Shadow Representation: Multinational Firms and International Standard-Setting

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Abstract

Many international institutions adopt formal equality among members, such as one country-one vote, to prevent capture by powerful states. However, this may have unintended consequences when private actors' interests cross national borders. Specifically, multinational corporations can use global subsidiary networks to expand their influence by mobilizing host countries. I examine this in the case of the International Organization for Standardization (ISO), which develops standards that shape global market access. Using original data linking voting membership across 165 countries and 630 ISO technical committees from 2007 to 2017 to inward foreign direct investment, I show that countries begin participating in standardization areas where they receive related investment. I also introduce a firm-level measure of interests based on ISO project leaders' email domains and show that investment from leading firms predicts host-country entry into the same committee. These findings show how formally equal institutions can amplify influence of globally networked firms. *(149 words)*

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1 Introduction

International organizations set many of the rules and standards that govern today's global economy. Alongside intergovernmental bodies such as the World Trade Organization (WTO) and the Organization for Economic Cooperation and Development (OECD), an expanding set of organizations now develops voluntary standards and regulatory frameworks that increasingly shape market behavior across borders (Abbott and Snidal 2001; Büthe and Mattli 2010). For all their variety, many of the prominent organizations still adopt representation at the national level, and formal authority is typically allocated equally among members—most visible one being the one country-one vote rule—to guard against powerful states from dominating the decisions (Bijlmakers 2023). This paper argues that this institutional design can provide disproportionate access to firms that have global subsidiary networks. When every member counts equally in their votes, influence accrues to those who can mobilize members—a capacity that belongs disproportionately to multinational corporations (MNCs), whose subsidiary networks span country borders. Formal equality among states, designed to prevent capture, can thereby amplify the channel through which globally organized firms influence international rules.

I develop and test this argument at the International Organization for Standardization (ISO), the most prominent organization in international standard-setting. Scholars have demonstrated that standards set by internationally recognized institutions like the ISO, while being private and non-enforceable, substantially impact global market access as they shape competition and market dominance both within and across countries (Swann 2010; Mangelsdorf 2011; Blind et al. 2018). These standards also influence domestic regulations (Perlman 2020b) and play a role in WTO dispute settlement processes (Klotz 2019). Given these consequences, firms and countries strategically pursue participation in standardization (Blind 2006; Wakke et al. 2015; Fuchs and Eaton 2022; Blind and von Laer 2022). Yet whose interests these participations actually represent remains an open question.

In fact, uncovering who shapes standard-setting in international private regimes poses both empirical and theoretical challenges. The demanders, suppliers, and targets of standards are often not identical (Büthe 2010b). The institutional structures often differ from those of traditional intergovernmental organizations (Büthe 2010a). Moreover, political power dynamics behind standard-setting processes are sometimes hard to distinguish from technical rationality (Mattli and Büthe 2003). For example, while some Western countries have voiced concern over China's rising

influence on technical standardization, they find it difficult to identify where exactly the Chinese government and firms are pushing their interests.[1] Therefore, while a growing literature has examined the global diffusion and adoption of ISO standards once they are published (Potoski and Prakash 2005; Prakash and Potoski 2007; Greenhill et al. 2009; Clougherty and Grajek 2014; Malesky and Mosley 2018), much less is known about who participates in the *creation* of these standards.

This paper focuses on the role of business firms in standardization and asks which types of firms particularly benefit from the current international standard-setting regime. I argue that an institutional design familiar across international organizations like the ISO and the International Electrotechnical Commission, namely the one country-one vote system that formally ensures equality among national members, motivates MNCs to leverage their connections with multiple countries established via their foreign subsidiary networks. MNCs therefore wield disproportionate influence in the ISO due to their ability to leverage global subsidiary networks. In addition to informational advantages gained by their ties with highly capable foreign national standardization bodies (e.g., those in the EU) (Büthe and Mattli 2011), MNCs can leverage the foreign subsidiary networks to mobilize participation from host countries, including those previously inactive in standardization. By offering technical expertise, strategic incentives, and financial support, MNCs can encourage these host countries to participate in technical committees (TCs) in ways that align with corporate interests.

As an observable implication, I expect MNCs' foreign direct investments to result in more active participation in international standardization by the host country, specifically in standard areas related to the firm's investment. To test this, I construct a panel data capturing the participation of 165 national standardization bodies across 630 ISO technical (sub)committees[2] from 2007 to 2017, mapped on to inward foreign direct investment (FDI) projects in each country related to each committee's standardization area. I do this by linking the HS product codes associated with standard published by each technical committee to the industry codes of inward FDI projects in each country. Furthermore, to address the challenge of identifying firm-level interests in standardization, I use the email domains of ISO project leaders to match them to specific firms. By combining this with firm-level FDI data, I show that countries receiving FDI from firms with high

[1]The Wall Street Journal. "From Lightbulbs to 5G, China Battles West for Control of Vital Technology Standards" (February 8th, 2021. https://www.wsj.com/articles/from-lightbulbs-to-5g-china-battles-west-for-control-of-vital-technology-standards-11612722698)

[2]These are the total numbers of unique TC/SCs that existed throughout the period considered in this study.

involvement in ISO standardization are significantly more likely to participate in relevant TCs.

This study shifts the focus from standard adoption to standard development in examining the relationship between international business and standards. Compared to the extensive literature that have examined the adoption stage of published ISO standards (Potoski and Prakash 2005; Prakash and Potoski 2007; Greenhill et al. 2009; Malesky and Mosley 2018), this study investigates the process through which these standards are developed in the first place. Building on recent works that highlights the role of national export and R&D interests in shaping standardization participation (Blind and von Laer 2022), I further highlight how cross-border firm-level interests—particularly those of multinational corporations—drive participation. In doing so, the paper argues that international economic transactions, particularly FDI, not only respond to standards (Chen et al. 2014) but actively shape their creation. This adds to recent works showing that not only do rules and institutions shape FDI (Pandya 2016), but investment, once made, reshapes the host country's international rule-making itself (Osgood 2018; Kim et al. 2025).

This paper's main argument also offers one explanation for why less developed countries, which used to play a limited role in international private standard-setting (Morikawa and Morrison 2004; Jansen 2010), are increasingly participating in ISO standardization as voting members. However, the findings imply that increased participation by developing countries does not necessarily indicate a more diverse set of interests represented at the ISO, as these votes may primarily reflect the interests of a limited set of powerful MNCs. Where participation is mobilizable, a formal seat in a committee may be an unreliable measure of whose interests are represented—an international analogue of the distinction between descriptive and substantive representation in domestic politics (Lowande et al. 2019, etc.). In other words, MNCs can take advantage of the gap between the boundaries of firm-level interests and state-level interests, under institutional designs that assume preference representation at the national level. In the long run, this may still lead to increased representation of the needs of historically under-represented countries. As with the case of WTO adjudication, participation by developing countries may increase through experience and learning (Davis and Bermeo 2009). However, if the ISO is institutionally prone to shadow representation of MNC interests, the pattern may persist or even intensify as MNCs further expand their global network. This paper thus adds to the scholarly debate on distributive outcomes of these private regimes—such as the power of MNCs, inequality between developed and developing countries, and the democratic accountability of international market governance (Vogel 2008; Drezner 2008;

Büthe 2010a; Johns et al. 2019)—by proposing the institutional mechanism through which private regimes affect distributional outcomes among firms.

The paper also contributes to the literature on why firms engage in the development of private standards and regulations, and how disparities among firms are reflected in this process (Green 2013; Malhotra et al. 2019). In the realm of domestic regulations, studies have shown that MNCs, innovative firms, and their local affiliates seek stricter domestic regulations and standards in order to encourage market exit of smaller or less innovative firms/products (Gulotty 2020; Kennard 2020; Perlman 2020a, 2023). These theories naturally extend to international standardization. In fact, productive firms operating across borders may have considerable interest in standardization that helps them expand their market share not only in particular countries but across the globe (Austin and Milner 2001). This paper argues that the institutional design of these regimes—especially their formal state-based structures—can be leveraged by firms with expansive global operations. Whereas the institutional complementarities theory highlights the importance of the domestic institution of each firm's home country (Büthe and Mattli 2011), I consider how MNCs can take advantage of the institutional design at the international level regardless of their home country. This also resonates with the politics of firm-heterogeneity, which emphasizes the role of productive MNCs as the central actors of trade and investment politics (Osgood 2016; Kim 2017; Kim and Osgood 2019). This paper adds an international political mechanism favorable to MNCs, disadvantaging purely domestic firms.

Empirically, the paper joins the new attempts to analyze the participation of all ISO members at the Technical Committee (TC) level, which offer granular insight into the specific areas in which states engage in standard development (Baron and Spulber 2018; Bjørkholt 2025).[3] Compared to the general ISO membership data (Lim and Prakash 2018), which only looks at whether a country is part of the organization itself, membership at the committee level gives us information about which specific standard area each member was interested in developing at each point in time. For example, Nepal's 2014 accession to the ISO by itself reveals little about its standardization interests; yet its TC memberships trace them over time—beginning with "Sustainability criteria for bioenergy" (TC 248) and "Clean cookstoves and clean cooking solutions" (TC 285), then expanding by 2023 to fields like statistical methodology for new product development (TC 69/SC 8). Furthermore, unlike the TC Secretariat positions held mostly by a limited set of leading

[3]See Bjørkholt (2025) for an introduction of a comprehensive data focused on ISO participation, which was collected in a similar manner using the Internet Archives.

countries (Blind and von Laer 2022), looking at TC membership allows us to examine participation by all members. Moreover, this paper is the first, to the author's knowledge, to identify *firm-level* interests at the ISO by using the email addresses of project leaders for each standardization project. This opens new avenues for understanding MNC influence in the standardization process, as it enables us to link firm-level interests with national-level participation in standard setting.

2 International Standards and the ISO

Established in 1947 and headquartered in Geneva,[4] the ISO is one of the most influential international private regimes shaping today's global market access. Members of the ISO are national standard developing organizations (SDOs), with only one SDO allowed to represent each country. For example, the American National Standards Institute (ANSI) serves as the U.S. representative to the ISO. ISO membership has expanded significantly, from around 40 in 1960 to 165 in 2020 (Lim and Prakash 2018). Although the ISO itself is a private institution, its national members vary in their degree of public or private character. In many developed countries, SDOs are private organizations—for example, the ANSI (U.S.), the Association Française de Normalisation (France), the Deutsche Institut für Normung e. V. (Germany). In contrast, others are represented by governmental or semi-governmental bodies, such as the Japanese Industrial Standards Committee (under the Japanese Ministry of Economy, Trade and Industry) and the Dirección General de Normas (under the Ministry of Economy of Mexico). Developing countries are most often represented by governmental bodies.

Each ISO member can join any of the Technical Committee or Subcommittee[5] as either a participating member (P-member) or an observing member (O-member) (Figure 1). As of June 2023, the ISO comprised 816 Technical (Sub)Committees, which set voluntary standards across a wide range of domains—ranging from the size of nuts and bolts and quality and safety management processes to emerging areas such as blockchain and 5G technology. The total number of published ISO standards at that time was 24,797.[6] Participating members hold voting rights and obligations to all standardization projects within a TC, while observing members do not have

[4]ISO. "About ISO" (https://www.iso.org/about, last accessed July 24th, 2025.)

[5]For convenience, this paper refers to both Technical Committees and Subcommittees collectively as "TCs."

[6]ISO Standards Catalogue (https://www.iso.org/standards-catalogue/browse-by-ics.html, last accessed June 14th, 2023.)

voting rights.[7] To be published, an ISO standard must receive approval from at least two-thirds of the participating members in the TC. ISO members (i.e., nationally representative SDOs) are eligible for participating membership in any TC as long as they meet participatory obligations: attending meetings, often held in person around the world, and casting votes.[8] These institutional rules—particularly the principles of one-country-one-vote and national delegation—are designed to safeguard against disproportionate influence or regulatory capture by any single country or actor (Bijlmakers 2023).

Although each national SDO is free to join any TC without requiring formal approval from other members, in practice, none participate in all available committees. This is largely due to the constraints of financial and human resources required to hold participating membership, including the expectation to attend meetings, vote on proposals, and stay engaged in ongoing technical work. As a result, both the number and pattern of TC participation vary considerably across countries. For example, as of July 2025, the US representative (ANSI) participated in 561 TCs and served as the committee secretariat for 92 of them.[9] Mexico's national representative (Dirección General de Normas) held participating membership in just 89 TCs and did not serve as secretariat for any.[10] An interview with a staff member from Malaysia's SDO confirmed that applying for participating membership is procedurally simple—essentially just a matter of clicking through the ISO's online portal—but emphasized that maintaining active participation is resource-intensive and they could not afford to participate as much as they would like.[11]

While the ISO is a non-governmental organization and its standards are voluntary, it exerts significant influence over global market access. First, ISO standards are frequently used as international reference points for identifying technical barriers to trade under the WTO's Technical Barriers to Trade (TBT) Agreement. When WTO members raise Specific Trade Concerns in the

[7] According to the ISO manual, "voting is a crucial part of a P-member's [participating member's] obligations. Those who fail to vote on over 20% of the questions formally submitted for voting on the CIB (New Work Item Proposals – NP, Committee Drafts – CD) over one calendar year may be downgraded to O-membership. Similarly, a P-member who fails to vote on an enquiry draft (DIS) or final draft (FDIS) or a systematic review (SR) will be downgraded to O-member [observing member]" (ISO 2018, "*My ISO job - What delegates and experts need to know*" (https://www.iso.org/files/live/sites/isoorg/files/archive/pdf/en/my_iso_job.pdf))

[8] In addition to the official manual cited in the previous footnote, interviews I conducted with former and current representatives from multiple SDOs (November 29, 2023; April 24, 2024; April 25, 2024) confirmed that members are likely to be downgraded to O-member status if they miss several meetings or fail to vote. This and all other interviews cited in this paper were conducted by the author under IRB-[anonymized]. Each interviewee was informed of the purpose of the research and of the voluntary and anonymous nature of participation, and provided oral informed consent.

[9] ISO. "ANSI." Retrieved July 24th, 2025. https://www.iso.org/member/2188.html

[10] ISO. "DGN." Retrieved July 24th, 2025. https://www.iso.org/member/1954.html

[11] Interview by author, April 24, 2024.

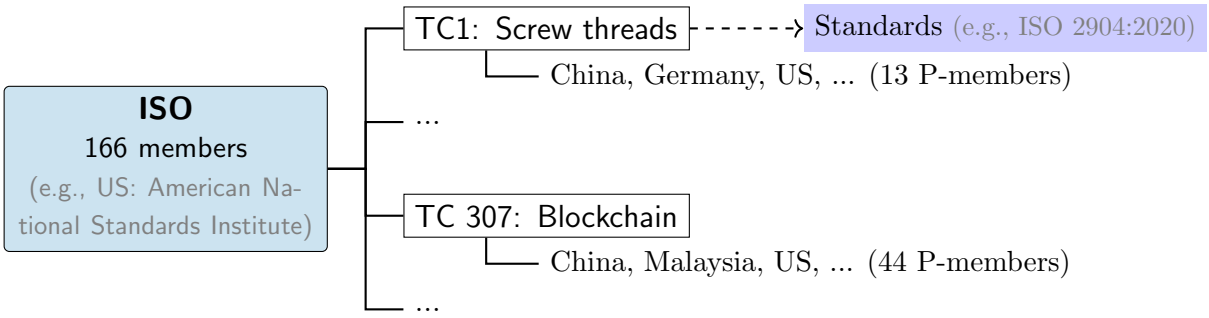


Figure 1: **Organizational structure of ISO and its Technical Committees**

TBT Committee to argue that a trading partner's domestic technical regulations constitute trade barriers, they often do so by highlighting discrepancies between the partner's national regulations and existing ISO standards. Technical barriers to trade are among the most politically sensitive and economically consequential issues in contemporary trade politics: in a 2010 UNCTAD firm-level survey, approximately 70% of non-tariff measures reported by firms concerned TBT and Sanitary and Phytosanitary (SPS) measures.[12] Correspondingly, the ISO has expanded its scope to include standards beyond product domains, such as the development of standards for smart city systems that incorporate emerging technologies (Murphy and Yates 2008; Graz 2019). Lim and Prakash (2018) attribute part of ISO's membership expansion—from just over 40 countries in 1960 to 165 today—to its appeal for export-oriented states outside the GATT/WTO, as ISO can be a functional alternative but with lower barriers to entry.

Second, ISO standards are frequently incorporated into domestic regulatory frameworks. In the U.S., for instance, the National Technology Transfer and Advancement Act of 1996 mandates that federal agencies and departments use technical standards developed or adopted by voluntary consensus standards bodies whenever possible.[13] Although the law does not specify particular organizations by name, ISO standards are commonly used as reference points in federal rulemaking.[14] Similarly, in the European Union, ISO standards are often adopted as the basis for harmonized regulations that govern market access across the European Economic Area.[15] Given these sub-

[12]UNCTAD, 2010. "International Trade After the Economic Crisis: Challenges and New Opportunities" (UNCTAD/DITC/TAB/2010/2)

[13]International Organization for Standardization, "National Examples: United States of America," https://policy.iso.org/usa.html.

[14]ANSI, "Why Voluntary Consensus Standards Incorporated by Reference into Federal Government Regulations Are Copyright Protected" (https://share.ansi.org/Shared%20Documents/About%20ANSI/Why-Voluntary-Consensus-Standards-Incorporated-by-Reference-into-Federal%20Government%20-Regulations-Are-Copyright-Protected.pdf)

[15]For example, for harmonized standards on medical devices, see Regulation (EU) 2017/745. (https://single-market-economy.ec.europa.eu/single-market/european-standards/harmonised-standards/medical-devices_en)

stantial regulatory consequences, ISO standardization processes are often highly contested and political.

Country-Level Representations Given the significance of ISO standards, whose interests are represented in the process of standardization? At the country level, two common proxies for influence within each Technical Committee are: (a) which national SDO holds the secretariat position, and (b) which countries hold participating membership status (i.e., members with voting rights). TC secretariat, a position held by one SDO among the participating members for each TC, is widely recognized as playing a critical role in shaping the standardization process. They have considerable discretion in determining which proposals receive priority attention and how quickly a standard advances from initial proposal to final publication. As a result, the number and subject areas of TC secretariat positions held by a national SDO are often interpreted as indicators of that country's influence within the ISO system (Graz 2019; Blind and von Laer 2022). Although most secretariat positions are held by large economies, the distribution of these roles has shifted notably over time. Between the late 2000s and late 2010s, China significantly increased its presence by establishing new TCs and assuming more secretariat roles. Meanwhile, while the United States continues to be one of the most prominent actors, ranking just behind Germany in the number of secretariat seats, it held fewer secretariat positions than it did a decade earlier (Appendix Figure 7.1).

At the same time, the number of TCs in which each national SDO holds participating membership has significantly expanded. While developing countries historically participated in very few TCs (Morikawa and Morrison 2004), TC membership today increasingly includes a broader range of countries beyond the traditional group of highly industrialized economies. For example, Mexico's participation expanded from 46 TCs in 2008 to 66 in 2022, Ethiopia from 3 to 41, and Uganda, after becoming a full ISO member in 2013, held participating membership in 77 TCs by 2022. Participating members play a central role in shaping standardization outcomes within each TC. When a new standard proposal is introduced, it must receive approval from a simple majority of participating members, and at least five must actively support it and nominate experts to the TC in order for the work to proceed. Furthermore, each subsequent drafting and approval stage requires support from a two-thirds majority of participating members.[16] Given these procedural

[16]ISO, "Voting and membership in ISO" (https://www.iso.org/sites/ConsumersStandards/voting_iso.html Last accessed June 9th, 2023)

rules, participating membership confers substantial institutional power. Therefore, relevant actors have a strong interest in who holds participating membership.

Uganda's entry to ISO/TC 296, *Bamboo and Rattan*, showcases how participating membership is actively pursued by relevant stakeholders. In 2017, the Uganda National Bureau of Standards (UNBS) became a participating member of this committee. According to the International Bamboo and Rattan Organization (INBAR), an intergovernmental organization headquartered in China and composed primarily of member states from the Global South, "Uganda's change in membership status is the outcome of the bilateral meeting between INBAR and UNBS held at the 23rd African Standardization Organization General Assembly on 26–30 June 2017."[17] INBAR further reported that "INBAR Members now make up 12 out of 17 Participating members for ISO/TC 296," and that it would continue working to help all its Members adopt standards.[18] This example illustrates that relevant actors——including international ones—have a strong interest in who holds participating membership in ISO TCs. The next section turns to the institutional environment under which firms engage with the ISO and how MNCs leverage their transnational networks to shape standardization outcomes.

3 Networked Power and Influence of MNCs

While secretariat positions and participating memberships are key formal indicators of influence within the ISO governance structure, these roles alone do not fully explain who shapes standardization outcomes. Mattli and Büthe (2003) and Büthe and Mattli (2011) emphasize the importance of domestic institutional settings in order for private actors to be effectively involved in standardization. Their institutional complementarities theory suggests that institutional structure of domestic SDOs (e.g., ANSI for the U.S.) affects the flow of information and consensus building, both of which are crucial for private sectors to effectively lead standard developments. Survey by Büthe and Mattli (2011) also indicates that U.S. firms with subsidiaries in Europe were better positioned than U.S. domestic firms because they could access information from European SDOs.[19]

[17]INBAR, 2017. "Uganda becomes a Participating Member of ISO/TC 296" (https://www.inbar.int/uganda-becomes-participating-member-isotc-296/?utm_source=pocket_saves)

[18]Ibid.

[19]In fact, firms proactively seek such ties. For instance, Sony Corporation, a multinational conglomerate headquartered in Japan, created standard-setting divisions in both its U.S. and European subsidiaries to become further involved with SDOs in each country (Harada 2008).

This paper extends their finding and argue that MNCs actively leverage their foreign subsidiaries to exert influence across the ISO's one country-one vote structure. Specifically, MNCs benefit not only from their connections with highly capable and resourceful SDOs such as those in Europe, but also from their broader global presence—indeed, especially through countries where participation may otherwise be limited. That is, the one country-one vote rule incentivizes globally operating firms to effectively increase their access points into ISO TCs.

MNCs have both the incentive and the capacity to mobilize votes in ISO TCs. In terms of capacity, MNCs can supply financial resources that enable SDOs in resource-constrained countries to take on the obligations of participating membership,[20] as well as the technical expertise, skills, and information required to participate actively in standardization. MNCs also have more strategic incentives than domestic firms because they are better positioned to form coalitions and utilize their connection to host-country SDOs in ways that enhance their ability to influence standardization outcomes. This is particularly important in the ISO context, where approval of a new standard requires a two-thirds majority vote from participating members.

In fact, foreign firms are often behind each national SDO. For example, among the seventeen primary members of the American Bearing Manufacturers Association, a nonprofit organization representing the U.S. through ANSI in ISO/TC 4 (Rolling Bearings), nine are ultimately owned by the U.S., six are subsidiaries of Japanese multinationals, one is owned by a German investor, and the one belongs to a Swedish multinational.[21] An interview with a Canadian representative that actively participated in a TC confirmed that the cost associated with the participating membership, including travel expenses and human resources, were covered by the interviewee's employer, an American firm.[22] These patterns indicate that MNCs can help drive the international participation of host countries. As a consequence of these MNC strategies, I argue that the recent increase in TC participating memberships may, in part, be attributed to FDI inflow into those sectors. In countries with limited resources or prior engagement in standardization, foreign affiliates may provide both the technical capacity and incentives for joining relevant TCs.

[20]Note that financial support is a substantial factor contributing to participation in TCs. Some estimate the amount companies pay as "$300,000 a year for one engineer to work on standards proposals and attend meetings all over the world, a price many small companies can't afford." (Whalen, Jeanne. "Government should take bigger role in promoting U.S. technology or risk losing ground to China, commission says", *The Washington Post*, December 1st, 2020. https://www.washingtonpost.com/technology/2020/12/01/us-policy-china-technology/).

[21]American Bearing Manufacturers Association. "Member Listing." Last accessed April 23rd, 2021. (https://www.americanbearings.org/page/memberlisting)

[22]Interview by author, April 11th, 2024.

This mechanism speaks to a growing literature in international political economy that puts firms, rather than countries or industries, as the central actors of economic policymaking (Osgood 2016; Kim 2017; Kim and Osgood 2019). While this literature has documented firm-level influence primarily through lobbying over policy outcomes, the mechanism here operates through the composition of the decision-making body itself: firms do not merely lobby the rule-makers, they help constitute the members that vote on the rules.

The vote recruitment mechanism in international organizations is not unique to the ISO. Studies have documented that powerful states actively use their foreign aid to (Kuziemko and Werker 2006; Dreher et al. 2015; Strand and Tuman 2012) recruit votes in intergovernmental organizations, spanning from UN Security Council to the International Whaling Commission. While the recruiting actors in these cases were states, this paper demonstrates that private actors such as MNCs can engage in such activities.

The Case of the ISO While MNC incentives may apply broadly to international organizations adopting a one country-one vote rule, ISO's status as a private, non-governmental institution may make it especially susceptible to firm-driven influence. Compared to intergovernmental organizations, private regimes can offer firms a venue for shaping international rules in ways that do not impose binding obligations that might harm their competitiveness (Haufler 2001). In some cases, private regimes may even preempt the introduction of more stringent public regulations that certain firms want to avoid (Malhotra et al. 2019). This makes private regimes such as the ISO especially attractive arenas for MNCs to exert early influence.

For example, the ISO's character as a private regime becomes clearer when contrasted with Codex Alimentarius, the intergovernmental standard-setting organization for food products. Similarly to ISO standards, Codex standards are recognized by the WTO as benchmarks for national regulations (Klotz 2019). However, Codex was established by the FAO and WHO and is composed of 188 member states and the European Union, with formal representation limited to governments.[23] Comparing the leadership roles assumed in Codex and the ISO, I observe that secretariat positions in ISO TCs are more disproportionately held by SDOs from highly developed countries, while host and co-host positions for Codex working groups are served also by

[23]FAO, Codex Alimentarius. "Members." Last accessed July 24th, 2025. https://www.fao.org/fao-who-codexalimentarius/about-codex/members/en/

government representatives from developing countries (Appendix Figure 7.3).[24] While the ISO has acknowledged this underrepresentation of developing countries and has launched initiatives such as mentorship programs to promote more inclusive participation,[25] both secretariat positions and TC membership remain heavily skewed toward large economies. This comparison of ISO and Codex highlights that leadership roles in private regimes may be more dominated by national representatives with sizable business interests, compared to those in public institutions.

Hypotheses Building on the theory outlined above, I develop the following hypotheses. First, I expect that when a country receives new greenfield FDI, it is more likely to participate in TCs related to the products or services associated with the investor firm. I limit my focus here on greenfield FDI, which involves the establishment or expansion of local facilities in the host country, instead of looking at brownfield FDI such as mergers and acquisitions (M&As). While I expect my theory to also apply to M&As, greenfield projects particularly fit the theory because they tend to create new substantial local presence. The first hypothesis is as follows.

> **Hypothesis 1**: Countries receiving new greenfield FDI are more likely to assume participating membership in TCs related to the products and services produced by the investing firm(s).

This expectation can be further refined by considering firm-level motives. When greenfield FDI is made by firms with a vested interest in developing standards within a certain TC, I expect the likelihood that the host country participate in that TC should increase. Although firm-specific interests are difficult to operationalize and measure, I here consider leadership roles in ISO standardization projects as a proxy. If individuals from a given firm serve as project leaders for standardization within a TC, it is reasonable to assume that this firm has a substantial interest in the TC's standardization outcomes.

> **Hypothesis 1a** *(FDI from ISO leader firms)*: Countries receiving new greenfield FDI *from firms that take leadership roles in ISO standard development* are more likely to assume participating membership in the TCs that the firm(s) served as project leaders.

[24] This pattern holds even in a within-sector comparison: in the area of food standards, the ISO's TC 34 (Food Products) shows more concentration of leadership in developed countries compared to the more evenly distributed leadership in Codex working groups.

[25] Katie Bird, "Developing country participation critical to ISO's future" *ISO*, September 18, 2019. (https://www.iso.org/news/ref2433.html) ISO also operate initiatives to encourage developing countries to participate, with mentorship programs one example (ISO, 2021. "Twinning is winning: Partnerships for capacity building") (https://www.iso.org/publication/PUB100414.html).

Second, the influence of inward FDI is likely to vary depending on the institutional and material conditions of the host country. Specifically, if MNCs exert influence by providing technical expertise, informational access, and financial resources, I expect the SDOs of developing countries to be particularly affected by inward FDIs because they tend to lack these resources.

> **Hypothesis 2a** *(FDI into developing countries)*: New greenfield FDI in developing countries is particularly likely to lead to participation in related TCs compared to similar FDI in developed countries.

Finally, I expect the strategic value of gaining a new vote in a TC to vary by the size of existing membership. Because ISO standards undergo multiple stages of voting and revision, including a two-thirds majority of participating members required for approval, an additional participating member is more influential in smaller TCs than in large ones. I hypothesize that MNCs have stronger incentives to encourage host-country SDOs to join TCs where their participation is more likely to influence outcomes. One empirical caveat, however, is that this is observationally close to a saturation pattern—large committees may already contain most interested members. I therefore treat this as an exploratory expectation.

> **Hypothesis 2b** *(Smaller TCs)*: New greenfield FDI is particularly likely to lead to host-country participating membership in TCs with smaller existing memberships compared to those with larger memberships.

Alternative explanations. Two alternative mechanisms could generate a correlation between inward FDI and committee participation. The first is a domestic exporter channel: inward FDI raises local production and export interests in related products, and domestic firms who benefited from this can be pushing their national SDO into the relevant committees (Blind and von Laer 2022; Bjørkholt 2025). MNCs can also leverage their ties with their local affiliates in the host country when mobilizing host countries. Analogous to the logic of host government extending property rights protection to MNCs with strong local ties (Johns and Wellhausen 2016), connections with local firms may provide further incentive for host-country SDOs to work closely with investing MNCs. I treat this not as a confounding to be dismissed but as part of the causal pathway to be decomposed. I include specifications that condition on related-product export volumes and examine how much of the relationship they absorb. The second alternative account, particularly for H2a and H2b, is a ceiling effect: highly developed countries already belong to most

relevant committees, and large committees already contain most interested members, so heterogeneity by development level (H2a) and committee size (H2b) could be mechanical. I address this by re-estimating the heterogeneity on the subsample of country-committee pairs that were not yet members, for which no ceiling can bind.

4 Data and Empirical Design

I first test whether new greenfield FDI into a country increases the probability that the country subsequently becomes a participating member in a TC related to the products and services of the investing firms. Second, I examine whether this relationship is stronger when the investment originates from firms that have previously served as project leaders in the relevant TC. Below I describe how TC membership and standard leadership data is collected, as well as how these were mapped to FDI data.

ISO TC-level Membership The main outcome of interest is each country's participating membership in TCs. To measure this, I collected membership data for 630 ISO Technical (Sub)Committees that existed throughout the period 2007–2017 based on the ISO's official website and its archives stored by `Wayback Machine`.[26] This approach to use online archives is also taken in other studies, as the historical membership data is not officially available (Bjørkholt 2025). For years in which archives are available for multiple points of time, I use the last available for that year. Committee membership is thus observed from 2007 through 2017, with 2009 missing because no archived snapshot exists for that year.[27] As an additional accuracy check, three research assistants reverified membership records against archived ISO webpages for all cells where this data disagreed with an independently collected dataset (Bjørkholt 2025). The verified corrections alter only 260 of 1.5 million country–TC–year cells (0.02 percent) and leave estimates substantively unchanged (Appendix Table 7.2). Using this panel data, I construct dependent variables to test each hypothesis on each country's TC membership. As shown in Figure 2, there are both temporal and

[26] Internet Archive, Wayback Machine. (https://archive.org/web/)

[27] Because the panel omits 2009, a two-period positional lag for outcome years 2010–2011 spans three calendar years; results are robust across the lag-1 through lag-3 specifications reported below.

cross-country variations in the TCs that each country representative holds.[28] The next subsection describes how I link these TCs to FDI projects.

FDI Projects and Related TCs As is often the case with any international organizations, identifying firm-level interests or activities within the ISO poses significant challenges. Information on which firm representatives attended standard-setting meetings, who proposed new standards, and how they voted at each stage is largely unavailable. This paper adopts two approaches to associate investing firms with TCs related to their interests. First, I link the industry code (NAICS) of FDI projects to TC's standard area code (ICS) through product codes (HS) associated with each. Second, among the firms that had FDI projects to each country, I identify those assuming leadership positions in each TC. For this second approach, I use the email domains of the ISO standard project leaders within each TC to identify these firms.

Project-level greenfield FDI data is obtained from the `fDimarkets` database. This captures announcements of greenfield investment cases made across the globe (e.g., the opening of a new manufacturing facility by a foreign firm). Although this data does not provide an accurate size of each investment—such as financial value or number of new employments— it offers a unique opportunity to identify firms, industries, and activity types associated with each investment project (Jung et al. 2021). One qualification of this dataset is that it records the announcements of greenfield projects. Some announcements concern a new factory beginning operations in the host country, while others may be announcements that the firm plans to build a new factory in the host country. Although the data provider deletes the announcements in the dataset if they were later confirmed that the projects did not actually take place, the time gap between the announcement (recorded in the data) and the actual implementation of the investment may vary between projects. Therefore, I estimate effects with various time lags in the key independent variable. The analyses

[28]From 2013 to 2014, countries such as Latvia turned from corresponding member to full member body. At the same time, countries like Antigua & Barbuda started participating even as corresponding members under the New Rights Pilot program that allowed correspondent members to participate in up to 5 TCs from 2014. (ISO Membership Manual, available at https://www.iso.org/files/live/sites/isoorg/files/store/en/PUB100399.pdf. Last accessed July 20, 2024; CARICOM Regional Organisation for Standards and Quality, "Service Standards for Open Global Markets" (https://website.crosq.org/service-standards-for-open-global-markets/ Last accessed July 20, 2024.))

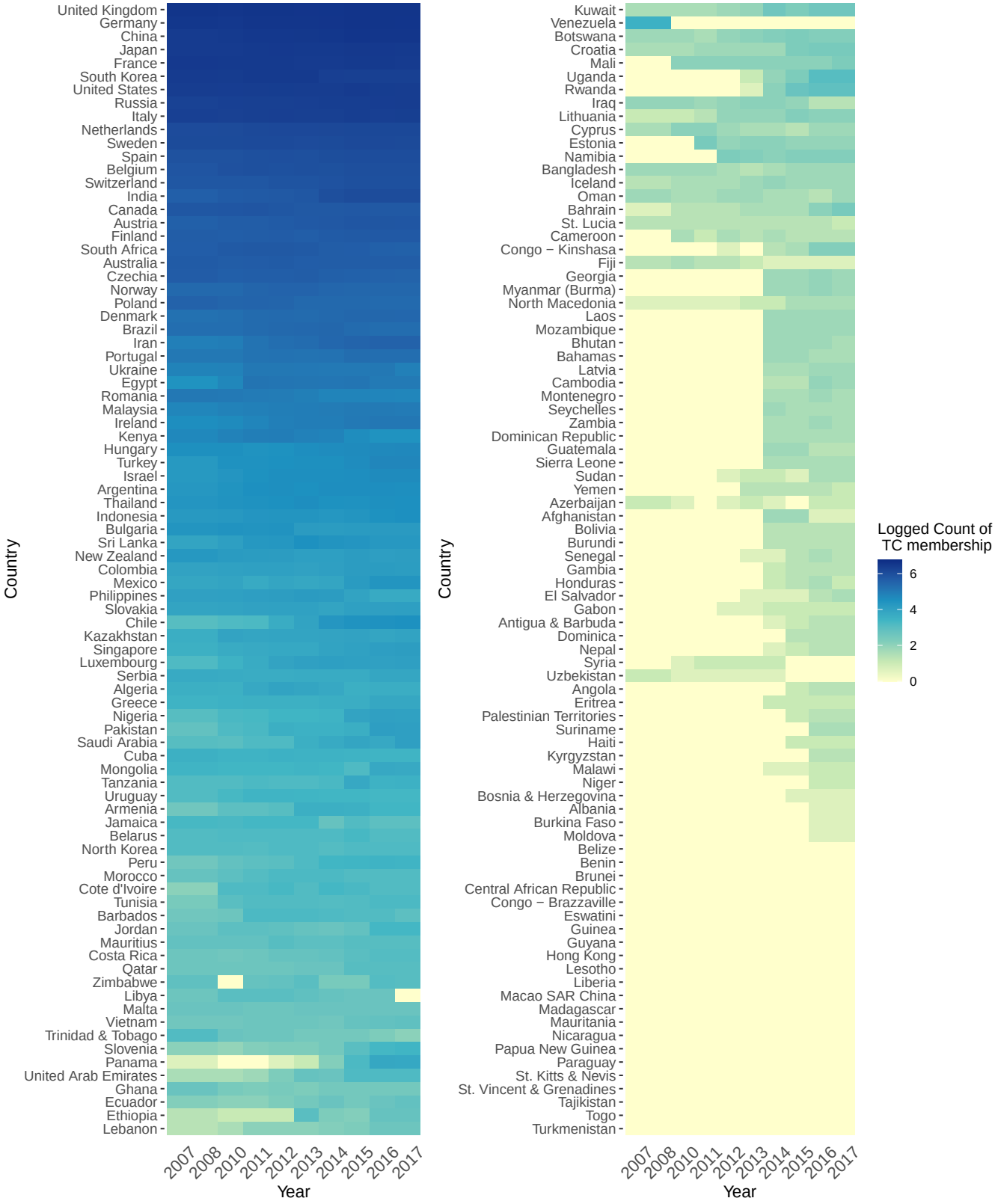


Figure 2: **Number of TC memberships by country and year**. This figure shows logged count ($\log(\text{count} + 1)$) of TCs in which each country (y-axis) held P-membership in each year (x-axis), 2007–2017; darker cells indicate more memberships. The year 2009 is missing from the Wayback Machine archive.

use all-sector FDI data covering 2003–2013.[29]

In the first approach, I associate FDI projects and TCs using HS products related to each. The FDI cases from the `fDimarkets` database include industry information (NAICS), while each standard developed by TCs is assigned to one or multiple International Classification for Standards (ICS) code. For example, a standard concerning "Rolling bearings – Thrust bearings – Geometrical product specification (GPS) and tolerance values" (ISO 199:2014) published by the TC for "Rolling bearings – Geometrical product specifications (GPS)" (ISO/TC 4/SC 4) is tagged with ICS code 21.100.20 (rolling bearings). Although there exists a concordance table between NAICS and HS code,[30] no established table exists to directly map ICS to the NAICS or HS.[31] To map each FDI case to related TC working areas, I leverage WTO's TBT notifications. The WTO's TBT notifications made by each WTO member country to the WTO are attached to either or both the ICS area and HS products affected by the reported technical barriers to trade by the WTO secretariat. For example, when the U.S. notified the WTO of their new TBT on clothes dryers and room air conditioners under the Energy Conservation Program in 2021, they provided multiple ICS and HS codes that are affected by this program (Figure 3). I use this information from 9,656 TBT notifications that had both ICS and HS to build a concordance table between HS and ICS. Although this approach may not be comprehensive, it offers related HS 4-digit code for 299 out of 332 ICS 5-digit codes associated with ISO standards.[32] Based on the ICS codes assigned to each ISO standard, I obtain the list of ICS that each TC publishes standards in. Using the ICS-HS crosswalk, I identify HS products that are related to each TC. Finally, I map them to the FDI data using the NAICS-HS concordance table. The key independent variable is whether a country had at least one new inward greenfield FDI related to each TC.

In the second approach, to identify firms that are particularly interested in standardization in each TC, I leverage the email domains of the ISO standard project leaders. For each of around

[29] Since the full-sector fDi Markets dataset was procured for 2003–2013, the main analyses use the 2003–2013 all-sector data as the FDI treatment source, with the latest panel years dropping out of lagged specifications. As a robustness check, I use firm-level analysis using manufacturing-only FDI for the full 2003–2017 window that the author has access to, which extends the time window at the cost of restricting the range of FDI to manufacturing investments (Appendix Figure 7.8).

[30] R-package `concordance` (https://cran.r-project.org/package=concordance) was used to perform this task.

[31] The WTO provides an HS–ICS conversion table (https://i-tip.wto.org/goods/Forms/Methodology.aspx), but it covers only 221 of 332 unique 5-digit ICS codes and yields 835 unique HS4–ICS5 pairs. This paper's ePing-based bridge extends the coverage to 299 ICS codes and 6,609 pairs.

[32] Among the 39,631 TBT notifications collected as of April 2021, 14,398 had only ICS codes attached and 9,656 had both ICS and HS codes.

[33] "ISO 5151:2017"(https://www.iso.org/standard/63409.html); "ePing: Track Product Requirements in Export Markets" (https://www.epingalert.org/en#/browse-notifications)

ISO Standards

TC	Standard	Description	ICS
ISO/TC 86/SC 6	ISO 5151:2017	Non-ducted air conditioners and heat pumps — Testing and rating for performance	23.120 (Ventilators. Fans. Air-conditioners) 27.080 (Heat pumps)
...			

WTO TBT Notifications

Notifying Member	Symbol and title	Products covered
United States of America	G/TBT/N/USA/305/Add.10 Energy Efficiency Program for Certain Commercial and Industrial Equipment: Public Meeting and Availability of the Framework Document for Residential Clothes Dryers and Room Air...	Clothes dryers, room air conditioners (HS: 8421.12, 8415.10; ICS: 97.060, 23.120, 13.020)
...		

Figure 3: **ISO standardization project (top) and WTO TBT notifications (bottom).**[33] Standards' ICS codes assign ICS areas to each TC, and WTO TBT notifications carrying both codes map each ICS to HS products.

24,000 active standards collected, there is a project leader (an individual) responsible for the development or review process that takes place every five years. The project leader's name and email were posted online for 79% of the 10,359 standard projects either already published or in the process of development or review as of April 2021. This included 4,388 unique leader individuals using 2,657 unique email domains. For example, a person with a @petrochina.com.cn email was the project leader for project ISO/CD 2006-1 (Rubber latex, synthetic: Determination of mechanical stability), a person with a @boeing.com email was the project leader for the "Aerospace series: Brazing and high-temperature brazed metallic components" project (ISO/WD 22161), and a person with a @umich.edu email was the leader for the "Wheelchairs: Wheelchairs for use as seats in motor vehicles" project (ISO 7176-19).

I provided these email domains to ChatGPT (GPT-4-1106-Preview) to identify the firm or organization name of the domains, its Ticker symbol, type (business/academic/others), and a description of the organization. To avoid conflating with emails from email service provider, I also asked to specify whether it is an email service provider domain (e.g., @gmail.com provided by Google LLC, or @163.com provided by NetEase, Inc.). ChatGPT returned results for 75% of the unique domains that appear in the project leader data. Of these, 1,187 were classified

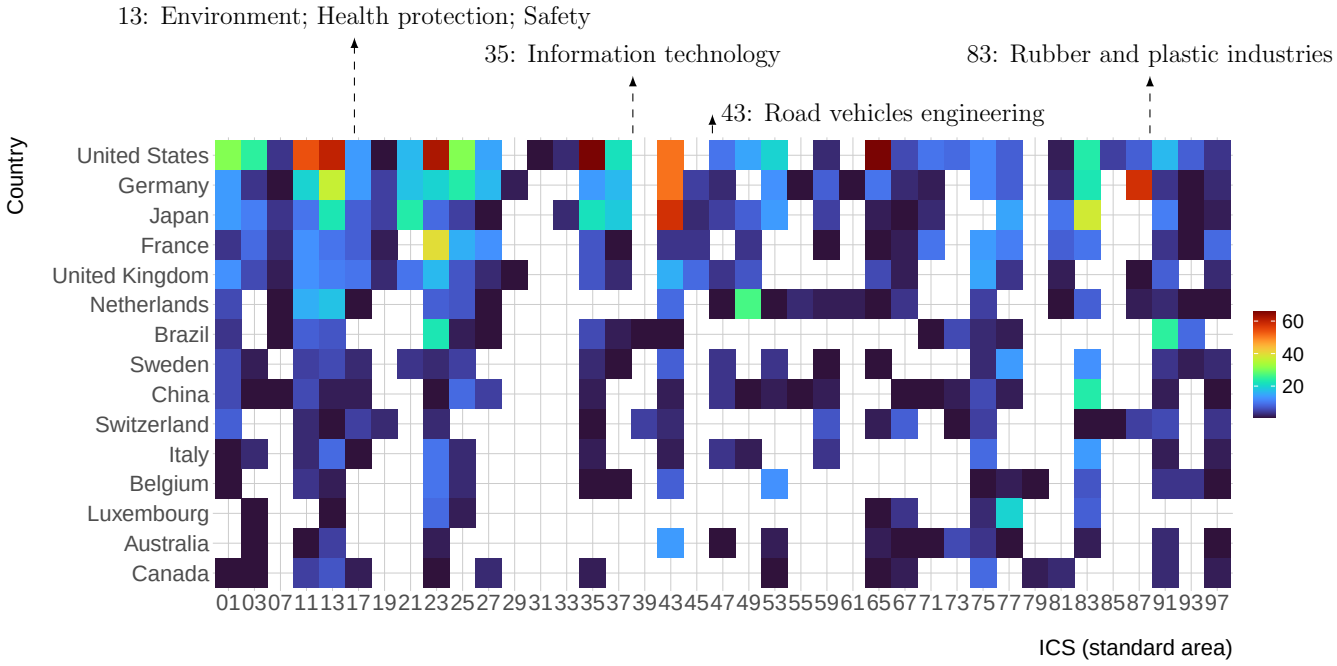


Figure 4: **Country-standard area distribution of project leadership**: The heatmap shows the number of firms headquartered in each country (y-axis) serving as TC project leaders in each 2-digit ICS standard area (x-axis), from blue (few) to red (many).

as business domains, 472 as academic domains, and the remaining 321 as others (e.g., non-profit organizations). To estimate accuracy rate, research assistants validated a randomly drawn sample (Appendix 7.3).[34] After removing 92 email service provider domains used for 1,430 standard projects, I looked up the returned firm names in the ORBIS database to extract reliable firm information (global ultimate owner, country, Ticker, and NAICS industry code). With this approach, an observation that a person with @chanel.com email was the project leader for "Essential oils and aromatic extracts: determination of residual benzene content" (ISO/AWI 14714) within the TC "Essential oils" (TC 54) allows us to recognize that Chanel Ltd., a fashion industry company headquartered in the UK, has taken a leadership role within TC 54.

This data reveals patterns conforming to existing knowledge, as well as several intriguing patterns. Figure 4 illustrates the distribution of firms in the data aggregated at the level of the home country and standard area. The most populated cells in this distribution align with our substantive knowledge: for example, there is an outstanding pattern that sees several firms

[34]To validate this classification, two research assistants manually verified a random sample of 365 business-classified domains using the web searches. Precision is 90.1 percent (exact binomial 95% CI: 86.6–93.0). Misclassified email providers that leaked through the provider filter amounted to 4.1 percent of the validated sample, and genuine wrong-firm identity assignments consisted 2.2 percent (95% CI: 1.0–4.3), bounding analytical contamination at roughly 6 percent.

from the U.S., Germany, and Japan holding leadership roles in TCs that standardize road vehicle engineering (ICS 43). The data also highlights a concentration of project leadership in firms from a handful of countries traditionally engaged in the ISO. In terms of both project count and unique individual count, over 50% of leadership roles are held by representatives from firms in the U.S., Germany, Japan, and France (Appendix Figure 7.2). While both the scholarship and media have emphasized the rise of China within the ISO, evidenced by the number of TC Secretariat positions it has secured, the U.S. companies remain dominant if we consider project leadership data.

Several qualifications about the data should be noted for this paper's analysis. First, information about project leaders is confined to the most recent data at the time of data collection (April 2021).[35] It does not capture the set of firms that may have held leadership roles historically. I use this data under the assumption that they provide a reasonable proxy for firms' interests in standardization area during the period of this analysis. Second, the dataset focuses exclusively on project leadership, a role limited to one individual per standard and indicative of high engagement. It does not capture, for example, firms that are not able to or willing to take leadership positions but continue to actively participate in standard development. Nonetheless, within the available information, the data leverages a unique and rare opportunity to examine firm-level engagement at international organizations like the ISO. Furthermore, these factors likely lead to an underestimation of the effects on the host country's TC membership, yielding conservative estimates.

Model Upon configuring these connections between cases of FDI and TCs, I test whether receiving new greenfield FDI increases the likelihood of that country becoming a participating member of TCs in related areas. In the main specification for H1, I use the following model to test the relationship between new inward greenfield FDI and TC membership at the country-TC level:

$$\text{logit}(\Pr(Y_{ijt} = 1)) = \alpha + \beta X_{ij,t-n} + \gamma Y_{ij,t-n-1} + \delta^\top \mathbf{W}_{i,t-n-1} + \eta^\top \mathbf{Z}_{ij,t-n-1} + \tau_t + \mu_i + \omega_j$$

where the outcome $\Pr(Y_{ijt} = 1)$ is the probability of country i holding membership in TC j in year t, and the key independent variable $X_{ij,t-n}$ denotes a binary indicator of whether country i received at least one greenfield FDI related to j in year $t - n$ ($n = 1, 2, 3$). $\mathbf{W}_{i,t-n-1}$ represents the set of country-year level control variables: the size of the economy (*logged GDP*), population

[35]This data was available upon ISO website login for anyone at the time of data collection.

(logged), and domestic regime type (*Polity2*). I also control for average export volume of products (logged) that are mapped to each TC, to account for the existing level of domestic production of related products in the country. The literature have shown that trade openness may both lead to TC membership (Bjørkholt 2025) and FDI inflow (Büthe and Milner 2008). This is denoted by $\mathbf{Z}_{ij,t-n-1}$. Additionally, I control for the lagged dependent variable ($Y_{ij,t-n-1}$) since the previous membership is highly predictive of the subsequent membership. I also control for the country's cumulative years of prior membership in the TC—counting both participating and observer years—to account for its accumulated engagement with the committee. In the main specification, I estimate this with logistic regression including fixed effects at the country (μ_i), year (τ_t) and TC (ω_j) levels. The standard errors are clustered at the country level to account for the within-group correlation of errors.

Since the logit specification pools over country–TC pairs that are already members, I complement it with a matched difference-in-differences design (Imai et al. 2023), which isolates the theory's central quantity of interest: the effect of FDI on the probability that a country newly joins the related TC. The ATT estimator is:

$$\hat{\beta_{ATT}} = \frac{1}{\sum D_{ijt}} \sum_{i \in I} \sum_{j \in J} \sum_{t=l+1}^{T-f} D_{ijt} \left\{ (Y_{ij,t+f} - Y_{ij,t-1}) - \sum_{i'j' \in M_{ijt}} w_{i'j't} (Y_{i'j',t+f} - Y_{i'j',t-1}) \right\}$$

where $Y_{ij,t}$ denotes whether country i holds membership in TC_j in year t, and D_{ijt} denotes the treatment. I apply this estimator in two ways. First, to test **H1**, the treatment is the occurrence of any greenfield FDI related to TC_j. The sample is restricted to country–TC pairs with non-trivial baseline exports in the TC's product domain—a pre-treatment relevance filter that removes pairs where membership was highly unlikely. Additionally, through exact matching on lagged membership status, I restrict to pairs that were not yet members in the year before the investment, so the estimand is the probability of joining. Second, to test **H1a**, the treatment is investment specifically from firms that served as project leaders in TC_j; because such firm-specific investment is a much rarer event, this matched design carries the main weight for the firm-level hypothesis. I subset to the 129 countries that ever received FDI from project-leading firms and the 187 TCs led by identifiable business firms. In both applications, I match on two years of treatment

history ($l = 2$) and estimate effects up to four periods ahead ($f = 4$) in the main specification,[36] and the matched sets M_{ijt} are refined using covariate balancing propensity score weighting. In the country-level application, matched controls are additionally matched exactly on the TC, and the weights $w_{i'j't}$ are constructed from the country's lagged GDP, population, regime type (Polity IV), related-product exports, and lagged and cumulative membership in the TC. In the firm-level application, I do not impose exact matching on TC due to the significantly reduced size of matched sets, and instead only use the covariate weights constructed from lagged GDP, population, regime type, and lagged membership in the specific committee. As an additional robustness check, I estimate a Bayesian varying-intercept model that pools information across countries, TCs, and years; it yields consistent patterns and is reported in Appendix Figure 7.6.[37]

Finally, to test for heterogeneous effects, I introduce the interaction term between new FDI occurrence and country's level of economic development (for **H2a**) and size of the TC (for **H2b**). The quantity of interest is β_0 and β_1 in the following model:

$$\begin{aligned}\text{logit}(\Pr(Y_{ijt} = 1)) = \alpha + \beta_0 X_{ij,t-n} + \beta_1 X_{ij,t-n} \times \text{Interaction Variable} + \gamma Y_{ij,t-n-1} \\ + \delta^\top \mathbf{W}_{i,t-n-1} + \eta^\top \mathbf{Z}_{ij,t-n-1} + \tau_t + \mu_i + \omega_j\end{aligned}$$

For **H2a**, Interaction Variable is a binary variable (S_i) indicating whether country i's GDP per capita is above certain threshold (median or 3rd quartile). For **H2b**, it is a binary variable (V_j) indicating whether TC j had above median membership (17 participating members) at the start of the observation (2007). **H2a** expects β_1 to be negative while β_0 is positive, indicating that the effect of inward FDI presence on TC participation is generally positive but smaller for developed countries compared to developing countries. The expectation for **H2b** is also $\beta_1 < 0$, indicating that FDI is more likely to lead to TC membership when the given TC features a smaller prior membership size.

DV:	Membership (t)					Membership (t-2)	FDI (t)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FDI (t-2)	0.238*	0.350**	0.335**	0.056	−0.066		
	(0.116)	(0.134)	(0.121)	(0.122)	(0.150)		
FDI (t)						0.451	
						(0.341)	
FDI (t-2) * GDPpc above median		−0.232					
		(0.185)					
FDI (t-2) * GDPpc above 3rd quartile			−0.405*				
			(0.177)				
FDI (t-2) * small TC				0.398*			
				(0.169)			
Membership (t-3)	6.040**	6.039**	6.042**	6.040**		8.857**	
	(0.137)	(0.137)	(0.138)	(0.137)		(0.194)	
Membership (t-2)					6.740**		0.050
					(0.139)		(0.118)
Cum. membership years (t-3)	0.192**	0.192**	0.191**	0.192**		0.103	−0.217
	(0.039)	(0.039)	(0.039)	(0.039)		(0.087)	(0.175)
Cum. membership years (t-2)					0.137**		
					(0.035)		
GDPpc above median		0.079					
		(0.225)					
GDPpc above 3rd quartile			−0.659				
			(0.625)				
Exports (logged, t-3)	0.062**	0.064*	0.066**	0.062**		0.049	0.030
	(0.024)	(0.025)	(0.025)	(0.024)		(0.061)	(0.040)
Exports (logged, t-2)					0.055**		
					(0.014)		
GDP (logged, t-3)	0.391	0.399	0.360	0.387		1.037	0.693
	(0.689)	(0.703)	(0.688)	(0.689)		(2.832)	(3.690)
GDP (logged, t-2)					0.468		
					(0.694)		
Population (logged, t-3)	3.874*	3.877*	3.836*	3.878*		−1.575	5.678
	(1.675)	(1.680)	(1.681)	(1.675)		(3.462)	(8.394)
Population (logged, t-2)					2.736		
					(1.676)		
Polity IV (t-3)	−0.018	−0.013	−0.017	−0.017		0.081	−0.047
	(0.031)	(0.032)	(0.031)	(0.031)		(0.224)	(0.110)
Polity IV (t-2)					−0.030		
					(0.039)		
Obs	389 340	389 340	389 340	389 340	467 460	185 850	355 216
R2	0.829	0.829	0.829	0.829	0.866	0.922	0.553
BIC	67 287.0	67 307.4	67 290.5	67 293.8	63 683.1	22 847.7	150 997.8
Year FE	5	5	5	5	6	3	4
Country FE	124	124	124	124	124	99	150
TC FE	630	630	630	630	630	630	596

Note: + p < 0.1, * p < 0.05, ** p < 0.01

Table 1: **FDI (at $t-2$) and the subsequent membership in related TC**. Columns (1)–(5) presents the results of logistic regressions for a country's P-membership in each related TC in year t: (1)–(4) test relationship with occurrences of related greenfield FDI at $t-2$ and its interactions with country development level and TC size; (5) adds contemporaneous related-product exports. Column (6) is a placebo with past membership ($t-2$) as the outcome, and column (7) tests reverse causality with FDI at t as the outcome. All models include country, committee, and year fixed effects; standard errors are clustered by country. Observations with no variation in the outcome within a fixed-effect group are dropped.

5 Results

This section presents the results in the order of each hypothesis. Table 1 summarizes the regression evidence: model (1) tests the baseline relationship between related FDI and committee membership (**H1**), models (2)–(4) test the heterogeneity predictions (**H2a** and **H2b**), and models (5)–(7) address the export channel, placebo timing, and reverse causality. The matched difference-in-differences estimates provide the design-based evidence: Figure 5 for the joining of related committees by non-members (**H1**) and Figure 6 for the firm-targeted test (**H1a**). For **H2a** and **H2b**, the at-risk estimations in Appendix Table 7.7 adjudicate whether the heterogeneity patterns reflect real moderation or membership saturation.

First, I evaluate **H1**, which predicts a positive relationship between FDI and TC membership at the country–TC level. Table 1 presents the results of logistic regression models estimating the probability of a country holding P-membership in each TC in year t, with the main independent variable being the occurrence of greenfield FDI cases related to each TC in year $t-2$. Column (1) shows that the occurrence of at least one new greenfield FDI project related to a TC in year $t-2$ is associated with a 27% increase in the odds of a country holding membership in that TC in year t.[38] This positive relationship also holds for other numbers of lags in the independent variable, such as $t-3$ (Appendix Table 7.3) and $t-1$(Appendix Table 7.4).[39]

The logit coefficients translate into modest marginal effects, because the baseline probability of a country holding membership in any given TC is low (around 0.1 in 2007) and highly unbalanced across countries and TCs.[40] This motivates the matched difference-in-differences approach, where I compare treated pairs to control pairs with identical treatment histories and similar covariates. Figure 5 reports the effects estimated with the matched difference-in-differences estimator (Imai et al. 2023) with covariate-balancing propensity score refinement, estimated among *at-risk* pairs: country–TC pairs with non-trivial baseline exports in the committee's product domain that were

[36]For the firm-level application, due to the data structure beginning in 2007, treatment is detected with a lag (i.e., the treatment indicator is investment at $t-2$), to allow early FDI events to enter the analysis with a complete pre-treatment matching history. The placebo specification covers the periods immediately around the investment.

[37]These are estimated as $\text{logit}(\Pr(Y_{ijt}=1)) = \alpha+\beta X_{ij,t-n}+\gamma Y_{ij,t-n-1}+\delta^\top \mathbf{W}_{i,t-n-1}+\eta^\top \mathbf{Z}_{ij,t-n-1}+\tau_t+\mu_i+\omega_j$ where τ_t, μ_i, and ω_j are random intercepts drawn from group-specific normal distributions.

[38]This is calculated from $\exp(0.238) = 1.269$.

[39]When all three lags of the independent variable are included jointly, only FDI at $t-2$ remains statistically significant, absorbing the effects of FDI at $t-1$ and $t-3$ (Appendix Table 7.5).

[40]As a further robustness, Bayesian varying-intercept model pooling across countries, committees, and years yields consistent marginal effects, though its overall estimate is imprecise (Appendix Figure 7.6).

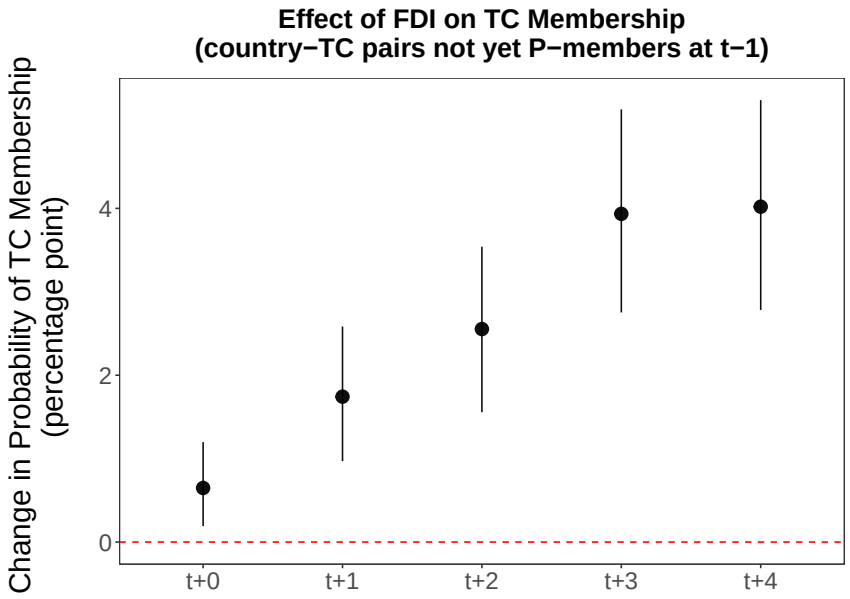


Figure 5: **Effect of FDI on joining the related TC.** This figure plots the matched difference-in-differences estimates of the effect of TC-related greenfield FDI on the probability that the host country becomes a P-member of that TC, among export-relevant (at-risk) pairs not yet members in the year before the investment. Error bars represent bootstrap 95% confidence intervals.

not yet participating members in the year before the treatment.[41] The probability of joining the related committee rises by 0.65 percentage points [95% CI: 0.19, 1.20] in the year of investment, and grows steadily to 4.0 percentage points [95% CI: 2.8, 5.3] four years out — more than a tripling of the 0.9 percent baseline joining rate among comparable non-member pairs.

As a robustness check, I also conduct a placebo test to rule out the possibility that FDI predicts past TC membership. Column (6) of Table 1 shows that there is no significant association between FDI at t and TC membership at $t-2$. Additionally, model (7) addresses reverse causality: prior TC membership does not significantly predict the subsequent occurrence of related FDI, indicating that investors are not simply selecting into countries already active in the relevant committees. Similar results hold for the $t-1$ and $t-3$ specifications (Appendix Tables 7.4 and 7.3), with one exception: the placebo model with the $t-3$ specification, which may indicate a longer-horizon feedback from standardization to investment.[42] These concerns, however, are addressed by the

[41] This is because a substantial share of country–TC pairs have no or little exports in the committee's product domain, and these pairs usually have very little prospect of membership. The filter keeps pairs whose baseline-year (2003) exports are at or above the median among pairs with positive baseline exports (43,042 of 107,100 pairs). By using baseline exports only, it does not select on the outcome. Estimated effects increase with the threshold's stringency, consistent with concentration among plausible joiners: pairs below lower thresholds essentially never join regardless.

[42] The patterns suggest that pairs that recently entered a committee may attract related investment over longer time horizon, consistent with feedback between standards and investment (Chen et al. 2014).

matched design analysis.

How much of this relationship operates through the growth of export interests within the country, rather than through the investing firm's own engagement? We know from the literature that investment strongly raises related-product exports (Kim et al. 2025), and export interests is a strong predictor of involvement in ISO standardization (Büthe and Mattli 2011). In fact, Appendix Table 7.6 shows that FDI predicts export volume at t and $t+1$ but not at $t-1$. Moreover, in the pooled analysis presented in Table 1 column (5), conditioning on contemporaneous exports (at $t-2$ instead of $t-3$) absorbs the FDI–TC membership association—a pattern consistent with export interests carrying part of the relationship. However, the following three observations imply that this domestic exporter channel is at most partial. First, exports predict membership only weakly at the margin. An FDI event raises related exports substantially, yet the membership effect implied by that export increase amounts to only about a 6 percent increase in the odds of membership, compared with the 27 percent total association with FDI.[43] Second, because an MNC's own exports count as host-country exports, the export control already partly includes the investing firm's local footprint itself. Third, the firm-level evidence for **H1a** below indicates direct MNC engagement. Domestic-exporter effect should appear regardless of whether the investing firm is itself involved in standardization, yet I find that the effects are stronger for investments where these firms are involved.

Next, I find that the positive relationship between inward FDI and TC membership is concentrated among less developed countries (**H2a**). Columns (2) and (3) of Table 1 each show that the positive estimate of FDI at $t-2$ on TC membership is larger for countries below the median GDP per capita compared to those above, and in the bottom 75% of GDP per capita compared to those in the top 25%. Specifically, the odds of holding TC membership in a given year increase by about 40% for countries in the bottom 75% GDP per capita group, while the effect is negligible (slightly negative) for the top 25% group.[44] The difference for the median split in column (2) is not statistically significant. The matched estimates yield a similar takeaway. Among at-risk country–TC pairs, the joining effect at $t+4$ is 2.7 percentage points [95% CI: 1.7, 3.9] for countries below the top GDP-per-capita quartile, with no detectable positive effect in the top 25% group (Appendix Figure 7.5). The varying-intercept model shows the same pattern, with positive effects

[43] These numbers are calculated from column (1) of Appendix Table 7.6 and column (5) of Table 1 as $\exp(0.983 \times 0.055) \approx 1.06$, compared with $\exp(0.238) \approx 1.27$ in model (1) of Table 1.

[44] This is calculated as $\exp(0.335) = 1.398$ and $\exp(0.335 - 0.405) = 0.932$.

driven by the bottom 75% GDP-per-capita group (Appendix Figure 7.6).

A natural concern is that this heterogeneity may be mechanical, since top wealthy countries already belong to most relevant committees. I address this concern about a ceiling effect by estimating the interaction on the subsample of country–TC pairs that were not members two years prior. The interactions should attenuate toward zero in this at-risk subsample if the heterogeneity was an artifact of the ceiling effect. Appendix Table 7.7 shows that the development-level interactions instead hold or grow in magnitude. The above-median interaction more than doubles and becomes statistically significant when subsetting to at-risk pairs, while the top-quartile interaction is essentially unchanged, although losing statistical significance due to the smaller sample. Developing countries' greater responsiveness to investment therefore reflects real moderation, rather than an artifact of saturation.

The evidence for **H2b** is weaker when the same ceiling test is applied. In the full sample, Table 1 column (4) implies that FDI predicts membership more strongly in smaller TCs.[45] However, among at-risk pairs, the interaction effect disappears (Appendix Table 7.7), indicating that the committee-size heterogeneity cannot be separated from differential saturation across committee sizes.

Finally, the results are more pronounced when I investigate the effect of FDI specifically by firms strongly interested in standard setting. Figure 6 displays the effects of having a new FDI project from a firm that served as project leader within a TC on the change in the predicted probability of holding the TC membership, estimated with a difference-in-differences estimator with matching (Imai et al. 2023). It shows that host countries receiving investments from these firms were more likely to secure membership in those TCs in the following years (**H1a**). The effect is absent in the placebo periods before the investment and remains statistically insignificant through $t + 3$, then grows from $t + 4$ onward: having a new FDI project from a firm whose employee served as project leader within a TC increases the predicted probability of holding that TC's membership by 1.1 percentage points [95% CI: 0.3, 2.1] at $t + 4$, rising to 2.0 percentage points [95% CI: 0.9, 3.1] at $t + 6$. The absence of any effect before and immediately after the investment, followed by steadily growing effects, matches the timeline in which an investing firm establishes local presence and the

[45] The odds of holding membership increase by about 57% ($\exp(0.056 + 0.398) = 1.575$) for TCs with below-median membership size (17 members as of 2007), while the effect is small and statistically insignificant for larger TCs.

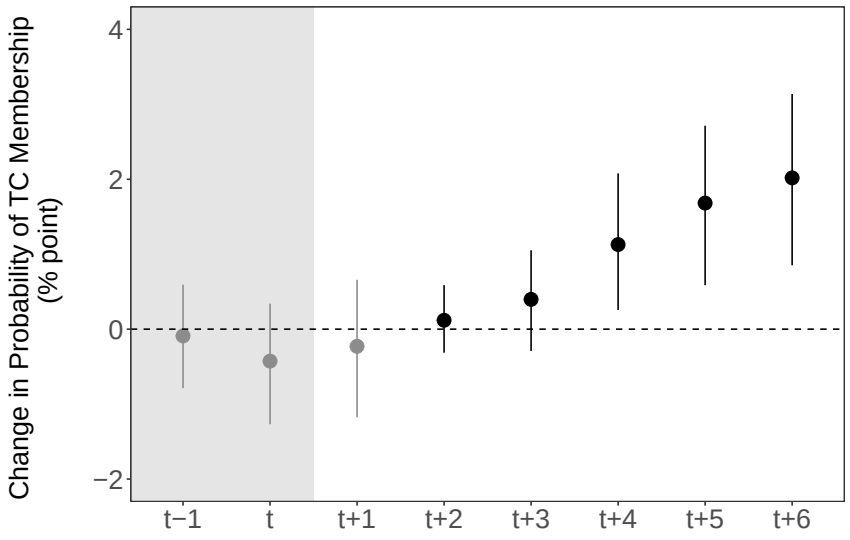


Figure 6: **Effect of related-firm FDI on TC membership.** This figure plots matched difference-in-differences estimates of the effect of a new greenfield FDI project from a project leader firm on the host country's probability of holding membership in that TC. Black points represent the main specification, which registers the investment with a two-year lag, thereby beginning at $t + 2$. Gray points are auxiliary specification with the indicator shifted forward, recovering earlier periods $t - 1$ through $t + 1$. The shaded pre-investment periods show null effects, alleviating concerns aboutanticipation or selection. Error bars represent 95% confidence intervals.

host-country SDO adjusts its membership.[46] The effects emerge later and are harder to detect than in the country-level estimates (Figure 5) because the country-level treatment aggregates all related investment projects, while the firm-level effect isolates the targeted response to a single leader firm's entry. The effect is also robust to alternative specifications with different leads and lags (Appendix Figure 7.7),[47] as well as to the manufacturing sector-only sample up to 2017 (Appendix Figure 7.8).

Overall, these analyses suggest that inward greenfield FDI leads to TC membership and that the effect is concentrated among countries outside the highest GDP per capita quartile, where MNC-supplied resources for ISO participation matter most. The placebo tests, the at-risk re-estimations, and robustness checks further support the notion that this relationship is not driven by reverse causality, membership saturation, or other confounding factors. Moreover, I find evidence that FDI from firms that are interested in certain standard setting, as indicated by their leadership

[46]This specification matches on two years of treatment history and covers FDI event cohorts from 2008 through 2011 (2,255 treated unit-years).

[47]Appendix Table 7.8 reports the unit-years each specification uses. The widest window covers every available FDI event year (2008–2013) and confirms a similar effect at $t + 4$.

roles in TCs, is associated with increased likelihood of the host country's membership in the exact TCs. This more directly supports the notion that firms with vested interests in standardization are more likely to influence the TC membership in the host country.

6 Conclusion

Private standards substantially impact global business patterns and regulations, particularly when they are formulated by internationally recognized organizations like the ISO. It comes as no surprise that certain standardization processes become highly politicized or geopolitical.[48] A pertinent illustration of this is the recent contestation between some Western countries and China regarding leadership around establishing standards for emerging technologies (e.g., 5G networks) and in pivotal policy domains (e.g., green finance) (Klotz 2023).

This paper studied such processes of standardization, presenting a contrast with the often-studied adoption stage of published standards to discuss, in particular, how MNCs may exert their influence in this process of ISO standardization. Using original panel data of each national representative organization's participating membership in each standardization area (TC) at the ISO, I find that active participation in international standardization follows patterns of inward greenfield FDI. Empirically, this contributes to the literature by systematically analyzing ISO participation at the country-issue area level. Compared to general membership in the ISO, which had already expanded to 168 countries by June 2023, TC-level participation tells us specific areas of interest (in standardization) of each member. The panel data also allows us to study the paths through which countries begin participating in standard development.

One major challenge for studying the ISO standardization process has been (and remains) its mostly confidential nature. Information about standard proposers and voting records is restricted, and access to the meetings and procedural documents is restricted to participating members, observing members, and liaison institutions. This certainly limits the range of micro-level studies that can be conducted. Nonetheless, by combining ISO's publicly available data over time or combining information from individual SDOs, it remains possible to study this politically important process of standard development. Future studies can further explore such opportunities by, for example, reviewing the comments and voting behavior publicized by each SDO or collecting

[48] Popper, Nathaniel. "Blockchain Will Be Theirs, Russian Spy Boasted at Conference" *The New York Times*, April 29, 2018. (https://www.nytimes.com/2018/04/29/technology/blockchain-iso-russian-spies.html)

information about individual standard project leaders.

Furthermore, future studies can explore the interplay between domestic firms and investing foreign firms in host countries. On the one hand, domestic firms may be learning from closely observing their national SDO and foreign firms participating in the ISO. They likely enjoy increased access to the information and resources necessary to keep up with the standard development process. On the other hand, domestic firms may have conflicting interests in terms of ISO participation or the standards they want. Although they may be indifferent to standards at the international level, national engagement with ISO standardization may affect their domestic regulations and standards. It would be interesting to see how the interests of domestic firms—in terms of not only the standards created but also access to participation and the acquisition of the requisite skills—affect how they interact with the foreign firms and the national SDO. All of this indicates that there will be distributional consequences for domestic firms, consequences especially dependent on whether domestic firms share interests with the investing MNCs, with firms connected through the production chain potentially benefitting from their national SDO's representation in the standardization process. Meanwhile, those firms that are disconnected will not enjoy these benefits and instead suffer relative loss.

Although recent trends of increased ISO participation by developing countries may encouragingly point toward fairer and more equitable representation in an impactful international organization, we must carefully evaluate its substantive consequences if it mostly amplifies the interests of the most productive MNCs. In an optimistic scenario, this may enhance representation of historically underrepresented groups of countries in the long term. These countries and their domestic companies can expect to benefit from the knowledge and skill transfer necessary to start participating in international standardization. However, if the ISO is institutionally inclined to favor MNC interests, this pattern may persist or even intensify in the context of today's expanding global production networks and disparities in firm-level productivity and innovation.

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7 Appendix

7.1 Data

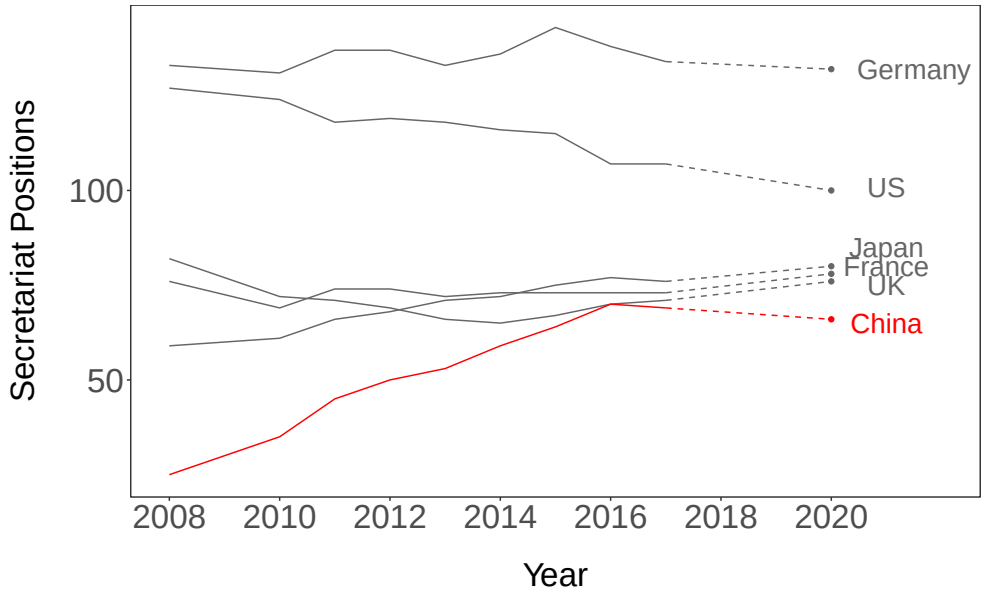


Figure 7.1: **Number of secretariat positions in ISO Technical (Sub)Committees held by top participating countries, 2007–2020**. This Figure plots the number of Technical (Sub)Committee Secretariat positions (y-axis) held each year (x-axis) by each of the six countries with the largest number of Secretariat positions as of 2020 (data for years 2018–2019 is currently missing). There is a notable increase in China's number of Secretariat positions, while that of the U.S. has dropped during this period.

country	secretariat
Germany	132
United States	100
Japan	80
France	78
United Kingdom	76
China	66
Sweden	26
Australia	23
Italy	21
Switzerland	20
South Korea	20
Canada	16
Netherlands	13
India	11
South Africa	11
Norway	10
Russia	7

country	secretariat
Spain	6
Belgium	5
Iran	4
Austria	3
Brazil	3
Denmark	3
Israel	3
Malaysia	3
Finland	2
Poland	2
Turkey	2
Argentina	1
Colombia	1
Jamaica	1
Kenya	1
Portugal	1
Uganda	1
Ukraine	1

Table 7.1: **Number of TC secretariat positions by country in 2020.**

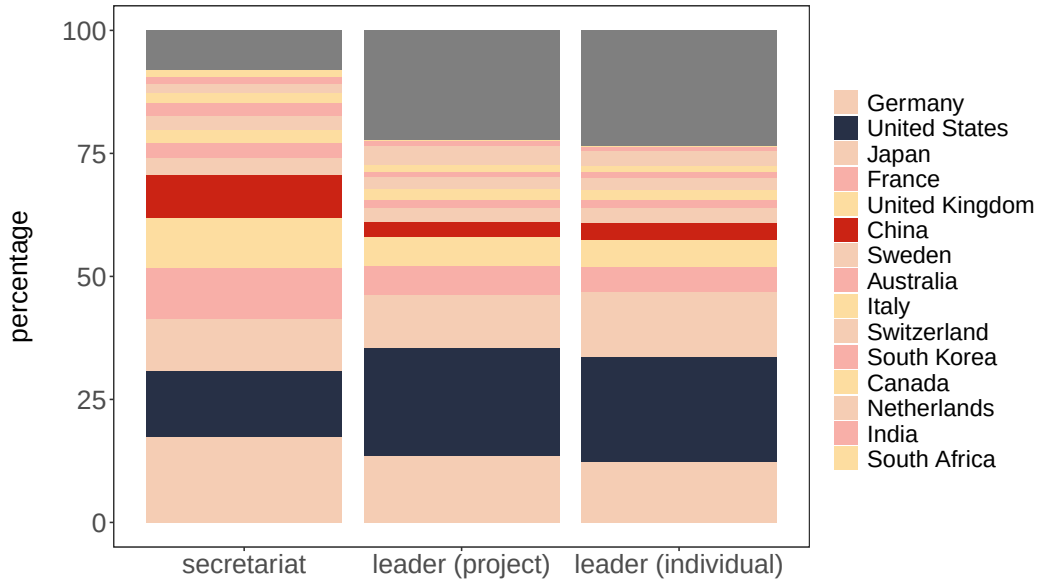


Figure 7.2: **Ratio of ISO Technical (Sub)Committee secretariat and standard project leader positions held by top participating countries in 2021**. This figure plots the ratio of Technical (Sub)Committee Secretariat positions held by each country (left), and of project leader positions held by representatives of each country's firms, measured by the number of projects (middle) and by the number of unique individuals (right), in 2021. While the Secretariat positions are dominated yet more evenly distributed by highly active states like Germany, US (colored in navy), Japan, France, UK, and China (colored in red), the project leader positions are more dominated by individuals from US firms. The data is based on the ISO's official list of Technical Committee Secretariat and Project Leader email domains collected in 2021.

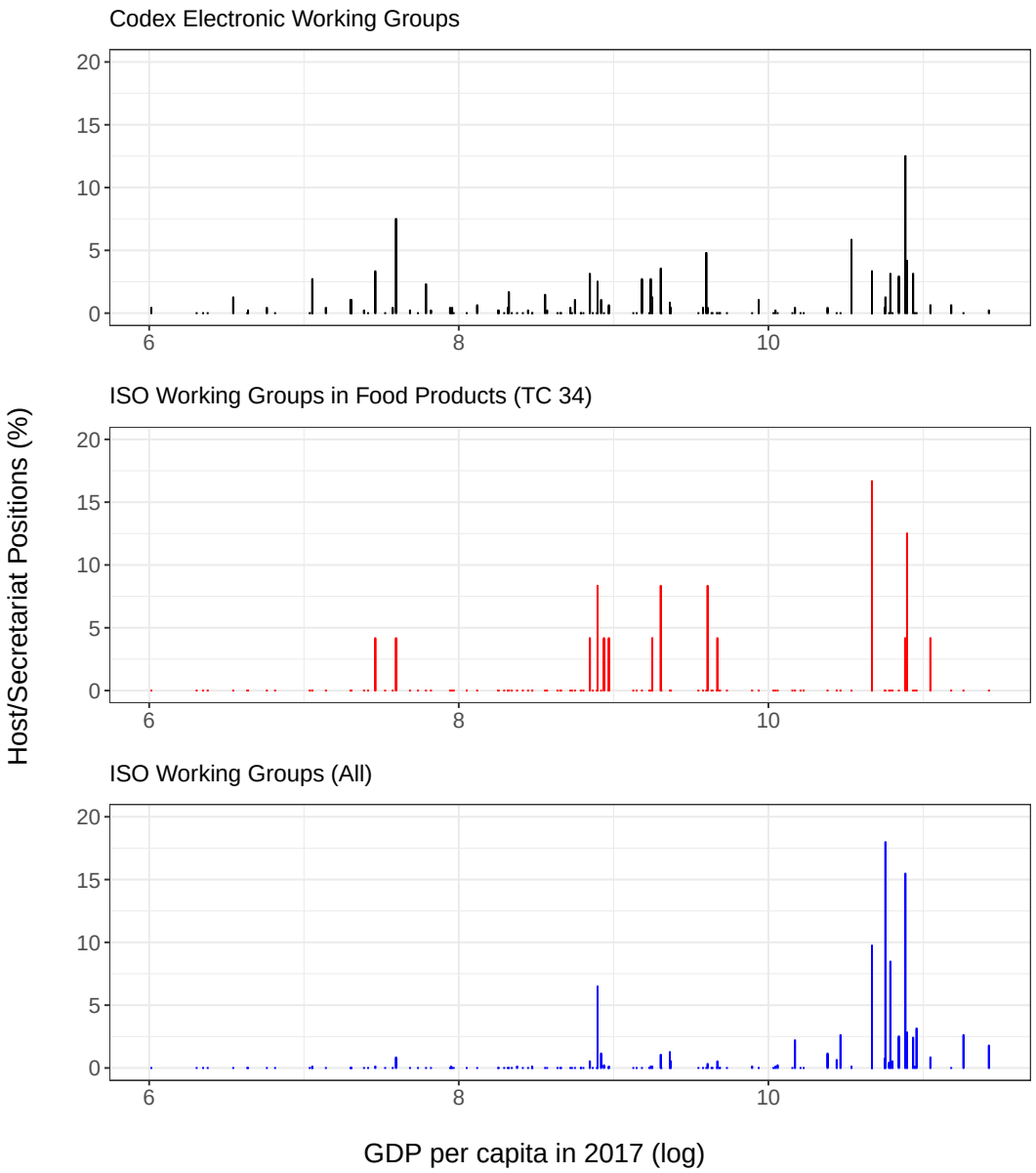


Figure 7.3: **Distribution of leadership roles by economic size, for Codex (top), ISO TC 34 (Food Product, middle), and all ISO TCs (bottom)**. The x-axis represents a country's logged GDP per capita in 2017, and the y-axis shows the average percentage of leadership roles each country at each economic level assumes. For Codex Electronic Working Groups, countries corresponding to various GDP per capita ranges, including those on the lower end, serve as hosts/co-hosts (top figure). Meanwhile, with only a few exceptions (e.g., Botswana) secretariat members for ISO TC 34 (Food Products) are mostly served by high-income countries, despite also developing standards for food products (middle figure). This tendency is even more obvious for ISO TCs overall, because the secretariat positions are mostly assumed by high-income countries (bottom figure) (c.f., Figure 7.1).

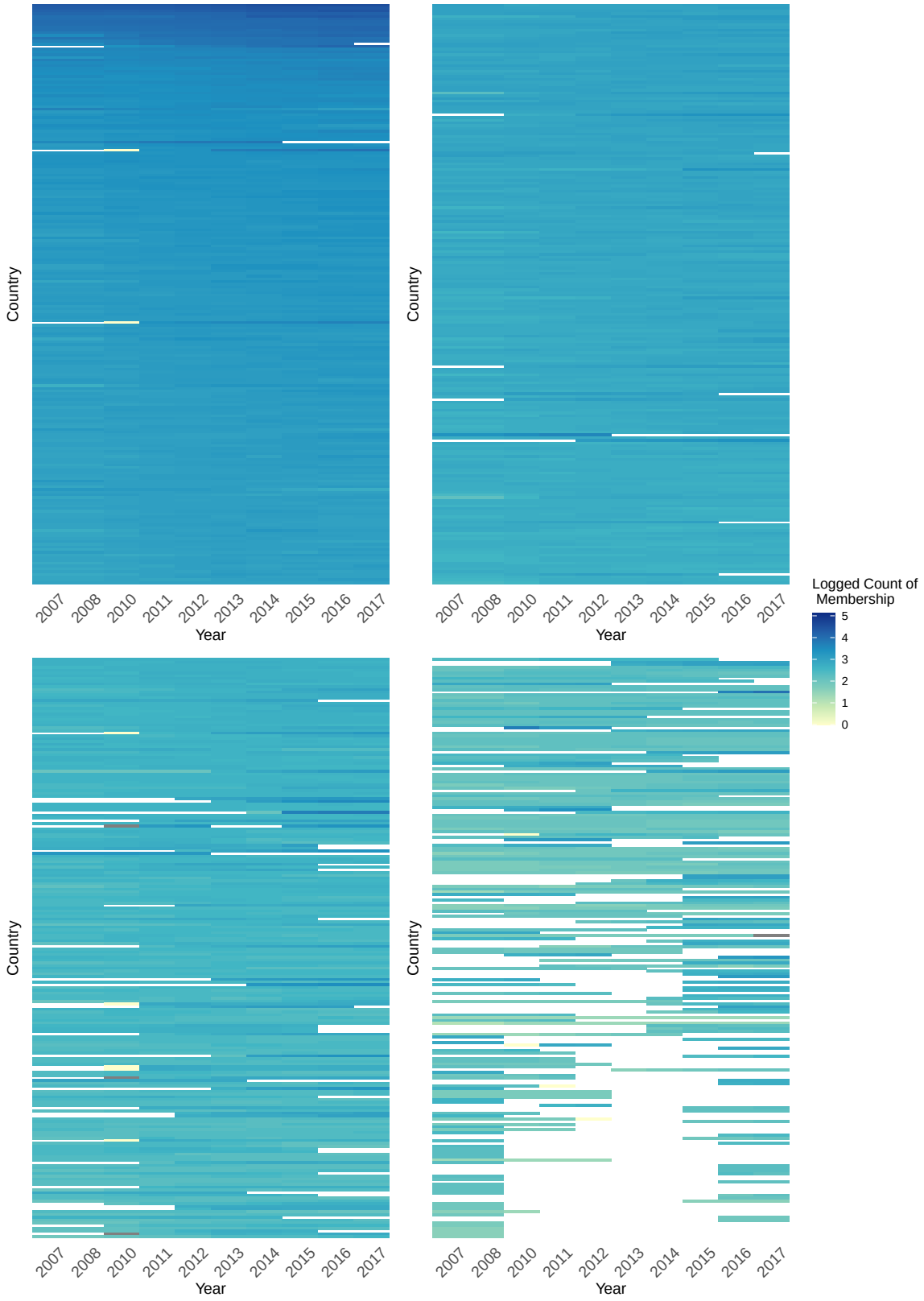


Figure 7.4: **Heatmap of the number of membership by TC and year**. This figure shows the number of countries that held P-membership for each TC (y-axis) in each year (x-axis), divided into four groups of TCs represented in each panel for visual presentation. The darker the color, the higher the number of P-members. For example, the top two rows in the top left panel display the TCs with the largest membership on average throughout 2007 to 2017, which correspond to TC176 (Quality management and quality assurance) and TC207 (Environmental management).

7.2 Additional Results

DV:	Membership (t)					Membership (t-2)	FDI (t)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FDI (t-2)	0.244*	0.360**	0.344**	0.072	−0.049		
	(0.115)	(0.133)	(0.121)	(0.122)	(0.156)		
FDI (t)						0.335	
						(0.358)	
FDI (t-2) * GDPpc above median		−0.240					
		(0.183)					
FDI (t-2) * GDPpc above 3rd quartile			−0.425*				
			(0.177)				
FDI (t-2) * small TC				0.378*			
				(0.169)			
Membership (t-3)	5.982**	5.982**	5.984**	5.983**		8.422**	
	(0.138)	(0.138)	(0.138)	(0.138)		(0.185)	
Membership (t-2)					6.666**		0.055
					(0.139)		(0.117)
Cum. membership years (t-3)	0.198**	0.199**	0.198**	0.198**		0.195*	−0.217
	(0.039)	(0.039)	(0.039)	(0.039)		(0.080)	(0.175)
Cum. membership years (t-2)					0.144**		
					(0.035)		
GDPpc above median		0.028					
		(0.216)					
GDPpc above 3rd quartile			−0.631				
			(0.627)				
Exports (logged, t-3)	0.065**	0.067**	0.069**	0.065**		0.060	0.030
	(0.024)	(0.025)	(0.025)	(0.024)		(0.059)	(0.040)
Exports (logged, t-2)					0.057**		
					(0.013)		
GDP (logged, t-3)	0.184	0.204	0.154	0.180		−0.346	0.692
	(0.652)	(0.666)	(0.651)	(0.652)		(2.580)	(3.690)
GDP (logged, t-2)					0.203		
					(0.652)		
Population (logged, t-3)	4.111*	4.093*	4.074*	4.115*		0.372	5.677
	(1.637)	(1.643)	(1.642)	(1.637)		(3.000)	(8.394)
Population (logged, t-2)					3.024+		
					(1.649)		
Polity IV (t-3)	−0.022	−0.016	−0.021	−0.021		0.045	−0.047
	(0.030)	(0.031)	(0.030)	(0.030)		(0.204)	(0.110)
Polity IV (t-2)					−0.036		
					(0.038)		
Obs	392 490	392 490	392 490	392 490	471 240	185 850	355 216
R2	0.827	0.827	0.827	0.827	0.864	0.914	0.553
BIC	68 098.1	68 117.3	68 099.7	68 105.4	64 723.5	24 302.5	150 997.9
Year FE	5	5	5	5	6	3	4
Country FE	125	125	125	125	125	99	150
TC FE	630	630	630	630	630	630	596

Note: + p < 0.1, * p < 0.05, ** p < 0.01

Table 7.2: **FDI (at $t-2$) and the subsequent membership in related TC, with RA-corrected data**. This table replicates Table 1 using the membership data after applying research assistants' manual Wayback Machine verification of all cells where this data disagreed with an independently collected dataset from Bjørkholt (2025). The corrections alter 260 of 1.5 million country–TC–year cells from my dataset and every estimate is substantively unchanged.

DV:	Membership (t)					Membership (t-3)	FDI (t)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FDI (t-3)	0.269**	0.428**	0.373**	0.145	−0.015		
	(0.101)	(0.128)	(0.106)	(0.120)	(0.121)		
FDI (t)						0.630*	
						(0.294)	
FDI (t-3) * GDPpc above median		−0.415*					
		(0.182)					
FDI (t-3) * GDPpc above 3rd quartile			−0.452**				
			(0.166)				
FDI (t-3) * small TC				0.273+			
				(0.161)			
Membership (t-4)	5.397**	5.401**	5.396**	5.397**		9.987**	
	(0.139)	(0.139)	(0.139)	(0.139)		(0.249)	
Membership (t-3)					5.913**		0.017
					(0.133)		(0.159)
Cum. membership years (t-3)	0.160**	0.160**	0.160**	0.160**	0.116**	0.199	−0.070
	(0.030)	(0.030)	(0.030)	(0.030)	(0.032)	(0.122)	(0.167)
GDPpc above median		0.970*					
		(0.445)					
GDPpc above 3rd quartile			0.146				
			(0.450)				
Exports (logged, t-4)	0.060**	0.064**	0.064**	0.060**		−0.028	0.088*
	(0.023)	(0.023)	(0.023)	(0.023)		(0.113)	(0.039)
Exports (logged, t-3)					0.054**		
					(0.017)		
GDP (logged, t-4)	0.365	0.233	0.336	0.362		6.594	−11.780*
	(0.732)	(0.742)	(0.734)	(0.732)		(7.366)	(5.401)
GDP (logged, t-3)					0.431		
					(0.741)		
Population (logged, t-4)	3.384**	3.749**	3.431**	3.387**		4.480	15.337
	(1.303)	(1.280)	(1.307)	(1.302)		(8.200)	(17.784)
Population (logged, t-3)					2.791+		
					(1.539)		
Polity IV (t-4)	−0.003	−0.014	−0.003	−0.003		0.125	0.024
	(0.031)	(0.035)	(0.031)	(0.031)		(0.081)	(0.105)
Polity IV (t-3)					−0.006		
					(0.039)		
Obs	414 540	414 540	414 540	414 540	497 700	122 220	265 816
R2	0.798	0.798	0.798	0.798	0.825	0.938	0.572
BIC	79 813.7	79 799.0	79 813.9	79 823.0	82 298.3	15 914.2	108 222.3
Year FE	5	5	5	5	6	2	3
Country FE	132	132	132	132	132	97	149
TC FE	630	630	630	630	630	630	596

Note: + p < 0.1, * p < 0.05, ** p < 0.01

Table 7.3: **FDI (at $t-3$) and the subsequent membership in related TC**. This table shows the robustness of the results from Table 5 to changing the lag structure to $t-3$. The first five columns show the coefficients of the logistic regression models estimating the probability of a country holding P-membership in each TC in year t, with the main independent variable being the occurrence of greenfield FDI cases related to each TC in year $t-3$ [(1)], its interaction with the binary indicators of the size of the country's economy [(2) and (3)] and the size of the TC [(4)], and a specification controlling for contemporaneous related-product exports [(5)]. Column (6) shows the logit model for a placebo test, where the dependent variable is the past P-membership ($t-3$). Column (7) shows the logit model testing for reversed causality, where the dependent variable is the occurrence of related greenfield FDI projects in year t. The models include country, committee, and year fixed effects. Some observations are removed because of no variation in the dependent variable within each group. Standard errors are clustered at the country level.

DV:	Membership (t)					Membership (t-1)	FDI (t)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FDI (t-1)	0.230+	0.358**	0.314**	0.091	−0.068		
	(0.117)	(0.133)	(0.120)	(0.128)	(0.179)		
FDI (t)						−0.097	
						(0.268)	
FDI (t-1) * GDPpc above median		−0.270					
		(0.176)					
FDI (t-1) * GDPpc above 3rd quartile			−0.352+				
			(0.185)				
FDI (t-1) * small TC				0.302			
				(0.189)			
Membership (t-2)	6.888**	6.888**	6.888**	6.888**		8.698**	
	(0.150)	(0.150)	(0.150)	(0.150)		(0.195)	
Membership (t-1)					8.355**		−0.017
					(0.157)		(0.115)
Cum. membership years (t-2)	0.218**	0.217**	0.217**	0.217**		0.233**	−0.166
	(0.040)	(0.040)	(0.040)	(0.040)		(0.057)	(0.114)
Cum. membership years (t-1)					0.104**		
					(0.039)		
GDPpc above median		0.228					
		(0.236)					
GDPpc above 3rd quartile			0.330				
			(0.224)				
Exports (logged, t-2)	0.064**	0.067**	0.067**	0.064**		0.051	−0.008
	(0.021)	(0.023)	(0.021)	(0.021)		(0.042)	(0.028)
Exports (logged, t-1)					0.057*		
					(0.026)		
GDP (logged, t-2)	0.351	0.329	0.335	0.347		0.138	1.132
	(0.556)	(0.558)	(0.556)	(0.556)		(1.417)	(1.482)
Population (logged, t-2)	3.991*	4.048*	4.041*	3.994*		3.037	6.293
	(1.817)	(1.812)	(1.822)	(1.817)		(2.428)	(4.878)
Polity IV (t-2)	−0.012	−0.011	−0.011	−0.012		0.018	0.070
	(0.046)	(0.046)	(0.046)	(0.046)		(0.117)	(0.088)
Obs	376 740	376 740	376 740	376 740	459 900	255 780	444 616
R2	0.870	0.870	0.870	0.870	0.923	0.925	0.547
BIC	52 369.9	52 391.1	52 386.9	52 380.3	40 201.1	27 355.7	189 337.2
Year FE	5	5	5	5	6	4	5
Country FE	120	120	120	120	122	102	150
TC FE	630	630	630	630	630	630	596

Note: + p < 0.1, * p < 0.05, ** p < 0.01

Table 7.4: **FDI (at $t-1$) and the subsequent membership in related TC**. This table shows the robustness of the results from Table 5 to changing the lag structure to $t-1$. The first five columns show the coefficients of the logistic regression models estimating the probability of a country holding P-membership in each TC in year t, with the main independent variable being the occurrence of greenfield FDI cases related to each TC in year $t-1$ [(1)], its interaction with the binary indicators of the size of the country's economy [(2) and (3)] and the size of the TC [(4)], and a specification controlling for contemporaneous related-product exports [(5)]. Column (6) shows the logit model for a placebo test, where the dependent variable is the past P-membership ($t-1$). Column (7) shows the logit model testing for reversed causality, where the dependent variable is the occurrence of related greenfield FDI projects in year t. The models include country, committee, and year fixed effects. Some observations are removed because of no variation in the dependent variable within each group. Standard errors are clustered at the country level.

DV:	Membership (t)
	(1)
FDI (t-3)	0.037
	(0.148)
FDI (t-2)	0.318*
	(0.140)
FDI (t-1)	0.024
	(0.156)
Membership (t-4)	5.553**
	(0.159)
Cum. membership years (t-3)	0.317**
	(0.052)
Exports (logged, t-4)	0.061**
	(0.016)
GDP (logged, t-4)	0.114
	(0.858)
Population (logged, t-4)	4.215*
	(1.956)
Polity IV (t-4)	0.025
	(0.031)
Obs	225 540
R2	0.801
BIC	48 934.9
Year FE	3
Country FE	120
TC FE	630

Note: + p < 0.1, * p < 0.05, ** p < 0.01

Table 7.5: **Joint model including all three lags of FDI at the same time**. This table reports the logistic regression of P-membership on FDI at $t-1$, $t-2$, and $t-3$ included jointly, with covariates measured at $t-4$. Only FDI at $t-2$ is statistically significant, absorbing the effects of the other lags. The model includes country, committee, and year fixed effects with standard errors clustered by country.

DV:	Exports (t)		Exports (t-1)
	(1)	(2)	(3)
FDI (t-1)	0.983**		
	(0.369)		
FDI (t)		0.764*	0.296
		(0.358)	(0.421)
Membership (t-3)	0.007	0.012	0.057
	(0.053)	(0.054)	(0.055)
Cum. membership years (t-3)	0.150*	0.175+	0.049
	(0.070)	(0.095)	(0.096)
Exports (logged, t-3)	0.331**	0.354**	0.326**
	(0.075)	(0.078)	(0.102)
GDP (logged, t-3)	−5.779*	−9.523*	−4.251
	(2.395)	(3.978)	(6.395)
Population (logged, t-3)	18.599+	25.818*	13.878
	(9.565)	(13.049)	(18.849)
Polity IV (t-3)	0.030	0.142	0.202**
	(0.189)	(0.095)	(0.064)
Obs	376 740	282 240	282 240
R2	0.848	0.858	0.863
BIC	1 810 162.4	1 337 146.9	1 318 121.5
Year FE	4	3	3
Country FE	150	150	150
TC FE	630	630	630

Note: + p < 0.1, * p < 0.05, ** p < 0.01

Table 7.6: **FDI predicting future and contemporaneous export volume of products related to TC**. Columns (1) and (2) show the coefficients of the OLS models estimating the relationship between the occurrence of greenfield FDI cases related to each TC in year $t-1$ and t and the logged export volume of products related to the TC in year t. Column (3) shows the coefficients of the OLS model testing for placebo, where the main independent variable is the FDI in year t and the dependent variable is logged export volume at $t-1$. All models include the control set from Table 1 measured at $t-3$, as well as country, committee, and year fixed effects. Standard errors are clustered at the country level.

	GDPpc med, full	GDPpc med, at-risk	GDPpc 3rdq, full	GDPpc 3rdq, at-risk	Small TC, full	Small TC, at-risk
FDI (t-2)	0.350**	0.554**	0.335**	0.404**	0.056	0.312+
	(0.134)	(0.182)	(0.121)	(0.156)	(0.122)	(0.185)
FDI (t-2) x GDPpc above median	−0.232	−0.594*				
	(0.185)	(0.285)				
FDI (t-2) x GDPpc top 25%			−0.405*	−0.444		
			(0.177)	(0.285)		
FDI (t-2) x small TC					0.398*	0.004
					(0.169)	(0.197)
GDPpc above median	0.079	0.329				
	(0.225)	(0.333)				
GDPpc top 25%			−0.659	−0.916		
			(0.625)	(1.486)		
Obs	389 340	283 747	389 340	283 747	389 340	283 747
R2	0.829	0.263	0.829	0.263	0.829	0.263
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	5	5	5	5	5	5
Country FE	124	121	124	121	124	121
TC FE	630	560	630	560	630	560

Table 7.7: **Ceiling-effect tests: FDI interactions in the full sample and at-risk pairs**. Each column reports the interaction between FDI at $t-2$ and the moderator variable (GDP per capita above the median, in the top quartile, or small TC), estimated on the full sample and on the "at-risk" subsample of country–TC pairs that were not participating members at $t-2$ (i.e.,those where ceiling effects do not bind). All models are estimated with logit and include the full set of controls from Table 1 and country, committee, and year fixed effects, with standard errors clustered by country.

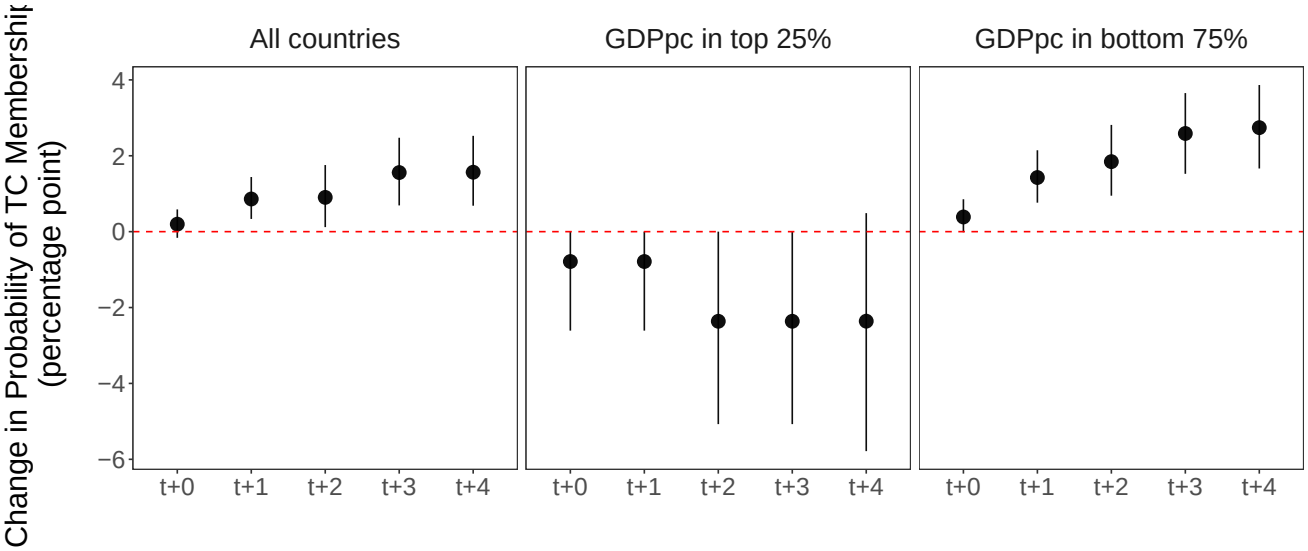


Figure 7.5: **Effect of FDI on related TC membership, by level of development**. This figure plots the matched difference-in-differences estimates of the effect of greenfield FDI on the probability of holding P-membership in the related TC, for all countries (left), countries in the top 25% of GDP per capita (middle), and the remaining countries (right), among export-relevant (at-risk) country–TC pairs. Note that unlike Figure 5, these estimates include pairs that were already members (whose membership can only be maintained, not newly gained), to preserve sample size in the subgroup analyses. The effect magnitudes are thus smaller than the joining estimates. Error bars show bootstrap 95% confidence intervals.

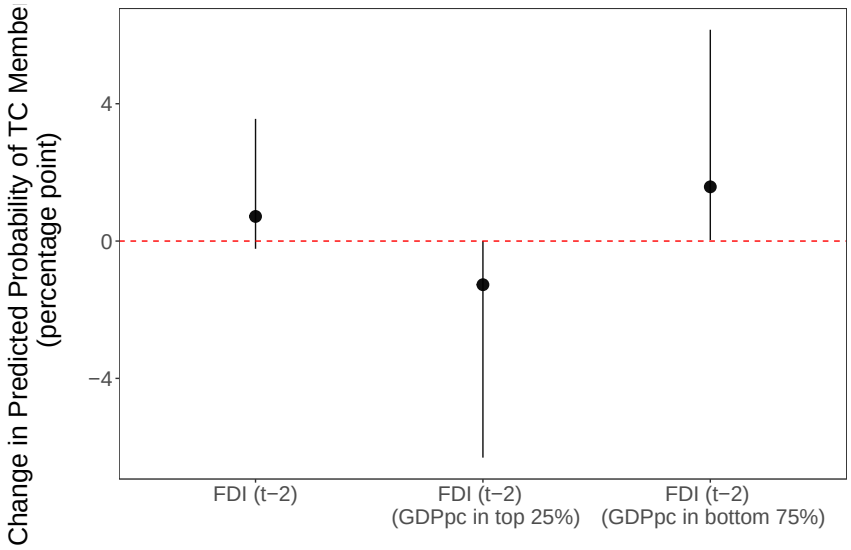
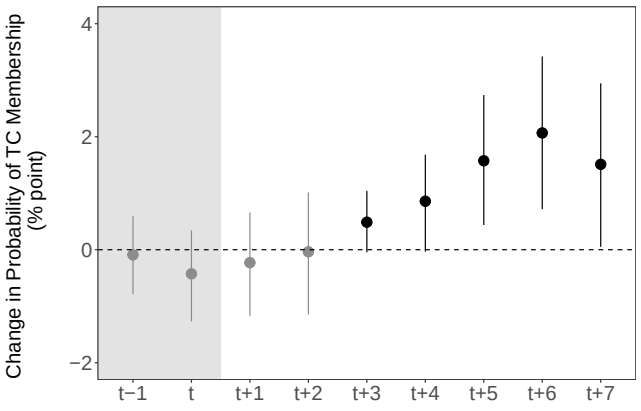


Figure 7.6: **Estimated effects of FDI on TC membership (Bayesian varying-intercept model)**. The figure plots the change in predicted probability of a country holding P-membership in each TC in year t given the occurrence of greenfield FDI cases related to each TC in year $t-2$ (left), for highly developed economies (middle) and the rest (right). The point estimates and 95% credible intervals are obtained from a logistic model with varying intercepts at the country, committee, and year levels, holding other covariates at their means. The pattern is consistent with the main results—positive effects concentrated outside the top GDP-per-capita quartile (1.58 percentage points $[95\%CI : 0.03, 6.15]$)—while the overall estimate is imprecise (0.72 percentage points, $[95\%CI : -0.22, 3.56]$).

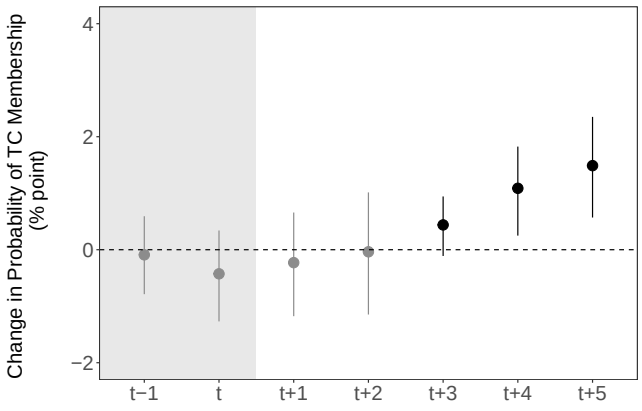
	Treated unit-years by FDI event year						
Specification	2008	2010	2011	2012	2013	Total	Effect window
Lag 2, leads 0–4 (main text)	827	630	798	—	—	2,255	$t+2$ to $t+6$
Lag 2, leads 0–2 (widest window)	827	633	798	626	696	3,580	$t+2$ to $t+4$
Lag 3, leads 0–4	827	630	—	—	—	1,457	$t+3$ to $t+7$
Lag 3, leads 0–2	827	630	798	626	—	2,881	$t+3$ to $t+5$
Placebo (treatment at $t+1$, leads 0–3)	—	—	782	618	692	2,092	$t-1$ to $t+2$

Table 7.8: **Identification windows of the firm-level specifications**. For each firm-level matched difference-in-differences specification (rows), the table reports the number of treated unit-years contributed to the estimation, by each FDI event year (columns). Cohorts before 2008 cannot enter because the membership data begins in 2007 and each specification requires two to three years of in-panel history of FDI; 2009 is absent because the ISO website is missing from Wayback Machine for that year. Counts differ slightly across specifications because each requires outcomes over its own lead horizon. The full years for which both the membership data and FDI data exist are 2008–2013, and the estimates are consistent across windows (Figure 7.7).

(a) lag = 3, leads 0–4 (FDI cohorts 2008, 2010)



(b) lag = 3, leads 0–2 (cohorts 2008–2012)



(c) lag = 2, leads 0–2 (all cohorts 2008–2013)

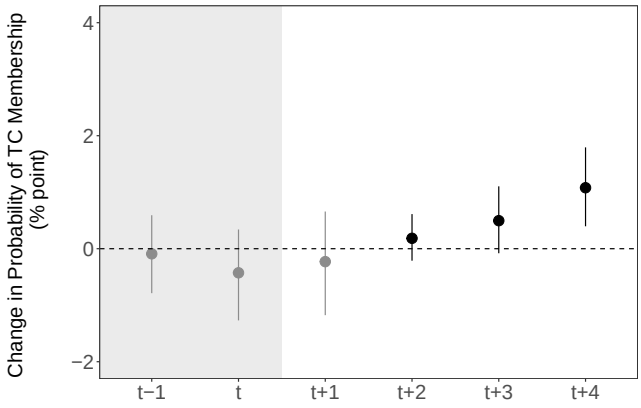


Figure 7.7: **Effect of related-firm FDI on TC membership, with alternative matching specifications**. This figure reports the firm-level difference-in-differences estimates under alternative lag/lead specifications, complementing the main-text specification (lag = 2, leads 0–4; Figure 6). In each panel, black points show estimates from the main specification and gray points show estimates from the placebo specification, which supplies the pre-investment periods. The shaded regions indicate the pre-investment periods. Panel (c) uses the most comprehensive identification window, covering years 2008–2013 (3,580 treated unit-years). The overall pattern of estimates are consistent across specifications: null before and immediately after investment, with significant positive effects emerging around $t + 4$.

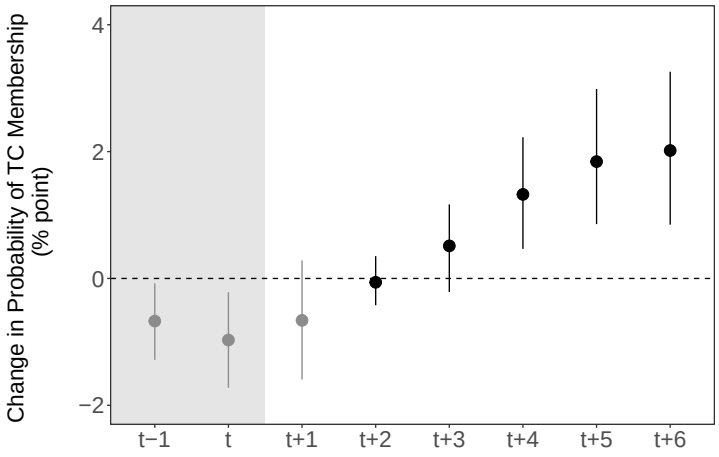


Figure 7.8: **Effect of related-firm FDI on TC membership, with manufacturing FDI only, 2003–2017**. This figure replicates the main firm-level specification (Figure 6) using manufacturing-sector FDI for the full 2003–2017 window, which extends the panel's treatment years at the cost of restricting the FDI universe to manufacturing investments. The dynamic pattern matches the main specification.

7.3 Validation of the Firm-Domain Classifier

Project-leader email domains were classified using OpenAI's GPT-4 (`gpt-4-1106-preview`, accessed January 2024), which returned an organization name, website, ticker symbol, organization type, and an email-provider flag for each of the 2,657 unique domains appearing in the project-leader data; classified business domains were then matched to ORBIS records to obtain firm identifiers. To validate the classifier, two research assistants manually verified a random sample of 365 business-classified domains against web searches. The classifier's precision is 90.1 percent (exact binomial 95% confidence interval: 86.6–93.0). Among validated true positives, 71.4 percent of assigned firm names match the verified name exactly or near-exactly; 8.5 percent are borderline matches resolved by manual review. Misclassified email providers that pass through the provider filter amount to 4.1 percent of the validated sample, and wrong-firm identity assignments propagated into the analysis by 2.2 percent (95% CI: 1.0–4.3).

7.4 Additional AI usage

I have used the following models to refining the text of my draft, suggest improvements, and to check for grammar and spelling errors: OpenAI's ChatGPT (GPT-4.5, GPT-5.5), Claude (Opus

4.6, 4.7, 4.8, Fable 5). Additionally, I used Claude Code (Opus 4.6, 4.7, 4.8, Fable 5) to assist in code editing. All final decisions were made by the author.