperation on disclosure enforcement and earnings attributes*
Attachment 4: *Barron's* op-ed - *China doesn't want to cooperate with U.S. regulators. Congress is raising the stakes.*

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Cross-border cooperation between securities regulators☆

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ABSTRACT

The events of September 11, 2001, prompted sweeping cross-border coordination efforts for securities regulators around the globe. After 9/11, the International Organization of Securities Commissions (IOSCO) forged a nonbinding arrangement—the Multilateral Memorandum of Understanding Concerning Consultation and Cooperation and the Exchange of Information (MMoU)—that standardized the protocol for information sharing among participating securities regulators. Because regulators from different countries entered the MMoU at different times, their enlistments created a set of staggered shocks. I use these shocks to show that the resulting cross-border cooperation (a) increases cross-border enforcement and (b) reduces the cost of liquidity provision in the capital markets of participating countries. These results support the conclusion that the MMoU helps fill gaps

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[1] The Securities and Exchange Commission, as a matter of policy, disclaims responsibility for any private publication or statement by any of its employees. The views expressed herein are those of the author and do not necessarily reflect the views of the Commission or of the author's colleagues on the staff of the Commission.

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in cross-border regulation that historically exposed investors to information asymmetry, agency costs, and expropriation risks.

1. Introduction

In purely domestic settings, regulators are usually (by construction) supplied with the surveillance and enforcement powers necessary to carry out their mandate. The same is not true in cross-border settings. In cross-border settings, information, witnesses, and assets typically reside outside the regulators' jurisdictions. As a result, regulators are often constrained by information shortfalls, jurisdictional complexities, and legal limitations. Thus, cross-border enforcement differs from enforcement within a single regulatory system in that it requires cooperation between regulators operating in different and seemingly incompatible legal systems. Recent increases in the number of cross-border transactions suggest a growing need for better cooperation and more effective cross-border enforcement,[2] but the literature to date tells us little about regulators' attempts to keep pace.

After September 11, 2001, the need to eliminate terrorism-related financing and money laundering compelled regulators in the International Organization of Securities Commissions (IOSCO) to standardize cooperation via a special arrangement—the Multilateral Memorandum of Understanding (MMoU). The MMoU addresses the scope, confidentiality, and use of information shared between signatory regulators.[3] For these regulators, the MMoU is a conduit designed to increase information flows (e.g., transfers of brokerage and beneficial ownership records, depositions, and testimony) and extend enforcement capabilities (e.g., restraining orders that freeze assets, reduce defendant flight risks, force the identification of accounts, and prohibit destruction of critical documents).[4]

The MMoU is not a treaty but rather a cooperative arrangement structured as a *statement of intent.* As such, the MMoU is neither ratified by national legislatures nor approved by executive branches; any disputes that arise from it cannot be arbitrated by (international) courts.[5] Legal scholars are thus skeptical of its effectiveness (Zaring, 2010; Cadmus, 2011), much as they are skeptical of other policy coordination using "soft law" methods (Klabbers, 1996, 1998; Raustiala, 2005).

I begin by studying securities regulators' cross-border enforcement capacities. Using the staggered introduction of the MMoU as a set of potential shocks to cooperative capacity, I find that the US Securities and Exchange Commission's (SEC) enforcement of US-listed foreign firms is around three times as likely when the firms' home country regulators are linked to the SEC by the MMoU.[6] This suggests that the MMoU helps catalyze enforcement, despite its lack of legal force.

Next, I broaden the scope to a global sample and show that the MMoU enhances equity market liquidity. Cross-border shares whose co-supervising (home and host) regulators are united by the MMoU experience an 18%—35% reduction in spreads, depending on the model specification. This finding is consistent with the MMoU fostering effective cross-border cooperation and enforcement, which in turn reduces the risks reflected in liquidity.

Finance and accounting research has paid attention to cross-border enforcement, particularly at the SEC, since the bonding hypothesis was conceived in 1999. This hypothesis proposes that investors in foreign firms benefit from the enhanced disclosure and shareholder protection that accompany a U.S. listing (Coffee, 1999; Stulz, 1999). A key to the hypothesis is the idea that the threat of enforcement deters malfeasance, which reduces agency conflicts and thereby creates value. However, some authors challenge the plausibility of the hypothesis, on the grounds that cross-listed firms face lower and less strict standards of SEC oversight than U.S. firms (Frost and Pownall, 1994; Frost and Kinney, 1996; Siegel, 2005). Licht et al. (2018) suggest that legal obstacles and a laissez-faire approach lead to weaker SEC enforcement against cross-listed firms. Some authors even question

[2] Increased cross-border market activity is illustrated by market liberalization, new technologies (e.g., telephone and internet brokerage relationships), trading configurations (e.g., location-neutral electronic trading platforms), global consolidations of major stock exchanges (e.g., mergers between the NYSE and Euronext, between NASDAQ and OMX, and between the London Stock Exchange and the Borsa Italiana in Milan), mergers of broker-dealers, and initiatives like the European Union's directives, harmonization, and "passporting" efforts (Christensen et al., 2016; Meier, 2017).

[3] The MMoU document (revised in 2012) can be viewed here.

[4] Some capabilities—such as acquiring banking, brokerage, and beneficial ownership records and witness testimony under oath as well as removing impediments to cooperation such as secrecy laws and blocking statutes—are explicitly identified by the MMoU. For other capabilities, Section 7(a) of the MMoU simply suggests that signatories provide each other with the "fullest assistance permissible."

[5] In practice, even legally binding agreements tend to work very poorly across borders. See, for example, Supreme Court Justice Alito's commentary in the oral argument in *US v. Microsoft* (February 27, 2018), noting that, even under (enforceable) treaties, acquiring information requires months or more typically years—long enough for most cases to go cold. Ederington (2001, p.1580), speaking about legally enforceable contracts, states that "one of the challenges of international cooperation is the absence of a central authority to enforce the terms of an agreement." Such issues are magnified when the arrangement is, at its outset, known to be unenforceable.

[6] "Foreign" and "cross-border" describe ADRs, dual listings, and foreign firms listed only in the United States. I refer to firms or shares from different countries that are not listed in any other country as "domestic."

whether the *threat* of SEC enforcement exists for cross-listed firms (Licht et al., 2018; Siegel and Wang, 2013). Yet researchers have not investigated the frictions that lead to weaker SEC enforcement.

Multiple factors can constrain cross-border cooperation, which is often necessary for enforcement. Enforcement can be slowed by ad hoc examinations of requests or halted entirely by confidentiality provisions (e.g., blocking statutes and secrecy laws), dual criminality requirements (which stipulate that assistance is allowed only if the activities in question are illegal in both jurisdictions), or the need for a foreign regulator to have an independent interest in a matter. Even when cooperation occurs, a lack of competence or legal authority in a foreign counterpart can weaken cross-border enforcement.

The MMoU aims to address these issues by standardizing the protocols for cooperation. Dual criminality requirements, confidentiality provisions, and independent interest stipulations are not valid reasons for an MMoU signatory to refuse to cooperate. As a result, the arrangement improves access to local information (e.g., depositions and local regulatory correspondence), auditors (e.g., work papers), banks (e.g., account and transaction identification), brokers, and third parties (e.g., internet/telephone and purchase transaction records). In addition, IOSCO's rigorous assessment requires that applicants demonstrate the requisite legal authority and competence to comply with the arrangement.

Three novel properties of the MMoU setting enable me to draw strong inferences. First, its justification was to combat terrorist financing and money laundering after 9/11, yet its capabilities have direct implications for securities regulation. Unlike most regulatory regime shifts, its establishment is unrelated to market forces and therefore arguably exogenous to firms, investors, and even regulators. Second, because cross-border firms reside in one country (*home*) but trade in another country (*host*), an important linkage is formed when regulators in two countries are united by the MMoU. Importantly, these linkages create shocks to cross-border regulation that occur not only at different times for different countries but also at different times *within* individual countries. That is, the network formation creates a treatment that is staggered in three dimensions, because the links jointly depend on a firm's (i) home-country joining date (ii), host-country joining date, and (iii) time. To my knowledge, this is the first network-created treatment of its kind. Third, in the liquidity analyses, purely domestic observations serve as a counterfactual (benchmark). I compare the liquidity of cross-border (treated) shares with that of domestic (untreated) shares that are exposed to otherwise similar circumstances (in the same country, at the same time), while controlling for industry and liquidity-related fundamentals. These comparisons are made both before and after the MMoU links home and host regulators. This constitutes a triple difference-in-difference design.

These unusual factors—(1) arguably exogenous shocks, (2) these shocks occurring in a three-dimensional stagger, and (3) within-country benchmark shares in a triple diff-in-diff design—yield persuasive inferences about the MMoU's market effects. To affect my inferences, a correlated omitted variable would have to do more than affect the liquidity of a country at a point in time (as occurs with changes in, say, business cycles or laws); it would have to affect certain subsets of treated shares (but not have the same influence on domestic shares) at the precise times when the MMoU links the treated shares' co-supervising regulators. A variable with such specific characteristics seems unlikely.[7]

This is the first empirical study of interactions between securities regulators, and it contributes to the literature in four ways. First, it illuminates cross-border enforcement of securities laws, an increasingly important topic as markets globalize. The literature contends that identifying cross-border frictions and regulators' management of those frictions is critical (Austin, 2012) and—due to confidentiality provisions of the MMoU and the opacity of regulators—empirically challenging (Cadmus, 2011). For almost four decades, cross-border enforcement has remained a black box whose inner workings are obscure even to experts. By documenting a link between enforcement outputs and the MMoU, this study establishes that cross-border cooperation helps catalyze enforcement.[8] Historically, cross-border frictions appear to have limited the SEC's tactics and information. These frictions—and not deliberate indifference—may have led to fewer cross-border enforcement actions. This matters for the bonding literature, which views a U.S. listing as promoting better oversight but struggles to determine whether increased oversight *actually* occurs.

Second, this paper shows that the MMoU is associated with large, measurable reductions in transaction costs. These reductions vary from country to country and between country pairs, and I use this variation to explore factors that condition the MMoU's impact (as inferred from liquidity). I find evidence that country-level legal paradigms (e.g., common vs. code law), laws (e.g., blocking statutes), and economic factors (e.g., economies of scale, and reciprocity) influence the magnitude of the liquidity improvement in predictable ways. These analyses demonstrate that the effect is broader than just the US (and UK)—which indicates that the MMoU is an effective global instrument. The results offer new insights and reinforce the conclusion that cross-border cooperation, made possible by the MMoU, is a key determinant of the cost of liquidity provision.

Third, I establish the appeal of the MMoU setting and develop its institutional details. The MMoU appears to have been politically motivated by the events of 9/11 and is arguably exogenous to the firms and perhaps even to the securities regulators themselves. This property, together with the within-country staggered design, makes this an attractive setting for studies seeking exogenous variation in regulatory enforcement.

Finally, the MMoU's association with enforcement suggests that it is an effective policy tool, despite being legally nonbinding. On the surface, this association might seem unsurprising, since enhanced enforcement is the MMoU's aim. But because cooperation is entirely unenforceable, there exists considerable skepticism regarding the MMoU's effectiveness.

[7] Note that this design substantially reduces the likelihood that various types of endogeneity, including the timing of MMoU entry, explain my findings.

[8] Silvers (2016) identifies the expansion in cross-border SEC enforcement and speculates that cross-border cooperation played a role in more frequent enforcement, but provides no tests that could separate these efforts from the effects of the Sarbanes-Oxley Act, SEC budgetary increases, or regulatory preferences.

Thus, the MMoU's association with enforcement is relevant to parties seeking new soft law transnational regulatory networks, enhanced cooperation, or policy convergence.

2. Background and research design

2.1. Cross-border enforcement

The literature lacks consensus on whether public oversight can affect contracting and monitoring costs, but many authors argue that it can (Coffee, 1984; Easterbrook and Fischel, 1984; Zingales, 2009). When *cross-border* oversight is considered, the discussion centers on the bonding hypothesis, which views cross-listing in the US as a way to credibly signal to investors a firm's commitment to enhanced disclosure, governance, and minority shareholder protection (Karolyi, 2006, 2012). Other literature questions the benefit of regulation and the legitimacy of the bonding hypothesis. Several papers contend that public regulators are unnecessary, incapable, corrupt, or swayed by powerful industries and lobbyists (Coase, 1960; Stigler, 1964, 1971; Posner, 1974; Peltzman, 1976). If anything, regulatory shortcomings are magnified in cross-border contexts. More recently, bonding-theory critics have acknowledged valuation benefits associated with secondary listings in the US, but ascribe them to factors other than legal protections, mainly because they view cross-border enforcement as too rare and dysfunctional to provide benefits (Licht, 2003; Licht et al., 2018; Shnitser, 2010; Siegel, 2005).

2.2. Enforcement cooperation and information-sharing arrangements

Historically, the tools at the disposal of securities regulators in ad hoc cross-border cases—letters rogatory and mutual legal assistance treaties (MLATs)—were fairly blunt instruments. Letters rogatory are precatory petitions, written by local courts, asking foreign courts to supply information or act on behalf of the requesting court by taking or preventing a legal action based on diplomatic incentives. Requests involving more egregious crimes (human trafficking, murder, etc.) often take priority over requests for securities investigations, but even the "successful" requests must crawl through diplomatic channels, which can take years (Swire and Hemmings, 2015). MLATs can provide criminal enforcement agencies a legal right to information or allow them to extradite criminals, but only under certain conditions. Investigations by securities regulators tend to be civil in nature, and regulators often lack a statutory analog of the alleged crime, which is a common precondition for invoking an MLAT. In sum, letters rogatory and MLATs are cumbersome tools with uncertain efficacy (especially in securities regulation). This helps explain why cross-border efforts during the 1980s and 1990s were protracted, costly, and generally ineffective.

These sorts of difficulties led regulators to seek new ways to facilitate and institutionalize cooperation. This was initially done by signing *bilateral* memoranda of understanding (MOU)—nonbinding (soft law) arrangements that expressed an *intent* to cooperate. Ironically, the early bilateral arrangements routinely acknowledged that both parties lacked the legal authority to share information, but expressed intentions to obtain such authority in the future (Fedders et al., 1984; Levin, 1985; Grassie, 1987). Unlike a treaty, an MOU is not enforceable, so the risk of counterparts not upholding their pledge is high. It is thus not surprising that the effectiveness of MOUs has been questioned. Although the bilateral arrangements of the 1980s and 1990s laid important groundwork for later efforts, academic research still criticized SEC enforcement against foreign firms during this period as "infrequent and ineffective" (Siegel, 2005). This view is consistent with the general skepticism about soft law expressed by prior research (Klabbers, 1996, 1998; Raustiala, 2005).

The terrorist attacks on September 11, 2001, generated widespread political support for information-sharing efforts, which led to an extraordinary exogenous change to cross-border enforcement capacities—the MMoU. Kempthorne (2013) states: "Regulators recognized the limitations to the current network of bilateral MOUs prior to the crisis, but it had not reached a critical point where securities regulators were willing to do something to address it. September 11 was that critical point."

The MMoU resembles the bilateral memoranda in that it seeks a similar objective (regulatory cooperation) and is not legally enforceable. But it arose for an extraordinary reason and is constructed entirely differently. Problems with ad hoc investigations led to the establishment of many bilateral arrangements, but it was 9/11—or, specifically, top-down political support for cooperation in the wake of 9/11—that motivated the MMoU. IOSCO (2014) explains that "the MMoU was developed by IOSCO following the events of 11 September 2001, when IOSCO created a Special Project Team to explore how securities regulators could expand cooperation and information sharing."

The MMoU facilitates cross-border enforcement by standardizing the acquisition and sharing of information, by specifying the scope of information gathering, and by defining the confidentiality and acceptable uses of the shared intelligence. These standards allow for an ex ante understanding of how cooperation will take place. Key components of the MMoU are its focus on the regulator's practical ability to provide assistance and its acknowledgement that regulators have widely varying grants of legal authority (Slaughter and Zaring, 2006). Unlike prior cross-border arrangements, which were often aspirational for one or both sides, the MMoU application process requires IOSCO to rigorously review the laws and institutions within each applicant nation to confirm the nation's legal capacity for swift cooperation.[9] Prior to admittance, applicants must remove any

[9] The MMoU application includes detailed questions related to the applicant's capability to obtain and share information. An IOSCO verification team, composed of securities regulators from around the globe, carefully reviews the answers to these questions and assesses applicants' ability to meet a high standard for assistance.

obstacles to cooperation, such as sovereignty issues (Nadelmann, 1993), governmental transparency initiatives (e.g., the Freedom of Information Act), foreign privacy laws that prevent evidence sharing with foreign counterparts (Savarese, 2015), and dual criminality requirements. They must also remediate blocking statutes or secrecy laws by legislating exceptions known as "gateways." After countries are admitted, the MMoU encourages them not only to comply with requests from other authorities but also to make reasonable efforts to provide *unsolicited* help when they possess potentially useful information. The MMoU's monitoring group provides an ongoing assessment of signatories' performance.

Sometimes applicants must change laws or regulations before they can sign the MMoU, and these changes may contribute to cross-border cooperation. Although the new laws or rules may narrowly predate the signing, the MMoU still motivates them, and their passage does not prevent the MMoU from serving as an instrument for identifying variation in cross-border cooperation. In fact, to the extent that local enforcement capacities simultaneously increase, cross-border enforcement might be less necessary, which would bias against my later findings.

Although the MMoU is soft law, IOSCO members have much stronger incentives to join the MMoU than to enter into bilateral arrangements (Van Cauwenberge, 2012). Unlike in bilateral arrangements, MMoU membership is all but required for participation in the global financial system: the IMF's Financial Sector Assessment Program and the Financial Stability Board each weigh MMoU membership when they consider a country's financial health, and IOSCO penalizes countries that are not part of the MMoU by revoking their IOSCO voting rights and membership (IOSCO, 2005). In most nations, a political motivation to stop money laundering and terrorist financing creates an important push for MMoU participation. One final incentive is that, by joining the MMoU, regulators can use the global support for IOSCO standards to justify needed changes to their laws.

Based on these factors, I propose that the MMoU breaks down significant cross-border barriers and increases the feasibility, in cost and logistics, of cross-border enforcement. My tests focus on SEC enforcement of U.S.-listed foreign firms. In recent decades, few changes have occurred in the basic structure of US securities laws, the SEC's approach to regulatory relief, and how the SEC's cases are made public, so there is a reasonable setting and reliable dataset to support empirical tests.[10] I expect that the application to the MMoU is associated with increased cross-border SEC enforcement.[11]

Although my enforcement tests focus on the SEC, there is evidence that the MMoU's effect on enforcement reaches beyond the commission. Anecdotally, securities regulators credit the MMoU for transforming their cross-border enforcement capacities (IOSCO, 2012). Ashley Alder, former CEO of the Securities and Futures Commission in Hong Kong and current chair of IOSCO, states: "The IOSCO MMoU is a widely used arrangement under which 121 securities regulators have agreed the basis on which they exchange information for the purposes of their enforcement mandates" (ESMA, 2019). Basic statistics from IOSCO and the SEC indicate that, in 2017, 4803 MMoU requests were made; of these, less than 600 were made by the SEC to foreign regulators (SEC Congressional Budget Justification, 2017). Clearly, other regulatory agencies are actively using the MMoU.

2.3. Capital market effects of enforcement cooperation

2.3.1. Important share type distinctions and structure of data

By using liquidity as an indicator of market quality, I can assess a global sample—not just firms registered with the SEC—in my tests of the MMoU on capital markets. There are two distinct effects of the MMoU, which affect different subsets of my sample. First are *market-wide* effects, which are common to all shares in a given country's market. These could occur because MMoU admission signifies that the country's regulator has met IOSCO's regulatory standards. Meeting these standards may have required legislative solutions to existing regulatory deficiencies, greater funding for regulators, or simultaneous efforts to cultivate capital markets. Increases in learning between regulators, dissemination of best practices, and regulatory convergence could also happen (Austin, 2012). All of these factors may strengthen markets generally; if they also affect liquidity, then the benefits should accrue to all share types. Consequently, changes that are contemporaneous with the MMoU—not to mention the signal provided by the MMoU admission itself—could affect the country's entire market.

Second are *cross-border* effects, which occur only for certain subsets of shares. Specifically, these effects should be limited to cross-border shares (shares of firms that have a listing outside their home market), and should occur when a link is formed between regulators in the relevant home and host markets. The cross-border shares of a given firm can either be *host* shares, which are listed in foreign markets,[12] or *home* shares, which are listed in a firm's home country. This distinction is important because host shares are the most exposed to both information and regulatory problems (for reasons described below).

[10] In contrast, other countries have changed their laws, evolved in their approach to regulatory relief, and often do not publicize enforcement outputs.

[11] Former SEC Chairman Donaldson highlighted the importance of the MMoU to the commission's enforcement efforts, saying, "The SEC has long recognized that international cooperation is vital to an effective enforcement program. The IOSCO (M)MOU is an important contribution to cross-border enforcement cooperation and a public statement that the world's securities regulators are committed to assisting one another in preventing and prosecuting violations of our securities laws. We are pleased to be a signatory to the (M)MOU and anticipate that this agreement will enhance our ability to obtain information valuable to our enforcement investigations." (SEC Staff, 2003).

[12] These could take the form of either American or Global Depositary Receipts ("ADRs" or "GDRs"), or regular (full) listings. I depart from the term "cross-listed," because cross-listed refers to the *firm*, not the *share*, and because shares that are exclusively listed in a foreign market are still considered host shares in my study.

Firms exclusively listed in their home market (non-cross-border shares) are hereafter called *domestic* shares and later serve as a baseline that should reflect any common within-country factors. This structure identifies effects of the MMoU that are common to all stocks in the country's market, as well as incremental effects found in cross-border (home and host) shares.

2.3.2. Cross-border regulatory cooperation and its relation to liquidity

Foreign assets offer investors benefits in terms of diversification or yield, but expose them to several risks. These risks arise in part because the regulatory deficiencies (described in Section 2.2) allow agency issues and information problems to proliferate. Therefore, cross-border regulatory gaps (and their resolution) have implications for liquidity.

Firms that pursue a foreign listing typically select host markets with more demanding standards of investor protection and disclosure than their home market requires. In these cases, exposure to the threat of sanctions from a stronger host market regulator is one way to credibly commit to better governance of the firm—thereby resolving agency conflicts and enhancing liquidity and firm value. This is the rationale for the bonding hypothesis. The ability for stronger host market regulators to substitute for weaker home market regulators depends partly on cross-border enforcement capacity—which, in turn, hinges on the assistance that regulators receive from foreign counterparts. When regulators cooperate, managers face a new threat of sanctions, which can increase transparency and constrain opportunism (for example, asset taking, fraud, or related-party transactions).[13] Therefore, the MMoU has clear implications for reducing the risks that arise from agency problems.

Information problems can arise because local investors, even ones who are not insiders, often have advantages over foreign investors in terms of the amount, precision, and timing of information (Gordon and Bovenberg, 1996; Brennan and Cao, 1997; Kang and Stulz, 1997; Bae et al., 2008). For example, lenders, customers, suppliers, analysts, market makers, brokers, journalists, and lawmakers often possess nonpublic, value-relevant information about the firm. This information diffuses into local environments before reaching foreign ones, which subjects foreign investors to adverse selection risks.

Cross-border trading can also raise issues outside the scope of classic bonding/agency problems. For example, host shares' bid-ask spreads are often wide, which makes them targets for price manipulation schemes fueled by bogus orders (pump-and-dump, spoofing, layering, etc.)., [14,15]

Gaps in the enforcement capacity of securities regulators magnify foreign investors' exposure to all of these risks. In purely domestic settings, a regulator uses the threat of enforcement to curtail behaviors that illegally exploit information advantages (and/or to return money to harmed investors). But cross-border regulatory gaps create safe havens for abuse. In fact, academics and practitioners argue that miscreants exploit cross-border regulatory vulnerabilities to evade scrutiny. In the absence of regulatory cooperation, cases of insider trading, asset taking, related-party transactions, front running trades, and market manipulation are unlikely to be prevented, discovered, or sanctioned.[16] For example, if regulators fail to cooperate, illegal insider trades can be strategically routed through foreign venues, which can conceal the trader's identity and diminish the chance of sanctions. This creates incremental adverse selection risks for host shares, because counterparties have a systematic advantage.

The tactics enabled by the MMoU should help protect investors from a variety of abusive practices. For example, the MMoU allows regulators to quickly identify, freeze, and repatriate ill-gotten gains regarding insider trading. It does so by promoting swift assistance in obtaining bank, brokerage, and beneficial ownership records and in executing temporary restraining orders that freeze assets, prohibit document destruction, or reduce flight risks.[17] A fast pace is critical, because pursuing insider-trading cases is futile once a trader absconds with the money. In addition, cases involving self-dealing and asset tunneling can be strengthened by intelligence about theft or questionable related-party transactions. Under the MMoU, this type of information can be obtained quickly from regulatory counterparts. The MMoU can also enable access to internet, telephone, and purchase records, which helps regulators establish the occurrence or content of communications between defendants. And it allows signatories to subpoena third parties and depose witnesses within other members' jurisdictions.

[13] Silvers (2018) provides evidence that cross-listed firms provide more transparent financial disclosure and less earnings management after the MMoU connects their home regulator to the SEC. Silvers' finding comports with those of Brockman and Chung (2003, p 927), who argue that the "legal-regulatory environment largely determines the quantity and reliability of publicly available information, particularly at the firm level." Greater transparency, in turn, should improve liquidity. Additionally, Lang et al. (2019) find that the MMoU changes the demand for owning US-cross-listed firms. Foreign investors in third-party countries (unaffiliated with the US or the home country) increase their holdings of US-cross-listed firms after the MMoU. Foreign ownership may prompt liquidity improvements (or vice-versa).

[14] For example, in Germany's (BaFin) investigation of suspicious trading of host shares of Dutch bank ABN Amro, the regulators identified a "comparatively wide bid-ask spread" between markets as something unscrupulous agents can exploit (BaFin, 2007, p. 182–183).

[15] In addition, host shares commonly have identical shares trading in other markets (that is, most have a corresponding home share that trades in the home market), and price formation is likely to occur disproportionately on the home exchange (Hauser et al., 2011). Host-country market makers thus face added risks from home-market informed traders, arbitrageurs, and competing market makers (who privately observe the arrival of information via trade demand by local investors with superior information) (Foucault et al., 2017). contend that prices of identical assets can temporarily diverge, because of differential shocks to an asset's value that derive from either (a) news arrival or (b) liquidity needs. News-based trades achieve profits at the expense of dealers who trade at stale quotes; such trades represent "toxic" arbitrage, because they consume liquidity and widen bid-ask spreads.

[16] For example, Austin (2014, p 41) suggests that perpetrators of market abuse structure their transactions in ways that deliberately conceal their actions and identity: "In the absence of an appropriate response by regulators it is clear that [cross-border changes to markets] have increased the opportunities for persons to engage in market abuse and their ability to hide such abuse from detection."

[17] Appendix A provides specific examples of various types of cases, from around the globe.

2.3.3. Firm versus share effects

The tactics and information access enabled by the MMoU provide a comprehensive change in regulatory capacity. This, in turn, helps regulators resolve issues both at the *share level* and the *firm level*. Share-level problems, such as market manipulation, insider trading, front running, arbitrage, and threats from competing market makers, create costs that are borne by specific counterparties in specific transactions in specific markets. Firm-level problems, including asset taking, disclosure, and related-party transactions, are agency related and harm all outside investors.

Host shares (cross-border shares listed in foreign markets) suffer from both firm- and share-level issues because adverse selection, information problems, and regulatory deficiencies are inherently more problematic in foreign markets. Foreign investors likely have higher sensitivities to, and lower tolerances for, the risks that the MMoU curtails. Thus, the effect of the MMoU should be strongest in *host* shares. Yet *home* shares (cross-border shares traded in local markets) may also experience certain benefits, including firm-level benefits and second-order effects such as increased competition for order flow from host markets, improved host-country capital-raising opportunities, and a more diverse shareholder base. Relative to *host* shares, however, *home* shares are likely to experience a less pronounced effect, because they are usually subject to fewer information problems and constraints on regulation (local regulators can typically supervise their own markets without cooperation from other regulators).

Some frauds combine several misdeeds and can mix share- and firm-level factors, such as when self-dealing is concealed through false or misleading disclosures.[18] Concealment and deception become more difficult under the MMoU. Ultimately, the MMoU is expected to deter malfeasance in ways that reduce the cost of liquidity provision, particularly for cross-border shares.

2.3.4. Cross-sectional factors that condition the magnitude of the liquidity effects

The cross-sectional tests focus on host shares because the effect of the MMoU should be larger and the cross-sectional effect should be more straightforward in these shares. In these tests, I assess country-level features that are likely to condition the liquidity effects of the MMoU linkages. These features, which are discussed in detail below, include regulatory strength, legal origins, laws that hinder information sharing, and economic motivations.

Although the MMoU requires all signatories to meet a threshold regulatory capability, signatories still vary in terms of regulatory strength (e.g., resources, skills, knowledge, and political leverage). Regulatory weakness could reduce the likelihood of cross-border cases being pursued, undermine the effectiveness of the MMoU, and limit the liquidity benefits.

Legal origins are also likely to affect the regulators' ability to cooperate. Prior work views legal origin as an important determinant of property rights, dispute resolution, and shareholder protection (La Porta et al., 2008). In the context of this paper, legal origin is important not only as a surrogate for legal strength but also as a way to understand the *compatibility* between the rules of paired countries. For example, common law countries are familiar with compelled testimony and extensive pre-trial documents discovery, both of which can help regulators build cases. Civil law countries, in contrast, view such requests as unconventional and often deny them if their scope is too broad or poorly defined.[19] A shared legal lineage ensures analogous procedures, doctrines, and standards that can prevent incongruities in how courts treat evidence, discovery, and elements of civil violations. Thus shared legal perspectives could aid in regulators' cooperation and enhance the liquidity effect of the MMoU. Alternatively, the MMoU may be most important in cases where incompatibilities exist, as it could help regulators work around these differences.

Laws that explicitly obstruct the transmission of information could also influence the liquidity effect. For example, preemptive jurisdiction (blocking) statutes make it a criminal offense (often punishable with jail time) for citizens to provide information to foreign agents. These statutes aim to protect national interests and sovereignty, but in practice they deter cooperation. Many even prohibit foreign persons, including regulators, from requesting information from citizens or regulatory staff in a given country. This exposes the staffs of the both the requested and the requesting authorities to the risk of criminal liability as they pursue cross-border cases.[20] Secrecy laws pose a similar challenge. Austin (2014) argues that secrecy laws, by shielding the identities of the involved parties, make insider trading particularly hard to detect. Because the MMoU is designed to remedy blocking statutes and secrecy laws, the marginal impact of the MMoU may be higher in these instances.

Finally, economic motivations and economies of scale may also affect cooperation. Host countries may invest more in understanding the nuances of home country laws and may work more closely with home country regulators when the host country investors make more frequent transactions in home country stocks. I call this an "economies of scale" argument, because it relies on host regulators spreading the (fixed) cost of assimilating the separate legal systems across more actual or

[18] Observing larger effects for host shares than home shares is not necessarily evidence that the MMoU is primarily a share-level effect. Home and host shares have different spreads to begin with, and could be subject to complex interrelationships (e.g., better disclosure at the firm level leading to reduced market manipulation—a share-level issue).

[19] For example, depositions are executed very differently in civil law jurisdictions. Questions must often be submitted in writing in advance of the deposition, and are administered by magistrate judges. Cross-examination is often not permitted. Defendants may not be permitted to be present. All of this creates a very unfamiliar process for those trained in a different legal regime. This can be problematic because common-law judges in many jurisdictions require sufficient similarity in the style of deposition for testimony to be admissible in court proceedings.

[20] Therefore there is considerable deference to such laws unless regulators are intimately familiar with, and have a high level of confidence in, how to properly circumvent them. My interactions with the regulatory community suggest that they are keenly aware of the personal and professional risks posed by blocking statutes.

expected interactions. In the other direction, greater trading by home country investors in a host country's market may result in leverage for the host market to acquire information. Conceptually, this dynamic captures reciprocity, which could shape the impact of the MMoU. In fact, formal requests for assistance between regulators commonly refer to reciprocity by name, and authorities often remind counterparts of recent examples where their roles were reversed and the requesting authority provided assistance.

3. The association between the MMoU and enforcement

3.1. Enforcement: sample

To test for changes in enforcement, I use data from Compustat and CRSP as well as from four other sources: IOSCO (for the MMoU), the SEC's website (for bilateral SEC arrangements and data describing enforcement actions against US-listed foreign firms from 1995 to 2010), and the Stanford Class Action Clearinghouse (for data on private litigation). The sample contains all US-listed foreign firms that satisfy the data requirements (described below). This includes cross-listed, dual (full) listings, and foreign incorporated firms that are exclusively listed in the United States. The final sample is a panel of 14,592 total firm-years (1652 unique firms over 16 years).

The SEC has taken 172 enforcement actions against 173 firms (1.19% of the firm-year observations). The data related to SEC enforcement actions were hand-collected. I define enforcement actions in an economic sense—as interventions by the SEC that aim to correct or punish firms or individuals for misreporting, insider trading, or aiding and abetting other firms in the perpetration of fraud, inter alia. The bulk of these events are litigated proceedings or settled cases for alleged violations of securities laws. SEC-prompted restatements without accompanying litigation are also included. Appendix B describes the sample of SEC actions in detail.

Table 1 describes the sample across 59 countries (Panel A), 10 industries (Panel B), and 16 years (Panel C). Panel A reports that, of the 59 countries with a U.S.-listed foreign firm, 38 have applied to the MMoU by the end of the sample period. The fifth column reports, by country, the percentage of firm-year observations that are subject to SEC enforcement actions (1.19% of firm-years, overall). In Panel D, the enforcement actions are described based on the type of alleged infraction: insider trading, financial reporting, Foreign Corrupt Practices Act (FCPA), and miscellaneous. Miscellaneous includes alleged violations, such as option backdating, aiding and abetting other firms, and improper loans or compensation to officers.

3.2. Enforcement: empirical design and results

3.2.1. Enforcement: main tests

Univariate evidence is consistent with the idea that the MMoU enhances cross-border enforcement. Table 2 shows the frequency of SEC enforcement directed towards U.S.-cross-listed firms, partitioned by the MMoU. Prior to the MMoU, 0.63% of the firm-years are subject to enforcement actions. This rises to 1.92% after the MMoU, a roughly three-fold increase that is economically and statistically significant ($p < 0.01$).

When formally testing this relationship, it is important to control for other factors associated with enforcement. I thus apply the private litigation model of Kim and Skinner (2012), which uses explanatory variables from Compustat and CRSP (page 9). This model preserves a maximum number of observations, making it ideal for the current setting. To predict litigation, it uses industries with historically high litigation rates, firm size, percentage change in sales, share turnover, equity returns, and distributional properties of returns (skewness and standard deviation). These variables are defined more precisely in the appendix. The descriptive statistics in Table 3 show notable differences between MMoU and non-MMoU observations in many of these litigation-related factors. To help rule out changes in malfeasance as an explanation for changes in SEC enforcement across time and countries, I follow Silvers (2016) by including an indicator for private litigation within the previous five years. I also include indicator variables for single- and secondary-bilateral arrangements.

Model (1) below is estimated using logistic and linear regression and takes advantage of the *two-dimensionally* staggered design illustrated in Fig. 1, panel C.

$$SEC\_ACTION_{it} = \alpha_0 + \alpha_1\, MMoU\_FILE_{it} + \alpha_2\, BILAT_{it} + \alpha_3 2nd\_BILAT_{it} + \alpha_4 CLASS\_ACTION_{it} + \alpha_5\, HI\_LIT_{it-1} + \alpha_6 SIZE_{it-1} + \alpha_7 PCT\_CH\_SALES_{it-1} + \alpha_8 RETURN_{it-1} \alpha_9 SKEW_{it-1} + \alpha_{10} RET\_STD_{it-1} + \alpha_{11} TURNOVER_{it-1} + \varepsilon_{eit} \quad (1)$$

SEC_ACTION is an indicator equal to 1 when the SEC files an enforcement action and 0 otherwise. *MMoU_FILE* is an indicator equal to 1 when the MMoU is filed by the firm's home regulator and 0 otherwise. My expectation is that the coefficient on α_1 will be positive and significant.[21] I report the descriptive statistics for these control variables in Table 3 and provide their

[21] Positive coefficients on α_2 and α_3 would similarly indicate an increased likelihood of SEC enforcement for firms from foreign countries that have single- and secondary-bilateral arrangements with the SEC.

Table 1
SEC enforcement samples.

Panel A: Sample firms by country

	MMoU	Firm-Years	Pct. Firm-Years	Enforcement Actions	Pct. Firm-Years w/enforcement	Unique Firms
Antigua And Barbuda	–	10	0.07	–	–	1
Argentina	–	175	1.20	–	–	19
Australia	**1**	284	1.95	3	1.06%	35
Austria	**1**	12	0.08	–	–	1
Bahamas	–	50	0.34	–	–	5
Belgium	**1**	45	0.31	4	8.89%	7
Belize	–	12	0.08	–	–	2
Bermuda	**1**	860	5.89	16	1.86%	106
Brazil	**1**	169	1.16	2	1.18%	18
British Virgin Isl.	**1**	260	1.78	2	0.77%	36
Canada	**1**	4590	31.46	37	0.81%	496
Cayman Islands	**1**	521	3.57	–	–	90
Chile	–	235	1.61	1	0.43%	25
China	**1**	222	1.52	6	2.70%	27
Colombia	–	5	0.03	–	–	1
Curacao	–	44	0.30	–	–	3
Denmark	**1**	61	0.42	2	3.28%	6
Dominican Republic	–	8	0.05	–	–	1
Finland	**1**	71	0.49	–	–	8
France	**1**	397	2.72	7	1.76%	40
Germany	**1**	288	1.97	13	4.51%	32
Ghana	–	7	0.05	–	–	1
Greece	**1**	42	0.29	1	2.38%	5
Hong Kong	**1**	122	0.84	2	1.64%	15
Hungary	**1**	15	0.10	–	–	1
India	**1**	150	1.03	–	–	16
Indonesia	–	46	0.32	1	2.17%	5
Ireland	–	311	2.13	3	0.96%	33
Israel	**1**	1223	8.38	9	0.74%	133
Italy	**1**	167	1.14	8	4.79%	17
Japan	**1**	471	3.23	5	1.06%	39
Jersey	**1**	43	0.29	–	–	4
Jordan	**1**	5	0.03	–	–	1
Korea	**1**	129	0.88	–	–	15
Liberia	–	68	0.47	–	–	6
Luxembourg	**1**	142	0.97	–	–	15
Marshall Islands	–	166	1.14	–	–	29
Mexico	**1**	359	2.46	6	1.67%	39
Netherlands	**1**	486	3.33	13	2.67%	50
Netherlands Antilles	–	34	0.23	–	–	3
New Zealand	**1**	55	0.38	–	–	8
Norway	**1**	61	0.42	1	1.64%	8
Panama	–	68	0.47	1	1.47%	7
Papua New Guinea	–	14	0.10	–	–	1
Peru	–	22	0.15	–	–	2
Philippines	–	37	0.25	–	–	4
Poland	**1**	4	0.03	–	–	1
Portugal	**1**	27	0.19	–	–	2
Puerto Rico	–	5	0.03	–	–	1
Russia	–	48	0.33	–	–	5
Singapore	**1**	88	0.60	–	–	9
South Africa	**1**	146	1.00	–	–	16
Spain	**1**	111	0.76	1	0.90%	10
Sweden	**1**	136	0.93	1	0.74%	19
Switzerland	**1**	288	1.97	20	6.94%	24
Taiwan	**1**	79	0.54	1	1.27%	7
Turkey	**1**	12	0.08	–	–	1
United Kingdom	**1**	1066	7.31	7	0.66%	138
Venezuela	–	20	0.14	–	–	3
Total	**38**	**14,592**	**100.00**	**173**	**1.19%**	**1652**

(*continued on next page*)

Table 1 (*continued*)

Panel B: Sample by industry

	Firm-Years	Pct. Firm-Years	Enforcement Actions	Pct. Firm-Years Enforcement
Agriculture, Forestry, and Fish	102	0.70	0	0.00%
Construction	107	0.74	2	1.87%
Finance, Insurance, and Real Estate	1636	11.27	30	1.83%
Manufacturing	5568	38.37	69	1.24%
Mining	2177	15.00	12	0.55%
Public Administration	119	0.82	11	9.24%
Retail Trade	248	1.71	8	3.23%
Services	1985	13.68	17	0.86%
Transportation & Public Utilities	2339	16.12	18	0.77%
Wholesale Trade	311	2.14	6	1.93%
Total	**14,592**	**100.00**	**173**	**1.19%**

Panel C: Sample by year

Years	Firm-Years	Pct. Firm-Years	Enforcement Actions	Pct. Firm-Years Enforcement
1995	674	4.62	2	0.30%
1996	811	5.56	5	0.62%
1997	880	6.03	2	0.23%
1998	904	6.20	4	0.44%
1999	995	6.82	7	0.70%
2000	994	6.81	2	0.20%
2001	979	6.71	6	0.61%
2002	949	6.50	12	1.26%
2003	950	6.51	11	1.16%
2004	958	6.57	14	1.46%
2005	965	6.61	24	2.49%
2006	963	6.60	17	1.77%
2007	948	6.50	23	2.43%
2008	909	6.23	13	1.43%
2009	868	5.95	17	1.96%
2010	845	5.79	14	1.66%
Total	**14,592**	**100.00**	**173**	**1.19%**

Panel D: Enforcement subject matter

Enforcement Actions	
Insider Trading	52
Financial Reporting	75
FCPA	20
Miscellaneous	26
Total	**173**

Panel A reports 14,592 firm-years and distinct firms in the enforcement sample, by country, for observations from 1995 to 2010. Panel B reports the same data by industry. Panel C reveals the occurrence of enforcement events by year, and Panel D breaks down the sample by subject matter. Additional details about the enforcement sample are provided in Appendix B.

Table 2
SEC enforcement by governing arrangements.

	Firm-Years	Enforcement Actions	Percent with enforcement
No MMoU	8292	52	0.63%
MMoU	6300	121	1.92%
Total	14,592	173	1.19%
MMoU- No MMoU comparison			
Marginal difference			1.29%***
Marginal Ratio			3.06

This table reports observed proportions of SEC enforcement, measured using the percentage of firm-years with an enforcement action. There are two conditions of multilateral arrangements (firm-years governed by the MMoU and firm-years not governed by the MMoU). To understand these differences, I also present marginal differences and ratios. *, **, and *** denote significance at the 10%, 5%, and 1% levels for a two-tailed difference in proportion, respectively.

expected sign in Table 4. Thirty-eight of the 173 firms do not have the data required to estimate model 1 and must be discarded from the multivariate analyses.

In Table 4, test 1 indicates that enforcement is significantly more likely after a firm's home regulator applies to the MMoU; this is true even after controlling for factors that could influence SEC litigation rates. The coefficient on *MMoU_FILE* of 1.03 ($p < 0.01$) indicates that, after home regulators pledge to share information, the odds ratio is 2.79, meaning firms are 279% as likely to be the subject of SEC enforcement action (after controlling for other factors). This finding is consistent with the

Table 3
Descriptive statistics.

	All			No MMoU			MMoU		
	N	Mean	Std	N	Mean	Std	N	Mean	Std
SEC_ACTION	14,554	0.01	0.11	8277	0.01	0.08	6277	0.02***	0.14
MMoU_FILE	14,554	0.43	0.50	8277	0.00	–	6277	1.00***	–
BILAT	14,554	0.71	0.45	8277	0.64	0.48	6277	0.81***	0.39
2nd_BILAT	14,554	0.10	0.30	8277	0.11	0.31	6277	0.09***	0.29
CLASS_ACTION	14,554	0.05	0.22	8277	0.03	0.17	6277	0.08***	0.27
HI_LIT	14,554	0.16	0.37	8277	0.16	0.37	6277	0.17**	0.37
SIZE	14,554	6.74	2.83	8277	6.58	2.64	6277	6.95***	3.05
PCT_CH_SALES	14,554	5.45	3.86	8277	5.98	4.10	6277	4.78***	3.48
RETURN	14,554	0.06	0.62	8277	0.05	0.63	6277	0.08***	0.62
SKEW	14,554	0.24	0.82	8277	0.26	0.83	6277	0.22***	0.81
RET_STD	14,554	0.14	0.09	8277	0.14	0.09	6277	0.14***	0.08
TURNOVER	14,554	0.01	0.28	8277	0.01	0.25	6277	0.01***	0.32

This table presents descriptive statistics for the sample that has the required information for prediction of SEC enforcement. All 14,554 firm-years are shown on the left; the 8277 firm-years unaffected by the MMoU are shown in the middle; and the 6277 firms are shown on the right. *, **, and *** denote significance of the difference in means between the MMoU and non-MMoU subsamples at the 10%, 5%, and 1% levels for a two-tailed difference in proportion, respectively.

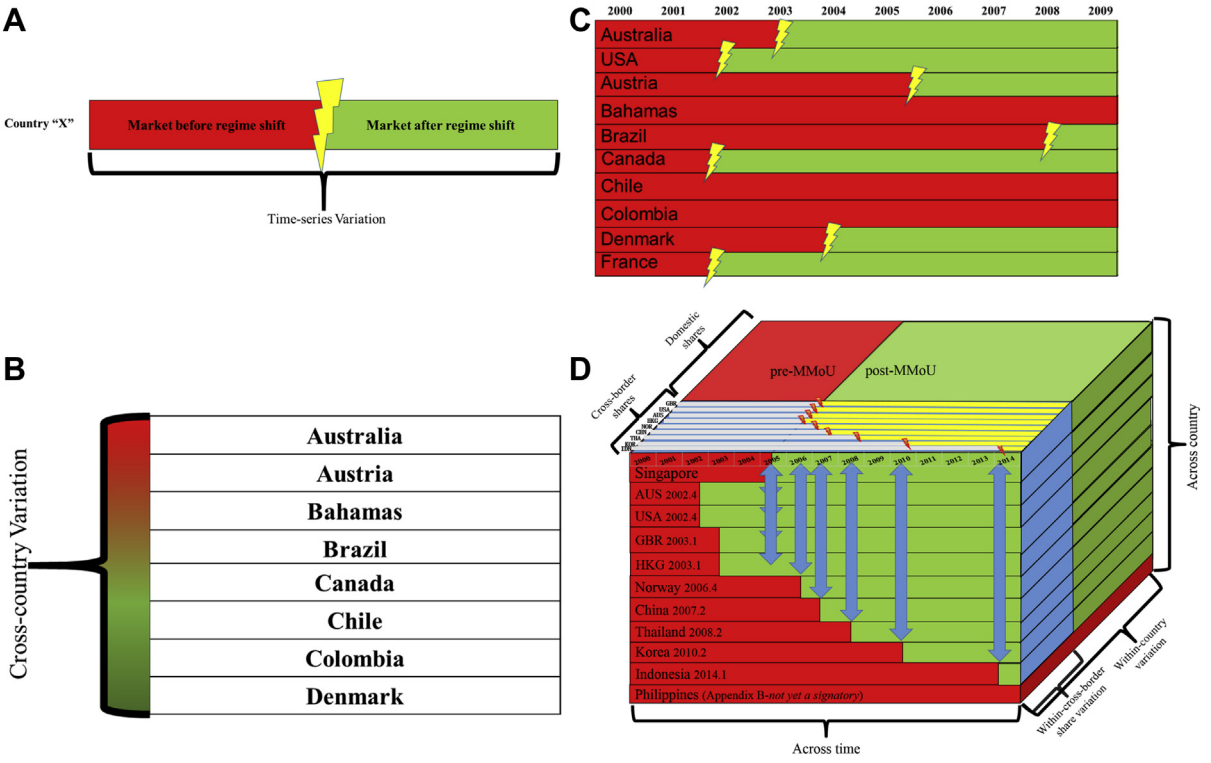


Fig. 1. Research designs. This figure describes the types of research designs often used in studies of regulation, enforcement, and new laws or mandates. These figures are for illustrative purposes only. They do not necessarily reflect the exact dates of MMoU adoption, nor do they accurately depict the fraction of a given country that is cross-listed or the relevant origins of the cross-listed firms. **A:** Across time. Pre-vs. post-event comparisons of a shock to a given country at a point in time. **B**: Across countries. Comparisons of countries across a range on a given dimension (e.g., indices for governance, legal strength, or enforcement). **C**: Two-dimensional time-series/cross-sectional. Shocks are staggered across (occur at) different times in different countries but are common to all firms in a given country (see Section 3.2 *Enforcement*). **D**: Three-dimensional (my design). Shocks are staggered in three dimensions, creating variation across time, home country, host country, and within home and host shares. Singapore illustrates the design below, with host shares in blue, and the treatment (which occurs at different times) in yellow. Note that Table 5 presents this information about the timing of the shocks for the entire sample. . (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

MMoU reducing cross-border regulatory frictions. In general, the control variables from Kim and Skinner (2012) are consistent with the expected sign (although size is the only consistently significant predictor).

Other specifications show that the inferences remain the same when controlling for country and time factors. Tests 2 and 3 use logistic regression and a linear probability model, respectively. Each includes country and year fixed effects. Both tests indicate a significant increase in the probability of SEC enforcement after the MMoU. Note that, when using these fixed effects,

Table 4
Probability of cross-border enforcement.

Parameter		(1)		(2)		(3)
		Mainresult		Country & year FEs		Linear Probability Model (country & year FEs)
		Estimate	Odds Ratio	Estimate	Odds Ratio	Estimate
MMOU_FILE	+	1.03***	2.79	0.78***	2.18	0.84***
BILAT	+	−0.16	0.85			
2nd_BILAT	+	1.13***	3.09			
CLASS_ACTION	+	1.38***	3.96	1.37***	3.92	3.37***
HI_LIT	+	0.12	1.13	0.01	1.01	0.02
SIZE	+	0.17***	1.19	0.18***	1.20	0.13
PCT_CH_SALES	+	0.00	1.00	0.00**	1.00	0.00
RETURN	−	0.26	1.30	0.24	1.27	0.15
SKEW	−	−0.08	0.92	−0.02	0.98	−0.01
RET_STD	+	3.23***	25.24	3.23***	25.16	2.82**
TURNOVER	+	0.15	1.16	−1.44	0.24	−0.03
Intercept		−7.33***		−12.73***		−2.07
N		14,554	(135)	14,554	(135)	14,554
Country FEs		N		Y		Y
Year FEs		N		Y		Y
Pseudo-R^2/R^2		0.14		0.17		0.03
Area Under ROC Curve		80.3		80.9		*

This table presents the results from regressions with SEC enforcement as an indicator dependent variable (set equal to 1 for firm-years with SEC enforcement actions, 0 otherwise). Columns 1, 2, and 4 present logistic regressions. The third column presents a linear probability model (with coefficients multiplied by 100). The sample includes all foreign firms listed in U.S. markets (described in Table 1). Because most of the variables of interest are binary indicators, odds ratios are reported for the logistic regression. The control variables in the model come from Kim and Skinner (2012) and are defined in Appendix B. I also include indicators for the MMoU, bilateral arrangements, secondary bilateral arrangements, class action litigation in the previous five years, and key interactions of interest. Standard errors are double-clustered by country and year. Because several indicator variables are used, I apply penalized maximum likelihood to the logistic regressions to reduce coefficient bias due to quasi-complete separation (Firth, 1993; Heinze and Schemper, 2002). *, **, and *** denote significance at the 10%, 5%, and 1% levels for a two-tailed test, respectively.

I drop the bilateral arrangement indicators. I do this because very few countries engage in new bilateral arrangements with the SEC during the sample period.

3.2.2. Enforcement: robustness and identification tests

The internet appendix Tables I–IV presents a battery of additional tests (e.g., simulations and counterfactually shifting the true MMoU dates) that provide evidence consistent with the increase in enforcement corresponding to the precise times and places predicted by the MMoU. The results persist when I use constant samples, which rules out the effect of a changing sample composition.

In theory, countries that join the MMoU early could differ systematically from ones that join late. However, the timing of an applicant's MMoU admission often depends on fairly esoteric laws about capacities to gather and share information with other countries, and these laws do not appear to partition countries on market development.[22] I find that countries that join later in the sample period experience increases of similar magnitudes to those that join early. When I exclude firms whose home country joins the MMoU in 2002, 2002–2003, 2002–2004, and so on, the likelihood of enforcement is similar to the late-joining and early-joining countries. This helps rule out the possibility that the results are concentrated in certain countries in ways that could indicate more sophisticated endogeneity.

The inferences are also similar when potentially influential subsamples have been removed. For example, when I discard observations from two countries that account for the largest fractions of the sample—the United Kingdom and Canada—or from the other seven countries in the G8, the results barely change. Likewise, removal of observations from the banking, insurance, and real estate industries yields similar estimates.

The tests cannot achieve the same standard as a randomized experiment, but the attributes of the setting suggest that the MMoU's shock to cross-border oversight capabilities is plausibly exogenous.

4. The association between the MMoU and liquidity

4.1. Liquidity: sample

Next, I examine the potential for cross-border enforcement to affect the cost of liquidity provision. For the liquidity assessment, I expand the sample to all World Federation of Exchanges shares that Datastream identifies as equity and that have the information required to estimate model (2) (described below in Section 4.2) from the first quarter of 2000 to the

[22] In addition, there is some unpredictability to the verification-processing time. This could relate to the quality of the application, the workload of the verification team members (who have full-time jobs as regulators in their own markets), or idiosyncratic reasons.

second quarter of 2014. Market data on returns, market value, quoted bid-ask spreads, and volume come from Datastream.[23] To be included, a share must be listed on a regulated exchange, have an ISIN number (or an equivalent), and have a nonmissing value for total assets in the current year (to ensure that it produces accounting data).[24] I identify cross-listed shares via Datastream and use data from JP Morgan and the Bank of New York ADR websites as of January 13, 2016. The MMoU dates come from the IOSCO website.[25]

The staggered design relies on sufficient variation in the linkages between regulators, in terms of both time and country. Table 5 presents the MMoU date for each country (using three-digit abbreviations). Countries begin entering the MMoU in October 2002 and continue to join throughout the sample period.[26] The table is configured as a *matrix* that tabulates the number of unique host shares, reporting the home country ('*j*') across the top and the host country ('*i*') on the left, so that each cell represents an '*i-j*' country pair.

To illustrate how robust the linkage variation is across country pairs and time, I organize the countries by the quarter in which they signed the MMoU on both the home and host dimensions (instead of alphabetical sorting). This setup conveys the variation in the timing of the shocks to cooperation in my sample. Each first-time shock for country pairs is coded with a different color, so connected colors experience the shock at the same time. The treatment varies substantially across time and country—enough to promote strong identification. Finally, the table indicates considerable separation in linkage dates, even *within* the same column (home country) or row (host country).

Table 6 provides separate descriptive statistics for the full sample as well as for the domestic, home, and host share subsamples. Home and host shares constitute 3.9% and 5.3% of the share-quarters in the sample, respectively. There are more host share observations (59,661) than home share observations (43,980) because i) cross-listed firms can have cross-listings at one or more exchanges, and ii) some firms are listed only in a foreign market (with zero home shares).

Following prior research, I measure liquidity using the quarterly averages of the daily bid-ask spread (Christensen et al., 2013, 2016).[27] The bid-ask spread is one dimension of liquidity that should be sensitive to the risks described in the previous section. Descriptive statistics reported in Table 6 comport with previous research. Spreads range from less than 1%−19% of the share price and are, on average, narrower for home shares (1%) than for host shares (2%) and domestic shares (3%). Home shares are roughly two times more liquid than host shares; this supports the intuition that, on average, adverse selection and informational risks are greater in host shares.

4.2. Liquidity: empirical design

The next tests evaluate the association between the MMoU and liquidity. I use quoted bid-ask spreads as a proxy for transaction costs (an inverse proxy for liquidity). Bid-ask spreads—the difference between market makers' posted buy and sell quotations for a quantity of shares—compensate market makers for adverse selection (as well as order processing, inventory holding, and other costs) (Glosten and Milgrom, 1985). An important indicator of market quality, bid-ask spreads should narrow whenever investor-perceived risks decline (demonstrating enhanced liquidity). In the setting of the MMoU, such a decline would occur when regulatory enhancements improve a firm's information environment and reduce the risk of trading against informed investors. To test my expectation that the MMoU improves liquidity, I estimate a model based on prior literature, notably Christensen et al. (2013, 2016). Shown below, model (2) uses a quarterly time interval, which balances the need to discern the timing of the liquidity-MMoU association with the need to accurately measure liquidity.

$$log(BAS) = \beta_0 + \beta_1 Home + \beta_2 Home * Link + \beta_3 Host + \beta_4 Host * Link + \sum_{k=1}^{K} \beta_k Controls + \sum_{l=1}^{L} \beta_l Fixed\ effects + \varepsilon. \quad (2)$$

The model allows for separate effects across the home and host shares, as outlined in Section 2.3.1. I expect home and host shares to be influenced by the linking of securities regulators. In the model, indicators for home and host shares capture their unconditional effects, relative to domestic shares (i.e., non-cross-border firms). (Depending on the model used, these indicators are sometimes subsumed by fixed effects, as described below.) The primary variables of interest capture the effects of linking regulators that cosupervise home and host shares, captured by β_2 and β_4, respectively. The *Link* variable is set equal to 1 when both the home and host regulators are MMoU signatories, and is essentially a post-treatment indicator. The

[23] I supplement this dataset with CRSP data for US-listed shares.

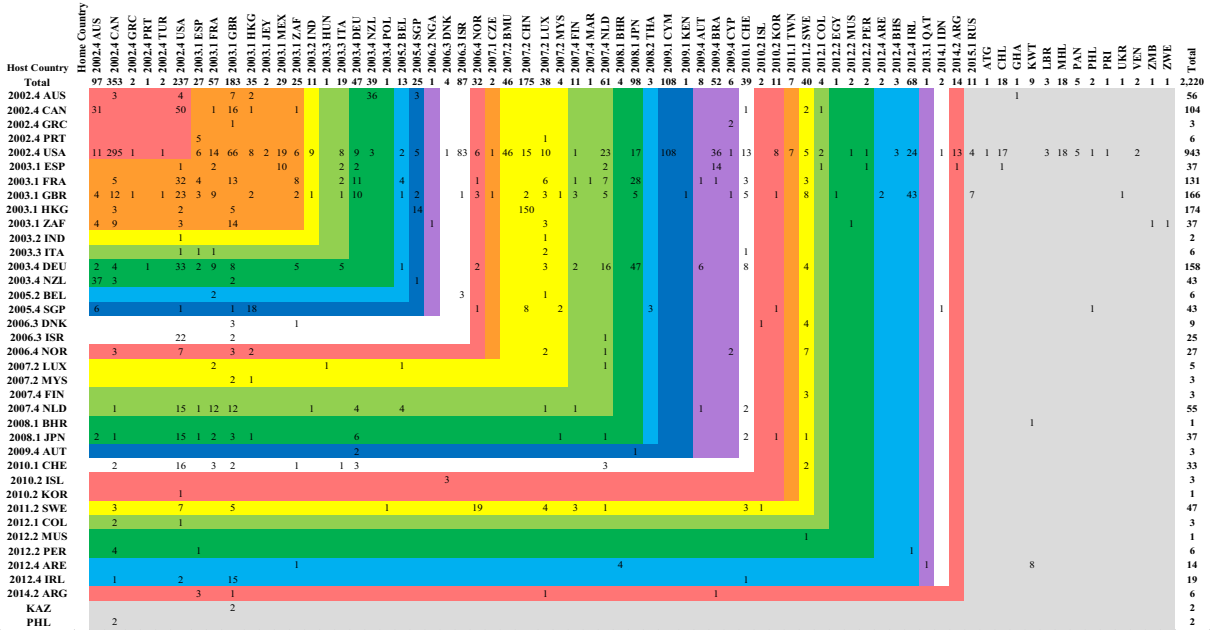
[24] Because I intend to test for public oversight, I exclude "unlisted" shares, whether sponsored or unsponsored, since they do not have the same regulatory oversight or filing requirements. (These shares are generally trading in OTC markets, alternative/growth boards, traded-not-listed boards, or multilateral trading facilities.) Details about separating listed and unlisted shares, along with Datastream coverage issues, can be found in Appendix C.

[25] For the interested reader, Internet Appendix Table VI describes the 1,128,392 share-quarters by country (Panel A) and by year (Panel B). Panel A shows wide variation across countries, while Panel B shows wide variation across time, both for the fraction of the sample affected by the MMoU and for the links between regulators connected by the MMoU.

[26] There is no obvious clustering in the timing of the MMoU adoptions; nor is adoption obviously correlated with the liquidity-related events documented previously (e.g., changes in country-level enforcement, EU directives, or IFRS (Christensen et al., 2013, 2016)).

[27] Daily bid-ask spread is the difference between the daily closing ask and the bid divided by the midpoint. I discard daily spreads that are negative or greater than a third of the midpoint. To minimize the influence of extreme observations, all continuous variables are winsorized at the 1% tails. This captures the price concessions required to execute a trade within a short period (Bessembinder and Venkataraman, 2010) and is frequently used as a proxy for market quality.

Table 5
Host share matrix.



The table presents a matrix of all 2,220 host shares in the sample. It presents the pairwise listings between host (row) and home (column) countries and uses different colors to illustrate the timing of the initial linkage, where connected colors all experience the linkage shock at the same time. It may be helpful to start by looking at one row (host market) at a time.

Table 6
Descriptive statistics.

	FULL SAMPLE							DOMESTIC (non-cross-border)						
	N = 1,128,392							N = 1,024,751						
	MEAN	STD	P1	Q1	MEDIAN	Q3	P99	MEAN	STD	P1	Q1	MEDIAN	Q3	P99
BAS	0.02	0.04	0.00	0.00	0.01	0.03	0.19	0.03	0.04	0.00	0.00	0.01	0.03	0.19
ln(BAS)	−4.45	1.25	−6.86	−5.4	−4.5	−3.52	−1.64	−4.42	1.25	−6.86	−5.4	−4.5	−3.52	−1.64
frac_vol	0.95	0.19	0.48	1	1	1	1	0.98	0.09	0.48	1	1	1	1
ln(Market value$_{t-4}$)	5.13	2.15	0.45	3.5	4.87	6.24	9.81	4.91	1.99	0.45	3.5	4.87	6.24	9.8
ln(Turnover$_{t-4}$)	3.85	2.16	−1.16	2.53	4.15	5.45	8.06	3.96	2.06	−1.15	2.53	4.15	5.45	8.06
ln(Return variance$_{t-4}$)	−6.24	0.53	−6.87	−6.63	−6.39	−6	−4.33	−6.24	0.53	−6.87	−6.63	−6.39	−6	−4.33
	HOME							HOST						
	N = 43,980							N = 59,661						
	MEAN	STD	P1	Q1	MEDIAN	Q3	P99	MEAN	STD	P1	Q1	MEDIAN	Q3	P99
BAS	0.01	0.03	0.00	0.00	0.00	0.01	0.13	0.02	0.03	0.00	0.00	0.01	0.02	0.19
ln(BAS)	−5.01	1.13	−6.77	−5.86	−5.23	−4.3	−1.97	−4.58	1.25	−6.7	−5.61	−4.61	−3.68	−1.67
frac_vol	0.77	0.3	0.01	0.57	0.94	1	1	0.43	0.42	0.00	0.01	0.29	0.96	1
ln(Market value$_{t-4}$)	7.53	2.33	1.93	5.84	7.77	9.42	10.76	7.07	2.46	1.38	5.23	7.11	9.13	10.76
ln(Turnover$_{t-4}$)	4.46	1.67	−0.58	3.62	4.89	5.6	7.28	1.42	2.66	−3.21	−0.39	1.71	3.31	6.58
ln(Return variance$_{t-4}$)	−6.35	0.46	−6.86	−6.67	−6.48	−6.17	−4.55	−6.27	0.5	−6.84	−6.63	−6.42	−6.06	−4.42
link	0.61	0.49	0.00	0.00	1	1	1	0.61	0.49	0.00	0.00	1	1	1

This table reports the descriptive statistics for the bid-ask spread and independent variables used in subsequent tests. The top left panel describes the entire sample. The top right panel describes domestic (noncross-border) shares. The bottom panels describe the two types of cross-border shares (home and host). Home shares are the primary listings that have shares cross-listed in other countries and are sometimes called primary or parent shares. Host shares—sometimes called cross-listed, foreign, dual, or secondary shares—are either subsidiary listings to a home share or listings outside of a firms' home market that trade on a host exchange. I report the raw and log-transformed values for *BAS* (the quarterly mean of the closing asking price minus the closing bid, divided by the midpoint). *ln(Market value$_{t-4}$)*, *ln(Turnover$_{t-4}$)*, and *ln(Return variance$_{t-4}$)* are lagged and logged values for market value, turnover, and return variability, respectively. Continuous variables are winsorized at the 1% tails.

uninteracted indicator does not appear in the model, because, as described later, I include country-quarter fixed effects. (*Link* would be a linear combination of these fixed effects.) Therefore, the design represents a generalized (triple) difference-in-difference approach.

To elaborate, the β_2 coefficient allows me to compare the difference between the bid-ask spread of home and domestic shares *before* the MMoU to the difference between the bid-ask spread of home and domestic shares *after* the MMoU. That is, β_2 represents the *change* in the *difference* between the bid-ask spread of home and domestic shares that occurs with the MMoU linkage. A negative β_2 coefficient indicates a narrowing of spreads, relative to what takes place for the benchmark domestic shares. β_4 analogously represents the *change* in the *difference* between the bid-ask spread of host and domestic shares that occurs with the MMoU linkage. Thus both β_2 and β_4 compare cross-border shares to a benchmark (domestic shares) that should not be exposed to cross-border problems or their resolution via cooperation. Because domestic shares are the referent group for both home and host shares, I pool them in the same regression for parsimony. Although the design has more dimensions of variation than most empirical studies, the interpretation is that β_2 and β_4 represent the effect of the MMoU linkage for *home* and *host* shares, respectively, relative to domestic shares in the same market at the same time.[28]

The continuous control variables are size, turnover, and return variance from the same quarter in the previous year; all are known determinants of liquidity. The literature proposes that liquidity issues related to venue trading preferences are an important determinant of valuation benefits (King and Segal, 2004). To control for these issues, I also include the share's fraction of total firm trading volume that takes place in a given quarter.

The primary tests use country-quarter fixed effects to identify the effect of cooperation using within-country variation in treatment events.[29] This explicitly controls for time-invariant country-level factors. It also controls for time-*variant* changes in a particular market that would affect all shares' liquidity, which may be the biggest threat to the validity of my inferences. Thus, the fixed effects should remove the liquidity effects of changes in monetary policies, economic cycles, IFRS, central counterparty clearing, laws, computerized surveillance, exchange rules, systems of spread measurement, etc., as well as any

[28] *Link* cannot be included by itself in the model because it will always be 0 for purely domestic shares. (Domestic shares do not have a second regulator and therefore cannot have linkages.) I do not use "effect coding" that compares home to domestic shares and host to home shares, because this would complicate the interpretation unnecessarily.

[29] Alternative fixed-effect structures offer different advantages: country and quarter fixed effects control for time-invariant characteristics at the country level as well as secular changes in liquidity, have low dimensionality, are consistent with many other cross-country studies, and allow for estimations of the broad effect of the MMoU on all shares (not just the effect of linkages on home/host shares). Country-quarter, plus home-country-quarter and host-country-quarter, control for time trends for home and host shares within each individual market (rather than assuming that time trends are common to all home and all host shares), at a point in time. Share and quarter fixed effects control for time-invariant determinants of liquidity at the share level and changing sample composition over time as well as for secular changes in liquidity. These and other specifications yield the similar inferences as the primary tests. For completeness, I present alternative fixed effect options in Internet Appendix Table VII.

market-wide regulatory improvements that are required by the MMoU. I include additional fixed effects for the treatment shares (home-quarter, home-country, host-quarter, and host-country fixed effects) to control for temporal and cross-sectional variation in the liquidity of home and host shares, respectively. I estimate standard errors clustered at the country level. Because there are only 58 clusters, this choice is more conservative than outcomes from other justifiable estimation techniques.

The treatment events are scattered across time and country, similar to the work of Christensen et al. (2013, 2016). This scattering reduces the likelihood of one or more concurrent events driving the results (a concern in many studies of regulatory, legal, or enforcement changes). Distinct features of the MMoU setting offer additional strength to the identification strategy. Foremost is that the treatment falls only on cross-border shares instead of on all shares in a country. This within-country variation adds a layer of complexity that reduces the likelihood of endogenous factors driving the results.

In Fig. 1, I illustrate my design and contrast it with others in the literature. My design exploits variation across time, across countries, and within country. The treatment employs all three sources of variation, so the shock is staggered in three dimensions (as opposed to being common to all firms in all countries at the same time or all firms in a given country at the same time). In addition, benchmark (domestic) shares—an enrichment of the within-country variation—help rule out the effects of possibly endogenous factors. These factors include observed and unobserved countrywide events that have been shown to affect liquidity (e.g., MiFID (Cumming et al., 2011), changes in enforcement (Christensen et al., 2013), International Financial Reporting Standards (IFRS) application (Daske et al., 2008), and European Union directives related to market abuse and transparency (Christensen et al., 2016; Meier, 2017)). None of these factors appear to be collinear with the MMoU, and all affect entire countries instead of only cross-listed firms. Therefore country-quarter fixed effects should control for these and other similar events.

4.3. Liquidity: results

4.3.1. Liquidity: main tests

Table 7 presents the results of estimating the log-linear model from Section 4.2. I begin with a subsample that includes only the treatment (home and host) shares. This ensures that any improvement measured in the full sample results from

Table 7
Liquidity effects of MMoU linkages.

	(1)	(2)
Description:	Treatment sample only	Main test (country-quarter plus additional FEs)
Sample:	Home and Host Shares	Full sample
Home	(Absorbed)	(Absorbed)
Home*link	−0.069*	−0.062*
	(-1.84)	(-1.80)
Host	(Absorbed)	(Absorbed)
Host*link	−0.292***	−0.433***
	(-3.80)	(-2.99)
Fraction of volume	−0.499	−0.360**
	(-5.89)	(-2.65)
ln(Market Value$_{t-4}$)	−0.230***	−0.294***
	(-17.10)	(-20.33)
ln(Turnover$_{t-4}$)	−0.190***	−0.194***
	(-11.38)	(-8.06)
ln(Return variance$_{t-4}$)	0.449***	0.298***
	(6.69)	(8.82)
Observations	103,641	1,128,392
Industry FE	Yes	Yes
Home-quarter FE	Yes	Yes
Host-quarter FE	Yes	Yes
Home-country FE	Yes	Yes
Host-country FE	Yes	Yes
Country-Quarter FE	No	Yes
R^2	0.746	0.746

This table reports the estimates of Model (2) on page 22. The dependent variable (bid-ask spread) is log transformed. *Home* is an indicator for shares that have affiliated shares cross-listed in other countries. *Host* is an indicator for host-listed shares. *MMoU* is an indicator for shares that are listed on an exchange whose regulatory agency has signed the MMoU. *Link* is an indicator variable equal to 1 when both the home and host regulators for a given cross-border share have adopted the MMoU. Several variables are subsumed as linear transformations of the control variables. Controls for size (year-lagged market value in US dollars), trading volumes (year-lagged turnover in US dollars), and (year-lagged) return variability are included as predictors of liquidity. Fixed effects that serve as controls are unreported. *, **, and *** denote significance at the 10%, 5%, and 1% level for two-tailed tests, respectively, using standard errors that are clustered at the country level.

changes in the treatment shares and not a deterioration in benchmark domestic shares' liquidity (which could be mistakenly interpreted as an improvement on a relative basis). Column (1) estimates the effect of the MMoU linkage using industry, home-quarter, home-country, host-quarter, and host-country fixed effects to control for cross-sectional and temporal variation in bid-ask spreads that are common to certain industries, as well as countries or periods (for all shares and within the groups of home and host shares, respectively). The MMoU's effect on home and host shares is estimated by the *Home*link* and *Host*link* coefficients, respectively. *Home*link* is −0.069* and *Host*link* is −0.292***, indicating that bid-ask spreads narrow when home and host regulators are linked. These changes represent improvements of about 6% for home shares and about 25% for host shares.[30] This provides preliminary support for the idea that the MMoU facilitates improvement in liquidity and that the largest improvements occur in host shares.

Because the treatment is staggered even within countries, the setting allows me to use domestic observations in the same market as a counterfactual (benchmark) and include *country-quarter* fixed effects to control for country-wide effects in liquidity. Column 2 shows that the estimates, when using this specification, are comparable to previous tests: they show 9% and 35% improvements for home and host shares, respectively. Note that the Internet Appendix Table VII deploys other fixed effect structures (described in footnote 28), each with different assumptions that rule out certain threats. The results from those tests are largely consistent with the inferences above, with fairly similar estimated magnitudes.

These results provide support for the idea that MMoU-enabled cross-border cooperation improves liquidity of cross-border shares. Home shares experience liquidity improvements of about 6–9%. Host shares experience larger and statistically stronger improvements, ranging from 25% to 35%. Note that the improvements to home and host shares are over and above the MMoU-related improvements for all shares in a market.[31] These results support the notion that because shares trading in a foreign venue are most exposed to information and regulatory problems, the MMoU most affects host shares.

To put these estimates in context, the effect for host shares is about twice as large as the effects for other capital market events on domestic shares reported by Daske et al. (2008), Cumming et al. (2011), and Christensen et al. (2013, 2016). This seems reasonable, given that host shares (i) start with wider spreads, (ii) are more likely to be exposed to expropriation risk, and (iii) are most deprived of regulatory oversight. The enhanced liquidity associated with MMoU links is consistent with investors perceiving value in public oversight (a key view of the bonding hypothesis). It cannot be explained by alternative causes such as market segmentation, competition in liquidity provision, or other firm changes that accompany a secondary listing, because the treatment is uncorrelated with these factors.

Finally, the control variables using firm-level characteristics (market value) and share-level characteristics (turnover and return variance) are comparable to prior research in sign, magnitude, and significance. A 1% increase in market value, turnover, and return variance is associated with changes of −0.29%, −0.18%, and 0.30%, respectively, in bid-ask spreads. And, not surprisingly, the fraction of total trading in a given firm that occurs in the share's market is associated with liquidity—a 1% increase in the fraction of trading decreases spreads by about 0.39%.

In sum, Table 7 shows that the MMoU linkages increase the liquidity of cross-border shares, with host shares improving the most. Although the magnitude of the effect varies slightly based on the fixed-effect structure, the implications of the results remain consistent. The effects are large and economically important but not implausibly so.

4.3.2. Liquidity: other tests

This section evaluates the parallel trend assumption and timing of the effect. To determine whether the parallel trend assumption is reasonable and to assess whether the improvements occur at the expected times, I plot bid-ask spreads in event time relative to the link dates. When assessing the timing, it is important to understand that the median time from a country's MMoU application to its MMoU signing is about 14 months, and that, during this time, countries sometimes pass new MMoU-related laws. When countries initiate joining the MMoU, market participants may observe changes in cooperative capacity and start to change their behavior and expectations in ways that affect spreads, leading to liquidity effects that predate the MMoU linkages. Following the linkage, market makers may further adjust bid-ask spreads if they observe changes in cross-border enforcement and update their expectations accordingly. This could generate effects that endure after the signing of the MMoU. Accounting for both of these timing issues, I expect the changes in bid-ask spreads to be *proximate* to the linkage dates and not sharp structural breaks centered at time zero.

To assess the parallel trends assumption, I plot the geometric mean of bid-ask spreads in event time for home and host shares.[32] I also plot various control groups (country, industry, and world spreads) to determine whether the treatment shares

[30] Transforming the coefficient to an economic interpretation requires the expression $\widehat{g} = \exp(\widehat{\theta}) - 1$, where θ is the coefficient estimate from the tables. The interpretation is that a one-unit change in the independent variable is associated with a $\widehat{g}$ percent change in the dependent variable (Halvorsen and Palmquist, 1980; Kennedy, 1981; van Garderen and Shah, 2002). When the independent variable is also in log form, the interpretation is that a 1% change in the independent variable is associated with a "θ%" change in the dependent variable. For interacted indicator terms, one can first add up the coefficients and then transform the sum of the coefficients to obtain estimates that are conditional on multiple indicators.

[31] Tests that do not use country-quarter fixed effects (reported in appendix Table VII) allow for an estimate of the MMoU on all shares in a market. They indicate a 7%–13% improvement, consistent with a market-wide effect described in 2.3.1, although they are not as well identified, given that omitted country-level factors may contribute to this result.

[32] Geometric means have several favorable properties for this setting, including the fact that the value represents the exponentiated arithmetic mean of the logged values—analogous to the transformations in the empirical tests. Also, geometric means strike a balance between being entirely unaffected by the information in extreme observations (as medians are) and overly influenced by them (as arithmetic means are).

exhibit parallel patterns in liquidity as domestic shares outside the event periods. The results in Table 7 indicate that these control groups, particularly the country group, may be partially treated by the MMoU. That is, the MMoU's standard-setting effect may create a bias *against* finding a result.

Fig. 2 presents *home* shares in Panels A and B and *host* shares in Panel C. Panel A shows that *home* shares have much lower bid-ask spreads than benchmark shares throughout the event-time period. Panel A's common y-axis compresses the variation in *home* shares, and the scales differ so much between groups that it is difficult to fairly evaluate the bid-ask spread behavior. Panel B reproduces the graph using a version with separate axes. It indicates a pattern of liquidity that, by and large, supports the parallel trend assumption. In terms of timing, bid-ask spreads for *home* shares begin to narrow three quarters before the MMoU linkage. This also appears to be the same point at which liquidity of the *host* shares diverges in Panel C (described below). The graphs should be interpreted with caution, however, because they do not account for other known predictors of liquidity or properly weight the observations.

The results for *host* shares, reported in Panel C, dovetail with the results in Table 7, showing that (i) the effect occurs proximate to the linkage and (ii) the parallel trend assumption seems reasonable. Spreads drop from roughly 115 basis points (1.15% of asset values) before the link to roughly 80 basis points (0.80% of asset values) afterward. Both before and after, *host* shares appear to support the parallel trend assumption, moving in tandem with all of the control groups. The effect appears to be proximate to the MMoU linkage, indicating a drop in bid-ask spreads that is concentrated in the three quarters before and after the event. That is, the departure from the other groups appears to begin about three quarters prior to the MMoU linkage and continue for another three quarters afterward. Outside of the treatment period, the liquidity pattern in the benchmark shares seems to match the pattern for treatment shares. Thus, the benchmarks seem to be a useful counterfactual, showing what might happen in the absence of the treatment (the MMoU linkage). Therefore country-quarter fixed effects appear to be a suitable way to control for unobserved heterogeneity in liquidity.

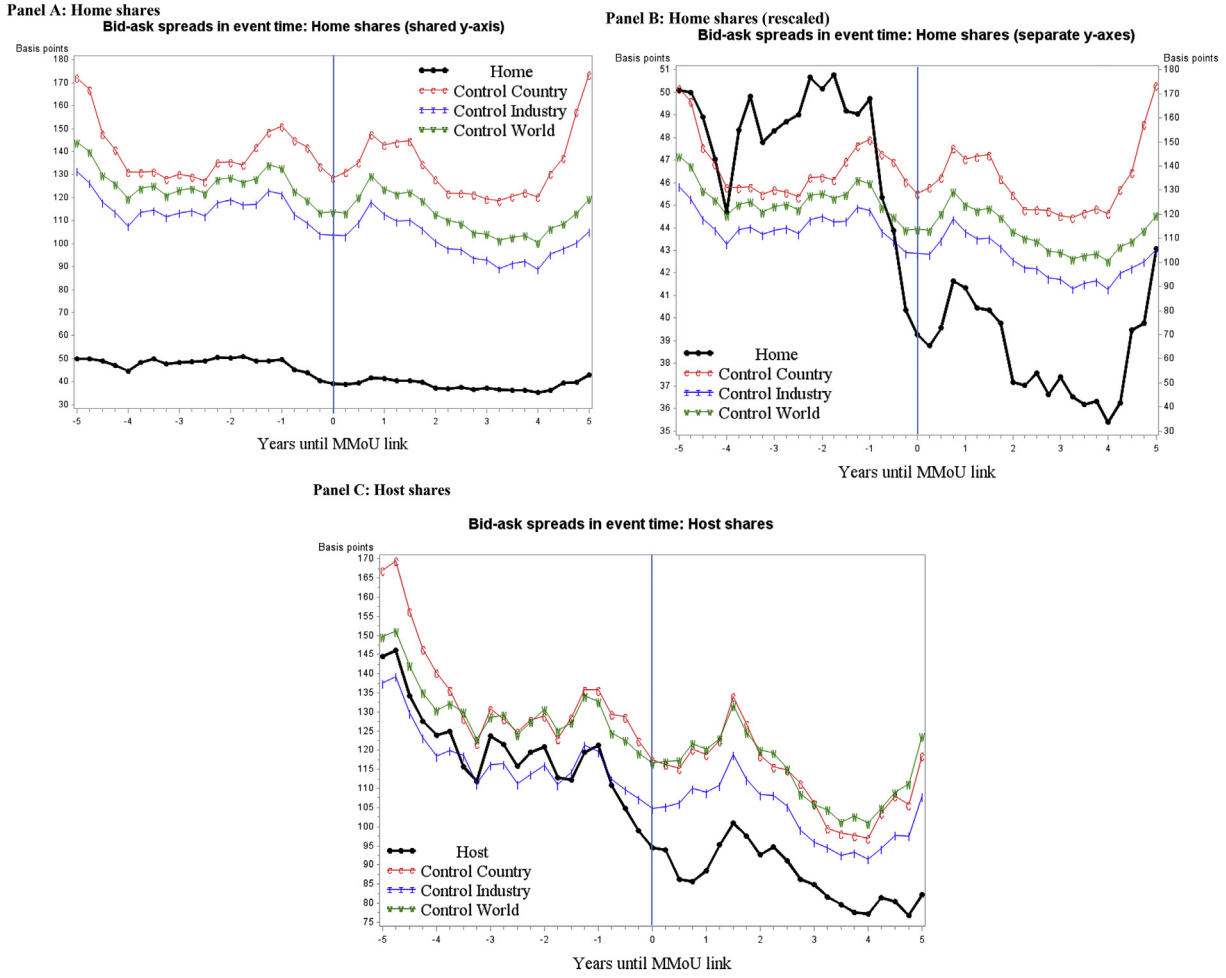


Fig. 2. Liquidity in event time. This figure presents the average bid-ask spread in event time (by quarter) for the treatment group (home or host, respectively) and three other groups (shares from the same country, same industry, or the entire world). Time '0' is the first quarter in which the MMoU links the home regulator to the host regulator.

Table 8
Cross-sectional tests of the MMoU's effect on liquidity.

LAW-Strength								
(1) Common Law		Home			(2) Disclosure Strength		Home		
		No	Yes	*0.23*			Low	High	*0.60**
Host	No	−0.12	−0.32**	*−0.20***	Host	Low	−0.21*	0.16	*0.37*
	Yes	−0.56***	−0.32**	*0.24*		High	−0.44***	−0.30	*0.14*
		*−0.44**	*0.01*	*−0.19*			*−0.23***	*−0.46*	*−0.09*
LAW-Attributes									
(3) Non-EU Blocking Statute		Home			(4) EU Blocking Statute		Home		
		No	Yes	*−0.66****			No	Yes	*−0.48***
Host	No	−0.44***	−0.53***	*−0.09*	Host	No	−0.44***	−0.83***	*−0.40****
	Yes	0.13	−0.01	*−0.14*		Yes	−0.35**	−0.25*	*0.10*
		*0.57***	*0.520****	*0.43****			*0.08*	*0.58****	*0.18*

This table constructs four 2 × 2 tables to understand the circumstances where the MMoU yields the largest (smallest) effects—one 2 × 2 for each of the four partitioning variables. The sample is the same as in Table 7, and all the control variables and fixed effects from Table 7 are included (but unreported for brevity). The numerical values represent the untransformed sums of the appropriate coefficients from regressions that include the control variables and fixed effects. The statistical significance of the pre- and post-MMoU differences for each cell and pairwise contrasts between cell differences (denoted in italics) are indicated using *, **, and ***, which denote significance at the 10%, 5%, and 1% levels for two-tailed tests, respectively, using standard errors clustered at the country level. No adjustments are applied for multiple comparisons.

In sum, these additional tests provide evidence that the liquidity effect occurs proximate to the treatment date.[33] They reveal no signs that omitted variables, time trends, or other violations of parallel trend assumptions distort my inferences.

4.3.3. Liquidity: country-level factors that condition the effectiveness of the MMoU

How much a linkage increases cross-border oversight and, in turn, liquidity may partly depend on country-level factors. As described in Section 2, I expect regulatory strength, legal paradigms, and impediments to cooperation to condition the amount of cross-border oversight—and the magnitude of the liquidity effect of the MMoU. Because the results are strongest and the theoretical arguments are clearest for host shares, the cross-sectional tests focus on these shares. I include a full set of interactions between the *link* variable and the various country-level variables. Because the scale of the variables is different, interactions of continuous measures can be difficult to interpret jointly. To simplify, continuous variables are first transformed into dichotomous variables that denote high (1) or low (0) on the various dimensions using a median split.

The MMoU's effect can then be observed in four different conditions, depending on home and host country attributes, both of which can take on yes/no (or high/low) values. The sum of the appropriate coefficient estimates is used to create a 2 × 2 table that reports the MMoU's liquidity effect in each of the four conditions. Table 8 reports the effect of the MMoU on host shares in each condition and provides statistical tests of the pre-versus post-MMoU differences as well as between-cell contrasts. This table identifies the conditions (cells) in which the MMoU provides the most (or least) benefit to cross-border shares. Note that this is a multivariate test that controls for the other factors in previous regressions (although those estimates are not reported in Table 8).

The first tests assess the strength of a country's legal systems, first using legal origins and then using disclosure quality measures. With respect to securities regulation, common law origins are often considered stronger than code law legal systems (LaPorta et al., 2008).[34] Legal origins split home and host countries into common law and code law origins, making up the four conditions. Several patterns are worth noting. First, host regulators with common law origins achieve greater improvements in liquidity, which is consistent with public regulation driving the results. The largest liquidity improvement, −0.56 (or about a 43% reduction), occurs when home markets are code law and host markets are common law—a result consistent with the bonding hypothesis. Furthermore, the tests shown in the top right and bottom left cells are consistent with the MMoU facilitating cooperation between countries with different legal customs. The only situation in which liquidity is unaltered is when both the home and host markets are code law. Unreported tests indicate that shares hosted by the US and UK contribute considerably to the common law results (as one might expect). Yet, the effects persist even after discarding US/UK-related observations. Thus, cross-border cooperation appears to be a truly global phenomenon (rather than confined exclusively to the US/UK).

A second measure of regulatory strength involves the disclosure requirements index (LaPorta et al., 2006). Like the previous tests, this measure yields the strongest result when the home market is weak—regarding disclosure, in this case—and the host market is strong. In contrast, when shares of firms from strong disclosure countries are listed in weak disclosure countries, the shares experience no significant changes in liquidity (although this could be an issue of low statistical power, particularly in the case of high home disclosure paired with high host disclosure strength). This makes sense, because firms from strong home markets are less likely to receive incremental oversight from a weak host regulator. These results add to

[33] Appendix Table VIII and its discussion explore the concept that bilateral arrangements also relate to transaction costs. Although there is some evidence that bilateral arrangements also condition the cost of liquidity provision, the inclusion of bilateral arrangements does not subsume the effect of the MMoU.

[34] The results are similar using the anti-self-dealing index (La Porta et al., 2006), rule of law index (LaPorta et al., 1998), case law as a source of law (David, 1973; LaPorta et al., 2004), and the World Bank's measure of the rule of law.

Table 9
Impact of economic motivations.

	[VAR] = Economies of scale	[VAR] = Reciprocity
	(1)	(2)
Home	(Absorbed)	(Absorbed)
Home*link	−0.000	0.015
	(-0.00)	(0.35)
Home*[VAR]	−0.000	0.003
	(-0.06)	(0.77)
Home*link*[VAR]	−0.008	−0.013***
	(-0.88)	(-2.80)
Host	(Absorbed)	(Absorbed)
Host*link	0.494	−0.362**
	(1.10)	(-2.64)
Host*[VAR]	−0.109***	−0.025
	(-2.71)	(-1.47)
Host*link*[VAR]	−0.089**	−0.014
	(-2.38)	(-0.99)
Fraction of volume	−0.343**	−0.361**
	(-2.54)	(-2.60)
ln(Market Value$_{t-4}$)	−0.294***	−0.295***
	(-19.85)	(-19.98)
ln(Turnover$_{t-4}$)	−0.193***	−0.193***
	(-7.75)	(-7.86)
ln(Return variance$_{t-4}$)	0.296***	0.297***
	(8.87)	(8.83)
N	1,129,721	1,129,721
Fixed effects	I, C−Y-Q	I, C−Y-Q
R^2	0.732	0.731
R^2-within	0.530	0.527

This table reports the estimates from tests that build on Model (2), including the controls described in Section 4.3.4. The dependent variables are in log form. *Economies of scale* is the log of host country portfolio ownership of home country stocks at year *t-1*. *Reciprocity* is the log of home country portfolio ownership of host country stocks at year *t-1*. Fixed effects are unreported. *, **, and *** denote significance at the 10%, 5%, and 1% levels for two-tailed tests, respectively, using standard errors that are clustered at the country level.

research showing that institutional features from firms' home markets continue to condition liquidity, even when those firms are cross listed within the same host country (Eleswarapu and Venkataraman, 2006).

The third and fourth tests involve a direct impediment to cooperation: blocking statutes.[35] The results indicate that blocking statutes strongly condition the liquidity effects of the MMoU. Improvements are largest where historically the most formidable obstacles to cooperation existed. Sections (3) and (4), show that the largest increases in host share liquidity occur when home regulators have blocking statutes and host regulators do not. The −0.53 estimate translates into a 41% reduction in spreads. When neither the home nor the host country has blocking statutes, liquidity increases by a smaller magnitude—about 35%. And when the *host* country has blocking statutes, the effect of the MMoU on liquidity is insignificant. This makes sense if countries with blocking statutes defer the pursuit of cross-border cases (even when the MMoU enables it), out of respect for privacy and sovereignty.

Overall, the tests show empirical support for the theoretical arguments presented in Section 2.3.4 and are consistent with cross-border cooperation being the mechanism driving the effect. Even so, these results come with the caveat that the identification of an attribute such as legal strength is imperfect and subject to substantial collinearity with other country-level measures (Isidro et al., 2016).

4.3.4. Liquidity: economic motivations

Economic incentives may also help determine the effectiveness of cross-border cooperation. I test for two such incentives: economies of scale and reciprocity. As a measure of economic incentives, I use annual portfolio ownership data from the IMF's Coordinated Portfolio Investment Survey (CPIS), which measures portfolio investment "involving debt or equity securities" (IMF, 2009, p110).

My economies of scale prediction is that, when the host country investors have more frequent transactions in home country stocks, the host country regulator will be more likely to work to understand the nuances of home country laws, since the (fixed) cost of this can be spread across more interactions. This exposure to a given market occurs when the host country's

[35] I classify the existence of blocking statutes using information from the Hague Evidence Convention and from various articles in the legal literature. This variable is tabulated in Internet Appendix Table VI.

ownership of the home country's securities is high. Therefore economies of scale is the log of host country portfolio ownership of home country stocks at year *t-1*.

In Table 9, the interaction of the *Economies of scale* variable with the *Home* (*Home*link*) indicator captures the cross-sectional variation in liquidity before (after) the MMoU linkages. The same structure is used to separately measure cross-sectional variation in the host shares. The coefficients on *Home*link*economies of scale* is small and insignificant. The *Host*link*economies of scale* estimate is significantly negative, indicating that a 1% increase in the amount of host country ownership of home market shares yields an incremental −0.089% reduction in spreads. This is consistent with economies of scale shaping the effectiveness of the MMoU.

Reciprocity may also come into play. When an authority deliberates whether to provide regulatory assistance to a requesting authority, reciprocity is often an explicit consideration. My prediction is that, when the home country has a high ownership of a host country's market, the host country can use this as leverage when it requests assistance from the home market regulator, based on reciprocity. Reciprocity is the log of home country portfolio ownership of host country stocks at year *t-1*. The effects are similar in magnitude for home shares (−0.013) and host shares (−0.014), but only the home shares reach conventional significance levels. Given measurement error, extensive fixed effects, and the interactions, failure to reach statistical significance is unsurprising. The results are broadly consistent with reciprocity helping determine the effectiveness of the arrangement.

5. Conclusion

This paper evaluates cross-border cooperation between regulators under IOSCO's MMoU. It examines the effects of this cooperation on enforcement capacity, then assesses how the observed changes in enforcement capacity affect the cost of liquidity provision. In doing so, the paper extends literature streams in economics, law, finance, accounting, and international relations.

It makes four major contributions. First, it illuminates an important but poorly understood topic: cross-border enforcement of securities laws. It shows that enforcement is significantly more likely for firms whose home and host regulators share information via the MMoU. This finding suggests that, by reducing cross-border regulatory frictions, interagency coordination and information flows can enhance enforcement. Second, it shows that cooperation enabled by the MMoU reduces the cost of liquidity provision. Cross-sectional tests reinforce the idea that the effects arise, at least in part, from remediation of cross-border regulatory frictions. Third, the use of the MMoU as a proxy for cross-border regulatory capacities seems sensible, and the research design reduces the likelihood of reverse causality or omitted variables affecting the results. This setting can therefore serve as a model for future studies that seek a better identification of the enforcement construct. Fourth, this paper shows that soft law has important consequences and helps identify factors that may determine its effectiveness.

These results are timely, given the rapid expansion in cross-border investment and the global interconnectedness of capital markets. They have implications for firms, markets, regulators, and investors and offer novel insights about how legal systems interact. An important caveat is that my study is not intended to capture the costs associated with the MMoU, which could be incurred by regulators, firms, broker-dealers, market makers, or certain investor classes. Nor does it consider social costs that could result when regulators have greater access to information and can more easily execute enforcement tactics. Such costs could include diminished financial privacy for individuals or an erosion of national sovereignty.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jacceco.2020.101301.

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Does regulatory cooperation help integrate equity markets?

By Roger Silvers*

Abstract: In this study, I test for the effect of cooperation between securities regulators on market integration. Cooperative arrangements between securities regulators enable enhanced cross-border enforcement, better regulatory decisions through learning and shared experiences, and reduced regulatory procedures and paperwork for cross-border activities. Cooperative arrangements are formed at different times between different country pairs, and each arrangement signifies enhanced cooperative capacity between the involved countries. When cooperative arrangements unite countries' securities regulators, cross-border investment between affected country-pairs increases by 11%. Asset-pricing tests reveal a shift in risk exposures from local to global market indices, consistent with enhanced market integration. Cross-sectional tests show patterns consistent with stronger effects in contexts where cooperation is likely to be effective and where the risks of exploitation and information asymmetry are likely to be greatest. Cross-border investment and market integration thus depend, in part, on regulatory counterparts working together to extend legal and institutional capacities across borders.

Keywords: cross-border cooperation, regulatory networks, integration, capital mobility

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I. Introduction

Theory suggests that global integration of capital markets provides important benefits. Cross-border investment helps firms raise more capital at lower costs while allowing investors to diversify their portfolios and access higher yields than in domestic markets (Grauer et al. 1976; Errunza and Losq 1985; Alexander et al. 1987). Yet investors still tend to significantly overweight local assets, leaving the benefits of international diversification partially unrealized, both for them and for firms (Karolyi and Stulz 2003). Multiple overlapping literature streams explore why investors forgo the benefits of diversification, and cite frictions such as capital controls, political risk, taxes, transaction costs, information asymmetry, and fear of expropriation.[1]

In domestic settings, securities regulators moderate many of these frictions as part of their mandate to facilitate capital formation, promote fair and liquid capital markets, and protect investors. Ideally, the regulators craft laws that target exploitative behaviors (insider trading, front running, cyberattacks, etc.) without introducing onerous requirements. Their policies extend to, and influence, areas such as disclosure requirements, political risks, purchase restrictions, information asymmetry, and transaction costs.

In cross-border settings, however, regulators' ability to unilaterally moderate such frictions is often limited. Regulatory requirements that are effective in one jurisdiction may, in conjunction with another country's requirements, prove burdensome, duplicative, and costly. In foreign jurisdictions, regulators have no legal right to acquire information or execute the tactics required for investigation and prosecution, and must turn to local authorities for assistance. In the past, regulators could expect little, if any, support from foreign counterparts, so the prospects for effective policy coordination or investigations were bleak. Wrongdoers who recognized cross-border regulatory gaps could, with virtual certainty, use them to evade repercussions. Thus, even between two countries with effective local regulation, market integration may depend (in part) on resolving the regulatory frictions between them.

In this paper, I study whether cooperation between securities regulators resolves cross-border investment frictions and thereby enhances market integration. I evaluate the

[1] Prior work frames global market integration in the context of asset pricing (Black 1974; Solnik 1974; Brennan et al. 1977; Stulz 1981; Dumas and Solnik 1995; Bekaert and Harvey 1995; Bekaert et al. 2002; Bekaert et al. 2011), cross-listing (Karolyi 2006; Lewis 2017), capital mobility (Feldstein and Horioka 1980; Gordon and Bovenberg 1996; Obstfeld and Taylor 2005; Bayoumi et al. 2015), foreign portfolio allocation (Adler and Dumas 1983; Stulz 1995; Brennan and Cao 1997; Portes and Rey 2005; Daude and Fratzscher 2008; Lane and Milesi-Ferretti 2008a, 2008b, 2017), home bias (French and Poterba 1991; Bekaert and Wang 2012; Coeurdacier and Rey 2013), and international capital flows (Chuhan et al. 1998; Alfaro et al. 2007; Edison and Warnock 2008; Coppola et al. 2019).

effects of regulatory cooperation on (i) investors' cross-border ownership, and (ii) firms' market-risk exposures to local and global indices in asset-pricing tests. To measure changes in cooperation policy, I exploit cooperative arrangements called "memoranda of understanding" (MoUs), which securities regulators use to address cross-border frictions. Regulators claim that such arrangements enhance enforcement capacity, improve regulatory decisions (by leveraging shared experience), and reduce administrative costs, which in turn builds "investor confidence" in foreign investment (SEC 2010). Consistent with this claim, I find support for the view that cooperation resolves frictions and promotes market integration. This, in turn, implies improved welfare for investors and firms.

An MoU is a reciprocal statement of intent to cooperate, collaborate, and share information in connection with regulatory and enforcement issues. Though not legally binding, MoUs address cross-jurisdictional legal incompatibilities and enhance various regulatory tactics between the involved nations (without requiring harmonization or convergence). MoUs improve cross-border enforcement across a wide range of cases and countries (Silvers 2020a). Thus, MoUs mark changes in cross-border capacities for pairs of countries at precise points in time, creating a complex treatment pattern that is staggered across time and country pairs. This unusual pattern helps me to identify the effect of cooperation policy from time-series variation in investment between pairs of countries.

An obvious concern is that, like any institutional attribute, cooperative arrangements could arise out of an endogenous process. To help mitigate this issue, I draw inferences solely from the International Organization of Securities Commissions' (IOSCO's) *Multilateral* Memorandum of Understanding (*M*MoU), because prior research concludes that the country-pair links formed by the *M*MoU are largely exogenous to investors, firms, and even regulators (Silvers 2020a). Typically, market forces dictate a regulator's policy agenda, and such forces may be the impetus for some or even most bilateral arrangements. The *M*MoU, in contrast, was created in response to the events of 9/11. Instead of being market-driven, the push for the *M*MoU came top-down from heads of state who were seeking to fight terrorism and terrorism-related money laundering. Thus, the *M*MoU's inception does not appear to have been market-driven. Another advantage to the *M*MoU is its wide participation, with 116 different countries forming over six thousand country-pair linkages (as of January 2020). Thus, each signatory has 115 connections with counterparts, formed at different times from 2002 to the present.

Several factors affect the timing of a country's *M*MoU admission. First, there is the

decision to join; this is generally dictated by geopolitical agendas over which market participants have minimal sway. Once this decision is made, the timing of admission depends on idiosyncratic factors such as the country's capacity to comply with *M*MoU standards and adeptness in remedying arcane laws against information sharing with foreign authorities. The workloads of the applicant country's staff and of the *M*MoU verification team members (who have full-time duties as regulatory staff members) may also affect the timing. In a given country pair, a link is formed only when regulators from both countries have been independently admitted to the *M*MoU. All of these factors indicate that the *M*MoU linkages are plausibly exogenous with respect to cross-border investment. Therefore, the *M*MoU setting provides insights into how cooperation impacts market integration.

My first analyses explore the effect of cooperation on market integration from the perspective of the *investor*. Exploiting the staggered country-pair shocks created by the *M*MoU, I examine foreign portfolio investment (FPI). The design compares time-series changes in FPI for a cooperating pair with time-series changes in FPI for a counterfactual benchmark (country pairs that share either the same investee or investor country as the treated pair). This is achieved using three-way fixed effects for (i) country pairs, to control for time-invariant country-pair characteristics; (ii) investee×time, to control for "pull" factors (unobserved changes in an invest*ee* country's economic conditions); and (iii) investor×time, to control for "push" factors (changes in outbound FPI that are common to all invest*ee* countries). This generalized difference-in-difference design also helps to rule out country-level omitted variables (e.g., laws, policies, domestic yields, or economic conditions), since these factors should affect investment to (or from) counterparts in a similar way. While bilateral MoUs capture the same theoretical construct as the *M*MoU, they are more likely to be subject to endogeneity concerns. Thus, I include them only as controls.

Although concerns about omitted variables and reverse causality cannot be ruled out, they are mitigated by the elaborate network-formed linkage pattern and features of the research design. To bias the estimates, an omitted variable would have to affect the treated country pairs at the times they experience the shock, without affecting the counterfactual country pairs (country pairs that include either the same investee or investor country).[2]

[2] Due to the multilateral nature of the *M*MoU, if a given country was enticed to enter by a single counterpart, the effect would be counteracted by 114 other linkages that are not subject to this bias. Thus, a single endogenous linkage would need to have an extraordinary magnitude to impart a substantial bias on the estimate. Multiple endogenous linkages would need to map onto a very unique sequence and timing across country pairs. This seems unlikely to occur. Similar arguments apply to reverse causality (e.g., joining the *M*MoU in response to investment), as regulators would need to reverse engineer the alignment of multiple events (many of which occur in the future, and are thus beyond the applicant's control) to impart a bias on the estimate.

Using Poisson pseudo-maximum likelihood (PPML) estimation (Gourieroux et al. 1984; Silva and Tenreyro 2006), I find that *M*MoU linkages are associated with an 11% increase in FPI, relative to the benchmark country pairs. This is consistent with regulatory cooperation resolving investment frictions that might otherwise prevent investors from diversifying their portfolios across borders. The scope of the effect is significant. Over the sample period from 2001 to 2017, the average FPI across all countries is $16.8 trillion. Thus, the 11% FPI increase that is attributable to cooperation policy equates to roughly $1.8 trillion. The effects are most consistent where cooperation is expected to be most effective (e.g., between countries with developed markets) and are largest where information and expropriation risks are pronounced (e.g., between country pairs that are geographically distant or that include one or more weak-rule-of-law countries). At the other extreme, I observe no effect in the observations where capital controls create binding impediments to investment. The bulk (78%) of the observed effect occurs in the year of the treatment, and placebo tests show that the result is unique to the precise sequence and timing of the *M*MoU.

An emerging literature on regulatory cooperation starts with Silvers (2020a), who shows that cross-border cooperation increases enforcement and enhances liquidity for firms cross-listed between participating countries. Because the enhanced enforcement resulting from the *M*MoU is a non-excludable public good, Lang et al. (2020) use the setting to test for a regulatory spillover resulting from US oversight. Specifically, they explore how US oversight affects investment in US cross-listed firms from third-party countries (countries unaffiliated with the US or the cross-listed firm's country), and find that mutual funds from third-party countries respond to the *M*MoU by reallocating their existing holdings in a country out of non-US-cross-listed and into US-cross-listed firms in the same country. From a country-level perspective, this exclusively within-country reallocation implies that cooperation is a zero-sum game, with no net effect on diversification, cross-country risk exposures, or market integration.[3]

Building on the idea that cooperation affects investors' preferences, I use a different research design and larger sample to answer a different research question: "Does market

[3] It might seem predictable that Lang et al.'s result would extend to cross-country changes, but a supplemental analysis in their paper explores this question and finds *no* cross-country portfolio reallocation. Lang et al. note that their test, constructed differently than mine, is prone to endogeneity from investee-country-level factors, and that their research design, outcome variable, and specification are ill-suited to identify net cross-country changes. My analyses do not focus exclusively on cross-listings and are therefore not subject to the firm-level data requirements that limit the Lang et al. sample to less than a tenth of total FPI. Aside from the obvious benefit of a larger sample, using the full sample of FPI also provides a more fully populated matrix of country-pair ownership. This enables three-way fixed effects that control for a variety of issues, including the investee-country-level factors that impair the Lang et al. (2020) inferences.

integration depend on regulatory cooperation?" The answer, as I described above, is yes. In addition, the increased cross-country diversification that I observe is likely to have country-level welfare effects due to improved global risk-bearing capacities and the consumption smoothing that occurs when savings are decoupled from investment (Feldstein and Horioka 1980; Sørensen et al. 2007). This extends Lang et al. (2020)—whose within-country reallocation implies no changes in integration or country-level welfare—by showing that their finding is just one aspect of a more comprehensive cross-country reallocation of ownership. Thus, my results reveal a distinct finding—enhanced integration.

The second set of tests explores market integration from a *firm's* perspective, using asset-pricing tests. Changes in market integration hinge on the extent to which the increased investment (described above) alters the marginal investor's pricing of an asset. Alexander et al. (1987) and Errunza and Losq (1985) suggest that cross-border ownership diversification enables firms to achieve a higher equilibrium price and a lower expected return than they would in a single segmented market. Their models imply that a shift from local pricing of a firm (signifying a segmented market) to global pricing of a firm (signifying an integrated market) should lead to changes in observed local and world market risk exposures (and also imply a reduction in the firm's cost of capital).

When a cross-listed firm's home and host country regulators cooperate via the *M*MoU, I find that global (local) risk exposures increase (decrease). Given that the price of local market risk should always exceed that of global market risk, this shift implies a reduction in firms' cost of capital. The effects are stronger where local legal infrastructures are weak. I also examine purely domestic firms, using the date their home country regulator enters the *M*MoU, and find that (on average) integration increases for large firms but not for small firms. Overall, the results suggest that the changes in ownership significantly affect the marginal investor (in all but the smallest firms in a country). This supports the idea of an increase in market integration and implies a reduction in firms' cost of capital.

This study contributes to the literature in three ways. First, my findings support the notion that cooperation policy resolves investment frictions and integrates capital markets. My key finding—that cooperation impacts both firms and investors and may have country-level welfare effects—advances several interrelated literatures on the frictions that lead investors to forgo the benefits of international diversification. By demonstrating that the ramifications of cooperation are larger and farther-reaching than was previously known, this paper also adds to a nascent literature on cooperation between securities regulators.

Second, this paper is related to two additional strands of the economics and finance literatures: one that stresses that a country's domestic institutional features define its suitability for foreign investment (Knack and Keefer 1995), and one that portrays institutional features as a country-level phenomenon (LaPorta et al. 1998; Acemoglu et al. 2001; Glaeser et al. 2004; LaPorta et al. 2008). Although legal systems—and therefore property rights, contract enforcement, judicial quality, and securities regulation—are organized at the country level, this study reveals that institutional aspects defined at the *country-pair* level significantly influence cross-border investment.

Third, this paper relates to the bonding hypothesis, which views foreign legal systems as a potential source of investor protection and firm value (Coffee 1999; Stulz 1999). In a general sense, I find support for this idea, yet my results challenge the maintained assumption, in prior work, that regulatory standards revert to the stronger of the two involved legal systems. I argue that, in practice, *interactive* coordination between securities regulators determines how well a firm can bond to a foreign legal system. Thus, investors' level of protection and firms' access to and cost of cross-border financing depend not only on a firm's decision to cross-list, but also on regulatory pairs' capacity and willingness to cooperate.

II. Background

A. Motivation and related literature

Cooperation helps institutional features transcend territorial boundaries, which can (i) enhance enforcement, (ii) improve regulatory decisions through learning and shared experiences, and (iii) reduce red tape. This increases "investor confidence" and makes investment more attractive to foreign investors (SEC 2010, p 4).

Absent appropriate enforcement, investors face significant risks when investing abroad. Kang and Stulz (1997) note that investors consider risks arising from information asymmetry and political uncertainty (e.g., confiscation of, or troubles repatriating, their foreign holdings) in particular. The risks arise because local investors possess information advantages, either through direct relations with firm insiders, such as managers, officers, directors, or controlling blockholders, or through proximity to outsiders who possess firm-specific information, such as lenders, suppliers, banks, customers, and politicians. Exacerbated by regulatory inadequacies, these advantages can lead to fraud and expropriation, which discourage foreign investment.

By promoting robust enforcement, cooperation can deter behaviors that unfairly take advantage of information asymmetry. Cooperation allows regulators to swiftly investigate insider trading, related-party transactions, cyberattacks, market manipulation, front running, and clearing and settlement failures.[4] If a foreign firm is cross-listed or multinational, cooperation between regulators can ensure the firm's compliance with applicable listing, auditing, and disclosure obligations. By resolving issues that prevent enforcement, cooperation deters abusive behaviors and allows for possible restitution if expropriation occurs. This makes investment more attractive to foreign investors.

Cooperation also allows regulators to benefit from a wider set of shared experiences in connection with common regulatory concerns. Regulators who are linked by the *M*MoU meet to deliberate both day-to-day issues and crises, and consult one another in IOSCO meetings, technical assistance programs, and ad hoc interactions. Their consensus building gives them leverage over lawmakers when the regulators seek the laws or authority to carry out their mandate in accordance with international standards. And their shared experiences may help them understand and encourage the appropriate policy response to FPI. For example, foreign capital inflows must be managed to avoid excessive currency appreciations that destabilize the broader economy (and ultimately threaten the viability of foreign investment) (Prasad et al. 2007). Closer interactions between regulators help facilitate this.[5]

Cooperation can also help reduce regulatory red tape and complicated or duplicative requirements, which are particularly burdensome for international market participants. For example, regulators can simplify compliance burdens on trade infrastructures by allowing ad hoc exemptions, modified requirements, waivers, or "substituted compliance" (the concept that the rules in a foreign jurisdiction, though technically different, are of sufficient quality to substitute for domestic requirements). By lowering the costs of foreign transactions for broker-dealers, central counterparties, transfer agents, and other back-end functions, regulators also reduce costs for investors transacting in foreign shares.

My focus on cooperation is based on the idea that cooperation will resolve multiple

[4] As examples of tactics requiring assistance, consider acquiring records (banking, beneficial ownership, brokerage, telephone, purchase, travel); serving a defendant; contacting witnesses and deposing them or compelling their testimony; pursuing restraining orders that prohibit destruction of documents or halt flight risks; and identifying, freezing, and repatriating ill-gotten assets.

[5] This relates to a literature on regulatory harmonization. Prior work evaluates efforts to harmonize aspects of markets, including common currencies (like the European Monetary Union) (Bekaert et al. 2013; Larch et al. 2019; Glick and Rose 2016), accounting standards (Yu and Wahid 2014), and laws regarding disclosure obligations and market abuse (Christensen et al. 2016)). Bekaert et al. (2013) is the only previous work focused on market integration. However, note that harmonization is neither the stated goal, nor the outcome, of the *M*MoU. Instead, the *M*MoU seeks to establish a mechanism to support cross-border cooperation across regimes—even ones with very different legal procedures and regulatory frameworks. Thus, cooperation should not be confused with harmonization.

frictions to foreign investment simultaneously (thus, I bypass a formal reckoning of the individual frictions responsible for fragmented markets). Enhanced enforcement should deter malfeasant behaviors, compensate harmed investors, and promote more symmetric information. Consultation between regulators should provide a richer set of experiences that help regulators arrive at better decisions. And reduced compliance costs should make ownership of foreign shares easier and less costly.[6]

Although prior work focuses on the importance of institutional features at the country level (Hall and Jones 1999; Acemoglu et al. 2001; Alfaro et al. 2004), the preceding discussion implies that, with respect to capital markets, cooperation represents an important institutional feature at the *country-pair* level.

Only recently has the literature begun exploring cross-border cooperation between securities regulators, but the findings to date are broadly consistent with the discussion above. Silvers (2020a), the first empirical study of international cooperation between securities regulators, provides comprehensive institutional detail about the history of cooperation, including the progression of information sharing and the use of cooperative arrangements. Although cooperation can take place through numerous mechanisms, including ad hoc requests, letters rogatory, and Mutual Legal Assistance Treaties, Silvers (2020a) describes a host of problems with these methods. Instead, MoUs—and IOSCO's *M*MoU, in particular—provide the main avenue for cooperation.

Silvers (2020a) finds that, after controlling for other factors, cross-border enforcement is about three times as likely after the *M*MoU connects two regulators. This is consistent with the anecdotal evidence of regulators, who indicate that the *M*MoU has revolutionized their cross-border capacities (IOSCO 2012). Moreover, using share-level data, Silvers (2020a) shows that transaction costs decline for cross-listed shares (even relative to non-cross-listed firms from the same country) when the *M*MoU links the firms' home and host countries. This implies a reduction in the risks perceived, and/or costs borne, by liquidity providers.[7] A related study by Silvers (2020b) demonstrates that US cross-listed firms' financial reporting becomes less opaque after the *M*MoU; this, too, is consistent with a decline in expropriation risks.

[6] Certain political risks may also decline with the *M*MoU, since it is part of the Financial Sector Assessment Program (FSAP), which can influence IMF/World Bank lending. Thus, risks that arise from the threat of sovereign defaults may contemporaneously decline, contributing to more suitable conditions for foreign investment.

[7] This comports with literature that documents a decline in opportunistic trading and price informativeness following insider trading enforcement actions publicized by the US SEC, which increase the expected cost of insider trading (Del Guercio et al. 2017).

Focusing on US oversight of US cross-listings in 27 countries, Lang et al. (2020) show that when the *M*MoU links the SEC to a foreign counterpart, funds in (unaffiliated) third-party countries free-ride on US oversight by shifting existing investment out of non-US-cross-listed firms and into US-cross-listed firms from the same country. Their study is similar to mine in that it documents investors' preference for more robust regulatory oversight, all else equal. However, the authors' focus on spillover investor clientele effects and within-country reallocations neglects a potentially larger phenomenon: *cross-border* reallocations that increase cross-border capital mobility and market integration. Lang et al. conclude that the *M*MoU is not associated with net changes in cross-country investment; this implies that cooperation is a zero-sum game at the country level. They note, however, that their study is ill-suited to identify net cross-country investment behavior (the subject of my tests), because it cannot control for unobserved economic circumstances that could change the attractiveness of a given investee country (Lang et al. 2020, p. 28). Due to their study's different focus and approach, Lang et al. provide no insights about market integration, aggregate changes in cross-border investment, or market risk exposures. My study complements their finding by showing that it is part of a more comprehensive shift in investment that signifies increased integration.

Some might assume that the United States is the only country actively using the *M*MoU to pursue cross-border cases, but this would not be accurate. According to IOSCO (2017), out of the 3,330 requests in 2016, the top three requesting countries were France (374), the US (360), and the UK (329). Silvers (2020) reports that in 2017, only about 12.5% of the 4,803 total requests under the *M*MoU were made by the US securities regulator. Thus, the overwhelming majority of requests are not made by the US. Indeed, "The IOSCO MMoU is a widely used arrangement under which 121 securities regulators have agreed the basis on which they exchange information for the purposes of their enforcement mandates," says Ashley Alder, chair of IOSCO and former head of the Securities and Futures Commission in Hong Kong (ESMA 2019).

Finally, an important departure from prior research, in this paper, is the recognition that the benefits of cooperation likely extend beyond cross-listed firms. Lang et al. (2020) and Silvers (2020b) focus exclusively on US oversight of US-cross-listed firms. Although a regulator's right of action is clearest for these firms, many factors described above (enforcement, regulatory decision quality, and red tape) extend to *all* firms. Thus, cooperation potentially has broader implications that translate to enhanced demand for

cross-border ownership of cross-listed and non-cross-listed firms alike.

III. Cross-border investment

A. Research design

In the empirical analyses, I am agnostic with respect to an "optimal" portfolio allocation (unlike in the home bias literature, which specifies the world market portfolio as the normative benchmark). Instead, I evaluate the association between cooperation and FPI. A positive association between cooperation and FPI supports the hypothesis that cooperation remediates investment frictions that would otherwise deter foreign investment.

On the surface, the perspective that cross-border cooperation is relevant for non-cross-listed firms may seem like only a subtle departure from prior work. In exploring this potentially broader effect, however, I am able to use the full sample of FPI, which provides a fuller matrix of country-to-country investment between country-pair combinations. (When confined to ownership of cross-listed firms, the matrix is sparsely populated.) Aside from the obvious benefit of a larger sample, this more fully populated matrix enables a design that tackles a variety of issues using numerous fixed effects. This includes (a) country-pair fixed effects, to control for time-invariant country-pair factors that lead to different levels of investment between different country pairs. It also includes (b) investee×time fixed effects, to control for common increases in investment to a particular investee country (as might happen when a country becomes a more attractive investment target for economic reasons). The investee×time fixed effects largely remove changes due to investee-country-level economic circumstances, such as increases in FPI for a given investee country that are common to all investor countries (which resolves a key limitation in the study of cross-border investment in Lang et al. (2020)). Also included are (c) investor×time fixed effects, to control for an expansion in investment from a particular investor country that is common to all countries worldwide (as might happen when the investor country has excess capital and few or low-return domestic investment opportunities).[8] In fact, the fixed effects described as (b) and (c) control for both "push" (outbound investment) and "pull" (inbound investment) factors (Griffin et al. 2004; Fratzscher 2012; Alderighi et al. 2019). Finally, I include (d) linear time trends for each pair to capture any temporal trends in FPI that are unique to the country pair, because Bergstrand et al. (2015) argue that within-country-pair trends bias the estimated effects of economic agreements upward.

[8] This design comports with the intuition in Anderson and van Wincoop (2003) that *relative* barriers determine bilateral interactions.

Ideally, the estimates would indicate the effect of cooperation on a country pair's FPI, compared to a hypothetical state of no cooperation. In my tests, the counterfactual takes the form of other country pairs that possess the treatment pair's investee or investor country at the same point in time. Note that this is a generalized difference-in-difference design (Bertrand et al. 2004). The model does not use the traditional treatment, post, and treatment×post indicators, because they are linear combinations of the more comprehensive fixed effects described above.

The pair fixed effects also subsume all time-invariant cross-sectional characteristics, making it both unnecessary and impossible to include the variables that often appear in gravity models of trade, such as distance, common language, and colonial relationships (Tinbergen 1962). Similarly, the investor(ee)×time fixed effects make it unnecessary and impossible to include country-time variables such as GDP, market-wide returns, inflation, and other macroeconomic conditions. This allows me to isolate the *cross-border cooperation* aspect, as opposed to other country-level factors that could accompany the *M*MoU (such as unobserved changes in economic circumstances that occur near the *M*MoU).

Despite the comprehensive fixed effects, it is worth ruling out known country-pair-specific, time-variant changes from other events that may alter the underlying economic relationship between two countries. Thus, I control for pair-level events that could affect FPI, including trade agreements (from Hofmann et al. (2017)), tax treaties (from the International Bureau of Fiscal Documentation), and investment treaties (from the UNCTAD Investment Policy Hub).

Model 1 below presents the coefficient(s) of interest—λ_1 (and λ_2)—the indicator for the *M*MoU (and the indicator for bilateral arrangements, some of which are potentially endogenous). This coefficient captures time series variation in FPI that cannot be explained by the fixed effects and other controls and is associated with the *M*MoU (or bilateral arrangements).

$$(1)\quad Investment_{ijt} = \lambda_0 + \lambda_1 MMoU\ Link_{ijt} + \lambda_2 MoU\ Link_{ijt} + \sum_{l=1}^{L} \lambda_l\ Pair\ time\ trends_{ij} + \sum_{i=1}^{I} \lambda_{it}\ Investor \times time\ FEs + \sum_{j=1}^{J} \lambda_{jt}\ Investee \times time\ FEs + \sum_{m=1}^{M} \lambda_m\ Investor \times Investee\ (country\ pair)\ FEs + v_{ijt}$$

I estimate model 1 using cross-border investment for country '*i*' in country '*j*' at the end of period '*t*' (denominated in US dollars). Recent research indicates that log-linear ordinary least square (OLS) estimates can impart substantial bias in the presence of heteroscedasticity and inconsistent estimates in the presence of many zero observations for

the dependent variable (as is the case in my setting) (Silva and Tenreyro 2006). To deal with many zero observations and the heteroscedasticity they create, Silva and Tenreyro (2006) present a computationally feasible solution that uses Poisson pseudo-maximum likelihood (PPML) estimation. PPML is a consistent estimator and naturally bounded at zero. It uses dollars of FPI as a natural way to characterize investment (as opposed to a transformed or scaled dependent variable). Finally, standard errors are corrected for clustering at the country-pair level (the same level as the treatment (Abadie et al. 2017)).

Figure 1 shows the adjacency matrix for the country-pair observations included in the sample. Investor countries are reported across the top and investee countries are reported on the left-hand side; each cell corresponds to a country pair. The figure is based on the actual sample coverage of FPI (described in detail later), which covers investor countries more extensively than investee countries. For example, although Sri Lanka joins the *M*MoU in 2004 and is observed as an investee country, it does not appear as an investor country because it does not report to the IMF's survey.

Note that Figure 1 also indicates the *timing* of the *M*MoU treatment across country pairs. Countries adopt the *M*MoU at different times, leading to the formation of multiple linkages for each new entrant: *n-1* new linkages occur as the n^{th} member joins the arrangement. To illustrate this variation in the timing of the linkage across country pairs, I organize the countries by the year in which they signed the *M*MoU on both the investor and investee dimensions (instead of alphabetical sorting). Blocks with the same color represent country pairs that experience the shock at the same time; blocks with different colors represent country pairs that experience the treatment at different times.

An association between the *M*MoU and inbound/outbound FPI would indicate that FPI conforms to a specific and fairly elaborate pattern of connections between country pairs. For example, Singapore's outbound investment into other countries, shown in Figure 1 in the vertical column "2005/SGP," indicates that the country formed 24 connections simultaneously upon joining the *M*MoU in 2005, and an additional 68 connections as future investee countries entered the network. Inbound investment *from* other countries *into* Singapore is represented by the horizontal "SGP" row. Singapore formed 23 connections upon joining, and 42 more as future investor countries entered the network. Once again, the staggered nature of the treatment is illustrated. *M*MoU-prompted changes in inbound and outbound FPI for pairs involving Singapore should occur in 2005 for Germany (DEU) and Belgium (BEL), in 2006 for Denmark (DNK), in 2007 for the Netherlands (NLD), in 2009

for Austria (AUT), in 2010 for Switzerland (CHE), and so forth. Thus, these arguably similar counterpart countries experience an offset timing of the treatment, making them ideal counterfactual benchmarks.[9] Furthermore, this example illustrates how the design reduces concerns about omitted variables and reverse causality. For example, an omitted variable can substantially affect the estimates only if it is of an extraordinary magnitude or aligns with the multiple events generated by the treatment (described in the introduction and footnote 2).

B. Sample

The FPI (cross-border equity ownership) sample comes from the IMF's Coordinated Portfolio Investment Survey (CPIS), which covers a maximum of 88 investor and 203 investee countries annually for the years 2001–2017. To be included in the sample, a pair must have at least one non-zero value during the sample period. This leaves 15,355 pairs over a 17-year period (or 261,035 country-pair years). Figure 2 shows that aggregate levels of equity throughout the sample period increase almost monotonically. Annual equity investment reached a high of $30.5 trillion in 2017. The average level of FPI during the 17-year period is $16.8 trillion or roughly $1 billion per country pair.[10] This time period excludes the many market liberalizations prior to the turn of the century and helps ensure that they do not influence my tests.

C. Empirical results

In Table 1, column 1, the results using PPML show that both the *M*MoU and bilateral arrangements have strong associations with cross-border equity ownership, even after including the comprehensive three-way fixed effects (for pair, investor×year, and investee×year) and the other controls. The magnitude—about 11% for the *M*MoU and 9%

[9] Alternatively, consider the connections Singapore forms with Hong Kong in 2005, China in 2007, Japan in 2008, and Taiwan in 2011, or with Isle of Man in 2005, Malta in 2006, the British Virgin Islands in 2007, Cyprus and Guernsey in 2009, and Gibraltar in 2013.

[10] Note that, for my purposes, cross-border positions by organizations explicitly unaffiliated with a particular jurisdiction (e.g., the IMF) are excluded from the analyses. Also, observations are redacted in some instances. The redacted observations appear to represent a trivial portion of total cross-border investment. Finally, the CPIS is now conducted semi-annually, but only since 2012. I exclude 1997 because it has lower coverage and quality and is separated from the nearest year by four years.

for bilateral arrangements—is statistically significant in both cases.[11,12] The average FPI across all countries during the sample period is $16.8 trillion, so the 11% increase attributable to cooperation policy equates to about $1.8 trillion. The estimates on the control variables related to tax, trade, and investment treaties are insignificant.

A more traditional approach using a log-linear model yields the same overall inference, but with a substantially larger magnitude. Column 2 in Table 1 shows that relative to control pairs (i.e., pairs that do not cooperate), cross-border investment is 46% greater for pairs linked via the *M*MoU and 75% greater for pairs linked by bilateral arrangements; this reinforces the idea that regulatory cooperation influences cross-border investment. The sizable difference in magnitudes across the PPML and log-linear regressions is consistent with recent studies in which these same two alternative estimation techniques were used (Glick and Rose 2016; Larch et al. 2019). The design and specifications in those studies also measure an effect that is similar to the *M*MoU's effect on FPI: the effect of currency unions on bilateral trade. However, log-linear estimates may be misleading in terms of magnitude. PPML's theoretical superiority with respect to bias and consistency has made it the prevailing "workhorse" estimator for evaluating policies in settings with similar pairwise structures (e.g., international trade) (Weidner and Zylkin 2020). Therefore, I use PPML as the preferred methodology hereafter.

The results are consistent with cooperative arrangements having larger economic effects than was previously known. The primary effect of cooperation on FPI does not occur through a spillover involving unaffiliated countries, but rather via direct investment between cooperating country pairs. The evidence supports the idea that regulatory cooperation enhances international capital mobility and market integration.

D. Cross-border investment: cross-sectional tests

This study proposes that there are impediments to foreign investment and that regulatory cooperation can partially resolve these impediments through better enforcement, smarter regulatory decisions, and a reduction of red tape. Two opposing effects could

[11] Because Poisson uses a log-link function, the coefficient interpretation is precisely the same as in log-linear models. An economic interpretation requires transformation using the expression $\hat{g}=\exp(\theta)-1$, where θ is the coefficient estimate from the tables. The interpretation is that a one-unit change in the independent variable is associated with a $\hat{g}$ percent change in the dependent variable (Halvorsen and Palmquist 1980; van Garderen and Shah 2002; Kennedy 1981). When the independent variable is also in log form, the interpretation is that a 1% change in the independent variable is associated with a θ% change in the dependent variable.

[12] Technically, this is investment in excess of non-cooperating country pairs that include the same investee or investor country—so, in some circumstances, this could represent less retrenchment rather than an absolute expansion in investment.

condition the outcome from the previous section: (i) the extent of these impediments (e.g., expropriation risks and red tape), and (ii) the capacity to resolve them (via enforcement cooperation and streamlined procedures). For example, a change in enforcement of a given magnitude would seem likely to have a larger effect on an investee country with low regulatory quality, where concerns about expropriation risks are higher. However, investee countries with low regulatory quality may also have limited capacities for cooperation, relative to countries with high regulatory quality. This would make them less likely to provide assistance, which could, for example) limit the reach or effectiveness of enforcement. Thus, the impediments (e.g., expropriation risks, red tape, etc.) *and* the capacity to remediate them with cooperation could simultaneously influence the effect, either offsetting each other or inducing U-shaped non-linearities in the cross-section.

Below, I test for cross-sectional patterns, using tests that are somewhat exploratory. Given the complexity of the treatment pattern, these tests are not vital to the identification strategy (as is sometimes the case for studies examining a common shock).

Empirically, I study the cross-sectional effect of the *M*MoU by exploring the interactions of the linkage indicator with partitioning variables intended to capture the following attributes: geographic distance between country pairs, capital controls, attributes of a country's institutions (e.g., legal strength and origin), and market size and development. In addition to being proxies for impediments to FPI (e.g., expropriation risk), these attributes may also serve as inverse proxies for cooperative capacity. The *uni*nteracted partitioning variable need not (indeed, cannot) be included separately because of the investor×time and investee×time fixed effects.

Prior research uses geographic distance as a proxy for information asymmetry between country pairs (Portes and Rey 2005). I interact indicators for the geographic distance tercile with the *M*MoU. In panel A of Table 2, I report the percentages implied by the coefficient estimates. The effect of the *M*MoU increases monotonically with geographic distance, consistent with larger effects occurring in country pairs that are farther apart and more likely to have greater information asymmetries. FPI increases by 5%, 9%, and 15% for the small, medium, and large distances. This pattern is consistent with reductions in foreign-versus-local information asymmetry.

Next, I explore the effect of explicit prohibitions on foreign investment that occur through capital controls (i.e., policies that restrict foreign ownership). Capital controls appear to be a friction that cannot be resolved by cooperation. Thus, cooperation is unlikely

to affect countries that use capital controls. Panel B in Table 2 supports this prediction. It shows that cooperation has no effect on FPI in the presence of capital controls but is associated with a 13.6% increase in FPI in countries without capital controls. The effect in countries without capital controls is larger than the 11% shown in the main test; this suggests that pooling these two groups brings down the average effect.

The remaining cross-sectional tests explore various attributes of a country's institutional, economic, and market-related features using the following measures: indicators for common law legal origin (LaPorta et al. 2008); the World Bank's index for rule of law (Kaufmann et al. 2010); equity market size; and market development classifications (from MSCI). Because these dimensions vary for both the investee and investor countries, I use tercile indicators for continuous measures and interact them to break down the effects of the *M*MoU across various combinations of country attributes. I report the effect in a 3×3 table of investor/investee pairings (2×2 in the case of common law legal origin).[13]

Legal systems with a common law lineage may better protect property rights, resolve disputes, and protect shareholders (LaPorta et al. 2008). Yet Table 2, panel C shows that common law appears to be relatively unimportant in conditioning the effect of cooperation. Although cooperation between two common law countries yields a larger increase in FPI (15.1%) than other pairings (ranging from 8.4% to 9.4%), unreported tests reveal no significant statistical differences between pairwise combinations of legal systems.

Panel D shows the effect of cooperation across combinations of the rule-of-law dimension. The rule-of-law dimension measures agents' confidence in the rules of society—particularly the quality of contract enforcement, property rights, and the courts, and the likelihood of preventing crime (Kaufmann et al. 2010). Moving from the upper left to the bottom right corner—from two weak rule of law countries to two strong rule of law countries—there is a non-linear U-shaped pattern, with the largest effect occurring in pairs of weak countries, insignificantly negative effects in middle-to-middle strength countries, and a moderate effect (10.2%) in pairs of strong countries. This is consistent with the two countervailing effects described above: the risk level and the countries' capacity to remediate risk appear to simultaneously influence the effect, inducing non-linearities in the cross-section. The off-diagonals display considerable symmetry, consistent with the concept of

[13] These partitions do not weight the effect of the *M*MoU in a way that reconciles to the overall effect of 10.5 (11%) from Table 4. Lack of reconciliation occurs both because some variables (e.g., common law or market development) do not partition the sample with equal numbers of observations and because the *M*MoU indicator occurs disproportionately in different cells.

reciprocity between regulators, which prior research argues is critical in cross-border cooperation (Silvers 2020a).

Next, I partition by equity market size and market development. Panel E uses market size to partition the effect. Significant increases in FPI occur exclusively in pairings that include investee countries with medium or large market sizes. This is consistent with the notion that higher market size is associated with greater regulatory sophistication, which in turn increases the capacity for, and effects of, cooperation. Panel F uses market development to partition the effect of cooperation.[14] Market development increases incrementally as one moves from frontier, to emerging, to developed markets. The strongest statistical relation for increases in FPI is between countries with developed markets (13.5%, significant at $p<0.01$); this echoes previous results in which the most stable effects occur between countries that share common law backgrounds or a strong rule of law. Note, however, that cooperation also influences frontier markets: they increase their holdings in emerging and developed markets by 26.5% and 8.1%, respectively.

A recurring theme throughout the cross-sectional tests is that, when paired countries share common law backgrounds, a strong rule of law, or developed market status, the regulatory effects of cooperation are statistically strong, if not the strongest observed, despite being moderate in economic magnitude. In other words, the effects of cooperation on foreign investment are most consistent between two "strong" countries.

When examined in isolation, however, certain other country pairings exhibit patterns that are not fully anticipated. For example, the increases in FPI from weak rule of law countries to strong ones are unexpected (see Panel D).[15] In my setting, regulatory cooperation may provide a resolution to the distrust and fear of expropriation that investors from weak, frontier, or code law countries have when investing in more sophisticated markets (which has been shown to curb cross-border portfolio investment (Guiso et al. 2008, 2009)).[16]

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[14] I use MSCI's classification and consider any country not included to be a frontier market.

[15] Such findings are analogous to the Lucas paradox—the well-documented observation that capital does not flow from developed countries to developing countries even though the marginal benefit should be largest in developing countries (Lucas 1990). One rationale for the Lucas paradox is that low institutional quality impedes investment from rich to poor countries (Alfaro et al. 2008).

[16] The potential for asymmetric gains from cooperation raises practical questions about fairness and reciprocity, which are core principals of effective cooperation (see Licht (1999) for game-theoretic models of cooperation between securities regulators). Another concern is that the results arise out of complexities from the heterogeneity of countries included in the analyses. In other words, the benchmark pairs may be unsuitable counterfactuals. To investigate, I re-estimate the effect of cooperation in a sample that is confined to the 22 *developed* investee and investor markets. By removing much of the heterogeneity across countries, I seek to ensure that the benchmark country pairs are similar. Despite this rather demanding restriction, I find a comparable result (see Internet Appendix Table I, column 1 for details). Thus, the association between FPI and cooperation does not appear to be attributable to poorly identified benchmarks. The next section explores related themes in greater detail.

Overall, it appears that cooperation plays a critical role in cross-border investment decisions, and that this relationship is subject to complex dynamics. The cross-sectional results are consistent with both of the arguments presented above: weaker investee countries have the most to gain, but stronger countries are the best cooperative partners.

E. Cross-border investment: identification and robustness tests

In this section, I provide additional tests to explore the identification and robustness of the results across various subsamples and estimation methods. A difference-in-difference design requires that the untreated group follow the same trend in the absence of the treatment (Bertrand et al. 2004). To explore the assumption that the benchmark country pairs meet this criterion, I perform two tests.

First, I eliminate, from the sample, any countries (country pairs) that never experience the *M*MoU shock, then re-estimate the effect. The identification comes from pairs that are eventually treated but have not *yet* experienced the shock. The results in column 1 of Table 3 indicate that the *M*MoU's association with FPI persists at a similar magnitude in this subsample. Thus, there is no evidence that an unobserved heterogeneity across countries (country pairs) which is associated with accession to the *M*MoU drives the result. This result also ensures that the results are not concentrated in economically trivial observations (pairs of small countries with inconsequential levels of FPI).

Second, I map out the effect of the cooperation linkages in event time to explore the parallel trend assumption and to assess the timing of the effect. It is possible that investors anticipate a country's *M*MoU admission by a year (or possibly two), since *M*MoU applicants must often pass new legislation and must always wait for an official verification prior to the formal signing. Moreover, qualifying countries frequently defer the formal signing until a ceremony is held at the IOSCO annual meeting.[17] (Internet Appendix I provides a detailed hypothetical timeline of the various steps in the application process.) The investors' observation of preparations for the *M*MoU could introduce some predictable measurement error. As an example, consider a country that proposes draft legislation in January of one year and signs the *M*MoU in February of the following year. FPI is measured on an annual basis at the end of each year. Thus, if investors anticipate the *M*MoU during the year the draft legislation is passed (and perhaps even goes into force), their investment could drive changes in FPI well before the signing occurs. Moreover, the annual unit of observation

[17] See http://www.csrc.gov.cn/pub/csrc_en/affairs/AffairsIOSCO/201205/P020120524357975007952.pdf for examples.

makes it possible for a 13-month anticipation to span two year-ends, thus resembling a two-year anticipation.

Figure 3 shows the six years before and the six years after the *M*MoU linkage and is consistent with investors narrowly anticipating the signing. The effect is largely concentrated in the first year of the linkage, when 78% of the total effect of 0.105 from Table 1, column 1 occurs. The trend before and after the link appears fairly level, giving no indication that the parallel trend assumption has been violated.

Some moderate preemption appears to narrowly anticipate the formal signing of the *M*MoU. It is impossible to determine whether this is due to measurement error from the lengthy process of becoming a signatory or to reverse causality (or elements of both). Silvers (2020a) reports that, on average, it takes 14 months from *M*MoU application to approval. Thus, for reverse causality to explain Figure 3, the average regulator would need to anticipate increased investment over a year into the future. I cannot rule out this explanation, but the premise seems doubtful. Furthermore, each *M*MoU admission generates multiple connections that are outside the regulator's control, making reverse causality even less likely. Although no test (including this one) can conclusively affirm the appropriateness of the benchmark country pairs, there is no indication that the parallel trend assumption has been violated.

Next, I attempt to rule out the concern that an unknown tautological design feature or misspecification drives the results. Bertrand et al. (2004) show that random assignment of state-level treatments rejects the null hypothesis (of no effect) too often, which suggests that generalized difference-in-difference designs can be untrustworthy. If selecting any random year to partition the time series of a country pair produces a result similar to the one in Table 1, the model could be poorly specified, or a different mechanism could underlie the result. Therefore, I assign the real *M*MoU years to countries at random and recalculate the linkage date for country pairs as a pseudo-treatment. The distribution of the pseudo-treatment estimates is centered at -0.00017 and exceeds the estimates from the real treatment dates just 32 times out of 1,000 (p=0.032).[18] (Internet Appendix Figure 1 provides a histogram of the placebo coefficient estimates.) This finding is inconsistent with

[18] Of these, only nine of the placebo tests exceed the *statistical* significance of the real estimate (z>2.95, the value from Table 1 column 1), which suggests that they are mostly driven by a few extreme observations.

tautological design features or misspecification influencing the results.[19]

The preceding simulation indicates that, in expectation, the effect of a linkage created at random is zero. Thus, for endogeneity to account for an 11% increase in FPI, an omitted variable (or reverse causality) would need to align with a very intricate linkage pattern, and each linkage would need to have an endogenously determined 11% magnitude. Alternatively, if each individual country endogenously joined the *M*MoU because of an inducement by another counterpart, the magnitude of the single endogenous linkage would need to be big enough to neutralize the other linkages that are *not* formed endogenously.[20]

The time-variant country-pair controls (e.g., treaties) may be coarse with respect to other evolving pair-specific economic conditions. Prior studies often try to predict trade itself, making trade impossible to use as a control variable; in my study, however, trade can be used. Specifically, I include (log-transformed) bilateral trade in both directions (investor to investee, and vice-versa). The data, which comes from the UN Comtrade dataset, represents commodities traded between country pairs in US dollars. Column 2 of Table 3 demonstrates that the estimated effect of the *M*MoU is virtually unchanged, supporting the idea that other economic factors do not drive the results. However, my use of trade as a control does weaken the estimated effect for bilateral arrangements, perhaps reflecting some endogenous relations between bilateral arrangements and economic forces.

Finally, I add controls for various potentially influential subsets of country pairs and find results similar to the main result in column 1 of Table 1. The design makes it unlikely that any given country pair could substantially impact the overall estimates, because each country makes a fairly small contribution to the sample. Nevertheless, columns 3 to 6 of Table 3 show that the main inference is unaffected even after I separately control for the *M*MoU's effect on pairs of EU countries (which represent a significant fraction of the sample), country pairs involving the US (as investee or investor), pairs involving any of the 27 investee countries that have a significant number of US cross-listings (the subsample examined by Lang et al. (2020)), and country pairs possessing at least one cross-listed firm. The *M*MoU estimates remain fairly stable (between 0.087 (9%) and 0.110 (12%)), demonstrating the robustness of the inference to various factors. The primary effect of

[19] The simulation exercise in Bertrand et al. (2004) rejected the null 45% of the time, indicating a serious design flaw. By contrast, over-rejection of the null hypothesis in the simulations is less prevalent in my setting: 133 of the 1,000 replications have a p-value less than 0.10. (In theory, this should only happen 100 times out of the 1,000 simulations.)

[20] Of the 114 countries joining the *M*MoU, 92 have sample data. Thus, assuming the other 91 country-pair connections were exogenous and have zero effect, the magnitude of an endogenous linkage would need to be 1,001% to account for the estimated effect (of 11%).

cooperation is thus extensive, not driven by US or EU observations, and more far-reaching than was previously known. The effect is not exclusive to pairs that involve countries with US cross-listings; nor is it confined to the country pairs that have cross-listings. This implies that investors also perceive a reduction in investment risks for non-cross-listed firms.

The idea that cross-border issues are relevant even for purely domestic firms underscores the global nature of capital markets. Malfeasant conduct by banks, broker-dealers, investment advisors, credit rating agencies, transfer and clearing agents, consultants, analysts, short sellers, and individuals routinely extends between jurisdictions, and there is no reason to believe that its effects are confined to cross-listed firms. As Beyea (2011) observes, it is "very rare to find a modern securities fraud case that does not have an international facet of some kind." Consistent with this, anecdotes from staff at the US SEC suggest that more than 30% of the cases they pursue have at least some cross-border element, even though few of them involve cross-listed firms. Furthermore, cost reductions for trade infrastructures likely extend to all firms, not only cross-listed ones. Thus, the empirical support for cooperation having a broader impact than was previously characterized also comports with a practical understanding of modern regulatory environments.

Overall, I find evidence that cooperation relaxes an impediment to investment, raising the equilibrium cross-border investment for foreign investors who must balance the benefits of foreign diversification against the expected risks (Brennan and Cao 1997). This supports the idea that cooperation increases capital mobility.

IV. Market integration

A. Tests of market integration

The previous tests examine integration from the perspective of investment holdings. Whether the changes in ownership I observe translate into meaningful differences in the way firms are priced remains an open question. To address this question, the next tests follow previous studies of cross-listing events that examine integration at the firm level. Alexander et al. (1987) and Errunza and Losq (1985) suggest that when formal investment barriers are removed, firms can achieve a higher equilibrium price and a lower expected return than they would in a single segmented market. Their models imply that a shift from local pricing of a firm (a segmented market) to global pricing of a firm (an integrated market) should lead to changes in local and world market risk exposures and the firm's cost of capital. Bekaert and

Harvey (1995) formalize this intuition by combining local and international capital asset-pricing models (CAPM). The local CAPM describes expected returns in a perfectly segmented market, where assets are priced locally and the price of risk is determined locally (by risk aversion and the local risk-free rate). The international CAPM describes expected returns in a perfectly integrated market, where assets are priced globally. In the international CAPM, the implication is that assets with a given risk level are priced the same regardless of the market in which they trade.

Building on this prior work, the intuition in the cooperation setting is that a decline in local beta, an increase in world beta, or both are evidence of an increase in integration, representing a potential shift toward a global market pricing of an asset.[21] More formally, model (2) shows that the expected return of security i is a function of its local and world price of covariance risk (ψ) and covariance with local and world returns, where Ret, R^L, and R^W represent the firm, local market, and world market returns, respectively. Integration can be inferred from the relative exposures to the local and world indices. This model, shown in (4) below, includes Φ, a continuous integration parameter ranging from 0 (a fully segmented market) to 1 (a fully integrated market). It essentially captures the fraction of the total *quantity* of risk (composite beta) that is attributable to global market beta. Note that, ceteris paribus, Φ increases when local (global) market risk exposures decrease (increase).

$$E_{t-1}[Ret_{it}] = (1 - \Phi_{i,t-1})\psi^L_{t-1}\, Cov_{t-1}[Ret_{it}, R^L] + \Phi_{i,t-1}\psi^W_{t-1}\, Cov_{t-1}[Ret_{it}, R^W] \quad (2)$$

Empirically, I estimate a model based on the intuition described by equation (2), allowing risk exposures to change based on the *M*MoU as an indicator of a structural break in the risks perceived by investors (as a consequence of regulatory cooperation). Model (3) below illustrates the basic structure, with firm and time subscripts omitted. *Post* is an indicator equal to 1 when cooperation occurs. A decrease in the local beta (β_4) and/or an increase in the world beta (β_5) implies that cooperation promotes market

[21] I am *not* testing for "abnormal" returns or endorsing the ability of this two-factor model to correctly price an asset. As Bekaert et al. (2011) point out, there is no consensus about the best asset-pricing model, since world and local betas do not fully explain the cross-section of returns. I am more interested in market integration and whether market risk exposures change with cooperation, which would support my hypothesis (even if priced risk factors were omitted from my model). Bekaert et al. (2014) use a similar asset-pricing model, which tests for changing risk exposures. The staggered-shock design makes it unlikely that even a misspecified asset-pricing model would confound my inferences regarding changing market risk exposures, because any omitted risk factors would need to change at the same points in time (which seems unlikely).

integration.

$$(3) \qquad Ret = \beta_0 + \beta_1 R^L + \beta_2 R^W + \beta_3 Post + \beta_4 R^L * Post + \beta_5 R^W * Post + \varepsilon_t$$

I expect that cooperation between securities regulators, by reducing a variety of investor risks, resolves informal barriers to foreign investment. In the context of asset pricing, increases in cross-border investment imply that assets may be priced globally rather than locally, as shown in changing risk exposures from the local market to the world market. Of course, this depends on whether the changes in FPI are large enough to influence the *marginal* investor.

The FPI analyses imply that the effects of cooperation are not confined to countries with cross-listings. Thus, enhanced integration may occur both for cross-listed and purely domestic firms. On one hand, cooperation may be most relevant for cross-listed firms, given that they are co-supervised by a home and host regulator. On the other hand, cross-listed firms are likely to already be more integrated. In subsections C and D below, I explore changes in integration for cross-listed firms and purely domestic firms, respectively.

B. Sample

I estimate model (3) on a sample of cross-listed firms, then repeat the analyses on purely domestic firms.[22] As in prior work, I use weekly (Wednesday to Wednesday), US dollar-denominated returns that are adjusted for the T-bill rate. Datastream is the source of the market return data for the asset-pricing tests in both the cross-listed and domestic subsamples. To designate cross-listed firms, I primarily use the Datastream data, supplemented with various lists from the major ADR banks. Firms without data during the 52 weeks before and the 52 weeks after the *M*MoU are necessarily excluded from the analyses.[23] This helps reduce the possibility that the sample includes firms that (endogenously) pursue a cross-listing *because of* the *M*MoU and prevents comingling the effects of cross-listing with the effects of cooperation.

The cross-listed sample consists of 1,164 individual firms from 206 country pairs that experience the shock during the period from 2001 to 2014. The domestic sample consists of

[22] See Jorion and Schwartz (1986), Chan et al. (1992), Dumas and Solnik (1995), Foerster and Karolyi (1999), and Lewis (2017).

[23] To allow for estimates of reasonable quality, I require that a firm have weekly return data for at least 75% of the observations in both the pre- and post-treatment time periods.

6,535 individual firms from 52 countries.

C. Cross-listed firms

Relying on the logic described above, several prior studies examine changes in beta(s) at the time of a US cross-listing. Their findings support the notion that cross-listing promotes market integration. Using a single local market index, Foerster and Karolyi (1993) show that Canadian firms' exposure to local market risk declines following US cross-listings. Using a global sample and an analogous two-factor model that includes the local and world indices, Foerster and Karolyi (1999) observe a decline in local market betas and no change in world betas following US cross-listings. And Jayaraman et al. (1993) show a decrease in local beta and no change in US beta in 95 firms from Japan and the UK that cross-list in the United States.

Though structurally similar to previous studies, my tests focus on cooperation. Instead of the cross-listing event, I identify the linkage between the home and host regulator as the treatment (analogous to the FPI treatment). Recall that the bonding hypothesis posits that the benefits of cross-listing result from bonding to a stringent legal system in which firms must uphold higher investor protection and disclosure standards (Coffee 1999; Stulz 1999). A cross-listing event likely comingles changes in market segmentation with changes in legal infrastructures. A key innovation of my test is that it dampens potentially confounding factors such as the inevitability of the asset.

C.1. Cross-listed firms: main empirical results

As shown in column 1 of Table 4, the equilibrium betas prior to the *M*MoU are dominated by the local market betas: 0.598 for the local beta and 0.380 for the world beta.[24] These numbers indicate that the risk of the assets is priced in the local market more than the global market. The composite beta is very close to 1. After the *M*MoU, the local and world betas change in opposite directions. Exposure to the local market decreases by 0.081, while exposure to the world market increases by 0.065. The post-cooperation changes in betas are consistent with an increase in the integration parameter (Φ) from 0.39 [0.380/(0.598+0.380)] to 0.46 [0.445/(0.517+0.445], representing a 19% increase in market integration. The composite betas are near 1 both before and after regulatory cooperation,

[24] Note that I construct the market indices manually after excluding the cross-listed firms. This avoids using commercially created indices, which, when weighted by market capitalization, might consist mainly of treatment firms.

indicating a stable overall quantity of market risk. Nevertheless, this shift from local to world pricing implies a reduction in the cost of capital because it replaces local market equity risk premiums with global equity risk premiums, which are generally much lower.

Unlike the FPI analysis, the sample is strongly influenced by US cross-listings (which represent about 38% of the sample firms). To ensure that these observations to do not drive the result entirely, I re-estimate the effects on the non-US-cross-listed and US-cross-listed subsamples, respectively. The results, presented in columns 2 and 3 of Table 4, reveal smaller and weaker effects without the US cross-listings (e.g., the post-*M*MoU local beta declines by 0.065, *p=0.083*). These groups likely pool heterogeneous sets of firms (which I explore in the next subsection). The US cross-listings exhibit a stronger association with cooperation (for example, the local beta drops by 0.135, *p=0.032*). The larger effect is expected, given that US regulators are among the most proactive regarding cross-border issues.

In terms of magnitude, the estimated effect of the *M*MoU is smaller than the effects that Foerster and Karolyi (1999) observed around US cross-listing events. This result is also expected, given that cross-listing events appear to have more profound implications for investability, co-bundle several factors, and are potentially endogenous. In sum, Table 4 supports the premise that regulatory integration facilitates market integration.

C.2. Cross-listed firms: cross-sectional tests

The degree to which cooperation resolves hindrances to market integration likely varies in the cross section of country pairs. The country-pair matrix of cross-listed firms is sparsely populated and has less variation than the FPI sample (particularly for host countries). Moreover, the integration signals—beta loadings on local and global indices—are potentially noisier than previous tests of FPI. To mitigate these issues, I reduce noise through aggregation by using coarser partitions for continuous variables in the cross-sectional tests. The cross-sectional partitioning variables are the same as those used in the FPI analyses: geographic distance, common law indicators, rule of law, market size, and development classifications.

Panel A of Table 5 reports the effect of geographic distance on the effect of the *M*MoU. It shows that the changes in beta that accompany the *M*MoU increase with distance (as monitoring becomes more difficult). The differences in the changes in local and world betas for close and far country pairs are both significant at the 0.01 level.

Panel B partitions the sample based on capital controls. Note that, by virtue of being

cross-listed, firms may to a large extent circumvent capital controls (Auguste et al. 2006). Thus, there is no clear prediction regarding the cross-sectional magnitudes. I find that the changes in local and world betas are of similar magnitude for firms in countries with, and for firms in countries without, capital controls. The changes are only statistically significant when capital controls are absent.

In a 2x2 table for code/common law and home/host market, Panel C reports the change in the betas on local and world market indices. When both the home and host markets possess common law legal origin, the *M*MoU is associated with a 0.11 reduction in the local market beta and a 0.13 increase in the world market beta. This is the largest, and most significant, result. The effect is otherwise fairly homogenous across the four cells, as it was in the FPI analyses.

Panel D describes the results partitioned by rule of law. Recall that there is not much variation in host country rule of law. The strongest results, in this panel, are for strong/strong country pairs. The weakest results occur when both the home and host market countries are weak.

Panel E partitions the results by market size. The effects are concentrated in country pairs in which the home and host country are both large, and are mostly confined to host countries with large market sizes.

Panel F provides the results partitioned by development classification. The benefits of cooperation are largely concentrated in cross-listings between developed markets, which is similar to the pattern in the FPI analyses. The point estimates are also high for firms from countries with undeveloped markets that cross-list in countries with developed markets. Again, this is consistent with the bonding hypothesis.

Overall, the cross-sectional patterns closely resemble those from the FPI analyses, in the that the strongest results typically occur between countries that both have common law origins, strong rule of law, or developed markets.

C.3. Cross-listed firms: robustness tests

I perform additional tests that assess the timing of the effect and the sensitivity of my inferences. First, I construct tests to explore the sensitivity of my results to alternative estimation windows. I expand the estimation window in both directions in half-year increments up to an eight-year time series (four years pre/post). In wider estimation windows, the integration parameters are smaller in both the pre and post periods. Moreover,

there is some evidence that expanding the estimation window by six months increases the integration parameter ($\Delta\Phi$) and thus influences the estimates in integration. Overall, however, the change in the integration parameter is fairly insensitive to the choice of estimation horizon. Ultimately, there is no evidence that my results capture a gradual trend or reflect a temporary period of high (low) world (local) beta that reverts in future periods.

Unreported tests show that the changes in integration derive almost entirely from a reduction in the standard deviation of asset returns (consistent with a reduction in risk) and decreases/increases in the correlation between asset returns and local/global market indices (consistent with market integration).

D. Integration: domestic firms

In this section, I perform analogous tests using purely domestic firms (weekly, US dollar–denominated, T bill–adjusted returns during the 52 weeks before and the 52 weeks after the *M*MoU, regressed on local and world indices). One critical difference in this test is that the use of purely domestic firms necessitates a different definition of the treatment, because, unlike the subjects of the previous tests, these firms do not have a home and host regulator. As the treatment, I use the date that the home market joins the *M*MoU. Admittedly, this country-wide treatment partially negates some of the design features relative to the within-country staggered treatment of the previous tests.

The discussion and empirical results for the FPI analyses suggest that the effects of cooperation on foreign investment extend to purely domestic firms. Once again, however, it is not clear whether this translates into different pricing of the firm or which firms would be affected. If investors respond to cooperation by holding a fully diversified set of firms from the cooperating country, then the impact on individual assets could be weak, because the investment is diffused across many assets. However, prior research shows that foreign investors prefer large, liquid firms (Ferreira and Matos 2008). This suggests that the effects may be concentrated in the largest firms in a given country. Since nano- and micro-cap stocks are less likely to be affected (and potentially subject to measurement issues that arise from illiquidity), I exclude firms with less than under $500 million in market capitalization them from the tests.

D.1. Domestic firms: main empirical results

The main empirical test, in Table 7, provides several insights. First, the average level

of integration (implied by the local and world betas) is lower for purely domestic firms than for cross-listed firms, both before and after the *M*MoU. This result is predictable based on the intuition that cross-listed firms are more globally integrated than domestic firms. For example, before the treatment, purely domestic firms have an integration parameter of 0.359 (0.377/(0.672+0.377)), whereas cross-listed firms have an integration parameter of 0.388 (0.380/(0.598+0.380). Second, although the purely domestic firms' post-*M*MoU decline in the local market beta (-0.154) supports the idea of enhanced integration and is of comparable magnitude to the shift observed for cross-listed firms, it is insignificant. Of course, statistical insignificance may arise from measurement error in selecting the appropriate date for changes in cooperation, or from pooling a heterogeneous mix of firms (i.e., some that experience increased integration and others that do not). The next section is devoted to cross-sectional tests, some of which examine the latter explanation.

D.2. Domestic firms: cross-sectional tests

This section investigates subsamples split by firm size and along the same country-level dimensions as previous tests: legal origin, rule of law, market size, and market development. (I dispense with the distance measure, since there is no secondary regulator from which to calculate a distance.)

Panel A splits the sample by median firm size within each country. Small firms experience no significant changes in risk exposures (and imply virtually no change in integration). For large firms, however, the local beta declines significantly (by -0.19), and the world beta increases (by 0.05). This indicates that changes in integration are concentrated within the largest firms, and supports the notion that changes in integration extend beyond cross-listed firms to include at least some domestic firms.

The cross-sectional partitions in Panels B-F reveal almost no significant changes in local or world betas. Directionally, they imply more integration for countries with code law, weak rule of law, small market size, and undeveloped markets. This lends stronger support to the idea that cooperation fosters more integration in markets characterized by subpar institutional features. Firms from countries with common law, strong rule of law, and large market size show a slight decrease in integration, which is not expected. Again, measurement error in selecting the date for changes in cooperation may play a role in these results. Furthermore, these changes in integration could reflect a more sophisticated dynamic that is beyond the scope of this study. For example, domestic investors may

reallocate their holdings out of cross-listed shares in their own country and into domestic shares in their own country (as is implied by Lang et al. (2020)). How this plays out for the average firm appears to be somewhat complex.

D.3. Domestic firms: robustness tests

Again, I expand the estimation window to gauge the sensitivity and stability of the results. Table 9 demonstrates that the integration effect stays fairly constant over different time horizons. It does not appear to reflect a gradual trend or a temporary period of high (low) world (local) beta.

Overall, the evidence provides modest support for the idea that the effects of cooperation on market integration extend to purely domestic firms. Relative to cross-listed firms, which start off with a higher degree of integration with global markets, purely domestic firms exhibit a broader spectrum of cooperation-related integration: small firms exhibit no effect, while large firms exhibit an increase in integration that is larger than the increase for cross-listed firms.

V. Conclusion

The analyses in this paper shed light on an opaque and hitherto unexplored aspect of capital market integration—cooperation between securities regulators. I study the role of cross-border cooperation between securities regulators in integrating equity markets. Using a research design with properties that rule out many alternative explanations, I find that cooperation via the *M*MoU is associated with an 11% increase in FPI, relative to the time-series of other pairs that include the same investor or investee country. I find similar support for market integration using asset-pricing tests. Thus, global risk sharing via investment diversification and integration with world markets appears to depend, at least in part, on regulators' capacity and willingness to cooperate. Such cooperation could benefit both (a) investors, who must balance diversification benefits against adverse selection and other risks, and (b) firms, which often seek higher valuations and lower cost of capital by integrating with global capital markets.

In addition to being relevant to investors, firms, and regulators, these findings may be applicable in the context of contemporary policy coordination issues, such as the Brexit, the EU's Capital Markets Union initiative, and the regulatory responses to the recent

pandemic.[25] However, policymakers should also consider the *costs* of cooperation under the current system and alternative mechanisms or configurations (which fall outside the scope of this study). Although the current system has demonstrated its effectiveness, its unenforceable nature makes it delicate—built on reciprocal and prudent behavior by signatories. Extending the privilege of cross-border assistance to regulatory counterparts relies on a recipient's judicious use of borrowed authority.

[25] For example, securities regulators have actively pursued a coordinated response to COVID-19 through IOSCO (IOSCO 2020).

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TABLE 1—CROSS-BORDER INVESTMENT

	(1) *Main Result (PPML)*	(2) *Main Result (log-linear)*
MMoU	0.105***	0.377***
	(2.95)	(4.60)
Bilateral MoU	0.084*	0.562***
	(1.91)	(2.79)
Investment treaty	-0.034	0.567***
	(-0.51)	(5.12)
Trade treaty (PTA)	0.026	0.218**
	(0.51)	(2.30)
Tax Treaty	-0.053	-0.039
	(-1.04)	(-0.26)
N	63,957	260,856
R^2	0.99	0.83
Country-pair FEs	Y	Y
Investor-year FEs	Y	Y
Investee-year FEs	Y	Y
Pair time trends	Y	N

Source: Author calculations. This table presents the results of PPML regressions of cross-border investment. Column 2 uses a log-linear specification. Standard errors are clustered by the country-pair level. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

TABLE 2—CROSS-BORDER INVESTMENT ACROSS LEVELS OF PARTITIONING VARIABLES

Panel A: Distance

Close	5.2%*
Medium	9.10%***
Far	14.6****

Panel B: Capital controls

Investee country	*Capital controls*	-2.0%
	(No controls)	13.6%***

Panel C: Common Law Origin

		Investor country	
		Other	*Common*
Investee country	*Other*	8.8%**	9.4%**
	Common	8.4%	15.1%***

Panel D: Rule of Law

		Investor country		
		Weak	*Middle*	*Strong*
Investee country	*Weak*	74.8%	68.4%*	32.1%***
	Middle	86.8%	-19.2%	-3.9%
	Strong	45.8%**	-2.1%	10.2%***

Panel E: Market size

		Investor country		
		Small	*Medium*	*Large*
Investee country	*Small*	-6.2%	-4.0%	-2.7%
	Medium	10.9%	0.7%	7.5%
	Large	11.8%	9.3%**	11.9%***

Panel F: Market Development

		Investor country		
		Frontier	*Emerging*	*Developed*
Investee country	*Frontier*	-0.2%	2.0%	8.6%
	Emerging	26.5%*	-6.1%	0.6%
	Developed	8.1%*	7.7%	13.5%***

Source: Author calculations. This table constructs the estimates of the effect of the *M*MoU across nine conditions of market development for country pairs, using PPML regressions of cross-border investment. The raw estimates are transformed using the expression $\hat{g}=\exp(\theta)-1$, where θ is the coefficient estimate from the tables (described in footnote 11). Standard errors are clustered by the country-pair level. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. No adjustments are made to account for performing multiple tests.

TABLE 3—CROSS-BORDER INVESTMENT (ADDITIONAL TESTS)

Test description	(1) *M*MoU countries only	(2) Controlling for bilateral trade	(3) EU pairs	(4) US	(5) Countries with US cross-listings (from Lang et al. 2019)	(6) Controlling for cross-listings
MMoU	0.091***	0.098***	0.087***	0.098***	0.093**	0.110**
	(2.98)	(3.80)	(2.71)	(3.04)	(2.29)	(2.52)
Bilateral MoU	0.122***	0.065	0.104***	0.075*	0.075*	0.080
	(3.11)	(1.33)	(2.65)	(1.89)	(1.90)	(1.61)
*MMoU*EU pair*			0.000			
			(0.00)			
$MMoU*US_i$				0.038		
				(1.03)		
$MMoU*US_j$				0.014		
				(0.44)		
*MMoU*Countries with US x-list*$_i$					0.013	
					(0.36)	
*MMoU*Countries with US x-list*$_j$					0.016	
					(0.54)	
$Trade_{i\ to\ j}$		-0.004				
		(-0.69)				
$Trade_{j\ to\ i}$		0.003				
		(0.57)				
*MMoU*X-list_indicator*						-0.008
						(-0.03)
Investment treaty	-0.018	-0.017	-0.010	-0.018	-0.017	0.030
	(-0.43)	(-0.46)	(-0.24)	(-0.46)	(-0.43)	(0.67)
Trade treaty (PTA)	0.045*	0.033	0.051**	0.032	0.030	-0.059
	(1.78)	(0.92)	(2.05)	(1.12)	(1.04)	(-1.03)
Tax Treaty	-0.051	-0.066*	-0.062*	-0.046	-0.044	-0.044
	(-1.45)	(-1.73)	(-1.90)	(-1.29)	(-1.25)	(-0.77)
N	44,288	61,957	61,957	61,957	61,957	61,957
R^2	0.99	0.99	0.99	0.99	0.99	0.99
Country-pair FEs	Y	Y	Y	Y	Y	Y
Investor-year FEs	Y	Y	Y	Y	Y	Y
Investee-year FEs	Y	Y	Y	Y	Y	Y
Pair time trends	Y	Y	Y	Y	Y	Y

Source: Author calculations. This table presents the results of PPML regressions of cross-border investment. Standard errors are clustered at the country-pair level. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

TABLE 4—MAIN TESTS OF CHANGES IN BETA—*CROSS-LISTED FIRMS*

	(1) *Main result*	(2) *Non-US cross-listed*	(3) *US-Cross-listed*
R^L	0.598***	0.663***	0.481***
	(6.54)	(5.73)	(3.17)
R^W	0.380***	0.319***	0.477
	(6.43)	(4.08)	(4.61)
Post	-0.001	-0.001	-0.000
	(-0.75)	(-0.86)	(-0.07)
R^L*post*	-0.081**	-0.065*	-0.135**
	(-1.98)	(-1.74)	(-2.16)
R^W*post*	0.065	0.052	0.128**
	(1.24)	(1.03)	(3.33)
N observations	120,639	71,962	48,677
N firms	1,166	718	448
N clusters	206	172	34
R^2	0.167	0.193	0.135

Source: Author calculations. This table reports the results of estimating asset-pricing models based on equation (3): $Ret=\beta_0+\beta_1 R^L+\beta_2 R^W+\beta_3 Post+\beta_4 R^L * Post+\beta_5 R^W * Post+\varepsilon_t$. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. Standard errors are clustered at the country-pair level.

TABLE 5—CROSS-SECTIONAL TESTS OF CHANGES IN BETA—*CROSS-LISTED FIRMS*

Panel A: Distance

		ΔR^L	ΔR^W
	Close	0.02	-0.05
	Medium	-0.04	0.00
	Far	-0.21***	0.18***

Panel B: Capital controls

		ΔR^L	ΔR^W
Home country	*Capital controls*	-0.10	0.07
	(No controls)	-0.08**	0.08**

Panel C: Common law

		Host country			
		Code		*Common*	
		ΔR^L	ΔR^W	ΔR^L	ΔR^W
Home country	*Code*	-0.08	0.03	-0.09**	-0.01
	Common	-0.07	-0.03	-0.11***	0.13***

Panel D: Rule of law

		Host country			
		Weak		*Strong*	
		ΔR^L	ΔR^W	ΔR^L	ΔR^W
Home country	*Weak*	-0.04	0.08*	-0.06	0.15
	Strong	-0.13**	0.02	-0.30***	0.12

Panel E: Market size

		Host country			
		Small		*Large*	
		ΔR^L	ΔR^W	ΔR^L	ΔR^W
Home country	*Small*	-0.07	0.07	-0.17***	0.15**
	Large	-0.17*	0.08	-0.27**	0.22**

Panel F: Market development

		Host country			
		Undeveloped		*Developed*	
		ΔR^L	ΔR^W	ΔR^L	ΔR^W
Home country	*Undeveloped*	-0.05	0.04	-0.08	0.02
	Developed	0.01	0.10	-0.08**	0.08**

Source: Author calculations. This table reports the results of estimating asset-pricing models based on equation (3): $Ret=\beta_0+\beta_1 R^L+\beta_2 R^W+\beta_3 Post+\beta_4 R^L * Post+\beta_5 R^W * Post+\varepsilon_t$.
*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. Standard errors are clustered at the country-pair level.

TABLE 6—ALTERNATIVE TIME HORIZONS—*CROSS-LISTED FIRMS*

Years pre/post	Φ_{Pre}	Φ_{Post}	$\Delta\Phi$
1	0.389	0.463	0.074
1.5	0.301	0.461	0.160
2	0.286	0.423	0.137
2.5	0.231	0.417	0.187
3	0.225	0.404	0.178
3.5	0.224	0.399	0.175
4	0.203	0.396	0.193

Source: Author calculations. This table reports the results of estimating asset-pricing models based on equation (3): $Ret=\beta_0+\beta_1 R^L+\beta_2 R^W+\beta_3 Post+\beta_4 R^L * Post+\beta_5 R^W * Post+\varepsilon_t$. Each estimation is described in the text.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. Standard errors are clustered at the country-pair level.

TABLE 7—MAIN TESTS OF CHANGES IN BETA—*DOMESTIC FIRMS*

	(1)
R^L	0.672***
	(4.76)
R^W	0.377*
	(1.78)
Post	0.000
	(0.21)
R^L*post*	-0.154
	(-1.51)
R^W*post*	0.012
	(0.31)
N observations	495,880
N firms	6,535
N clusters	51
R^2	0.181

Source: Author calculations. This table reports the results of estimating asset-pricing models based on equation (3): $Ret=\beta_0+\beta_1 R^L+\beta_2 R^W+\beta_3 Post+\beta_4 R^L*Post+\beta_5 R^W*Post+\varepsilon_t$.
*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. Standard errors are clustered at the country level.

TABLE 8—CROSS-SECTIONAL TESTS OF CHANGES IN BETA—
DOMESTIC FIRMS

Panel A: Firm size

		ΔR^L	ΔR^W
	Small	-0.13	-0.02
	Large	-0.19*	0.05

Panel B: Capital controls

		ΔR^L	ΔR^W
Home country	*Capital controls*	0.04	-0.10
	No capital controls	-0.19	-0.03

Panel C: Common law

		ΔR^L	ΔR^W
Home country	*Code*	-0.15	0.01
	Common	0.06	0.02

Panel D: Rule of law

		ΔR^L	ΔR^W
Home country	*Weak*	-0.17	0.04
	Strong	0.07	-0.07

Panel E: Market size

		ΔR^L	ΔR^W
Home country	*Small*	-0.13	-0.03
	Large	0.01	-0.10

Panel F: Market development

		ΔR^L	ΔR^W
Home country	*Undeveloped*	-0.15	-0.04
	Developed	0.06	-0.14

Source: Author calculations. This table reports the results of estimating asset-pricing models based on equation (3):
$Ret=\beta_0+\beta_1 R^L+\beta_2 R^W+\beta_3 Post+\beta_4 R^L * Post+\beta_5 R^W * Post+\varepsilon_t$.
*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. Standard errors are clustered at the country-level for panel A. Panels B-F contain cells with as few as 17 countries, so standard errors are clustered at the country-year level.

TABLE 9—ALTERNATIVE TIME HORIZONS—*DOMESTIC FIRMS*

Years pre/post	Φ_{Pre}	Φ_{Post}	$\Delta\Phi$
1	0.36	0.43	0.07
1.5	0.33	0.43	0.10
2	0.28	0.36	0.07
2.5	0.27	0.34	0.07
3	0.25	0.33	0.08
3.5	0.26	0.33	0.07
4	0.28	0.31	0.04

Source: Author calculations. This table reports the results of estimating asset-pricing models based on equation (3): $Ret=\beta_0+\beta_1 R^L+\beta_2 R^W+\beta_3 Post+\beta_4 R^L * Post+\beta_5 R^W * Post+\varepsilon_t$. Each estimation is described in the text. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.
Standard errors are clustered at the country level.

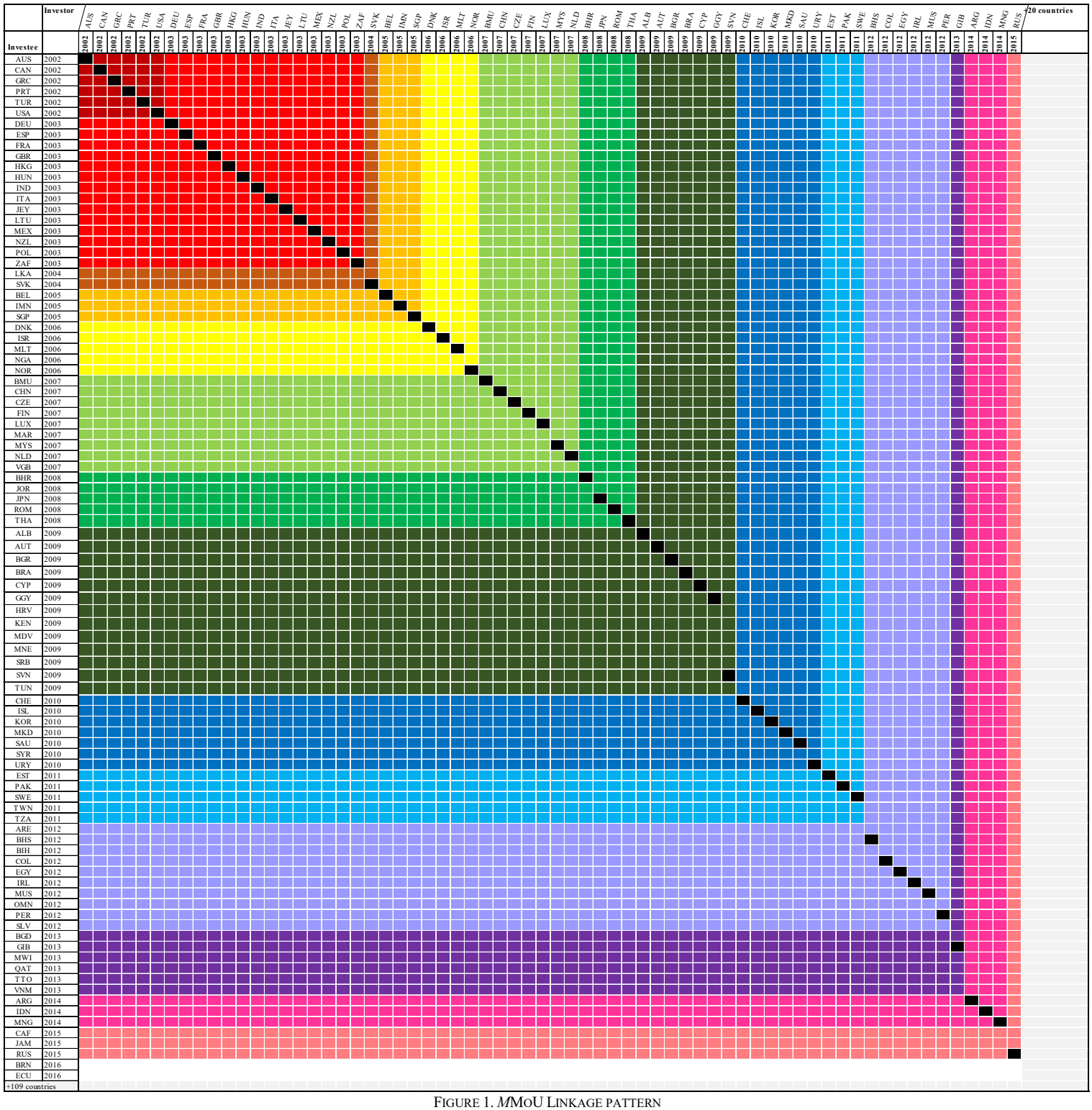


FIGURE 1. *M*MOU LINKAGE PATTERN

Notes: This adjacency matrix represents each of the country pairs in the FPI analysis and indicates when the treatment occurs for each pair. For brevity, investor and investee countries are reported using their International Organization for Standardization (ISO) three-digit codes. Shocks that occur in the same year have the same color, so blocks of the country pairs with the same color experience the shock at the same time (and different colored pairs experience the treatment at different times). The year of the treatment is the larger of the *M*MoU adoption years for the associated row and column. The matrix demonstrates that each individual country (row or column) typically has substantial variation in the treatment date, depending on its joining date and the counterpart country's joining date. Each cell has a 17-year time series. An additional 109 investee countries and 20 investor countries are suppressed because of space considerations, and because they do not receive the treatment.

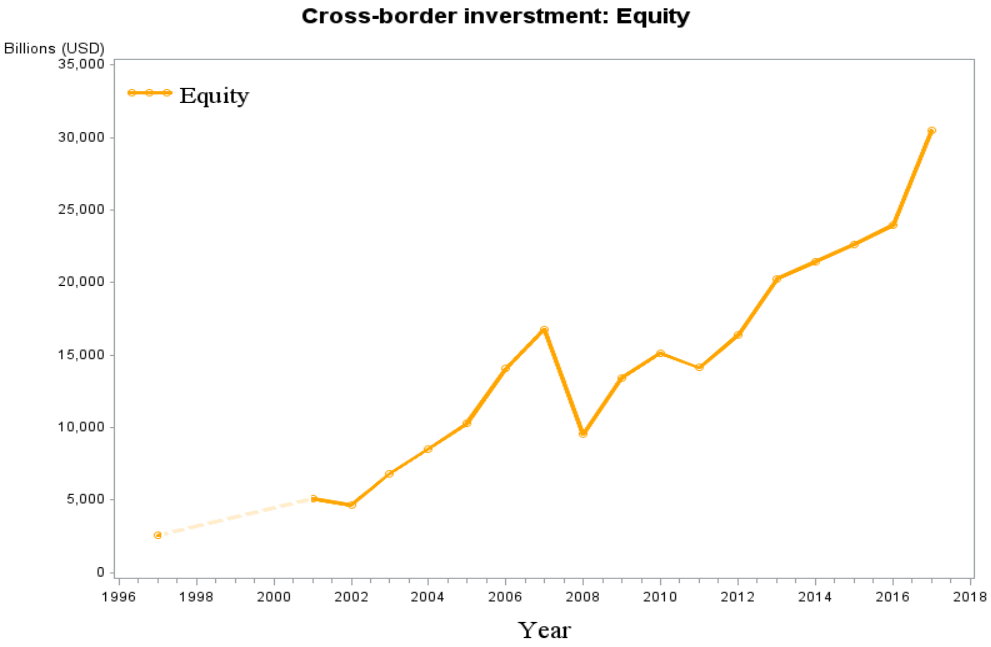


FIGURE 2. TOTAL CROSS-BORDER INVESTMENT OVER TIME

NOTES: THIS FIGURE SHOWS CROSS-BORDER INVESTMENT IN THE FORM OF EQUITY FROM THE IMF'S COORDINATED PORTFOLIO INVESTMENT SURVEY (CPIS).

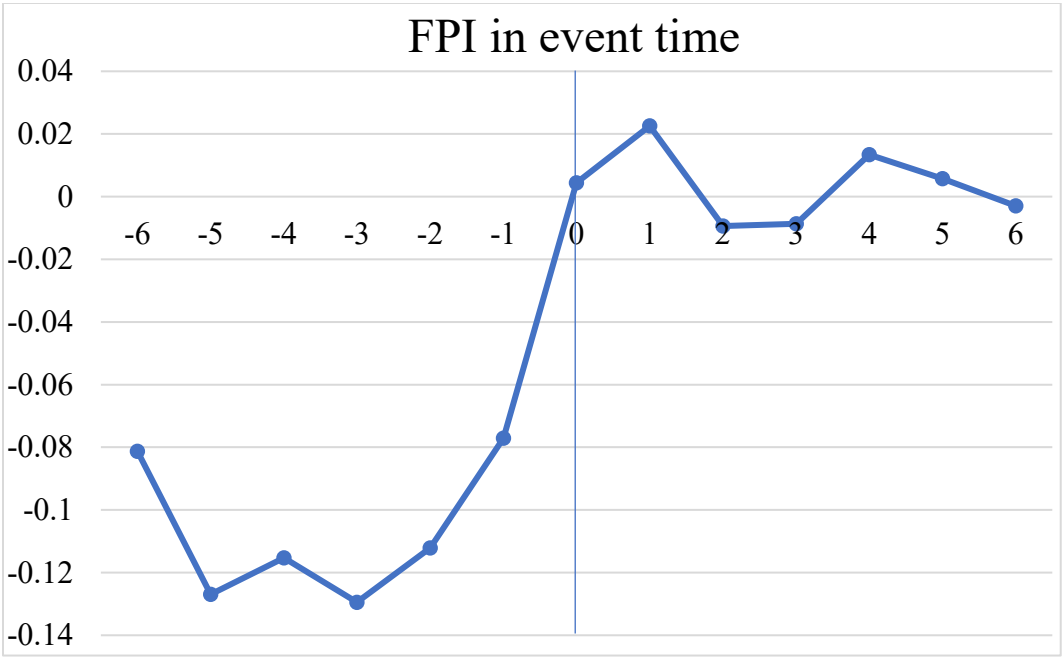
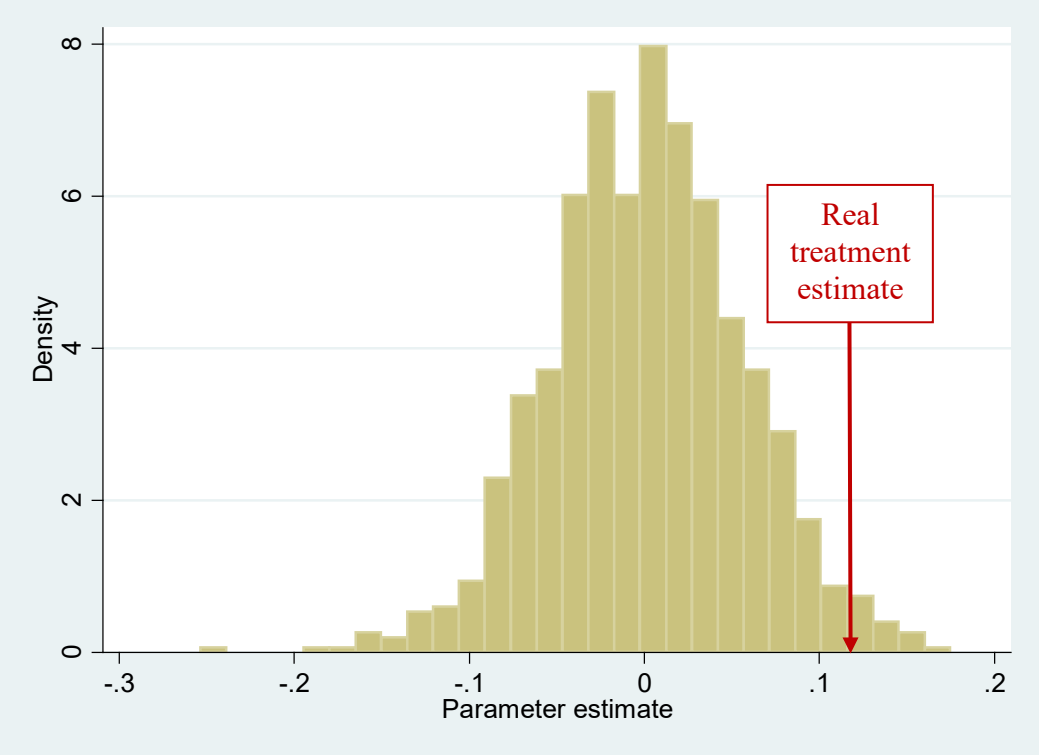


FIGURE 3. CROSS-BORDER INVESTMENT IN EVENT TIME

NOTES: THIS FIGURE SHOWS THE EFFECT OF THE *M*MOU ON FPI IN EVENT TIME. THE X-AXIS REPRESENTS YEARS RELATIVE TO THE *M*MOU LINKAGE DATE, AND THE Y-AXIS REPRESENTS THE COEFFICIENT (PRIOR TO EXPONENTIATING).



INTERNET APPENDIX FIGURE 1. DISTRIBUTION OF ESTIMATES FROM PSEUDO-TREATMENT

NOTES: THIS HISTOGRAM SHOWS THE DISTRIBUTION OF THE PSEUDO-TREATMENT COEFFICIENTS (AS DESCRIBED IN SECTION *III CROSS-BORDER INVESTMENT: E. IDENTIFICATION AND ROBUSTNESS TESTS*).

IOSCO's Committee 4 is a subcommittee that comprises a group of global representatives from IOSCO members. Committee 4's full name is the "Committee on Enforcement and the Exchange of Information and the Multilateral Memorandum of Understanding Screening Group," but it is known as "SG/C4." When a regulator submits its application to the *M*MoU, the application is closely examined by a specially constituted Verification Team (the "VT") (usually a geographically diverse, nine-member group that, for efficiency, often includes members who are familiar with the applicant). The process either starts a formal application, or a consultation with the SG regarding any special circumstances in terms of a regulator's eligibility. A hypothetical timeline based on actual applicants is provided below.

January 1, 2010: Mounting global political pressure to combat terrorist financing and money laundering stirs a regulator (which I will call the "FMA") to pursue the *M*MoU. This pressure can come from parliaments (or other legislative authorities), presidential cabinet members, IOSCO itself (in 2005, IOSCO gave its members 5 years to sign the *M*MoU or risk losing their voting rights), the IMF, World Bank, FSB, or other regulatory peers.

March 1, 2010: After evaluating their own qualifications pursuant to the *M*MoU, the FMA, in conjunction with their local government, proposes new legislation to revise the legal framework for cooperation in the field of securities supervision. This draft legislation is intended to address shortcomings that arise from bank secrecy laws, blocking statutes, and procedural issues. For market participants, this is an early signal that the FMA is preparing to sign the *M*MoU.

April 1, 2010: The FMA files its application to become a signatory of the *M*MoU. As part of the application, the FMA submits a completed questionnaire, including descriptions of the pending legislative proposals.

April 15, 2010: The application is forwarded to the VT members for review.

July 1, 2010: Based on the FMA's answers to the *M*MoU questionnaire, an initial evaluation is made and a report is drafted with a recommendation to accept (or require revisions or further information). The report is delivered to the SG for consideration at the next semi-annual SG meeting.

August 1, 2010: The draft law proposed on March 1, 2010, is passed and enters into force on January 1, 2011.

November 1, 2010: At the SG meeting, representatives of the FMA are invited to attend a discussion of the FMA's eligibility. The SG could reach a consensus that the applicant meets all of the criteria and thus proceed to the next step, or it could require additional legislative changes or solicit more information, in which case the application could be reconsidered at the next semi-annual meeting (six months later).

October 15, 2010: If additional changes are required, additional iterations of the step described on March 1 can take place.

January 1, 2011: The new laws enter into force on January 1, 2011.

February 15, 2011: *M*MoU is signed (unless signing is delayed until IOSCO Annual Meeting in April).

INTERNET APPENDIX TABLE I—CROSS-BORDER INVESTMENT

	(1)
	FPI: Developed country-pair sample
MMoU	0.088**
	(2.13)
Bilateral MoU	-0.053
	(-0.99)
Investment treaty	0.045
	(1.37)
Trade treaty (PTA)	-0.114**
	(-2.19)
Tax Treaty	-0.056
	(-0.94)
N	6,720
R^2	0.99
Country-pair FEs	Y
Investor-year FEs	Y
Investee-year FEs	Y

Source: Author calculations. This table presents the results of estimations described in the text. Standard errors are clustered by the country-pair level. *** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

The effects of cross-border cooperation on disclosure enforcement and earnings attributes[◊]

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Abstract: This study tests for changes in U.S.-listed foreign firms' financial reporting properties and transparency when their home market regulators enter an arrangement that facilitates enforcement cooperation with the Securities and Exchange Commission. This arrangement—the International Organization of Securities Commissions' Multilateral Memorandum of Understanding Concerning Consultation and Cooperation and the Exchange of Information (MMoU)—has explicit disclosure-related provisions. I show that the MMoU is associated with improvements across various measures of accounting properties and transparency. Collectively, the findings help resolve enduring questions about why the earnings quality of U.S.-listed foreign firms diverged from that of U.S. firms during pre-MMoU periods.

Keywords: information sharing, regulatory coordination, enforcement, SEC, cross-list, bonding
JEL codes: K22, G38, F22, F23, F59, M48

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[†] This paper was prepared during an assignment as a senior economist at the Securities and Exchange Commission (SEC). The SEC, as a matter of policy, disclaims responsibility for any private publication or statement by any of its employees. The views expressed herein are those of the author and do not necessarily reflect the views of the Commission or of the author's colleagues on the staff of the Commission.

1. INTRODUCTION

A commonly held belief represented in the accounting and finance literature is that the Securities and Exchange Commission (SEC) does not hold U.S.-listed foreign firms to the same standards as U.S. firms (Frost and Kinney 1996; Frost and Pownall 1994; Mathew et al. 2007). Some researchers even question whether the SEC has any bite whatsoever for foreign firms (Siegel 2005). However, recent research suggests that a cooperative arrangement—International Organization of Securities Commissions' (IOSCO's) Multilateral Memorandum of Understanding (MMoU)—has strengthened the SEC's cross-border enforcement program via better cooperation with foreign securities regulators (Silvers 2020). The MMoU establishes various investigative and prosecutional capabilities—including the ability to access bank, brokerage, and beneficial ownership records; audit work papers; and witness testimony; and to identify, freeze, and repatriate assets in foreign countries.

I study the MMoU to understand how the threat of enforcement influences financial reporting choices, as observed through earnings properties. My results suggest that enhanced enforcement capabilities alter reporting choices in ways that are consistent with improvements in earnings quality and transparency—proxies for earnings management decline, while there are increases in timely loss recognition, value relevance, and return synchronicity. These properties converge with matched U.S.—largely eliminating differences that existed before the MMoU.

Although prior research provides conceptual reasons to think that enforcement might influence earnings properties (among other things), endogeneity concerns often complicate the empirical identification of enforcement. The literature indicates that broad-level institutional features (e.g., public versus private firm status; a country's legal origin; and indices of formal laws, regulatory powers, and investor protection) are associated with financial reporting properties (Ball et al. 2000; Ball et al. 2003; Leuz et al. 2003; Bushman and Piotroski 2006; Ball and Shivakumar 2005; Burgstahler et al. 2006;

DeFond et al. 2007). Yet others point out severe limitations for such variables as enforcement proxies.[1]

The MMoU provides a rare opportunity to study the effect of plausibly exogenous variation in the SEC's prospective enforcement on reporting choices. The setting offers several advantages. First, the MMoU affects a specific component of the U.S. system—public enforcement by the SEC. The MMoU does not alter other facets of the institutional systems surrounding foreign firms (e.g., securities laws, accounting standards, and disclosure obligations). Therefore, using the MMoU as a shock to cross-border enforcement capabilities, I can make inferences about *SEC* enforcement, specifically. Second, the motivation for the MMoU was to aid investigations of terrorist financing and money laundering.[2] Thus, the MMoU is not prompted by the usual factors that produce changes in regulatory power (e.g., market failure, firm malfeasance, or investor dissatisfaction) and is entirely beyond the control of investors, issuers, the SEC, and, to some extent, even foreign regulators. Yet the capabilities the MMoU enables provide broad new powers for the SEC. Third, although the MMoU is a single arrangement, its signatories are introduced at different times. As a consequence, the MMoU's shocks to cross-border SEC enforcement occur at different times for different firms, depending on when a firm's home country regulator enters. The timing of a country's MMoU admission depends on its ability to comply with IOSCO's standards for signatories. To qualify, some countries must pass new laws to remediate blocking statutes or secrecy laws that prohibit or complicate assistance to foreign counterparts.[3] In such cases, the rate at which a country can pass MMoU-related legislation adds to the

[1] Cross-sectional variation in enforcement may proxy for omitted variables that catalyze observed capital market outcomes (Jackson and Roe 2009; Coffee 2007). Most of these measures make no attempt to distinguish between public enforcement by regulators and private enforcement via courts. Using variation across time can also be problematic, because enforcement events often commingle with other institutional changes, are jointly determined by the regulatory mechanism and firm behavior, and arise from market cycles. (Similar arguments are presented in Bhattacharya et al. (2003), Daske et al. (2008), Christensen et al. (2013), and Isidro et al. (2016)).

[2] IOSCO routinely refers to the 9/11 attacks as the impetus for the MMoU, which is consistent with interpretations from legal and political economy scholars (see Sheng (2002), Nakagawa (2011), Austin (2012), and Kempthorne (2013)).

[3] For example, consider Israel's amendment to its securities laws—*5728-1968 Extending Cooperation to a Foreign Authority*—which went into effect in January 2006 and was designed to make the Israel Securities Authority eligible for MMoU entry (which occurred in July 2006). See http://www.isa.gov.il/sites/isaeng/1489/1511/Pages/1755.aspx for details.

variation in the timing of the treatment. (Overall, there is no indication that these factors produce a sequence or timing of adoption that is endogenous.[4]) Finally, foreign firms have already selected a U.S. listing, thereby embracing various regulatory requirements and elements of the U.S. legal system as well as reconciliation of earnings to U.S. GAAP. Thus, MMoU setting provides a homogeneous set of accounting standards, which helps to rule out the effects of changing reporting requirements (in contrast to settings that potentially commingle changes in accounting standards and changes in enforcement).[5] Overall, the MMoU setting provides staggered variation in enforcement that is not driven by market forces and is beyond the control of firms, investors, and the SEC.

Despite the benefits, however, the MMoU setting has certain limitations. In contrast to domestic settings, short window earnings response coefficients (ERCs) present a problem: there are two sets of expectations of earnings and actual earnings are released at different times. Home market earnings systematically preempt the U.S. GAAP-reconciled earnings, so short-window analyses would yield distorted and unpredictable results. Consequently, like prior work, I use *annual* horizons.

Even prior to the MMoU, numerous prior studies recognized the importance of U.S.-listed foreign firms. Lang et al. (2006) explore the reporting properties of these firms, motivating their study on enforcement deficiencies for cross-listed firms (relative to U.S. firms). U.S.-listed foreign firms exhibit earnings attributes that suggest lower-quality reporting than matched U.S. firms. Ultimately, the authors downplay enforcement as an explanation for their results and attribute the gap in reporting quality to different incentives *in general*. In a discussion of Lang et al. (2006), Leuz (2006) points out that several

[4] For example, several large economies join the MMoU early in the sample period (U.S., UK, Canada, etc.), but so do many smaller ones (Turkey, Portugal, Greece, Jersey). The notion that certain economies join early does not jeopardize a causal interpretation of my results. Neither firms nor investors have influence over whether/when a country joins. The timing is problematic only if correlated omitted variables align with the staggered treatment, which is not the case for events such as PCAOB inspections (Shroff 2016; Aobdia and Shroff 2017) or bilateral tax treaties (see internet appendix figure I).

[5] My sample ends in 2009, which naturally limits the impact of the SEC's elimination of the reconciliation requirement for foreign firms that apply IFRS (effective March 4, 2008), and Morrison v. Australia National Bank—a 2010 Supreme Court decision that fundamentally changed private litigation for U.S.-listed foreign firms (Naughton et al. 2018b) .

factors other than enforcement could account for their results. However, this leaves unanswered the critical question of *why* foreign firms appear to have higher levels of earnings management.

I conceptualize the MMoU as a series of staggered enhancements to the prospective cross-border enforcement and test for changes in financial reporting properties. First, as a baseline, I establish that the MMoU is associated with increased *disclosure-related* enforcement. This is a modest extension of Silvers (2020), which shows that the MMoU is associated with increased cross-border enforcement *in general* (pooling financial reporting cases with those of insider trading, bribery, and other managerial improprieties). My tests of enforcement use only financial reporting cases (e.g., accounting and auditing enforcement releases, litigated proceedings, settled actions, and SEC-prompted restatements). When the MMoU connects the SEC to a firm's home regulator, there is an initial surge in financial reporting-related enforcement activities; enforcement then tapers but remains higher than pre-MMoU levels. This is consistent with the idea that firms adjust to a new equilibrium of enforcement by selecting a lower level of reporting aggressiveness when the SEC's enforcement capabilities are enhanced. It also substantiates the use of the MMoU as an indicator for prospective disclosure-related enforcement.

Next, I present the main earnings quality tests. Prior to the MMoU application dates, cross-listed firms show evidence of greater earnings management, less timely recognition of losses, and weaker associations between accounting outputs and stock prices (relative to matched U.S. firms). These findings essentially replicate those of Lang et al. (2006). However, after a firm's home country authority applies to the MMoU, the differences between cross-listed and matched U.S. firms disappear almost entirely. These inferences are generally insensitive to using non-cross-listed firms from the home market as an alternative benchmark, which helps to mitigate several alternative explanations—including the idea that the estimated effects of the MMoU pick up changes occurring in the home market. Moreover, the results persist despite explicit controls for several factors, including IFRS. The

findings provide novel insights about the effect of enforcement on the use of discretion at the firm level and suggest that disparity in enforcement is responsible for prior results showing evidence of greater earnings management, less timely recognition of losses, and lower associations between accounting outputs and stock prices (for foreign firms relative to matched U.S. firms).

Finally, to summarize transparency, I study the synchronicity between the returns of cross-listed firms and the returns of U.S. and home market indices. I observe increased synchronicity under the MMoU and attribute it to an increase in transparency, which is consistent with other tests in this paper and other work on cross-listing by Dasgupta et al. (2010) and recent work by Gassen et al. (2019).[6]

In the cross-section of firms' home countries, one might expect the largest impact to be in firms from home countries with weak regulatory attributes; this would be consistent with enforcement having a higher marginal effect for firms that are otherwise subject to low regulatory scrutiny. Of course, such an expectation assumes that the MMoU yields homogeneous changes in cooperative capabilities across countries. Given the wide variation in foreign regulators' domestic powers and resources, the capabilities that the cooperation enables are probably *hetero*geneous across regulators. Since powerful regulators most likely make the best cooperative partners, cross-border cooperation may have a larger impact for firms from countries with strong enforcement, which contrasts with the prediction above. I find some differences across subsamples split on legal origin (common/code law) and on median rule of law index (based on Kaufmann et al. (2010)). However, the cross-sectional patterns are at times contradictory, dependent on the measure and benchmark used, and not overwhelmingly supportive of either prediction. Fortunately, the staggered treatment pattern renders cross-sectional tests less critical for the identification strategy (a significant difference from designs with a common shock).

My findings relate to studies on enforcement and misconduct, which have become more

[6] I acknowledge that Morck et al. (2000) interpreted returns more synchronous with the market as indicative of *less* firm-specific news impounded into price and *reduced* idiosyncratic volatility. I provide a full discussion in section 3.

substantive in recent years (Karpoff et al. 2008; Dyck et al. 2010; Correia 2014; Heese et al. 2017; Parsons et al. 2018; Duro et al. 2019; Heese 2019). Perhaps the most closely related study is Kedia and Rajgopal (2011), which shows that financial misreporting increases with geographic distance from SEC offices and decreases with historical county-level SEC enforcement. Although my findings support their conclusion that financial misbehavior is inversely related to the threat and salience of enforcement, my study is distinct in several ways. The variation in prospective enforcement in the MMoU is not a discretionary strategic choice by the SEC to maximize deterrence (see also, Stice-Lawrence (2019)). Instead, it is a plausibly exogenously imposed shock to regulatory capabilities enabled by cooperation. My tests are designed to capture opacity and distorted financial reporting, even if such reporting falls short of committing outright fraud. Furthermore, differences in the cross-border setting make it unclear that Kedia and Rajgopal's results generalize. Prior work suggests that foreign firms may have other incentives that may dominate regulatory concerns (Lang et al. 2006; Leuz 2006). Although regulation in domestic settings may be "most effective when it is local" (Kedia and Rajgopal 2011, p 259), my tests indicate that cooperation compensates for both geographic and jurisdictional limitations.

The present study also extends contemporary work related to cross-border cooperation between securities regulators. Silvers (2020) provides evidence that the MMoU is associated with enhanced liquidity of cross-listed firms. A distinct contribution of the current study is its focus on earnings properties. Yet, because the MMoU most likely curtails numerous activities that compromise liquidity (e.g., insider trading, market manipulation, asset taking, front running, and undisclosed connected transactions), we cannot attribute improved liquidity to firm-level improvements in transparency or assume such improvements exist. Thus, it has previously been unclear whether financial reporting plays any role in the observed liquidity improvements. The results presented here, however, indicate that prospective enforcement enabled by cooperation affects issuers' reporting choices.

This is the first paper to study the effect of cross-border cooperation on financial reporting properties and transparency. It contributes to the literature in at four main ways. First, cooperative policy emerges as an important, but unexplored, institutional feature that determines reporting behavior for foreign firms. Second, the temporally staggered changes in enforcement capabilities are outside the control of firms, producing results that extend related literatures on enforcement and institutional features by providing better identification. An omitted variable would need to occur at the staggered times at which a country joins the MMoU, while not affecting the reporting qualities of matched U.S. or home country firms. Third, the paper helps resolve enduring questions about why the reporting properties of U.S.-listed foreign firms, in particular, have differed from those of domestic U.S. firms. Reporting properties of U.S.-listed foreign firms whose home regulators have signed the MMoU are now indistinguishable from those of U.S. firms. Thus, gaps in cross-border SEC enforcement—rather than incentives *in general*—explain the finding in Lang et al. (2006) that cross-listed firms fall short of U.S. firms' earnings quality. Finally, the results have relevance for securities regulators' global policy coordination efforts, which are increasingly reliant on arrangements that are similar to the MMoU.

2. Background

The MMoU and (disclosure-related) enforcement

By entering U.S. markets, foreign firms subject themselves to a new and generally stricter accounting, legal, regulatory, and enforcement regime. Cross-listed firms must satisfy not only the requirements of their home country but also those of the U.S., including U.S. GAAP financial reporting and SEC regulations. Stulz (1999) and Coffee (1999) suggest that, when a foreign firm willingly chooses the regulatory strictness that accompanies a U.S. listing, it credibly signals, to investors, a commitment to higher standards of investor protection and disclosure. This notion, known as the bonding hypothesis, depends critically on effective enforcement from the U.S. legal system.

Yet the idea that a U.S. cross-listing provides even a *threat* of enforcement has been questioned

by prior research (Siegel 2005; Licht et al. 2017). This skepticism is understandable given that, for several decades, securities regulators that sought cross-border assistance from their counterparts usually failed to receive the help they needed. The IMF (2007) identifies seven types of cross-border obstacles that have traditionally hindered regulators: (1) the burdens of case-by-case examination of regulatory counterparts and requests, (2) the need for an independent interest in the subject matter of a request, (3) dual criminality requirements, (4) diagonal information sharing (between regulators with different functions), (5) consideration of reciprocity, (6) availability of information-collecting powers, and (7) proactive information exchange. In the pre-MMoU years, these obstacles may have hindered cooperation between securities regulators to the point that cross border cases were rarely pursued. This would explain the Siegel (2005) finding that observed cross-border enforcement was rare.

After the terrorist attacks of September 11, 2001, IOSCO acted immediately to coordinate a response that would provide a means of investigating and deterring terrorist financing and money laundering. Thus, it was 9/11—not a market cycle or any of the other usual triggers for regulatory interventions—that led IOSCO to create the MMoU. Moreover, 9/11 generated an urgent and powerful push among high-level politicians to make the arrangement work.

The network structure of the MMoU enables a negotiation dynamic that differs greatly from that of bilateral memoranda. IOSCO members collectively determine the standards of the MMoU and this appears to give IOSCO more sway over lawmakers, features not seen in bilateral agreements. Legislators may be more likely to approve regulatory changes that are tailored to international standards and less likely to approve changes that merely assist a particular jurisdiction (especially when the benefits of the agreement do not appear to be reciprocal (Licht 1999)). The MMoU is also unlike bilateral efforts in that it leverages its network structure and standard-setting role to impose a gatekeeping function. Applicants to the MMoU are required to complete a detailed questionnaire about

specific laws that will enable them to comply with the memorandum. A formal screening/monitoring mechanism ensures that applicants can uphold minimum MMoU standards and routinely identifies issues that these countries must address legislatively. This screening process directly targets the impediments to cross-border cooperation that have hindered regulators in the past.

Importantly, the MMoU is not legally binding on its 124 current signatories. Neither a contract nor a treaty, it is structured as a statement of intent, meaning that neither IOSCO nor requesting authorities have a direct recourse if parties fail to uphold its terms. Still, for most countries, the threat of losing influence, signatory status, and voting rights is not trivial. The MMoU is an important benchmark for peer regulators and is a criterion in various assessments (e.g., the IMF and FSB). IOSCO monitors all cooperative requests between signatories and stipulates that responses be provided within two weeks.[7] Both participants in the MMoU as well as empirical evidence suggest that the memorandum has transformed cross-border enforcement (see IOSCO (2012) for details).

Although research in the 1990s and early 2000s described cross-border firms as largely beyond the reach or priorities of the SEC (Licht et al. 2017; Siegel 2005), Silvers (2020) indicates that the probability of enforcement increases by a factor of almost three when a firm's home-country regulator joins the MMoU. Silvers (2020) assesses *overall* enforcement, which pools disclosure-related issues with infractions such as insider trading, bribery (under the Foreign Corrupt Practices Act (FCPA)), and sundry improprieties (e.g., option backdating, aiding and abetting other firms in fraud, receiving prohibited loans to corporate officers, or acting as a market maker for one's own securities). The enforcement increases documented by Silvers (2020) occur at the precise times and places that the

[7] Cunha (2010, p 681) states that, "Signatories are required to report to the Monitoring Group MMoU failures by other signatories, under the MMoU cooperation framework; in those cases, the Monitoring Group will take action." A response can be an explanation for why the request has not yet been fulfilled, but this still promotes accountability.

MMoU connects the SEC with a foreign firm's home regulator.[8]

The MMoU's effect on disclosure-related enforcement

Whether the results from Silvers (2020) extend to *disclosure-related* enforcement is uncertain. On one hand, cross-listed firms have clear reporting obligations, and the SEC might be able to appropriately penalize noncompliance even without assistance from home regulators.[9] Disclosure violations appear distinct from crimes like insider training; in those cases the SEC depends critically on MMoU-enabled cooperative activities (such as access to bank records or the ability to freeze assets). It is therefore possible that the MMoU accomplishes little with respect to disclosure enforcement.

On the other hand, the MMoU may eliminate loopholes between legal systems that were once exploited by cross-listed firms. Prior to the MMoU, some foreign firms used legal ambiguities to conceal misbehavior; others had no choice but to conceal information, since compliance with SEC requests would lead them to violate local laws. In fact, it was often difficult to distinguish legitimate refusals from self-serving ones. Insofar as possible, the Commission tries to avoid putting foreign actors in situations of conflict. Thus, the SEC's access to information, pre MMoU, was largely at the discretion of the issuer. Under the MMoU, the SEC can route information requests through local regulators. This mechanism satisfies the SEC's information needs while circumventing any prohibitions—legitimate or not—faced by local actors. Enhanced information gathering by the SEC may increase the likelihood that questionable reporting choices will be investigated, raising the expected cost of such choices.

The new (disclosure) enforcement regime enabled by the MMoU implies that, in equilibrium, firms should change their behavior in response to a greater likelihood of sanctions. Therefore, observed

[8] There are numerous observable examples of the SEC receiving assistance via the MMoU in pursuing a foreign firm or market participant for alleged crimes involving financial reporting. For example, a recent case against a Panasonics Aviation CFO who allegedly backdated contracts to inflate revenue by $82 million illustrates the extensive reach the SEC has pursuant to the MMoU. The SEC obtained cooperation from *eight* regulatory counterparts that are MMoU signatories (Switzerland, Canada, United Arab Emirates, Japan, Singapore, Malaysia, Australia, and Pakistan).

[9] There is evidence that cross-listed firms attempt to lower the perceived information disadvantage for foreign investors by providing more numerical values and more readable text (Lundholm et al. 2014), obviating the need for SEC enforcement. Of course, this result may partially reflect the enforcement capabilities enabled by the MMoU.

enforcement may reveal a pattern. When the MMoU first connects regulators, enforcement outputs should initially increase, reflecting the regulators' new capacity to sanction firms for recent behavior (which is largely unalterable). Outputs may then taper slightly, as firms respond to the new equilibrium by improving their disclosure quality.

Why might the MMoU affect earnings properties (earnings management, etc.)?

Ex ante, it is unclear whether the MMoU's ability to move the needle on enforcement would change the choices that preparers make and, ultimately, alter earnings properties. On one hand, the resources and competence of foreign authorities are generally not on par with the SEC, and so assistance from these agencies may be of little consequence. Furthermore, preparers may not consider the threat of public enforcement during the reporting process, or such considerations may be largely dominated by other (local) incentives. Thus, the MMoU may have no association with earnings properties.

On the other hand, prior research indicates that financial misbehavior is inversely related to enforcement-threat salience (Kedia and Rajgopal 2011), which would suggest that enhanced enforcement might alter reporting choices in ways that increase transparency and better reflect a firm's economic performance. Such a deterrent effect applies not only to outright fraud, which is clearly related to the threat of enforcement (Becker 1974), but may apply to aggressive positions that fall within GAAP but still attract scrutiny from regulators.[10] When SEC enforcement focuses on financial reporting, firms may shy away from choices that could trigger investigations because investigations consume resources and increase exposure to private litigation. SEC scrutiny increases the expected cost of breakdowns in the reporting process even when errors are *unintentional*. The increased threat of an SEC investigation thus shifts the optimal allocation of resources toward the reporting process, in the

[10] In asset impairment decisions, for example, a manager may use aggressive estimates of future cash flows to avoid impairment write-downs (or to reclassify them to different periods). These choices become less viable when a firm's home regulator can provide the SEC with more direct evidence of the economic reality that the firm faces. Other decisions that require discretion in estimating future events (bad debt expense, an asset's useful life, warranty expenses, etc.) may also be affected by SEC oversight, which may in turn influence earnings properties.

form of increased managerial attention, support for internal controls, and audit effort.

Srinivasan et al. (2015, p 1206) suggest that cross-border "SEC enforcement relies on local infrastructure (e.g., lawyers and auditors) to support enquiries and action in the home country." Local auditors are likely to transfer their additional exposure to SEC sanctions to issuers, through additional audit effort that shapes reporting properties.[11] (Indeed, soon after the MMoU was established, auditors and law firms noted its implications for prospective cross-border enforcement.[12]) Liaisons with local regulators and auditors help the SEC to better grasp firms' economic reality and more closely inspect their financial reporting. The increased risk of investigations and sanctions should encourage auditors and preparers to report more carefully and avoid any choices that might raise red flags (which would seem to include many earnings management techniques).

The MMoU's explicit provisions on "misrepresentation of material information and other fraudulent or manipulative practices" (IOSCO 2002) have assisted SEC investigators in various instances. For example, in a 2017 case against Homex, a Mexican homebuilder with ADRs listed in New York, the SEC obtained satellite images of a home development site where, "Homex had not even broken ground on many of the homes for which it reported revenues" (SEC Staff 2017).[13] To use these images in federal courts, the SEC sought and obtained permission from Mexico's National Banking and Securities Commission (CNBV). In this case, cooperation simply entailed allowing the SEC to legally use information it had already obtained from other sources. But without the MMoU in place,

[11] Despite the existence of the PCAOB, the SEC can sanction any legal person, regardless of their registration obligations, with a wider set of injunctions (including criminal referrals). With some frequency, the SEC is involved in audit matters.
[12] Here are three examples. PWC reports that "the SEC entered into new cooperation agreements with the European Union and various EU countries' securities regulators, as many more securities litigation matters went 'global'" (PriceWaterhouseCoopers 2004, 2). Ernst & Young (2003) recognize that "the IOSCO multilateral MOU will assist in international cooperation and information-sharing." (Latham and Watkins 2019) maintain that, "The SEC's ability to take enforcement action against foreign private issuers and non-U.S. nationals is also limited by its ability to obtain evidence from outside the U.S. The SEC is a signatory to the MMOU, which is the first global multilateral information-sharing arrangement among securities regulators."
[13] Other examples include SEC v.: Homex, Vivendi, executives of Nortel Networks, Biovail, Lumenis, and Parmalat.

even basic regulatory tasks like this one are trickier and less certain. Thus, the MMoU even affects case *selection* because it impacts capacities for evidence gathering, prosecution, and acquiring restitution if a judgement is obtained.

Even enforcement that is not focused on financial reporting can affect reporting. Leuz et al. (2003) propose that other forms of investor protection influence financial reporting by limiting private control benefits, which reduces the insiders' need to conceal activities from outside shareholders. Because the MMoU enables broad enforcement powers which apply to many types of misconduct, including insider trading, market manipulation, asset taking, expropriation of minority shareholders (broadly defined), and undisclosed connected transactions, the dynamic described by Leuz et al. could easily affect reporting by U.S.-listed foreign firms whose home countries are MMoU signatories.

3. EMPIRICAL TESTS

The empirical tests have three stages. First are tests of cross-border SEC enforcement actions for disclosure-related issues. Second are more granular tests of financial reporting outputs. Third are summary tests of firm-level transparency using return synchronicity.

3.1 Tests of cross-border SEC enforcement for disclosure-related issues

My study hinges on whether cross-border SEC enforcement changes financial reporting decisions and deters misconduct. Related work shows that the MMoU is associated with an increased probability of SEC enforcement (Silvers 2020). As a modest extension, I explore whether this result holds for actions pursuant to *financial reporting issues*, which remains uncertain. Furthermore, previous tests do not empirically explore the possibility that enforcement changes the equilibrium level of reporting aggressiveness—a central theme in this paper. As a starting point for understanding the MMoU's effect on financial reporting properties, I repeat these tests on financial reporting issues.

The enforcement tests use hand-collected data related to SEC enforcement actions from 1995 to 2010 that pertain to U.S. cross-listed firms (from the SEC's website, www.sec.gov). The enforcement

sample includes litigated proceedings and settled actions for misreporting as well as SEC-prompted restatements without accompanying litigation (i.e., accounting restatements or restatements pertaining to cases involving alleged financial reporting fraud).[14] I exclude observations of SEC enforcement for other types of malfeasance (such as insider trading). There are 75 total enforcement events in the full sample of 1,644 unique firms—that contribute a total of 14,494 firm-years.

Table 1 provides a sample description by country, industry, and year. For sample inclusion, I do not require a firm reconcile its earnings to U.S. GAAP, so it includes many firms that use U.S. GAAP in their primary accounts, and therefore do not reconcile their financial reports.

Before the MMoU, the rate of disclosure-related SEC enforcement is 0.28% (23 actions in 8,269 firm-years). After the MMoU, this rate increases to 0.84% (52 actions in 6,219 firm-years)—roughly three times as high. Other potentially confounding factors would need to align with the staggered introduction of the MMoU and account for a large increase in enforcement (three times as many actions per firm-year (0.84%/0.28%)), a possibility that would threaten any causal hypotheses tying an increase in enforcement to the MMoU. Although that possibility does not seem likely, multivariate tests are more appropriate for drawing secure inferences in this setting.

I rely on models used by prior literature, specifically the Kim and Skinner (2012) model as adapted by Silvers (2016, 2020). The predictor variables are industries with historically high rates of litigation; firm size; percentage change in sales; share turnover; equity returns; and distributional properties of returns (skewness and standard deviation). I include an indicator for private litigation to proxy for reporting improprieties that are not reflected in the other control variables.

The predictor variables are described in Table 2. Of the 75 enforcement actions, 12 lack sufficient data to estimate equation (1), leading to a different number of observations in Table 1

[14] More details regarding the sample can be found in Silvers (2016) and its internet appendix.

(14,494) and Table 2 (14,482).

$$(1)\quad SEC\_ACTION_{it} = \alpha_0 + \alpha_1 MMoU\_FILE_{it} + \alpha_2 BILAT_{it} + \alpha_3 2nd\_BILAT_{it} + \alpha_4 CLASS\_ACTION_{it} + \alpha_5 HI\_LIT_{it-1} + \alpha_6 SIZE_{it-1} + \alpha_7 PCT\_CH\_SALES_{it-1} + \alpha_8 RETURN_{it-1} + \alpha_9 SKEW_{it-1} + \alpha_{10} RET\_STD_{it-1} + \alpha_{11} TURNOVER_{it-1} + \varepsilon_{it}$$

SEC_ACTION is an indicator equal to 1 in firms-year observations where the SEC files an enforcement action and 0 otherwise. *MMoU_FILE* is an indicator equal to 1 when the MMoU is filed by the firm's home regulator and 0 otherwise. A positive coefficient on α_1 corroborates the idea that financial reporting enforcement increases.[15]

Table 3 reports the expected sign for these control variables with the estimation results. Table 3 is consistent with the MMoU enabling prosecution of financial reporting cases.[16] Financial reporting enforcement actions are 4.33 times as likely when a firm's home regulator participates in the MMoU, after controlling for other factors. The tests related to evolving earnings properties in the following sections are based, in part, upon this result.

The improvement of firms' financial reporting quality as a response to enhanced enforcement (as is expected, in equilibrium) may reduce the occurrence of future enforcement actions; better reporting choices should obviate the need for SEC intervention. As a consequence, one would expect an initial spike in financial reporting-related enforcement during the first years of the MMoU, followed by a decline as reporting quality improves. Column 2 in Table 3 provides an additional indicator, ***FIRST_TWO_MMOU_YEARS***, which is coded to capture the marginal impact of the first two years of the MMoU, relative to the other MMoU years. The coefficient is economically important, although only marginally significant (p=0.13). This is expected, given that the model uses an interaction, clusters standard errors by country and year, predicts rare events, and applies the "Penalized Maximum

[15] Positive coefficients on α_2 and α_3 would similarly indicate an increased likelihood of SEC enforcement for firms from foreign countries that have single- and secondary-bilateral arrangements with the SEC.

[16] My analysis excludes FCPA cases and restatements due to options backdating, which could be construed as reporting issues. FCPA actions often relate to financial reporting because they pertain to books and records violations as well as the adequacy of internal controls. Including these cases strengthens both the magnitude and statistical significance of the results.

Likelihood" correction (Firth 1993).

The probability of a reporting enforcement action is 5.54 times greater in the first two years of the MMoU relative to the pre-MMoU period.[17] After two years, and through the rest of the sample period, enforcement actions remain 3.75 times as likely relative to the pre-MMoU period. These data support the theory that enhanced enforcement has a significant initial impact, to which firms respond by refraining from financial reporting misconduct.

3.2 Tests of the firms' information environment: earnings quality

The tests of financial reporting quality follow prior literature closely: value relevance, earnings management (a negative proxy for earnings quality), and loss recognition properties. Even though previous literature accepts these measures, Barth et al. (2008) acknowledge that their relation to earnings quality could be ambiguous (see also Dechow et al. (2011) for a full discussion). I use these measures because they have been used in past research both in this setting (foreign/cross-listed firms) and in a similar one (foreign firms applying international accounting standards). Furthermore, the study that is most closely related to mine—Lang et al. (2006)—also uses these measures, and an important goal of the study is to understand how my results articulate with theirs.[18]

Primarily, the tests focus on analyses that can accommodate the difference-in-difference design in a panel with country, three-digit industry, and year-fixed effects. Appendix table I reports the results of using all nine aggregate proxies employed by Lang et al. (2003), Lang et al. (2006), and Barth et al. (2008). In both an absolute sense, and relative to benchmark firms, these tests generally yield inferences consistent with those drawn below.

3.2.1 Earnings quality sample description

[17] This result comes from exponentiating the sum of the two MMoU coefficients—$e^{(1.32+0.39)}$=5.54.

[18] In some settings restatements can signal opportunistic reporting, and my sample includes SEC-prompted restatements. Yet Cheng et al. (2014) conjecture that foreign firms often simply refuse to admit mistakes—and thereby avoid filing restatements. Thus, one takeaway from that paper is that, in the context of cross-listed firms, "voluntary" restatements have a complex underlying dynamic and are a potentially dubious measure of reporting quality.

Consistent with Lang et al. (2006), the earnings quality analyses use cross-listed firms that reconcile their earnings to U.S. GAAP using form 20-F. This approach has the advantage of holding accounting standards and reporting requirements constant when comparing the cross-listed foreign firms to U.S. firms. The sample, which consists of hand-collected data from the SEC's EDGAR database, starts in 2000 (due to data-availability reasons) and ends in 2009. This time period avoids contamination from changes arising from Morrison v. Australia National Bank. This Supreme Court decision fundamentally changed private litigation for U.S.-listed foreign firms, and firms responded by changing their voluntary disclosure (e.g., management earnings forecasts) (Naughton et al. 2018b)

To be included in the treatment sample, an observation must possess the required test and control variables and be clearly identified with a secondary regulator. These criteria result in a sample of 369 foreign firms (1,971 firm-years) from over 40 countries during the ten years from 2000 to 2009. Country and industry divisions of the sample are tabulated in Table 1 (under the heading "Earnings Quality Sample"). The sample is roughly three times larger than the samples in prior literature.[19] The larger size allows me to conduct more comprehensive tests that include controls for country- and year-fixed effects as well as interactions that control for factors that might threaten the validity of the study (e.g., IFRS).[20] To be clear, however, the MMoU and IFRS are not collinear (see Table 1).

A difference-in-difference testing structure uses matched firms as a benchmark. I select a U.S. firm (or home firm) as the benchmark by requiring that it share the same year and three-digit SIC industry classification and be closest in size to the foreign firm (with replacement, as in Lang et al. (2006)). When no firms have the same 3-digit SIC, as occurs in a handful of cases, I iteratively relax this criterion until I find a match at the 2- or 1-digit level. This approach yields 1,971 pairs. Although

[19] For comparison, Lang et al. (2006) includes 181 firms (698 firm-years) from 34 countries from 1991-2002.
[20] Note that a small subset of firms in 2008 and a slightly larger subset in 2009 that apply IFRS discontinued reconciliation to U.S. GAAP. The eliminated firms are mostly from well-developed markets that likely demand better earnings quality, so eliminating these firms provides a bias that likely works against the hypotheses presented here.

U.S. firms should be largely unaffected by the MMoU, they are subject to economic conditions, accounting standards, and other reporting incentives that are similar to those faced by cross-listed firms. Similarly, the alternative benchmark—firms from the cross-listed firms' *home* country—should be subject to comparable economic conditions, accounting standards, and reporting incentives.

The test and control variables are described by their mean and standard deviation in Table 4 across the treatment (cross-listed) group and both the U.S. and home country benchmark groups. (To limit the influence of outliers, I winsorize continuous variables at the 1% tails.) As in prior work, some differences in the dependent and control variables are found. This is expected, given that the match is not intended to equate these other factors. Note that there are often few candidates for matching in a 3-digit SIC code, so a propensity score technique does not help improve the matching scheme. I follow Lang et al. (2006) by controlling for the factors expected to affect the cross-listing decision (originally identified in Pagano et al. (2002)). These controls are designed to remove the effects of firm size, accruals, cash flows, financing structure, growth, the need for capital, and the occurrence of debt and equity issuances, any of which could influence reporting incentives and outcomes.

3.2.2 Earnings quality proxies and tests

Whether managers' choices change when the SEC can more freely receive assistance from its counterparts via the MMoU is to some extent an empirical question. As shown in Table 2 below, the tests use firm-year panel data and focus on value relevance, loss recognition, and earnings management (a negative proxy for earnings quality). In a panel regression, the tests incorporate formal controls for IFRS and the control variables identified in Pagano et al. (2002). To rule out other country-, industry-, or time-specific factors, I include fixed effects in panel regression framework, which can accommodate a difference-in-differences design (relative to matched U.S. firms). *MMoU_FILE* is equivalent to a traditional "post" variable, and *TREAT* is equivalent to a traditional "treatment" variable. I run separate regressions for the U.S. and home benchmarks respectively, which helps avoid too many interactions.

Note that this framework requires an expanded set of interactions in some tests.

$$(2)\quad EARNINGS\_PROXY_{it} = \alpha_0 + \alpha_1\ MMoU\_FILE_{it} + \alpha_2\ TREAT_{it} + \alpha_3 MMoU\_FILE*TREAT_{it} + \alpha_4\ IFRS_{it} + \\ + \sum_{k=1}^{K} \beta_k CONTROLS + \sum_{y=1}^{Y} \beta_y Year\ FEs + \sum_{c=1}^{C} \beta_c Country\ FEs + \varepsilon_{eit}$$

For each proxy, I first discuss the main tests, then revisit each table when evaluating cross-sectional differences. For simplicity, I focus on the tests that use the matched U.S. firms as a benchmark. In appendix Tables II to VI, I repeat the analyses using matched *home* firms as the benchmark and show that they generate very similar results.

First, I examine the relevance of earnings and the book value of stockholders' equity in explaining the cross-section of equity share prices. This requires an expanded set of interactions, as shown in Table 5. I report the coefficient estimates on earnings per share (EPS) and book value per share (BV) to see if the market applies a higher weight to accounting data for valuation purposes after the MMoU. This would signify that the MMoU promotes an accounting measurement framework that is more consistent with economic performance.

The first column in Table 5 uses U.S. firms as the benchmark. Prior to the MMoU, investors apply a higher weight, for valuation purposes, to U.S. firms' accounting data than to cross-listed firms' accounting data. The multiple for earnings per share is 2.104 lower for cross-listed firms than for U.S. firms (significant at the 10%-level). The estimated coefficient for book value is also lower (-0.062) for cross-listed firms, but not significantly so. This result implies that cross-listed firms' accounting data is less trustworthy or relevant for investment decisions, which is consistent with the literature examining pre-MMoU time periods. After the MMoU, the cross-listed firms' accounting signals become more useful for investors' valuation purposes, converging to U.S. firms. The MMoU incrementally increases cross-listed firms' multiple by 2.589*** for EPS and by 0.025 for BV. Thus, the gap in the informativeness of accounting information has been eliminated: -2.104+2.589=0.485.

Some may be puzzled by the result that, after the MMoU, cross-listed firms appear to have

superior earnings quality relative to U.S. firms, in the sense that the -2.104 plus 2.589 implies that cross-listed firms' earnings are now *more* value-relevant than U.S. firms. However, this superiority is not significant. Moreover, there might also be a plausible explanation for it: the substantial oversight that the SEC provides via the MMoU supplements the oversight of the home regulator. It is reasonable to expect that when both foreign and local constituents (regulators, investors) scrutinize financial reports the earnings properties of cross-listed firms could be as good as or better than those of U.S. firms. This is an interesting possibility, yet I do not believe it is a reasonable inference to draw from these results. (Note that I will revisit other columns in Table 5 when evaluating cross-sectional differences in section 3.2.4.)

Next, following Lang et al. (2006), I consider the properties of loss recognition. Greater information flow between regulators may promote prompter recognition of large losses and discourage the diffusion of losses into multiple future periods (Ball et al. 2000). If it does, then large losses should be more prevalent among firms subject to MMoU-facilitated regulatory assistance. Following previous literature, I use an OLS regression of the binary dependent variable, *LARGE_NEG*, on control variables and an indicator for treatment (cross-listed) firms. In Table 6 regression 1, ***TREAT*MMoU_FILE*** is 0.058 ($p<0.01$), which indicates that, relative to U.S. benchmark firms, cross-listed firms are significantly more likely to report large negative earnings after the MMoU.[21] This result is consistent with the MMoU discouraging the diffusion of losses into multiple future periods and with firms being more transparent and more timely in reporting poor performance.

I measure earnings management using a test of benchmark beating and a test of smoothing. The measure of earnings management is an indicator of firms' propensity to beat salient benchmarks. Burgstahler and Dichev (1997) use the positive earnings threshold as a possible target for firms that are

[21] Large losses could also result if managers artificially overstate losses in order to establish reserves for later use. Cases like these may reduce the quality of reported earnings.

reporting aggressively. In similar (international) settings, Bhattacharya et al. (2003), Leuz et al. (2003), Lang et al. (2003), and Lang et al. (2006) assert that small positive earnings are inversely associated with better regulatory and enforcement mechanisms. Following their approach, I use an OLS regression of the binary dependent variable, *SMALL_POS*, on control variables, indicators for cross-listed firms, the MMoU, and the interaction between cross-listed firms and the MMoU.

The results, presented in Table 7 column 1, indicate that, relative to U.S. benchmark firms, cross-listed firms are *more* likely to report small positive earnings before the MMoU (0.037*). The coefficient for the interaction of *TREAT*MMoU_FILE* is negative (-0.059***) and large enough to fully offset the 0.037 (adding the coefficients yields an insignificant -0.022). Thus, after the MMoU, U.S. and U.S. cross-listed firms are equally likely to report small positive net incomes.

The rationale behind the smoothing metric—the rank correlation between cash flows and accruals—is that managers may use reporting discretion to artificially supplement periods of poor cash flow performance with accruals. If the MMoU helps the SEC constrain such behavior, then the negative correlation between cash flows and accruals should become *less* negative. Consistent with this expectation, Table 8 regression 3 indicates that, relative to U.S. firms, cross-listed firms' correlation between cash flows and accruals is negative prior to the MMoU (-0.082) but that this difference is virtually eliminated (-0.082+0.058) afterward. This is consistent with less earnings management in the presence of the MMoU and with the elimination of any differences between U.S. and U.S. cross-listed firms.

For brevity, I present the results using a different benchmark—matched home-country firms—in the appendix Tables II through VI. Overall, the inferences are quite similar, which helps rule out the possibility that the results are due to unobserved changes in the home market that are correlated with the MMoU (such as expanded regulation or regulatory resources). To impact the results, an omitted

variable would need to be correlated with the pattern of the MMoU but not affect the benchmark firms (across two different benchmarks) in the same way as the treatment firms.

Jointly, the various metrics for accounting quality indicate an MMoU-related improvement in firm-level reporting. The convergence of these results across different measures makes it unlikely that the measures indicate *reductions* in firm-level earnings quality.[22] The fact that the estimated effects of the MMoU remain consistent using both benchmarks and are not subsumed by the additional controls for country, time, and IFRS provides support for the argument that information sharing via the MMoU is responsible for a change in earnings properties.

Aggregate tests that resemble those in Lang et al. (2003), Lang et al. (2006), and Barth et al. (2008) are included in the Internet appendix table I. The results of these tests complement the findings already described. The upshot is that prior to the MMoU, U.S. firms tend to have better reporting attributes (similar to the results in Lang et al. (2006)), and after the MMoU, the differences are more or less eliminated. The changes come primarily from improvements in the cross-listed shares, not from deteriorations in the matched U.S. firms. A comprehensive discussion of this follows Internet appendix table I.

3.2.3 Tests of firms' information environment: return synchronicity

Stock return synchronicity is considered a reflection of firms' transparency and information environments. Synchronicity refers to the portion of returns explained by an asset pricing model (usually CAPM), generally measured using R^2. The original interpretation of synchronicity was that price movements *asynchronous* to the market—that is, the idiosyncratic portion—derive from *firm-specific* information. Therefore, a lower R^2 suggests a higher amount of firm-specific information reflected in prices (Morck et al. 2000; Wurgler 2000; Durnev et al. 2004). Practically, however, this

[22] Similar points are presented in Barth et al. (2008). Furthermore, it is hard to understand why firms would respond to enhanced enforcement capacities with more aggressive reporting, since the expected cost of such behavior also increases.

interpretation has produced puzzling results, prompting researchers to reexamine whether return synchronicity should be interpreted as indicating *lower* or *higher* transparency.

Work by Dasgupta et al. (2010) and Gassen et al. (2019) provides theoretical and empirical support for the opposite interpretation—that higher R^2 indicates *higher* transparency because it reflects a reduction in idiosyncratic volatility (which should be lower when the return-generating parameters are known with more certainty). Dasgupta et al. (2010) present a model as well as empirical tests in support of the notion that events known to disclose large amounts of rich information to the market—including cross-listing—*increase* future return synchronicity. Of course, the cross-listing event comingles several factors: changes in investability, reporting obligations, leverage, expectations of growth, and institutional aspects such as exposure to private litigation.[23] This is consistent with synchronicity capturing *greater* transparency. Similarly, Kelly (2014) and Chan et al. (2013) find that stock return synchronicity is positively correlated with liquidity, suggesting that it captures transparency, production of better information by the firm, and reduced uncertainty about value.

Because cross-listed firms likely have market risk exposures to multiple countries, I use a two-factor return model that includes both U.S. and local indices in the empirical tests. In constructing the country-level indices, I use return data from Datastream and exclude the treatment firms from the index to avoid contamination.[24] I estimate a firm-specific model with weekly dollar-denominated, value-weighted local and U.S. factors, using R^2 to capture synchronicity (shown in equation *(3)* below).

(3) $$Ret=\beta_0+\beta_1 R^L+\beta_2 R^{US}+\varepsilon_t$$

As the dependent variable, I follow prior work by using an unbounded measure of R^2: $log\left(\frac{R^2}{1-R^2}\right)$

[23] Dasgupta et al. (2010) also examine firm life cycle and seasoned equity offerings as contexts in which firms seem likely to increase transparency. Chan and Chan (2014) reach similar conclusions in their study of seasoned equity offerings.
[24] In many countries, the U.S. cross-listed firms make up a non-trivial portion of the market. This is problematic because correlating firm-level returns with an index composed largely of the same firms may spuriously influence R^2.

(which is called "*Synch*" in the model *(4)* below).[25] I employ a test that includes the MMoU as an indicator, and I expect it to be positive.

(*4*) $$Synch_{it} = \alpha_0 + \alpha_1 POST_{it} + \alpha_2 CROSS\_LIST_{it} + \alpha_3 POST_{it} * CROSS\_LIST_i + \alpha_4 IFRS_{it} + \sum_{k=1}^{K} \beta_k CONTROLS_{it} + \sum_{y=1}^{Y} \beta_y Year\ FEs + \sum_{c=1}^{C} \beta_c Country\ FEs + \varepsilon_{it}$$

The results in Table 9 indicate that synchronicity *increases* for cross-listed firms following the MMoU, which is consistent with a change in transparency. There is some ambiguity in the synchronicity measure. However, in light of the previous results for earnings quality proxies, as well as prior literature that documents an association between the MMoU and liquidity for cross-listed firms (Silvers 2020), I interpret Table 9 as evidence of *greater* transparency (which dovetails with better value relevance, more timely loss recognition, and less earnings management). Overall, the convergence of the various proxies do not easily reconcile with alternative explanations. For example, Barth et al. (2008, footnote 9) argue that while the relations between earnings quality and both higher earnings variability and large losses could be ambiguous, a joint finding of greater value relevance alongside those earnings properties reduces the likelihood that these relations result from earnings management. For similar reasons, it would be difficult to reconcile a finding of reduced transparency with greater consistency between fundamentals and firm value.

3.2.4 Cross-sectional variation in the MMoU's effect on earnings quality and synchronicity

In this section, I test for cross-sectional differences in how the MMoU affects earnings quality and return synchronicity. One might expect that when a firm's home country regulator is aggressive and sophisticated (perhaps comparable to the SEC), the regulator is better positioned to provide cross-border enforcement support, which would enhance the observed effects for firms from strong home countries. Alternatively, the marginal effect of a given increase in SEC oversight is probably greater

[25] Specifically, $Synch = log\left(\frac{R^2}{1-R^2}\right)$, in accordance with prior literature (Roll 1988; Morck et al. 2000; Piotroski and Roulstone 2004).

for firms from weaker home countries, since their home market supervision is of lower quality.[26]

To investigate the cross-sectional effects, I perform tests separately on subsets of the sample that are split by home country characteristics and compare the coefficients of interest across the two groups. I use a median split based on a country's rule of law (measured using the index from (Kaufmann et al. 2010)) or legal origin (common law versus code law). These criteria result in a fairly even split of the sample in terms of the number of observations. To denote differences for cross-equation comparisons of the coefficients, I use †, ††, and ††† in the second column to denote significant differences at the 10%, 5%, and 1% levels, respectively.

Some of the cross-sectional tests show moderate differences across the partitions. Overall, however, the results do not yield a pattern that consistently supports either proposition (larger effects of the MMoU in firms from weak or strong home markets). Occasionally, inferences contradict across the measures of earnings quality. For example, the value relevance results in Table 5 imply that the increased weights applied to accounting outputs in valuing a firm are primarily concentrated in the firms from common law countries (although only the book value is significantly different, indicated by the superscript †† for *BV*TREAT*MMoU_FILE*). However, the rule of law partition is far less conclusive. It shows that the changes in value relevance that accompany the MMoU move in different directions for earnings and book value, respectively.

The tests for timely loss recognition in Table 6 (large negative net income) provide some weak evidence that the results are stronger in firms from common law countries and firms from countries with strong rule of law. However, the *TREAT*MMoU*FILE* coefficient for firms from code law countries is 0.035 and remains significant. (The coefficient for the low regulatory quality column (0.032**) is also significant.) In contrast, the tests in Table 7 reveal that benchmark beating (a proxy

[26] This observation would dovetail with Naughton et al. (2018a), which shows that when the SEC can rely on competent foreign authorities and private litigation, it chooses to exert a lower level of monitoring intensity.

for earnings management) declines almost exclusively for firms from code law and weak rule of law countries; the results are not significantly different from the common law or high rule of law observations, respectively. The smoothing proxy (the correlation between cash flows and accruals) exhibits no significant cross-sectional differences.

Statistically, I find the strongest cross-sectional results for the synchronicity analyses in Table 9. The coefficient of interest is 0.731*** for the code law column and 0.032 for the common law column (significantly different at the 1% level). Similarly, the low rule of law column is 0.500 and the high rule of law column is 0.094 (significantly different at the 5% level).

In sum, the overall cross-sectional pattern is not definitive. This is also true when the home country firms are used as benchmarks (as shown in internet appendix Tables II to VI). The results appear to offer some support for two independent ideas. The first is that strong regulators make for better cooperative partners. The second is that the largest marginal effects are in firms from countries with weak institutional features.

Conclusion

Using the MMoU arrangement as a series of staggered shocks to SEC enforcement capacities, I find corresponding changes in financial reporting properties. The idea that foreign firms are less transparent than U.S. firms is no longer descriptive for observations affected by the MMoU (which represents the bulk of the sample). Using earnings-quality proxies and synchronicity as measures of transparency, I demonstrate that the MMoU is associated with substantial increases in earnings quality relative to U.S. and home-country benchmarks. In accordance with prior work using U.S. benchmarks, I find that, prior to the MMoU application dates, cross-listed firms show evidence of greater earnings management, less timely recognition of losses, and lower associations between accounting outputs and stock prices, relative to matched U.S. firms. After home country authorities apply to the MMoU, however, these differences disappear almost entirely. These results are consistent with MMoU-enabled

enforcement changing how discretion is used at the firm level, suggesting that the disparity in enforcement is the primary factor driving the results in Lang et al. (2006). Explicit controls for country, time, and IFRS, as well as alternative benchmarks in the form of matched home-country firms, provide no evidence that these results are driven by other factors. The observed improvements in disclosure quality are consistent with cross-border supervision by the SEC being an important determinant of financial reporting properties. They also support the literature that views a U.S. listing as a way to adhere to a system with more stringent oversight.

By suggesting that MMoU-enabled enforcement alters managers' reporting decisions, the tests in my paper help address Holthausen's (2009, p. 453) comment about the literature lacking an understanding of "the importance of enforcement with respect to financial reporting outcomes." However, the present study is subject to some caveats. Although the results are consistent with improvements in firm transparency and earnings quality, caution in advised in drawing strong causal inferences. Ambiguity exists in measuring earnings quality. In addition, the results of this study focus on a specific subset of firms (U.S.-listed foreign firms that reconcile their earnings). Thus, the inferences may not generalize to all firms in all contexts.

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Appendix: Variable details

Variables used in the earnings quality analysis are defined below.

Main variables:

MMoU_FILE is an indicator equal to '1' in the year of and years after the MMoU, '0' otherwise.
CHANGE_NI is the change in net income, scaled by end-of-year total assets.
CHANGE_CF is the change in operating cash flows, scaled by end-of-year total assets.
TOTACC is the difference between net income and operating cash flows, scaled by end-of-year total assets.
CF is operating cash flow, scaled by end-of-year total assets.
SMALL is an indicator equal to '1' when net income scaled by total assets is between 0 and 0.01.
LARGE is an indicator equal to '1' when net income scaled by total assets is less than -.20.
ANNRET is the cumulative annual return (calculated from monthly observations).
EPS is earnings per share scaled by price.
R is the annual security return.
NEG is an indicator variable equal to 1 when returns above are negative.
$\mathbf{R^2}$ is the fraction of variance in returns that can be explained using variation in home and U.S. market indices (see equation 3).
Synch is $log\left(\frac{R^2}{1-R^2}\right)$.

Controls:

LEV is end-of-year total liabilities divided by end-of-year total equity.
GROWTH is the percentage change in sale**s.**
EQUITY_ISS is the percentage change in common stock.
DEBT_ISS is the year-over-year percentage change in total liabilities.
ASSET_TURN is sales divided by end-of-year total assets.
SIZE is the natural log of the market value of equity.

Table 1: The SEC enforcement and earnings quality samples

Panel A: Sample firms by country

		Enforcement Sample					Earnings Quality Sample		
	MMoU Date	Firm-Years	Pct. Firm-Years	Enforcement Actions	Pct. Firm-Years w/ enforcement	Unique Firms	Firm-Years	Pct. Firm-Years	Unique Firms
Antigua And Barbuda	.	10	0.07	-	-	1	-	-	-
Argentina	6/12/14	175	1.21	-	-	19	51	2.62	7
Australia	10/8/02	282	1.95	-	-	34	72	3.70	14
Austria	10/28/09	12	0.08	-	-	1	6	0.31	1
Bahamas	12/27/12	50	0.34	-	-	5	5	0.26	1
Belgium	4/3/05	45	0.31	4	8.89%	7	5	0.26	1
Belize	.	12	0.08	-	-	2	-	-	-
Bermuda	6/7/07	854	5.89	7	0.82%	104	43	2.21	6
Brazil	10/21/09	168	1.16	-	-	18	70	3.60	14
British Virgin Isl.	5/2/07	259	1.79	1	0.39%	36	4	0.21	3
Canada	10/23/02*	4,576	31.57	25	0.55%	496	421	21.62	97
Cayman Islands	3/24/09	521	3.59	-	-	90	5	0.26	3
Chile	11/22/18	235	1.62	1	0.43%	25	60	3.08	10
China	5/29/07	219	1.51	3	1.37%	27	77	3.95	12
Colombia	3/26/12	5	0.03	-	-	1	-	-	-
Curacao	.	44	0.30	-	-	3	-	-	-
Denmark	8/17/06	59	0.41	-	-	6	10	0.51	2
Dominican Republic	5/3/18	8	0.06	-	-	1	-	-	-
Finland	11/22/07	71	0.49	-	-	8	17	0.87	3
France	2/19/03	394	2.72	5	1.27%	39	64	3.29	12
Germany	11/5/03	275	1.90	-	-	30	34	1.75	7
Ghana	.	7	0.05	-	-	1	3	0.15	1
Greece	10/18/02	41	0.28	-	-	5	14	0.72	2
Hong Kong	3/3/03	122	0.84	-	-	15	28	1.44	5
Hungary	7/9/03	15	0.10	-	-	1	6	0.31	1
India	4/22/03	150	1.03	-	-	16	12	0.62	2
Indonesia	1/21/14	46	0.32	1	2.17%	5	10	0.51	1
Ireland	12/24/12	310	2.14	2	0.65%	33	43	2.21	8
Israel	7/2/2006	1,220	8.42	6	0.49%	133	53	2.72	10
Italy	9/15/03	162	1.12	3	1.85%	17	44	2.26	8
Japan	2/19/08	468	3.23	2	0.43%	39	23	1.18	4
Jersey	3/6/03	43	0.30	-	-	4	19	0.98	3
Jordan	2/13/08	5	0.03	-	-	1	-	-	-
Korea	6/9/10	129	0.89	-	-	15	46	2.36	6
Liberia	.	68	0.47	-	-	6	-	-	-
Luxembourg	5/8/07	142	0.98	-	-	15	24	1.23	6
Marshall Islands	.	166	1.15	-	-	29	-	-	-
Mexico	3/14/2003	352	2.43	-	-	38	134	6.88	18
Netherlands	11/22/07	476	3.28	4	0.84%	50	93	4.78	13
Netherlands Antilles	.	34	0.23	-	-	3	-	-	-
New Zealand	12/1/03	55	0.38	-	-	8	7	0.36	1
Norway	12/11/06	60	0.41	-	-	8	25	1.28	5
Panama	5/16/17	67	0.46	-	-	6	-	-	-
Papua New Guinea	.	14	0.10	-	-	1	8	0.41	1
Peru	5/16/12	22	0.15	-	-	2	13	0.67	2
Philippines	.	37	0.26	-	-	4	8	0.41	1
Poland	11/4/03	4	0.03	-	-	1	-	-	-
Portugal	11/4/02	27	0.19	-	-	2	7	0.36	1
Puerto Rico	.	5	0.03	-	-	1	-	-	-
Russia	2/16/15	48	0.33	-	-	5	5	0.26	1
Singapore	11/17/05	88	0.61	-	-	9	7	0.36	1
South Africa	3/18/03	146	1.01	-	-	16	30	1.54	4
Spain	3/24/03	110	0.76	-	-	10	23	1.18	5
Sweden	5/17/11	135	0.93	-	-	19	47	2.41	9
Switzerland	2/15/10	272	1.88	6	2.21%	24	19	0.98	5
Taiwan	3/15/11	79	0.55	1	1.27%	7	37	1.90	5
Turkey	11/14/02	12	0.08	-	-	1	-	-	-
United Kingdom	3/10/03	1,063	7.33	4	0.38%	138	230	11.81	45
Venezuela	.	20	0.14	-	8.89%	3	9	0.46	2
Total		***14,494***	***100.00***	***75***	***0.52%***	***1,644***	***1,971***	***100***	***369***

*-date represents the first province within a country

Panel B: Sample by industry

	Firm-Years	Pct. Firm-Years	Enforcement Actions	Pct. Firm-Years Enforcement	Firm-Years	Pct. Firm-Years	Unique Firms
Agriculture, Forestry, and Fish	102	0.70	-	0.00%	15	0.76	2
Construction	107	0.74	-	0.00%	10	0.51	1
Finance, Insurance, and Real Estate	1,616	11.15	6	0.37%	178	9.03	38
Manufacturing	5,541	38.23	27	0.49%	766	38.86	137
Mining	2,174	15.00	6	0.28%	302	15.32	67
Public Administration	116	0.80	6	5.17%	23	1.17	4
Retail Trade	244	1.68	3	1.23%	35	1.78	6
Services	1,947	13.43	12	0.62%	116	5.89	24
Transportation & Public Utilities	2,335	16.11	10	0.43%	486	24.66	85
Wholesale Trade	312	2.15	5	1.60%	40	2.03	5
Total	***14,494***	***100.00***	***75***	***0.52%***	***1,971***	***100***	***369***

Panel C: Sample by year

Years	Firm-Years	Pct. Firm-Years	Enforcement Actions	Pct. Firm-Years Enforcement	Firm-Years	Pct. Firm-Years
1995	674	4.62	0	0.00%	-	-
1996	811	5.56	1	0.12%	-	-
1997	880	6.03	1	0.11%	-	-
1998	904	6.20	0	0.00%	-	-
1999	995	6.82	2	0.20%	-	-
2000	994	6.81	0	0.00%	160	8.12
2001	979	6.71	1	0.10%	195	9.89
2002	949	6.50	7	0.74%	225	11.42
2003	950	6.51	6	0.63%	253	12.84
2004	958	6.57	9	0.94%	247	12.53
2005	965	6.61	15	1.55%	232	11.77
2006	963	6.60	11	1.14%	226	11.47
2007	948	6.50	12	1.27%	220	11.16
2008	909	6.23	3	0.33%	115	5.83
2009	868	5.95	5	0.58%	98	4.97
2010	845	5.79	2	0.24%	-	-
Total	***14,494***	***100.00***	***75***	***0.52%***	***1,971***	***100.00***

Panel A reports 14,592 firm-years and distinct firms in the enforcement sample, by country, for observations from 1995-2010. It separately reports firm-years targeted by the SEC and the number of SEC enforcement actions. The right-hand side of the table presents the earnings quality sample, which uses hand-collected U.S. GAAP-reconciled data from electronically filed 20-F reports from 2000-2009. Panel B reports the same data by industry. Note that the number of unique firms in the enforcement and earnings quality samples is inconsistent between Panel A and Panel B. This is because of changes in location of incorporation and leading industrial code over time. Panel C reveals the occurrence of enforcement events by year, and Panel D breaks down the sample by event type. Additional details about the enforcement sample are provided in the appendix.

Table 2: Descriptive statistics

	All			No MMoU			MMoU		
	N	**Mean**	**Std**	**N**	**Mean**	**Std**	**N**	**Mean**	**Std**
MMOU_FILE	14,482	0.43	0.50	8,269	0.00	-	6,213	1.00***	-
BILAT	14,482	0.71	0.45	8,269	0.64	0.48	6,213	0.81***	0.39
BILAT_MULTI	14,482	0.10	0.30	8,269	0.11	0.31	6,213	0.09***	0.29
CLASS_ACTION	14,482	0.04	0.22	8,269	0.03	0.17	6,213	0.08***	0.27
HI_LIT	14,482	0.16	0.37	8,269	0.16	0.37	6,213	0.17**	0.37
SIZE	14,482	6.74	2.83	8,269	6.58	2.64	6,213	6.95***	3.05
PCT_CH_SALES	14,482	5.45	3.86	8,269	5.98	4.10	6,213	4.78***	3.48
RETURN	14,482	0.06	0.62	8,269	0.05	0.63	6,213	0.08***	0.62
SKEW	14,482	0.24	0.82	8,269	0.26	0.83	6,213	0.22***	0.81
RET_STD	14,482	0.14	0.09	8,269	0.14	0.09	6,213	0.14***	0.08
TURNOVER	14,482	0.01	0.28	8,269	0.01	0.25	6,213	0.01***	0.32

This table presents descriptive statistics for the sample that has the required information for prediction of SEC enforcement. All 14,482 firm-years are shown on the left; the 8,269 firm-years unaffected by the MMoU are shown in the middle; and the 6,269 firms are shown on the right. *, **, *** denotes significance of the difference in means between the MMoU and non-MMoU subsamples at the 10%, 5%, and 1% levels for a two-tailed difference in proportion, respectively.

Table 3: Probability of SEC enforcement

		(1)		(2)	
Parameter		**Estimate**	**Odds Ratio**	**Estimate**	**Odds Ratio**
MMOU_FILE	+	1.47***	4.33	1.32**	3.75
BILAT	+	-0.33	0.72	-0.27	0.76
2nd_BILAT	+	0.74*	2.10	0.69	2.00
FIRST_TWO_MMOU_YEARS	+			0.39	1.48
CLASS_ACTION	+	1.83***	6.21	1.82***	6.15
HI_LIT	+	0.19	1.21	0.19	1.21
SIZE	+	0.04	1.04	0.05	1.05
PCT_CH_SALES	+	0.00	1.00	0.00	1.00
RETURN	-	0.09	1.09	0.10	1.10
SKEW	-	-0.13	0.88	-0.13	0.88
RET_STD	+	4.08***	59.14	4.02***	55.68
TURNOVER	+	0.19	1.20	0.19	1.20
Intercept		-7.36***		-7.41***	
N (Number of Targets)		14,482		14,482	
Pseudo-R^2		0.13		0.13	
Area Under ROC Curve		79.8		79.8	

This table presents the results from logistic regressions with SEC enforcement actions that target financial reporting as an indicator dependent variable (set equal to '1' for firm-years with SEC enforcement actions, '0' otherwise). The sample includes all foreign firms listed in U.S. markets (described in Table 1). Because most of the variables of interest are binary indicator variables, odds ratios reported. The control variables in the model come from Kim and Skinner (2011) and are defined in Appendix A. I also include indicators for class action litigation in the previous five years, bilateral arrangements, and multiple bilateral arrangements. Some tests use a number of other variables for additional tests. Standard errors are double-clustered by country and year. Because several indicator variables are used, I apply the Firth procedure to reduce coefficient bias due to quasi-complete separation (Firth 1993; Heinz and Schemper 2002). *, **, *** denotes significance at the 10%, 5%, and 1% levels for a two-tailed test, respectively.

Table 4: Return synchronicity and earnings quality descriptive statistics

	Match A: 1,971 U.S. Firms				Match B: 1,713 Home-country firms			
	U.S.		Cross-listed		Home		Cross-listed	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std
CHANGE_NI	0.00	0.12	0.00	0.12	0.01	0.10	0.00	0.12
CHANGE_CF	0.00	0.08	0.01	0.08	0.00	0.07	0.00	0.08
TOTACC	-0.07	0.10	-0.07**	0.10	-0.06	0.07	-0.07***	0.10
CF	0.05	0.13	0.05	0.14	0.08	0.09	0.04***	0.14
SMALL_POS	0.51	0.50	0.52	0.50	0.63	0.48	0.50***	0.50
LARGE_NEG	0.12	0.32	0.14*	0.34	0.03	0.18	0.14***	0.35
EPS	0.93	2.46	1.06	2.32	0.66	1.89	1.05***	2.28
NI	-0.02	0.20	0.00***	0.20	0.00	0.24	0.00	0.19
P (Price)	27.23	21.02	22.85***	20.85	10.94	18.80	22.83***	20.97
R^2 (%)	18.72	14.17	22.25***	15.58	22.02	18.39	21.26***	15.54
Synch	-2.10	1.13	-1.92***	1.18	-1.74	1.46	-1.65***	1.36
Controls								
LEV	2.77	4.80	2.79	5.30	2.84	5.29	2.85	5.44
GROWTH	0.27	0.74	0.39***	0.87	0.26	0.72	0.42***	0.91
EQUITY_ISS	0.10	0.25	0.10	0.24	0.03	0.14	0.09***	0.24
DEBT_ISS	0.17	0.48	0.18	0.49	0.17	0.49	0.18	0.50
ASSET_TURN	0.71	0.61	0.62***	0.53	0.84	0.65	0.63***	0.55
SIZE	7.34	2.61	7.40	2.68	5.92	2.09	7.37***	2.76

This table presents the sample of firms used for the earnings quality analyses: a maximum of 1,971 firm-years from 369 distinct firms. The variables are defined in the appendix. There are two cross-listed groups with different numbers of observations because the home country group lacks a match for several cross-listed firms. The first segment contains the main variables of interest used in the earnings quality analyses; the second contains control variables used in the analyses. *, **, and *** indicate significant differences between cross-listed and matched U.S. firms at the 10%, 5%, and 1% levels, respectively. Variables are defined in the appendix.

Table 5: Value relevance *U.S. Benchmarks*

	Full sample	Code law	Common law	Low regulatory quality	High regulatory quality
MMoU_FILE	-3.598*	-1.291	-2.236*	-2.231	0.374
	(-1.82)	(-0.51)	(-1.97)	(-0.78)	(0.38)
TREAT	-5.237***	-7.786***	-0.847	-5.251***	-3.371**
	(-5.69)	(-7.23)	(-0.64)	(-4.66)	(-2.59)
*TREAT*MMoU_FILE*	2.001*	1.082	-1.634	0.222	1.090
	(1.74)	(0.68)	(-1.05)	(0.14)	(0.67)
EPS	2.441***	2.190***	2.046***	1.648***	2.683***
	(17.68)	(12.30)	(12.15)	(10.01)	(15.15)
BV	0.633***	0.585***	0.574***	0.575***	0.627***
	(15.41)	(10.56)	(14.07)	(9.42)	(23.81)
*EPS*MMoU_FILE*	0.931***	1.132***	0.255	1.350***	0.393
	(3.13)	(4.98)	(1.17)	(4.32)	(1.24)
*BV*MMoU_FILE*	0.069	-0.026	0.144**	0.044	0.015
	(0.96)	(-0.29)	(2.29)	(0.63)	(0.19)
*EPS*TREAT*	-2.104***	-1.503*	-2.246	-2.284***	-0.803
	(-3.35)	(-2.00)	(-1.75)	(-3.13)	(-0.73)
*BV*TREAT*	-0.062	0.182	-3.560**	0.039	-1.916**
	(-0.21)	(0.83)	(-2.74)	(0.16)	(-2.55)
EPS*TREAT*MMoU_FILE	**2.589****	**1.860**	**3.932***	**3.535*****	**-0.100** †
	(2.47)	**(1.61)**	**(1.97)**	**(2.75)**	**(-0.06)**
BV*TREAT*MMoU_FILE	**0.025**	**-0.160**	**3.539**** ††	**-0.059**	**1.731*** ††
	(0.07)	**(-0.54)**	**(2.52)**	**(-0.18)**	**(2.06)**
IFRS	1.720	1.103	2.503*	3.721*	0.571
	(1.19)	(0.41)	(2.11)	(1.73)	(0.39)
*IFRS*EPS*	-0.174	-0.787	-0.533	-0.550	0.847
	(-0.34)	(-1.17)	(-0.76)	(-0.90)	(1.18)
*IFRS*BV*	0.073	0.159	-0.047	-0.062	0.242
	(0.53)	(0.76)	(-0.28)	(-0.38)	(1.70)
Intercept	4.990***		-5.238*	-6.652	-5.158
	(5.71)		(-1.70)	(-1.58)	(-1.54)
Controls	YES	YES	YES	YES	YES
Fixed effects	C,I,Y	C,I,Y	C,I,Y	C,I,Y	C,I,Y
Observations	3,158	1,658	1,500	1,660	1,498
R^2	0.60	0.59	0.72	0.613	0.704

This table presents the results of panel regressions of firm-specific measures of value relevance (the dependent variable is *Price* per share). Standard errors are reported below the coefficient estimates. All of the specifications include the control variables from Pagano et al. (2002) (although the estimates are suppressed for brevity); fixed effects for country, industry, and year; and estimates of standard errors clustered at the country level. *, **, and *** indicate significant differences from zero (two-tailed) at the 10%, 5%, and 1% levels, respectively. †, ††, and ††† indicate the significance of cross-equation differences (two-tailed) at the 10%, 5%, and 1% levels, respectively (tabulated only for the coefficients of interest in ***bold***).

Table 6: Loss recognition *U.S. benchmarks*

	Full sample	Code law	Common law		Low regulatory quality	High regulatory quality
MMoU_FILE	-0.034**	-0.001	-0.060		-0.009	-0.071***
	(-2.52)	(-0.06)	(-1.64)		(-0.94)	(-3.13)
TREAT	-0.016**	-0.021***	-0.003		-0.043***	0.023**
	(-2.56)	(-4.38)	(-0.16)		(-7.58)	(2.64)
TREAT*MMoU_FILE	**0.058*** **	**0.035** **	**0.064*** **		**0.032*** **	**0.061*** ** †
	(3.89)	**(2.56)**	**(3.60)**		**(3.05)**	**(4.95)**
IFRS	-0.017	-0.005	-0.023		-0.003	-0.027**
	(-1.39)	(-0.25)	(-1.65)		(-0.35)	(-2.19)
LEV	0.003***	0.001	0.006**		0.001	0.007***
	(4.80)	(0.91)	(2.69)		(1.06)	(3.32)
GROWTH	0.013***	-0.017	0.011*		0.007	0.002
	(3.24)	(-1.03)	(2.13)		(0.35)	(1.01)
EQUITY_ISS	0.047***	0.005	0.075***		0.029**	0.055**
	(3.39)	(0.65)	(3.55)		(2.11)	(2.75)
DEBT_ISS	0.025***	0.025***	0.028**		-0.008	0.037***
	(3.62)	(3.13)	(2.78)		(-0.89)	(3.74)
ASSET_TURN	-0.100***	-0.021**	-0.140***		-0.046***	-0.137***
	(-5.35)	(-2.39)	(-7.01)		(-4.49)	(-7.00)
SIZE	-0.068***	-0.040***	-0.089***		-0.027***	-0.088***
	(-7.74)	(-6.73)	(-8.80)		(-4.39)	(-8.10)
Intercept	0.685***	0.395***	0.836***		0.314***	0.844***
	(8.29)	(7.04)	(10.18)		(6.02)	(8.79)
FEs	C,I,Y	C,I,Y	C,I,Y		C,I,Y	C,I,Y
Observations	3,942	2,214	1,728		1,958	1,984
R^2	0.351	0.223	0.362		0.169	0.379

This table presents the results of panel regressions of firm-specific measures of timely loss recognition, using the dependent variable *LARGE_NEG*, which equals 1 when net income scaled by assets is less than -.2. Standard errors are reported below the coefficient estimates (which are clustered at the country level). All of the specifications include the control variables from Pagano et al. (2002) and fixed effects for country, industry, and year. *, **, and *** indicate two-tailed significance at the 10%, 5%, and 1% levels, respectively. †, ††, and ††† indicate the significance of cross-equation differences (two-tailed) at the 10%, 5%, and 1% levels, respectively (tabulated only for the coefficients of interest in ***bold***).

Table 7: Benchmark-beating *U.S. benchmarks*

	Full sample	Code law	Common law		Low regulatory quality	High regulatory quality
MMoU_FILE	0.061*	0.002	0.214***		0.084***	0.000
	(1.82)	(0.07)	(5.39)		(3.34)	(0.01)
TREAT	0.037*	0.062***	-0.013		0.076***	-0.031
	(1.78)	(3.55)	(-0.27)		(3.40)	(-0.99)
TREAT*MMoU_FILE	**-0.059*** **	**-0.066*** **	**-0.019**		**-0.079*** **	**-0.010**
	(-2.75)	**(-3.25)**	**(-0.35)**		**(-3.18)**	**(-0.25)**
IFRS	0.012	0.039	-0.018		0.010	0.023
	(0.49)	(1.13)	(-0.62)		(0.28)	(0.83)
LEV	-0.008***	-0.010***	-0.004*		-0.013***	-0.001
	(-4.28)	(-4.51)	(-1.80)		(-6.25)	(-0.26)
GROWTH	-0.016***	0.030*	-0.023***		0.022	-0.018***
	(-2.88)	(1.77)	(-4.76)		(0.72)	(-4.00)
EQUITY_ISS	-0.129***	-0.152***	-0.108***		-0.141***	-0.115***
	(-8.25)	(-6.31)	(-4.41)		(-4.84)	(-5.88)
DEBT_ISS	0.009	0.018	0.002		0.057**	-0.012
	(0.69)	(0.77)	(0.15)		(2.45)	(-0.90)
ASSET_TURN	0.070***	0.052**	0.081***		0.048**	0.075***
	(3.40)	(2.19)	(2.99)		(2.08)	(2.97)
SIZE	0.056***	0.053***	0.062***		0.030*	0.064***
	(7.76)	(6.68)	(5.51)		(1.90)	(4.45)
Intercept	0.053	0.160*	-0.130		0.325***	-0.015
	(0.74)	(1.99)	(-1.66)		(2.88)	(-0.11)
FEs	C,I,Y	C,I,Y	C,I,Y		C,I,Y	C,I,Y
Observations	3,942	2,214	1,728		1,958	1,984
R^2	0.279	0.199	0.311		0.180	0.341

This table presents the results of panel regressions of firm-specific measures of benchmark beating, using the dependent variable *SMALL_POS*, which is equal to 1 when net income scaled by assets is between 0 and .01. Standard errors are reported below the coefficient estimates (which are clustered at the country level). All of the specifications include the control variables from Pagano et al. (2002) and fixed effects for country, industry, and year. *, **, and *** indicate two-tailed significance at the 10%, 5%, and 1% levels, respectively. †, ††, and ††† indicate the significance of cross-equation differences (two-tailed) at the 10%, 5%, and 1% levels, respectively (tabulated only for the coefficients of interest in ***bold***).

Table 8: Smoothing *U.S. benchmarks*

	Full sample	Code law	Common law	Low regulatory quality	High regulatory quality
MMoU_FILE	-0.013	0.047**	-0.079	0.023	-0.009
	(-0.35)	(2.26)	(-1.20)	(0.84)	(-0.28)
TREAT	-0.082***	-0.111***	-0.018	-0.146***	0.002
	(-3.05)	(-3.90)	(-0.35)	(-4.55)	(0.06)
TREAT*MMoU_FILE	**0.058***	**-0.000**	**0.048**	**0.000**	**0.070***
	(1.91)	**(-0.01)**	**(0.84)**	**(0.00)**	**(1.82)**
IFRS	-0.053	-0.055	-0.044	-0.030	-0.087*
	(-1.45)	(-1.52)	(-1.21)	(-0.85)	(-1.92)
LEV	-0.000	-0.000	-0.001	-0.002	0.001
	(-0.18)	(-0.01)	(-0.26)	(-1.15)	(0.70)
GROWTH	0.043**	-0.038	0.056***	-0.024	0.042*
	(2.18)	(-1.36)	(3.89)	(-1.18)	(1.95)
EQUITY_ISS	0.059**	0.112**	0.042	0.016	0.117***
	(2.20)	(2.41)	(1.13)	(0.68)	(3.00)
DEBT_ISS	-0.007	-0.011	0.007	-0.020	0.009
	(-0.39)	(-0.35)	(0.41)	(-0.49)	(0.87)
ASSET_TURN	-0.122***	-0.133***	-0.097***	-0.137***	-0.101***
	(-6.77)	(-5.57)	(-2.99)	(-5.61)	(-4.12)
SIZE	-0.036***	-0.040***	-0.036***	-0.011	-0.042***
	(-4.88)	(-3.51)	(-4.01)	(-0.91)	(-5.56)
Intercept	-0.041	-0.015	-0.018	-0.216*	-0.042
	(-0.56)	(-0.13)	(-0.19)	(-1.89)	(-0.63)
FEs	C,I,Y	C,I,Y	C,I,Y	C,I,Y	C,I,Y
Observations	3,824	1,967	1,857	1,844	1,980
R^2	0.203	0.206	0.192	0.175	0.232

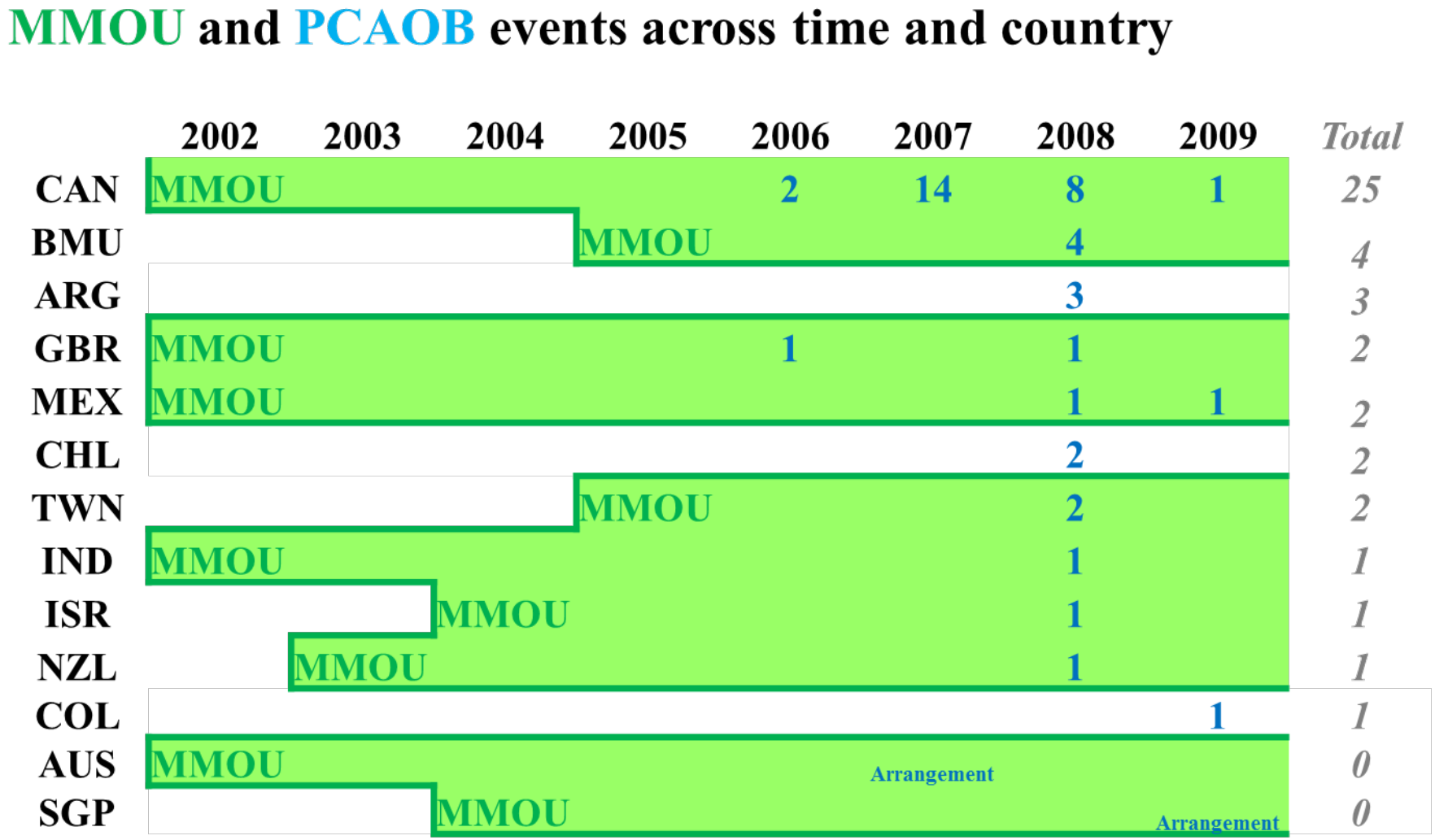
This table presents the results of panel regressions of firm-specific measures of earnings smoothing, using the correlation between cash flows and accruals over the previous five year. Standard errors are reported below the coefficient estimates (which are clustered at the country level). All of the specifications include the control variables from Pagano et al. (2002), and fixed effects for country, industry, and year. *, **, and *** indicate two-tailed significance at the 10%, 5%, and 1% levels, respectively. †, ††, and ††† indicate the significance of cross-equation differences (two-tailed) at the 10%, 5%, and 1% levels, respectively (tabulated only for the coefficients of interest in ***bold***).

Table 9: Return synchronicity *U.S. benchmarks*

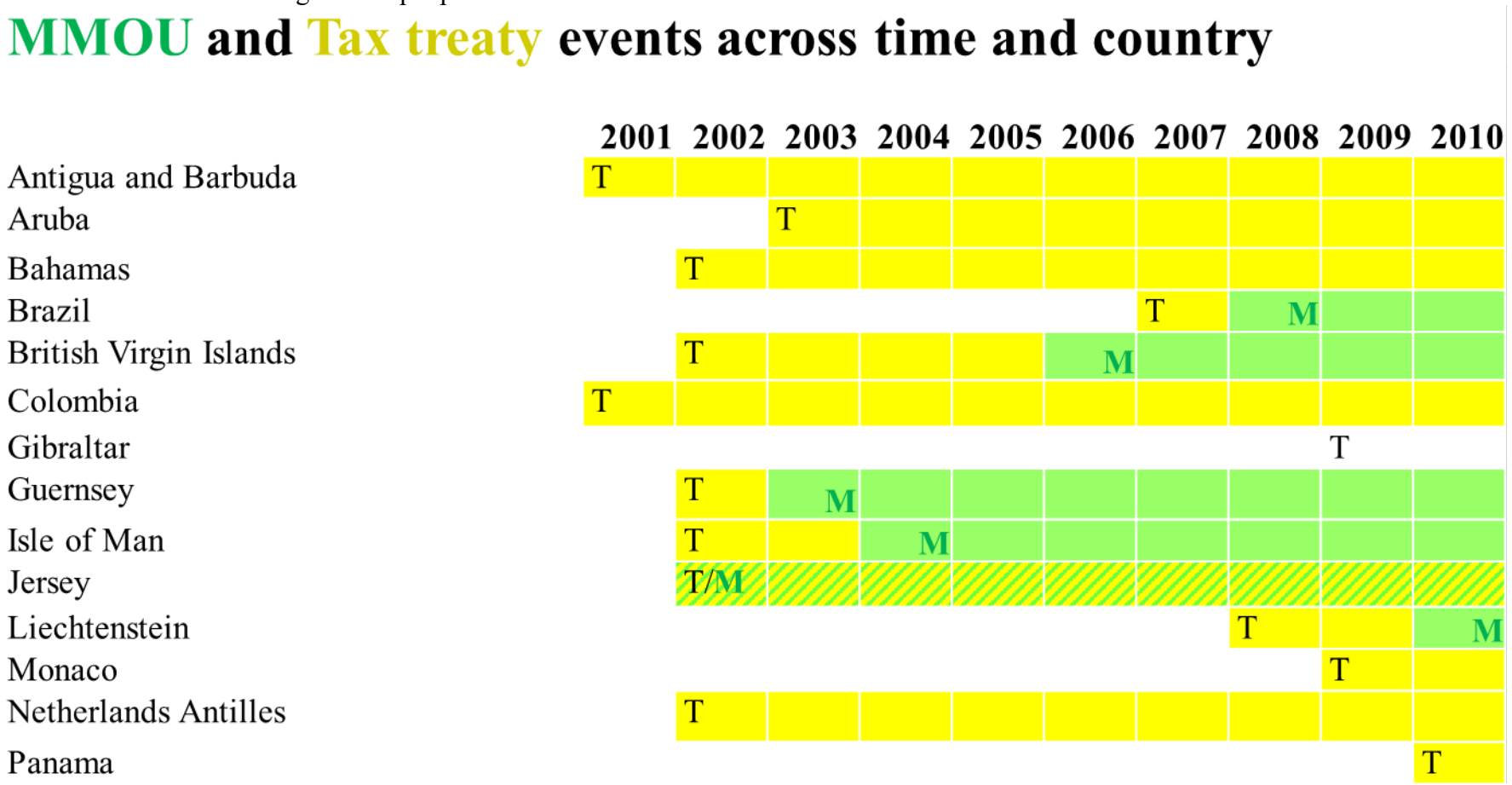
	Full sample	Code law	Common law		Low regulatory quality	High regulatory quality
MMoU_FILE	-0.113	-0.354	0.101		-0.176	0.359
	-1.18	-1.41	0.83		-0.83	0.99
TREAT	0.047	-0.066	0.145*		-0.088	0.211
	0.66	-0.53	2.04		-1.07	1.30
TREAT*MMoU_FILE	**0.328*** **	**0.731*** **	**0.032 †††**		**0.500*** **	**0.094 ††**
	3.85	**5.60**	**0.39**		**4.66**	**0.66**
IFRS	-0.047	-0.247*	0.064		0.173	-0.17
	-0.81	-2.02	1.14		1.59	-1.72
LEV	-0.006	-0.012*	0.001		0.004	-0.017
	-0.66	-1.84	0.10		0.56	-0.84
GROWTH	0.028	-0.147*	0.041		-0.342**	0.056*
	0.86	-1.96	1.57		-3.43	2.09
EQUITY_ISS	-0.094	0.008	-0.141		0.195**	-0.304*
	-0.99	0.07	-1.00		2.50	-1.91
DEBT_ISS	-0.039	0.087	-0.057		0.109*	-0.072
	-0.94	1.44	-1.31		1.86	-1.45
ASSET_TURN	-0.014	0.195*	-0.062		0.206**	-0.105*
	-0.27	2.18	-1.20		2.33	-1.91
SIZE	0.243***	0.295***	0.236*		0.197***	0.275***
	13.28	9.05	9.91		6.22	14.48
Intercept	-3.809***	-3.762***	-4.124		-2.675***	-4.129***
	-10.79	-8.96	-11.36		-7.77	-7.71
FEs	C,I,Y	C,I,Y	C,I,Y		C,I,Y	C,I,Y
Observations	103,855	51,794	52,061		46,304	57,551
R^2	0.342	0.305	0.368		0.347	0.363

This table presents the results of panel regressions of firm-specific measures of return synchronicity. The dependent variable is *Synch,* defined as $log\left(\frac{R^2}{1-R^2}\right)$, where R^2 is the fraction of variance in returns that can be explained using variation in home and U.S. market indices (see equation 3). Standard errors are reported below the coefficient estimates. All of the specifications include the control variables from Pagano et al. (2002): leverage, growth, equity and debt issuance, asset turnover, and size. Fixed effects are included for country, industry, and year, and estimates of standard errors are clustered at the country level. *, **, and *** indicate two-tailed significance at the 10%, 5%, and 1% levels, respectively.

Internet appendix:
Figure I: Confounding staggered events
Panel A: PCAOB inspections, PCAOB bilateral arrangements, and the MMOU



Panel B: Tax treaties during the sample period



These figures represent the occurrence of other events that are staggered in time and country. Figure I A shows the 11 sample countries that overlap between the MMOU and PCAOB audit firm inspections (shown by the blue numbers in each year) and the two countries that negotiated cooperative arrangements with the PCAOB (indicated by the word arrangement in blue). Panel B present tax treaties, indicated by the letter T and color yellow, with the same country-year structure.

Internet appendix table I: Comparisons of earnings quality between non-MMoU and MMoU firms

Earnings Management Metrics	Non-MMoU U.S.	Non-MMoU Cross-listed	Exp	Difference: U.S. vs.Cross (N=801)	Simulated p-value	MMoU U.S.	MMoU Cross-listed	Exp	Difference: U.S. vs.Cross (N=1,170)	Simulated p-value	Absolute Difference: Exp	Cross Pre vs. Cross Post	Simulated p-value	Relative Difference: Exp	Diff-in-diff	Simulated p-value
Variability of ΔNI^{ε}	0.014	0.011	-	-0.003***	0.045	0.015	0.016	N/A	0.000	0.732	+	0.005	0.153	+	0.004**	0.061
Var of $\Delta NI^{\varepsilon}/\Delta CF^{\varepsilon}$	2.671	2.033	-	-0.638**	0.204	2.547	2.319	N/A	-0.228	0.247	+	0.286	0.143	+	0.410*	0.113
Corr(ACC^{ε}, CF^{ε})	-0.220	-0.404	-	-0.184***	0.044	-0.264	-0.224	N/A	0.040	0.169	+	0.180	0.100	+	0.224***	0.085
Small positive NI	0.015**		+		0.013	0.005		N/A		0.089	-	-0.014**	0.025	-	-0.010	0.040
Timely Loss Recognition Metrics																
Large Negative NI	-0.021***		-		0.002	0.032**		N/A		0.054	+	0.046***	0.012	+	0.053***	0.007
Basu Coefficient	0.241	0.148	-	-0.093***	0.511	0.389	0.376	N/A	-0.014	0.697	+	0.228	0.369	+	0.079	0.359
Value Relevance Metrics (R^2)																
Price	0.415	0.354	-	-0.061*	0.024	0.503	0.658	N/A	0.155***	0.167	+	0.304	0.014	+	0.215***	0.076
Good News	0.046	0.002	-	-0.044**	0.678	0.116	0.014	N/A	-0.102***	0.589	+	0.012	0.300	+	-0.058	0.379
Bad News	0.043	0.073	-	0.030	0.657	0.134	0.158	N/A	0.024	0.732	+	0.085	0.553	+	-0.006	0.292

The metrics are described below and, where appropriate, include the set of controls employed by Lang et al. (2006). The first three measures follow prior research in using a two-stage procedure that first purges the relation between the test variable and the set of controls. This is indicated by the '$^{\varepsilon}$'. I winsorize all continuous variables at the 2.5% tails. The variables are defined in the appendix. I use a bootstrap to calculate the significance of differences in variance and other variables across treatments (type of firm (U.S. or cross-listed) and MMoU, in this case) (see Boos and Brownie (1988)). The first step is to create an empirical distribution by resampling N observations from each cell for the variable in question. Then I assemble all pairwise combinations to calculate the difference in that variable between U.S. and cross-listed firms. I perform this task once for non-MMoU and once for MMoU samples and evaluate all pairwise combinations of the non-MMoU and MMoU differences (to obtain a "difference-in-differences"). *, **, and *** indicate two-tailed significance at the 10%, 5%, and 1% levels, respectively.

Description of Internet Appendix I results

Internet appendix table I presents aggregate-level tests from prior literature, using the matched U.S. firms as the benchmark. I present results from the non-MMoU observations on the left and from the MMoU observations on the right, with difference and difference-in-differences statistics on the far right.[27] Although my sample does not contain exactly the same observations, the results on the left side are similar to those of Lang et al. (2006), who interpret their evidence as indicating lower earnings quality for cross-listed firms than for U.S. firms. More specifically, the results conform to the expectation that, compared with U.S. firms, cross-listed firms have less variability in income, a more negative correlation between cash flows and accruals, and a greater likelihood of reporting small

[27] Consistent with the design of Lang et al. (2006), I employ controls for selection issues (influenced by Pagano et al. (2002)) when testing proxies for earnings management, benchmark beating, timely loss recognition, and value relevance.

positive earnings, all of which are consistent with more earnings management.[28] The results also show that cross-listed firms are less likely to report large losses and are less timely in reporting losses. Finally, the cross-listed firms exhibit lower associations between accounting data and market prices than their matched U.S. counterparts.

In the right-hand columns of the table, I evaluate the same four properties (earnings management, benchmark beating, timely loss recognition, and value relevance) in the presence of the MMoU. First, I report changes in cross-listed firms in MMoU years relative to non-MMoU years, which are labeled "*Absolute Difference*." In all nine of the tests, the differences indicate an improvement in MMoU years, relative to pre-MMoU years. Next, I examine the differences between U.S. and cross-listed firms in the MMoU period. During firm-years governed by the MMoU, the differences that were observed between U.S. and cross-listed firms in non-MMoU firm-years are reduced or even reversed in almost all of the metrics. During the MMoU years, only three significant differences between the groups are observed: the value relevance of good news still favors the U.S. firms; the value relevance of earnings and book value on price favors cross-listed firms; and large losses are significantly more frequent for cross-listed firms, indicating more prompt recognition of poor performance. The remaining properties are all insignificantly different, which is consistent with an MMoU-facilitated convergence between the reporting properties of cross-listed firms and U.S. firms.

A more formal joint evaluation of both time periods, with the U.S. firms as benchmarks, uses the difference-in-differences approach. If earnings properties have converged, then the differences that existed prior to the MMoU should either be smaller or opposite in sign to those in the MMoU-governed firm-years. Consequently, I expect a difference-in-differences that is opposite in sign to the differences documented in Lang et al. (2006) *and* to the expectations for non-MMoU observations on the right-hand side of Table 4. The results are consistent with this prediction on almost every attribute. The explanatory powers of good and bad news are the only

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[28] The main constructs of interest are earnings management (a negative proxy for earnings quality), timely loss recognition, and value relevance—as in the firm-specific tests. The new measures include additional smoothing measures, the conditional conservatism metric, and various value-relevance regressions that rely on R^2.

The first smoothing proxy is the variability of earnings changes, scaled by total assets. In the absence of interventions that artificially smooth the earnings stream, the variance of earnings is expected to be larger (Lang et al. 2003; Leuz et al. 2003; Ball and Shivakumar 2006; Lang et al. 2006; Barth et al. 2008; Bhattacharya et al. 2003). The studies above find that smoothing is inversely related to (stronger) common law origins, timely recognition of losses, incentives provided by greater monitoring, and cross-listing in the United States (versus not cross-listing there). Greater variation in the amount of reported income may indicate less discretionary intervention by management (Ewert and Wagenhofer 2015). Given that underlying economic conditions also contribute to the variation in earnings changes, I follow prior literature by adding a second smoothing measure, which scales the variation in earnings changes by the variation in cash flow changes to control for variation inherent in a firm's operations. In both of these measures, less variability indicates greater earnings management.

A partially market-based metric for assessing timeliness is the asymmetric timeliness coefficient first proposed by Basu (1997). This approach, known as conditional conservatism, uses a slope (and intercept) shift to allow for a differential reporting lag for bad news (with negative returns as a proxy for bad news). In an accounting system that incorporates economic losses immediately (but recognizes gains as they are realized in future periods), one would expect the reporting lag for losses to be shorter.

Prior research also constructs measures of the association between accounting outputs and equity returns using R^2. As advocated by Ball et al. (2000), I separately examine this association for good- and bad-news firms (identified by positive and negative returns, respectively). The maintained assumption is that a higher association between accounting data and equity returns indicates more informative accounting outputs. Similarly, the value relevance of earnings and book value of stockholders' equity in explaining the cross-section of equity share prices use R^2, with similar predictions as described in the main text.

exceptions, but these differences are not significant. These findings suggest that the reporting attributes of cross-listed and U.S. firms converge in the presence of the MMoU, which is consistent with my expectation that the enhanced access to information enforcement enabled by the MMoU, and a resulting increase in the SEC's ability to supervise foreign firms, promote better financial reporting. Finally, comparing the absolute differences with the relative difference reveals that the results are driven mainly by improvements in the cross-listed shares (not by deterioration in the benchmark shares). For example, cross-listed firms' correlation between accruals and cash flows increases by 0.180, whereas the relative difference is 0.224. So 80% (0.180/0.224) of the diff-in-diff result derives from improvements in the benchmark shares.

Table II: Value-relevance *Home Benchmarks*

	Full sample	Code law	Common law		Low regulatory quality	High regulatory quality
MMoU_FILE	-1.921**	-1.234	-2.276		-2.281	0.453
	(-2.10)	(-0.89)	(-1.27)		(-1.67)	(0.33)
TREAT	6.324***	5.651***	5.527**		8.277***	2.353
	(5.05)	(3.23)	(2.12)		(6.11)	(1.42)
*TREAT*MMoU_FILE*	-1.551	-2.216	-2.869		-5.137***	1.270
	(-1.11)	(-1.10)	(-1.42)		(-2.78)	(0.73)
EPS	1.263***	1.385***	1.460		0.899	0.801*
	(3.24)	(2.86)	(1.45)		(1.18)	(1.81)
BV	0.614***	0.685***	0.159		0.487***	0.834***
	(7.57)	(9.07)	(0.90)		(4.73)	(10.07)
*EPS*MMoU_FILE*	0.877**	0.663	0.460		1.044**	1.279**
	(2.31)	(1.40)	(0.77)		(2.11)	(2.48)
*BV*MMoU_FILE*	0.200***	0.130	0.359**		0.262***	-0.035
	(3.10)	(1.60)	(2.25)		(3.04)	(-0.50)
*EPS*TREAT*	-2.630***	-1.766**	-2.771*		-2.828***	-1.229
	(-3.99)	(-2.49)	(-1.75)		(-3.33)	(-1.37)
*BV*TREAT*	-0.245	0.023	-3.440***		-0.056	-3.654***
	(-1.11)	(0.14)	(-2.82)		(-0.29)	(-3.57)
EPS*TREAT*MMoU_FILE	**4.687*** **	**3.315*** **	**5.394** **		**5.288*** **	**2.034** †
	(4.41)	**(2.73)**	**(2.36)**		**(3.40)**	**(1.60)**
BV*TREAT*MMoU_FILE	**0.279**	**-0.066**	**3.865*** ††† **		**0.042**	**3.786*** ††† **
	(1.02)	**(-0.29)**	**(2.95)**		**(0.17)**	**(3.55)**
IFRS	2.208	-0.344	3.950***		-0.458	5.311***
	(1.51)	(-0.19)	(2.91)		(-0.24)	(2.94)
*IFRS*EPS*	-0.408	-0.408	-0.811		-0.432	0.288
	(-1.12)	(-0.85)	(-1.12)		(-0.93)	(0.47)
*IFRS*BV*	-0.077	-0.038	-0.091		-0.072	-0.159*
	(-1.01)	(-0.38)	(-1.07)		(-0.55)	(-1.71)
Intercept	4.990***	-5.238*	-4.964		-6.652	-5.158
	(5.71)	(-1.70)	(-1.13)		(-1.58)	(-1.54)
Controls	YES	YES	YES		YES	YES
Fixed effects	C,I,Y	C,I,Y	C,I,Y		C,I,Y	C,I,Y
Observations	2,734	1,450	1,284		1,400	1,334
R^2	0.73	0.75	0.77		0.75	0.77

This table presents the results of panel regressions of firm-specific measures of value relevance (the dependent variable is *Price* per share). Standard errors are reported below the coefficient estimates. All of the specifications include the control variables from Pagano et al. (2002) (although the estimates are suppressed for brevity); fixed effects for country, industry, and year; and estimates of standard errors clustered at the country level. *, **, and *** indicate significant differences from zero (two-tailed) at the 10%, 5%, and 1% levels, respectively. †, ††, and ††† indicate the significance of cross-equation differences (two-tailed) at the 10%, 5%, and 1% levels, respectively (tabulated only for the coefficients of interest in ***bold***).

Table III: Loss recognition *Home benchmarks*

	Full sample	Code law	Common law	Low regulatory quality	High regulatory quality
MMoU_FILE	-0.021	0.002	0.000	0.024	-0.063**
	(-1.17)	(0.18)	(0.01)	(1.56)	(-2.17)
TREAT	0.096***	0.031**	0.170***	0.014	0.173***
	(4.12)	(2.04)	(5.23)	(1.67)	(6.50)
TREAT*MMoU_FILE	**0.079*** **	**0.027** **	**0.069** **	**0.014**	**0.093*** ††† **
	(3.54)	**(2.04)**	**(2.11)**	**(1.04)**	**(4.20)**
IFRS	-0.039***	-0.023	-0.031	-0.003	-0.052***
	(-2.67)	(-1.39)	(-1.56)	(-0.33)	(-2.78)
LEV	0.001	-0.000	-0.001	-0.000	0.000
	(0.35)	(-0.17)	(-0.18)	(-0.19)	(0.07)
GROWTH	0.010	0.003	0.003	-0.012	0.004
	(1.51)	(0.32)	(0.47)	(-0.94)	(0.78)
EQUITY_ISS	0.041**	-0.017	0.070***	0.017	0.065***
	(2.31)	(-1.64)	(3.96)	(0.79)	(3.70)
DEBT_ISS	0.002	0.008	-0.004	-0.012	0.008
	(0.19)	(1.32)	(-0.24)	(-1.09)	(0.49)
ASSET_TURN	-0.085***	-0.030*	-0.122***	-0.037**	-0.106***
	(-3.46)	(-1.71)	(-3.28)	(-2.41)	(-2.75)
SIZE	-0.056***	-0.024***	-0.073***	-0.018***	-0.075***
	(-4.79)	(-3.06)	(-5.26)	(-3.56)	(-6.27)
Intercept	0.463***	0.215***	0.531***	0.169***	0.581***
	(4.92)	(3.43)	(4.43)	(3.99)	(5.50)
FEs	C,I,Y	C,I,Y	C,I,Y	C,I,Y	C,I,Y
Observations	3,426	1,759	1,667	1,658	1,768
R^2	0.338	0.249	0.368	0.238	0.378

This table presents the results of panel regressions of firm-specific measures of timely loss recognition, using the dependent variable *LARGE_NEG*, which equals 1 when net income scaled by assets is less than -.2. Standard errors are reported below the coefficient estimates (which are clustered at the country level). All of the specifications include the control variables from Pagano et al. (2002) and fixed effects for country, industry, and year. *, **, and *** indicate two-tailed significance at the 10%, 5%, and 1% levels, respectively. †, ††, and ††† indicate the significance of cross-equation differences (two-tailed) at the 10%, 5%, and 1% levels, respectively (tabulated only for the coefficients of interest in ***bold***).

Table IV: Benchmark-beating *Home benchmarks*

	Full sample	Code law	Common law		Low regulatory quality	High regulatory quality
MMoU_FILE	0.064*	-0.031	0.211***		0.020	0.084
	(1.72)	(-0.85)	(3.19)		(0.55)	(1.49)
TREAT	0.409***	0.501***	0.258***		0.529***	0.280***
	(10.87)	(15.18)	(7.00)		(16.07)	(9.79)
TREAT*MMoU_FILE	**-0.078*** **	**-0.003**	**-0.053**		**-0.013**	**-0.087*** **
	(-2.75)	**(-0.09)**	**(-1.39)**		**(-0.35)**	**(-2.85)**
IFRS	0.036	0.004	0.072**		-0.001	0.060**
	(1.27)	(0.10)	(2.33)		(-0.02)	(2.08)
LEV	0.002	0.006	-0.001		0.004	-0.000
	(0.61)	(1.63)	(-0.19)		(0.81)	(-0.04)
GROWTH	-0.017	0.002	-0.023***		0.032	-0.022***
	(-1.65)	(0.08)	(-4.02)		(1.25)	(-4.32)
EQUITY_ISS	-0.095***	-0.133***	-0.037		-0.135**	-0.051**
	(-2.77)	(-2.79)	(-1.05)		(-2.19)	(-2.11)
DEBT_ISS	0.014	0.032	0.010		0.039	0.006
	(0.89)	(1.07)	(0.60)		(1.43)	(0.32)
ASSET_TURN	0.041	0.009	0.075**		-0.001	0.083**
	(1.57)	(0.25)	(2.14)		(-0.03)	(2.28)
SIZE	0.048***	0.028**	0.052***		0.019*	0.064***
	(4.59)	(2.51)	(3.67)		(1.99)	(5.14)
Intercept	-0.264***	-0.085	-0.392***		-0.047	-0.368***
	(-3.10)	(-0.93)	(-3.80)		(-0.62)	(-3.78)
FEs	C,I,Y	C,I,Y	C,I,Y		C,I,Y	C,I,Y
Observations	3,426	1,759	1,667		1,658	1,768
R^2	0.411	0.422	0.426		0.408	0.440

This table presents the results of panel regressions of firm-specific measures of benchmark beating, using the dependent variable *SMALL_POS*, which is equal to 1 when net income scaled by assets is between 0 and .01. Standard errors are reported below the coefficient estimates (which are clustered at the country level). All of the specifications include the control variables from Pagano et al. (2002) and fixed effects for country, industry, and year. *, **, and *** indicate two-tailed significance at the 10%, 5%, and 1% levels, respectively. †, ††, and ††† indicate the significance of cross-equation differences (two-tailed) at the 10%, 5%, and 1% levels, respectively (tabulated only for the coefficients of interest in ***bold***).

Table V: Smoothing *Home benchmarks*

	Full sample	Code law	Common law		Low regulatory quality	High regulatory quality
MMoU_FILE	0.049	-0.003	0.041		-0.024	0.132
	(0.67)	(-0.05)	(0.25)		(-0.41)	(0.90)
TREAT	-0.078**	-0.081	-0.014		-0.088	-0.071
	(-2.04)	(-1.48)	(-0.13)		(-1.57)	(-1.13)
TREAT*MMoU_FILE	**-0.058**	**0.015**	**-0.133**		**-0.020**	**-0.070**
	(-0.93)	**(0.20)**	**(-0.84)**		**(-0.31)**	**(-0.65)**
IFRS	-0.105**	-0.071	-0.165**		-0.087	-0.090**
	(-2.34)	(-1.61)	(-2.55)		(-1.41)	(-2.33)
LEV	-0.000	-0.003	0.008*		-0.008	0.010***
	(-0.01)	(-0.94)	(1.81)		(-1.45)	(3.20)
GROWTH	0.059***	-0.007	0.090***		-0.008	0.081***
	(4.25)	(-0.22)	(7.93)		(-0.22)	(6.29)
EQUITY_ISS	0.033	-0.025	0.099*		-0.005	0.078
	(0.76)	(-0.52)	(1.95)		(-0.11)	(1.23)
DEBT_ISS	-0.037*	-0.083***	-0.008		-0.094***	-0.004
	(-1.93)	(-2.80)	(-0.46)		(-3.96)	(-0.20)
ASSET_TURN	-0.036	-0.081*	0.013		-0.066	-0.011
	(-0.86)	(-1.67)	(0.20)		(-1.15)	(-0.19)
SIZE	-0.036**	-0.040**	-0.030		-0.031*	-0.043**
	(-2.29)	(-2.34)	(-1.18)		(-1.83)	(-2.50)
Intercept	-0.068	-0.042	-0.085		-0.092	-0.070
	(-0.51)	(-0.28)	(-0.33)		(-0.65)	(-0.37)
FEs	C,I,Y	C,I,Y	C,I,Y		C,I,Y	C,I,Y
Observations	3,360	1,722	1,638		1,624	1,736
R^2	0.257	0.272	0.255		0.288	0.259

This table presents the results of panel regressions of firm-specific measures of earnings smoothing, using the correlation between cash flows and accruals over the previous five years. Standard errors are reported below the coefficient estimates (which are clustered at the country level). All of the specifications include the control variables from Pagano et al. (2002) and fixed effects for country, industry, and year. *, **, and *** indicate two-tailed significance at the 10%, 5%, and 1% levels, respectively. †, ††, and ††† indicate the significance of cross-equation differences (two-tailed) at the 10%, 5%, and 1% levels, respectively (tabulated only for the coefficients of interest in ***bold***).

Table VI: Return synchronicity *Home benchmarks*

	Full sample	Code law	Common law		Low regulatory quality	High regulatory quality
MMoU_FILE	-0.202	-0.728***	0.302		-0.407*	0.245
	-1.03	-3.55	1.24		-1.83	0.89
TREAT	-0.689***	-1.137***	-0.323**		-0.766***	-0.547**
	-4.52	-6.46	-2.07		-3.58	-2.83
TREAT*MMoU_FILE	**0.414*** **	**0.756*** **	**0.058†††**		**0.468** **	**0.247*** **
	2.44	**3.35**	**0.34**		**2.10**	**1.18**
IFRS	-0.043	-0.286*	0.077		-0.025	-0.121
	-0.43	-2.00	0.76		-0.17	-0.84
LEV	-0.017	-0.018	-0.01		-0.009	-0.022
	-1.57	-1.32	-0.76		-0.81	-1.09
GROWTH	0.102**	-0.124	0.074*		-0.27**	0.126***
	2.81	-1.31	1.98		-2.25	3.16
EQUITY_ISS	-0.169	0.144	-0.322**		0.089	-0.409*
	-1.34	0.84	-2.41		0.74	-1.82
DEBT_ISS	-0.044	-0.042	-0.019		0.057	-0.054
	-1.09	-0.51	-0.49		0.60	-1.37
ASSET_TURN	-0.035	0.065	0.022		0.125	-0.139
	-0.51	0.65	0.19		1.00	-1.60
SIZE	0.302***	0.346***	0.296***		0.293***	0.316***
	14.15	11.43	10.65		11.93	7.77
Intercept	-2.791***	-2.268***	-4.627***		-2.357***	-2.753***
	-6.47	-4.94	-12.41		-5.22	-6.10
FEs	C,I,Y	C,I,Y	C,I,Y		C,I,Y	C,I,Y
Observations	88,277	39,009	49,268		43,661	44,616
R^2	0.395	0.454	0.378		0.400	0.397

This table presents the results of panel regressions of firm-specific measures of return synchronicity. The dependent variable is *Synch,* defined as $log\left(\frac{R^2}{1-R^2}\right)$, where R^2 is the fraction of variance in returns that can be explained using variation in home and U.S. market indices (see equation 3). Standard errors are reported below the coefficient estimates. All of the specifications include the control variables from Pagano et al. (2002): leverage, growth, equity and debt issuance, asset turnover, and size. Fixed effects are included for country, industry, and year, and estimates of standard errors are clustered at the country level. *, **, and *** indicate two-tailed significance at the 10%, 5%, and 1% levels, respectively.

BARRON'S

ECONOMY AND POLICY

China Doesn't Want to Cooperate With U.S. Regulators. Congress Is Raising the Stakes.

COMMENTARY By Roger Silvers June 12, 2020 3:30 pm ET

Keystone/Getty Images

Washington's frustration with Beijing has finally come to a head. The issue is that Chinese firms listed on U.S. exchanges don't receive adequate oversight from U.S. regulators, particularly the Securities and Exchange Commission and the Public Company Accounting Oversight Board. Congress is now taking action.

The Holding Foreign Companies Account Act, passed by the U.S. Senate in May, and yet to be taken up by the House, would purge from U.S. exchanges any company whose auditor is not inspected by the PCAOB. The law would put a target squarely on China, which for years has been unable or unwilling to cooperate.

This bill is an unprecedented step to help U.S. regulators gain cooperation from China. Management at the SEC changes every few years, and new blood brings renewed optimism about the prospect of negotiating with China. Previous failures get chalked up to staff-level shortcomings—U.S. officials simply didn't make the right arguments, create the right incentives, or negotiate hard enough to be successful. This time around, Congressional action has been endorsed by current SEC Chairman Jay Clayton.

That the SEC remains unable to foster cooperation without the Hill suggests agreement was never achievable through conventional negotiations. Embracing this new legislation and publicly admitting that China is beyond their reach represents a significant policy shift by the SEC.

There has been a long history of unfruitful talks with the China Securities Regulatory Commission. U.S. regulators have grappled with Chinese secrecy laws that prevent inspections of auditors and access to critical documents—which stonewalled the bulk of SEC investigations. In the few instances where the SEC made some headway, China clamped down by changing the rules. After prolonged litigation in 2011 against the Hong Kong auditors of the Chinese company, Longtop Financial, the firm's audit work papers were in sight. Then Beijing stipulated that audit work papers could not leave China, even though the auditors were based in Hong Kong.

In today's interconnected markets, companies have assets, operations, records, and relevant legal entities scattered across multiple jurisdictions. U.S. regulators have no authority to gather documents, compel testimony, or freeze assets outside the U.S. This fundamental problem has been addressed through "soft-law" cooperation arrangements at the SEC and PCAOB. These allow foreign counterparts to carry out functions on behalf of the U.S. regulators and vice-versa, making cooperation critical for U.S. regulators to fulfill their mandate to protect U.S. investors.

However, these arrangements are not uniformly effective or binding. While the CSRC is one of the most active regulators in the world in terms of entering arrangements with foreign counterparts, and is a signatory to the internationally recognized benchmark for cross-border cooperation, the Multilateral Memorandum of Understanding, they, like all other signatories, are not legally obligated to cooperate.

In my consultations with international regulatory communities, I've often heard frustration that China hasn't kept up with basic information-sharing and cooperation protocols agreed to under these memorandums of understanding. Staff at regulatory agencies across the globe trace fraudulent activities to China's doorstep, only to watch their investigations fall apart. Requests for assistance are met with a panoply of excuses, mostly about claims of state secrets and uncertainty about China's secrecy laws. With the benefit of prior experience, global regulators often give up once assistance from China becomes necessary. When regulators pursue these cases, they do so knowing that it is more of a political experiment to see if they can induce

cooperation rather than an enforcement investigation with a legitimate chance of success.

These circumstances make it easy for perpetrators to get away with fraud. When Chinese corporate entities engage in suspected abusive practices like insider trading, market manipulation, and misleading disclosures, they take advantage of defects in crossborder supervision caused by China's failure to cooperate. Meanwhile their companies continue to benefit from access to global equity markets. No doubt many Chinese companies will choose not to exploit these regulatory gaps, but for those that are tempted to engage in such activities (to the detriment of U.S. investors), their conduct is hidden from scrutiny. Without a game plan to properly police the market, the SEC appears powerless in fulfilling its mandate to protect investors. For example, the SEC allowed Luckin Coffee to resume trading last month even after allegations of fraudulently inflating sales figures at the once-$12-billion Chinese titan. It lost 90% of its value during a month-long trading suspension imposed by Nasdaq.

The bill also raises geopolitical and economic risks. The contention that Chinese financial information is inferior has implications not only for Chinese firms, but also for U.S. multinationals with operations in China. U.S. investors could sustain substantial financial losses if U.S.-listed Chinese firms are delisted. That said, it is unclear what effect delisting might have on the value of a firm's shares. Although liquidity would plummet without access to U.S. markets, Chinese shares could be so scarce that they become more valuable.

Yet this legislation is perhaps the best opportunity for U.S. regulators to get China to alter its stance on cooperation in securities regulation. For all parties involved, it seems preferable to avoid the "nuclear" option U.S. regulators have at their disposal—to refuse to recognize the legitimacy of financial reports from China altogether. Although U.S. regulators have been reluctant to go this route, changes in the geopolitical landscape make it more feasible. Because it would implicate U.S. multinationals, such a stance would likely set off a chain of events that would inflict considerable damage on the Chinese economy. U.S. multinationals would likely be forced to discontinue their operations in China, and would likely opt for the cheaper labor and equally viable shipping lanes in Vietnam, the Philippines, and elsewhere.

Although many negotiations between the SEC and Chinese regulators have failed in the past, the stakes have risen for China—enough to see U.S. regulators make headway

in piercing the veil of Chinese secrecy. But don't expect full resolution any time soon. If past experience with other countries is any guide, negotiations will be part of an ongoing and evolving process. Globally, securities regulators have made monumental progress with cooperation, but there's still room for improvement among most, if not all, countries.

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