Why FDI and Trade Politics Should Be Studied Together*

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Abstract

Global value chains (GVCs) have knit foreign direct investment (FDI) and trade together as firms' engagement in one activity inextricably depends on the other. Yet, existing political economy research often fails to consider the two simultaneously at the *firm-product level* where the actual interdependencies occur. We offer an integrated theory that explains how FDI changes countries' product-level trade profiles, creating new political cleavages along the lines of GVCs in trade politics. To test our theory, we first examine the effect of firms' new greenfield FDI projects globally since 2003 and find their presence is associated with over 45 more products exported from host countries in the subsequent year. To overcome the empirical challenges of evaluating our theory at the firm-product level, we then manually link our FDI data with unique Vietnamese customs data. We find that Vietnamese export (import) volumes of FDI-related products increased by 100% (30%) within four years of initial investments. Notably, these products also received substantial tariff reductions in the 2015 Vietnam-Korea Free Trade Agreement, indicating a direct link between firms' FDI activities and trade policymaking.

Key Words: foreign direct investment, global production networks, multinational corporations, trade politics

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1 Introduction

One of the most critical developments in the global economy in the past half-century is the enormous growth in intra-firm trade, related-party trade, and intermediate goods trade driven by fragmented global production (Bernard et al., 2012).[1] For example, over 50% of U.S. goods imports from Organisation for Economic Co-operation and Development (OECD) countries were intra-firm in 2009 (Lanz and Miroudot, 2011). Meanwhile, related-party trade accounted for around 43% of total U.S. goods imports/exports as of 2019.[2] Intermediate inputs also represent a significant part of global trade. For most OECD countries, more than half of their exports stem from products traded in the context of global value chains (GVCs) (De Backer and Miroudot, 2014). The primary driving force behind the global trade environment's transformation is the expansion of cross-country firm-level activities and global production networks established through foreign direct investment (FDI) by multinational corporations (MNCs) that encompass both developed and developing nations. In fact, MNCs are estimated to account for 80% of global trade as of 2010 (UNCTAD, 2013).

Despite the inseparable links between FDI and international product trade through the activities of MNCs, most international political economy (IPE) scholarship has considered the two firm-level activities separately.[3] The dominant theoretical frameworks in the political economy of trade literature tend to discount how MNCs' location choices may reshape inherent technological differences across countries and, in turn, the product composition of imports and exports. For instance, factor-, industry-, and even firm-centered IPE theories either explicitly or implicitly assume that *foreign* multinational corporations do not alter the domestic distribution of production technologies or political coalitions when it comes to trade policymaking (e.g., Rogowski, 1987; Hiscox, 2002a; Rodrik, 1995; Kim, 2017). Meanwhile, influential studies on the political economy

[1] Intra-firm trade consists of trade between parent companies and their affiliates abroad. In contrast, related-party trade may include transactions between firms linked through ownership structure outside of firms' boundaries.

[2] See `https://www.census.gov/foreign-trade/Press-Release/related_party/index.html`.

[3] See Pandya (2016) for a systematic review and the critique. For notable exceptions, see Baccini, Pinto, and Weymouth (2017); Anderer, Dür, and Lechner (2020). Note that while Büthe and Milner (2008, 2014) explicitly examine the link between FDI and trade agreements, their focus was mainly at the country-dyad/country level, as opposed to the firm-product level.

of FDI often overlook how the current distribution of foreign investments can reshape future bilateral or multilateral trade relationships and political coalitions across different production factors within host countries (e.g., Li, Resnick et al., 2003; Jensen, 2008; Pandya, 2014b; Owen, 2015).

In this study, we offer an integrated theory that explains how firms' strategic decisions about FDI shape product-level trade politics. We argue that understanding trade's distributional consequences based on the local abundance of production factors (e.g., capital or labor) or their mobility within countries has become increasingly obsolete as MNCs' FDI activities can fundamentally change these two dominant building blocks of IPE theories. Specifically, we contend that MNCs reshape the distribution of production technologies both within and across industries and countries. Therefore, countries' trade profiles—the product composition of imports and exports—should be conditional on FDI. In particular, FDI should alter host countries' subsequent product-level trade profiles at both the extensive (i.e., number of new products traded) and intensive margins (i.e., trade volumes).

FDI-led changes in trade will then create new political cleavages between firms that are part of GVCs and those that are not. Specifically, we argue that because of upstream or downstream linkages, firms in the same value chain will form common interests for liberal trade policies that go beyond their own products, industry, or even country. The broad political coalition built around GVCs and highly differentiated products used or produced within them will then make it politically easier for host governments to negotiate and achieve trade liberalization with their partners on export or import products tied to MNCs. Thus, by simultaneously driving global trade and FDI through value chains, MNCs and their foreign affiliates have become key political actors in shaping global trade policies (Manger, 2012; Baldwin, 2016; Danzman, 2019; Bown et al., 2020). Importantly, we expect MNCs' FDI activities to affect not only trade patterns and policies between the host-home country pair (e.g., Blanchard and Matschke 2015; Blanchard, Bown, and Johnson 2016) but also between the host country and other nations *beyond* dyadic relations.[4]

To test the implications of our theory, we construct new data sets that link FDI and trade activities. We first identify all manufacturing greenfield FDI projects made by MNCs globally

[4] See Erikson, Pinto, and Rader (2014) for the importance of considering relationships beyond country-pairs in International Relations research.

between 2003 and 2017 based on proprietary fDi Markets data.[5] We focus on greenfield FDI because it is a type of FDI in which MNCs establish new production facilities or offices in a different country and is thus most consistent with our theoretical framework. We focus on manufacturing projects because our primary interest is in FDI activities that can affect a host country's export and import profile.[6] We then construct a country-level data set that maps these projects to Harmonized System (HS) 6-digit product exports across a balanced panel of 105 countries between 2004 and 2017 and investigate whether FDI substantially alters the extensive margins of trade in host countries. Consistent with expectations, our analyses show that countries with new inward greenfield manufacturing FDI projects tend to expand their number of unique exported products by over 45 in the subsequent year. Notably, the results suggest that these new exported products stem from MNCs' FDI activities rather than from the inherent factors of production, such as labor and capital, that host countries are abundantly endowed.

Next, we extend the analysis to evaluate our theory more precisely at the product level—the level at which cross-country firm-level activities actually transpire. Linking firms to products, however, is a notoriously difficult task because such information is generally confidential and unobservable to researchers. In fact, it has been one of the main obstacles to scholars seeking to study trade and FDI together.[7] To overcome this critical empirical challenge, we focus on the case of Vietnam, where unique customs data are available. Specifically, we parse through a massive amount of Vietnamese customs data and identify the exact Harmonized System (HS) codes of products traded by individual firms. We then manually link the local exporting or importing firms in the customs data to MNCs' greenfield FDI projects in Vietnam between 2003 and 2017. Beyond data advantages, Vietnam is also an optimal case to test our theory as it is one of the most rapidly growing economies with substantial increases in inward FDI and changing local political

[5] The data covers reports of greenfield investments for all countries and sectors worldwide and is one of the most comprehensive databases on greenfield investments available. For details, see `https://www.fdimarkets.com/`. The data improves upon the balance-of-payments FDI flow data commonly used by researchers and known to introduce severe biases in empirical studies (Kerner, 2014; Jung, Owen, and Shim, 2021).

[6] While we focus on manufacturing that can be more export-oriented, our theory may also apply to other different sectors, such as services and infrastructure. This is because, even in these less export-oriented sectors, FDI may still change host countries' import profiles.

[7] See Baccini, Pinto, and Weymouth (2017) for a notable study using confidential data on U.S. firms from the Bureau of Economic Analysis (BEA), which is limited only to U.S. citizens.

dynamics (Malesky, 2008; Malesky, Gueorguiev, and Jensen, 2015). For example, Vietnam has attracted over $143 billion in cumulative FDI over the past ten years across various manufacturing industries, ranging from textiles to automobile parts to the electronics industry (U.S. Department of State, 2020). Hence, Vietnam provides an ideal laboratory to simultaneously examine the links between FDI and product-level trade patterns related to global production.

Using the new data, we investigate the effect of FDI on Vietnam's intensive margin of trade. To account for a potential selection bias whereby MNCs choose to invest in Vietnam given its pre-existing trade environment and political institutions, we use the difference-in-differences (DiD) identification strategy combined with a matching estimator (Imai, Kim, and Wang, 2021). Specifically, we match each product exported or imported by an MNC with other products similar in terms of various pre-FDI characteristics, such as their trade volumes, levels of product differentiation and upstreamness, and the number of destination or origin countries. The results suggest that FDI's effect on Vietnam's intensive margins of trade was substantial. Compared to similar Vietnamese products, the export volume of products related to MNCs and their affiliates increased up to 100% within four years of initial investments, while the import volume of MNC-related products grew up to 30%.

Lastly, but most importantly, we examine whether products linked to FDI tend to enjoy deeper trade liberalization. Focusing on the 2015 Free Trade Agreement (FTA) between Vietnam and one of its fastest-growing export and import markets, South Korea, we find that FDI induced tariff cuts, with a more pronounced effect with MNCs' earlier and more established FDI projects. Specifically, FDI-related products—compared to other similar products within the same industry—received 44% and 27% larger import tariff cuts from the Vietnamese and Korean governments, respectively. To the best of our knowledge, our study is the first to show that product-level trade policies are directly linked to individual firms. We then assess the generalizability of our findings by examining trade agreements signed by almost forty host countries at a more aggregated industry level. Consistently, we find deeper liberalization associated with FDI. Our findings provide supportive evidence for our argument that political coalitions built around MNCs' GVCs are influential, and coalition members are thus more capable of obtaining liberal trade policies for their input or output products. Given that the results are not confined to the investments made by MNCs headquartered in either of the countries signed FTA, our findings also suggest that FDI

can influence trade politics and policy beyond the host and home countries.

Our paper provides new theoretical angles to the study of IPE. First, simultaneously studying FDI and product-level trade allows us to deepen our understanding of the political economy of these activities in ways that might be missed when studying each on its own. For example, trade profiles across countries can no longer be explained solely by factor endowments—they also substantially depend on where and how much FDI flows. In turn, while FDI is drawn to destinations that hold locational (Helpman, 2006) or institutional advantages (Jensen, 2003, 2008; Li, Resnick et al., 2003; Pandya, 2014a; Pinto, 2013), the value chain networks that MNCs establish upon entry can offer them strong influence over trade and FDI policy environments (Manger, 2012; Blanchard and Matschke, 2015; Blanchard, Bown, and Johnson, 2016; Johns and Wellhausen, 2016). Adding to studies showing how PTAs increase FDI inflows (Büthe and Milner, 2008, 2014; Jamison and Pevehouse, 2021), we theorize and empirically show how the relationship also holds in the opposite direction at a much granular level: FDI activities shape product-specific policies within trade agreements.

Second, the political and economic effects of FDI and trade are no longer confined to dyadic relationships. In addition to changing trade profiles between the host and the home country, FDI can also affect trade profiles between the host country and third parties. This is because MNCs may invest in a host country to access large third-party markets. To facilitate such access, MNCs may also seek to influence host country trade policies toward the third party or vice versa. Overall, MNCs may reshape the directions of trade among countries along the entire GVC through their transactions and influence on trade policymaking. Our study is thus distinct from earlier research which primarily focuses on FDI's impact on *home* countries' trade liberalization (Milner, 1988; Osgood, 2018). We extend these important studies by directly linking firms to their products and demonstrating that FDI's effects pertain not only to host countries but also to third-party nations connected via GVCs.

Third, political cleavages over trade may increasingly fall along the lines of GVCs instead of factor ownership (Scheve and Slaughter, 2001; Mayda and Rodrik, 2005), occupation (Owen and Johnston, 2017), or sector (Hiscox, 2002b). Host-country firms integrated into GVCs (e.g., MNCs' subsidiaries, upstream suppliers, and downstream distributors) are in a better position to reap the benefits of trade liberalization than those that are not. This suggests that an individual's

employment ties with MNCs, and consequently their GVCs, may matter more than the individual's factor ownership, occupation, or sector when explaining trade policy preferences (Owen and Quinn, 2014).

Finally, we also contribute to the empirical study of FDI and trade by developing various research tools to navigate between the two activities that, unfortunately, have been recorded based on distinct classification schemes. For example, HS codes are typically used for categorizing internationally traded products, while investment decisions are classified by NAICS (North American Industry Classification System) codes. Using the concordances between diverse sets of nomenclatures, we also obtained measurements of key determinants of trade and FDI, such as product differentiation (Rauch, 1999; Broda and Weinstein, 2006) and upstreamness/downstreamness (Antràs et al., 2012; Antràs and Chor, 2013), at various levels of aggregation.[8] To promote future research at the intersection of trade and FDI, we consolidate these tools into an automated pipeline and make it freely available as an R package, `concordance`, at the Comprehensive R Archive Network (`https://cran.r-project.org/package=concordance`).

2 Theorizing the Effects of FDI on Trade Politics

There is ample empirical evidence that MNCs benefit disproportionately from liberal trade policy (Milner, 1988; Baccini, Pinto, and Weymouth, 2017; Osgood, 2018) and hold significant political power to affect trade policy outcomes (Manger, 2012; Blanchard and Matschke, 2015; Blanchard, Bown, and Johnson, 2016). Current scholarship, however, has yet to directly evaluate whether trade policies towards *products* related to foreign multinationals and their domestic upstream/downstream partners are significantly different from policies towards comparable goods produced by domestic firms outside of GVCs. In this section, we offer a theory that explains the effects of FDI on trade environments and trade policymaking at the product level. Specifically, we focus on whether MNCs' FDI activities change subsequent export or import patterns in host countries and, in turn, whether FDI-related products enjoy lower trade barriers in markets beyond the host-home country pair.

[8] The package provides a set of utilities for matching products in different classification codes and versions, such as HS, NAICS, Standard International Trade Classification (SITC), International Standard Industrial Classification (ISIC), and Broad Economic Categories (BEC).

2.1 MNCs Expand Product-level Trade Margins

We begin by investigating why FDI can affect trade profiles both at the extensive margin and intensive margin, i.e., altering the subsequent variety of products exported by the host country as well as their trade volumes. We posit that these effects will materialize even beyond the specific host-home country pair.

FDI as a Source of Comparative Advantage. Our theory builds on the empirical observation that trade flows are shaped by *firms'* transnational investment activities that rapidly reorganize factors of production globally. Developing nations no longer rely exclusively on exporting raw materials and labor-intensive goods when it comes to international trade. Rather, they increasingly produce and export sophisticated downstream manufactured products by combining cheap labor and land with massive foreign capital.

For example, Vietnam is now the world's second-largest cellphone exporter after China, exporting $35.5 billion in 2019. Why has Vietnam risen as a top producer of cellphones, a capital-intensive product, given its relative abundance in labor? One of the main reasons is that Samsung, a South Korean conglomerate, has made significant greenfield and R&D investments in Vietnam since its first plant opened in the Bac Ninh province in 2008, which transformed Vietnam's industry structure. In contrast, as Samsung phones are now assembled in Vietnam, South Korea has become only the world's 8th largest exporter of cellphones in 2019, with merely around 10% of Vietnam's export volume. FDI has also changed Vietnam's import profile. Since local companies are not yet ready to produce or supply complex electronic components for high-tech MNCs (e.g., Intel and Samsung) at the quality standards they require, Vietnam has now begun to import a large volume of such intermediate goods.

We argue that FDI serves as a new source of comparative advantage that expands host countries' product-level trade margins. We illustrate this argument based on the canonical Ricardian model developed by Dornbusch, Fischer, and Samuelson (1977). To focus on the implications of FDI on the margins of trade, we adopt this framework with a single factor of production: labor.[9] We assume that there are two countries (H and W) that produce a continuum of goods denoted

[9] In the Ricardian model, multiple factors can be seen as substitutes in the production function.

by $z \in [0,1]$.[10] Without loss of generality, we order the products according to host country H's comparative advantage. Specifically, the smaller the value of z, the more efficient H is in producing the good z than the rest of the world W. We denote $a(z)$ and $a^*(z)$ as the amount of labor required to produce product z by H and W, respectively. We can then denote the relative productivity between H and W by:

$$A(z) \equiv \frac{a^*(z)}{a(z)}, \tag{1}$$

where $A(z)$ is a decreasing function of z.[11] That is, $A(z)$ takes a higher value if H is relatively more productive in producing the good z. Suppose that the price of good z in a competitive equilibrium is $p(z)$.[12] Then, it is straightforward to show that there exists a product $\tilde{z}$ such that H produces and exports all products $z < \tilde{z}$, while W specializes in producing all products $z > \tilde{z}$.

Next, we consider a simple demand structure whereby the two countries have identical and homothetic Cobb-Doublas demand functions, where $b(z)$ denotes the Cobb-Douglas elasticities: $\int_0^1 b(z)dz = 1$. Under this demand structure, we can re-express $b(z)$ in terms of the ratio of expenditure spent on commodity z to income:

$$b(z) = \frac{p(z)c(z)}{wL} = \frac{p^*(z)c^*(z)}{w^*L^*} \tag{2}$$

where $c(z)$, w, and L denote the consumptions of good z, wage, and labor endowment in H, respectively, while the variables with asterisks denote the analogous quantities for W. Let us denote by $\theta(\tilde{z}) \equiv \int_0^{\tilde{z}} b(z)dz$ the fraction of income spent on goods produced by H, i.e., $z \in [0, \tilde{z}]$. Then, by trade balance, the relative wage between H and W can be written as:

$$B(\tilde{z}) \equiv \omega = \frac{w}{w^*} = \frac{\theta(\tilde{z})}{1-\theta(\tilde{z})}\left(\frac{L^*}{L}\right). \tag{3}$$

Note that the relative wage $B(z)$ can be interpreted as global demand for H's labor, and it is increasing in z, as $\theta(\tilde{z})$ increases when z increases.

Figure 1 shows that this canonical model is useful to understand the expansion of products produced by the host country following increased FDI. As noted above, the competitive equilibrium

[10] Dornbusch, Fischer, and Samuelson (1977)'s model has been further extended to a more complex setting in which researchers consider more than two countries (e.g., Eaton and Kortum, 2002). Furthermore, one can view our firm-product level framework as a special case of the model considered in Gaubert, Itskhoki, and Vogler (2021) that features Ricardian forces across sectors while firms compete oligopolistically within sectors.

[11] This is because we assumed that H has a comparative advantage in producing smaller z.

[12] That is, every country takes the price as given.

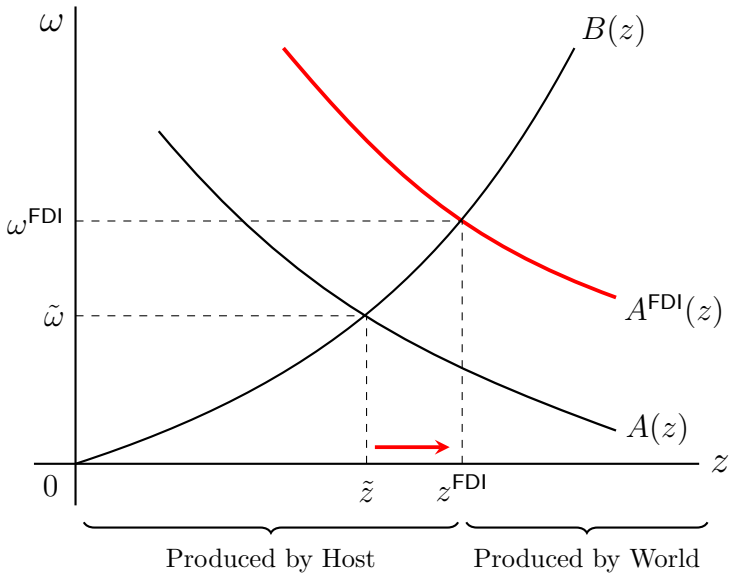

Figure 1: **Expansion of the Product Profile after FDI**. This figure illustrates the consequences of domestic production as a result of foreign investments following the Ricardian framework developed by Dornbusch, Fischer, and Samuelson (1977). Specifically, it shows that the set of products produced by the host country expands from $\tilde{z}$ to z^{FDI} as the relative production productivity of the host country increases following foreign investments, i.e., shift from $A(z)$ to $A^{\mathsf{FDI}}(z)$. It also shows that the relative wage of the host country increases.

under the setup is that the host country H produces all products $z < \tilde{z}$, while the other country W specializes in producing all the other products $z > \tilde{z}$. Suppose that the relative productivity of H, in the sector/product associated with MNC activities, increases with FDI. Then, $A(z)$ moves upward towards $A^{\mathsf{FDI}}(z)$ as the relative productivity of H compared to W increases. This will then change the equilibrium such that H expands the set of products it produces and exports from $\tilde{z}$ to z^{FDI} as indicated by the red arrow.

While the evidence on direct technological spillovers from foreign firms to local firms is still mixed (e.g., Alfaro, Kalemli-Ozcan, and Sayek, 2009; Ashraf, Herzer, and Nunnenkamp, 2016), we argue that MNCs and their local affiliates themselves enjoy significant increases in their productivity.[13] That is, the increase in productivity will be realized at the firm- and product-level. Nevertheless, as Figure 1 illustrates, this will expand the set of products exported by host coun-

[13] In this regard, trade patterns could at least help understand "revealed" comparative advantages of host countries even when direct technological spillovers to local firms do not occur.

tries at the aggregate level.[14] Furthermore, given economies of scale, an increase in production volume will further yield savings in production costs. This discussion generates two conditional hypotheses, highlighting the importance of studying product-level trade in relation to FDI. First, we anticipate that countries with more FDI inflows will begin to export more products directly tied to FDI than past selves compared to other countries with a similar level of prior engagements in international trade (**Hypothesis 1**). Moreover, we expect that the volume of FDI-associated exports from (or imports by) host countries will also expand over time (**Hypothesis 2**).

2.2 New Political Cleavages Along the Lines of GVCs

A large literature on the political economy of international trade has focused on the interests of domestic actors to explain trade policy outcomes. These *interest-based theories* derive domestic actors' demand for trade policy based on the income distributional consequences of free trade or trade protection (e.g., Heckscher-Ohlin or Ricardo-Viner models).[15] We build on this framework but argue that the growth of MNCs' global production networks calls for significant revisions. Specifically, we contend that the expansion of trade margins due to FDI (discussed in Section 2.1) will fundamentally change the political environment in trade policymaking.

First, we argue that FDI creates new political cleavages between firms that are part of the supply chain and those that are not. In particular, we contend that firms integrated into GVCs will share common interests for liberal trade policy *beyond* their own products or industry. Take the Trump administration's tariffs on steel and aluminum in 2018 as an example. The trade politics stemming from the tariff was no longer between exporting vs. import-competing firms within the steel industry. Instead, the tariffs created political cleavages between the top U.S. steel producers (e.g., United States Steel Corp) and various other industries that rely on steel as input and saw increases in production costs (Tita and Mauldin, 2020). According to the LobbyView database (Kim, 2018), businesses that raised concerns about the tariffs on steel and aluminum range from MNCs in the U.S. auto industry such as the Ford Motor Company and

[14] Note that state-investor contracts mandating MNCs export their produced goods to protect domestic industries can further expand the product set.

[15] To be sure, the literature on the political economy of international trade is vast. Scholars have also made significant contributions by highlighting how political institutions aggregate or reconcile domestic interests and how international institutions facilitate trade by providing information or serving as a forum for dispute resolution. See Milner (1999) for a broader review.

Honda North America, to American food and beverages companies such as Kraft Heinz, to firms in the consumer goods industry such as the Procter and Gamble Company, and even to trade associations in the retail industry such as the National Retail Federation.[16] This implies that governments will face stronger demand for liberal trade policy from a broader range of industries, especially for goods that are part of GVCs.

Second, and related to the previous point, we argue that it will become politically easier for host governments to liberalize specific upstream or downstream goods tied directly to MNCs' FDI activities. On the one hand, internal demand and pressures for liberal trade policy will rise over time as domestic intermediate goods producers become more integrated into GVCs and gain bargaining power by leveraging offshoring (Kobrin, 1987; Johns and Wellhausen, 2021). For instance, Ian Precision Vina, a Samsung brass components supplier in Vietnam, asked for a tariff exemption for their inputs, noting that otherwise it "will not be able to continue [its] production and business activities in Vietnam" (General Department of Vietnam Customs, 2018). In addition, domestic producers may also demand trade liberalization on behalf of their downstream MNC partners. This is because MNCs serve larger markets, and thus domestic suppliers of MNCs can benefit indirectly from increased economies of scale.[17] Again, this new political coalition may cut across industries. For example, there exists a tight partnership between Vietnamese domestic packaging companies (e.g., Viet Hung Packaging and Goldsun Packaging) and MNCs in various industries (e.g., Samsung, Canon, Carlsberg, Heineken, Coca-Cola, Ferroli. and Kangaroo) (CafeF, 2020). Therefore, it is no surprise that the Vietnam Packaging Asso-

[16] For example, Honda North America lobbied concerning "Steel and Aluminum Tariffs" (`https://disclosurespreview.house.gov/ld/ldxmlrelease/2019/Q4/301127901.xml`). Kraft Heinz lobbied to "exempt food packaging from 232 tariffs on aluminum and steel imported from China" (`https://disclosurespreview.house.gov/ld/ldxmlrelease/2019/Q4/301124715.xml`). The Procter and Gamble Company lobbied for tariff exemptions for steel used in its razor blades (Naidu, 2018). The National Retail Federation lobbied to "Communicate retail views on the importance of international trade and the global value chain" and to "Oppose Section 232 Steel and Aluminum Tariffs."

[17] Our argument is most similar to Johns and Wellhausen (2016). The authors argue that global supply chains tie firm interests, and thus firms in the same supply chain will look out for their mutual interests, giving host governments incentives to protect the investments of foreign firms tightly linked to domestic firms. We extend their argument and contend that GVCs also give host governments incentives to liberalize trade policies for MNCs who are closely linked to domestic firms.

ciation, whose members include local suppliers of packaging materials, advocated for Vietnamese engagement in FTAs even though they do not directly serve foreign markets nor manufacture goods produced by MNCs.

On the other hand, there will be lower domestic political opposition towards lowering trade barriers applied to FDI-related products. This is because the highly differentiated or proprietary inputs that MNCs tend to use are likely distinct from what domestic firms produce, and therefore domestic opposition against tariff reductions on the products that MNCs import should be low (Kim, 2017). Furthermore, given MNCs' higher quality standards, fewer domestic producers can directly compete with foreign input producers to begin with. For example, INTEL in Vietnam claimed that they had difficulty finding local suppliers that meet "the quality requirements that Intel products demand." Similarly, for SAMSUNG in Vietnam, most of their complex electronic component suppliers are foreign enterprises from countries like Korea, the United States, and China (CafeF, 2020).

Finally, we argue that MNCs are the main political actors that can affect host countries' policies towards the highly specific products they import and export. This is because MNCs suffer less from collective action problems—they are not only isolated (both economically and politically) from other firms in the same industry in foreign countries but also produce highly differentiated goods with little overlap. Indeed, MNCs have played a heavy role in Vietnamese trade policymaking. For example, media reports indicate that SAMSUNG had directly submitted proposals to the Prime Minister "requesting preferential tax treatment for its new Samsung CE Complex" (Vietnam Briefing, 2015). The General Department of Vietnam Customs even announced that Chang Shin Vietnam, a Korean MNC that manufactures and exports Nike shoes, received preferential customs treatment that exempted it from customs inspection (VietnamPlus, 2015). To be sure, MNCs may also collectively try to influence broader trade policies such as free trade agreements. For instance, administrative records show that the Japan Business Association in Vietnam sent a request to the Vietnamese Ministry of Finance asking for a revision in the Japan-Vietnam PTA to reduce tariffs on automobiles (Chamber of Commerce and Industry of Vietnam, 2017). In their request, the Japan Business Association pointed to Japanese auto manufacturers' joint concerns about losing their Vietnamese market share to Indonesian and Thai automobile firms, who would soon receive import tariff exemptions based on the ASEAN Trade in Goods Agreement.

Importantly, MNCs can have interests in facilitating or shaping host-country free trade agreements with a third party beyond the host-home country pair. This is because more favorable terms in these agreements give MNCs access to large third-party markets. For example, foreign investors in Vietnam have pointed out in the mid-2010s that even the prospects of Vietnam entering FTAs with South Korea, the European Union, or the Trans-Pacific Partnership (TPP) helped attract foreign manufacturers and firms in supporting industries to the country and generated orders for those already based in the country (Yuen, 2015). Our argument thus extends existing studies that have mainly focused on how MNCs shape trade patterns or policies between the host-home country pair (Blanchard and Matschke, 2015; Blanchard, Bown, and Johnson, 2016).

Taken together, we expect host governments to have incentives to push for more liberal trade policies on products directly linked to MNCs' FDI activities when negotiating with their trade partners (**Hypothesis 3**).

3 Data and Measures

Testing the implications of our theory requires data that link firms' FDI and trade activities. Yet, researchers have faced considerable empirical challenges when constructing such data. Most importantly, granular firm-level data on investments and trade transactions are often unavailable to researchers. On the one hand, firms do not publicly disclose their international transactions at the product level out of concerns that their competitors could take advantage of the information and undercut their prices or even deter their market entry.[18] On the other hand, while researchers can easily calculate aggregate country-level FDI flows using data on countries' balance of payments, detecting FDI at the firm level is more difficult, especially when investment activities occur strictly within a firm's boundary.

Furthermore, even when granular investment and trade data are available, the lack of standard industry- and product-level classification systems puts enormous constraints on connecting FDI and trade activities. For example, the United States uses the North American Industry Classification System (NAICS) to categorize domestic business establishments (including FDI), whereas the standard tariff nomenclature for internationally traded products is the Harmonized System (HS).

[18] Note that limited access to restricted data is available for some countries, such as The Longitudinal Firm Trade Transactions Database (LFTTD) from the U.S. Census Bureau (Bernard et al., 2007).

Again, this is because firms do not necessarily disclose the set of specific products associated with their investment decisions. Below, we discuss how we use new granular information on greenfield investments and declaration-level Vietnamese customs data to construct data sets that overcome these challenges.

3.1 Greenfield FDI Data

In this study, we focus on greenfield FDI because it tends to introduce dramatic changes in production technologies, such as new facilities and production lines, and thus allows us to more directly investigate the relationships between foreign investments and subsequent trade consistent with our theoretical framework. Furthermore, it has been the main mode of FDI inflow for developing countries (Antràs and Yeaple, 2014).

To measure greenfield FDI, we obtained new data from fDi Markets, which covers all reports of new cross-border greenfield projects since 2003. The data includes detailed information such as the name, location, and industry of the parent/subsidiary, as well as project-specific business activities. To the best of our knowledge, it is currently the most comprehensive and reliable source of greenfield FDI available and used by several recent studies (e.g., Andrews, Leblang, and Pandya, 2018; Jung, Owen, and Shim, 2021), as well as the United Nations Conference on Trade and Development (UNCTAD) in their annual World Investment Report.[19]

We further refine the fDi Markets data in two ways. First, since fDi Markets codes FDI projects based on news announcements, some projects may not realize. While fDi Markets verifies and removes such projects, it can take time to happen.[20] To be more conservative in counting FDI projects, we thus only use data up to 2017 from fDi Markets.[21] Second, among these verified greenfield FDI projects, we only focus on those related to manufacturing. This is because we are mainly interested in FDI that is likely to affect a host country's export or import profile, rather than FDI engaging in service activities and targeting the host country's domestic market (e.g.,

[19] See `https://unctad.org/topic/investment/world-investment-report`.
[20] Our communication with fDi Markets representatives confirms this.
[21] We acquired data for all host countries up to 2013 in 2017 and additional data from 2014 to 2017 in 2022.

finance, construction, and retail).[22] We classify a project as manufacturing if it meets the following two criteria: (1) fDi Markets codes its investment activity as "Manufacturing," and (2) its assigned 3-digit NAICS code falls under "Manufacturing" according to the NAICS classification (i.e., 2-digit NAICS codes 31, 32, or 33).[23] This ensures that we use a conservative definition of manufacturing that excludes greenfield investment activities that simply establish sales or marketing offices for goods in the manufacturing industry but do not involve production. Out of 189,553 greenfield FDI projects that fDi Markets records between 2003 and 2017, our criteria yields 43,949 manufacturing-related projects.[24]

3.2 Linking Greenfield FDI and Trade Data

Country-Level Data. To evaluate whether FDI increases host countries' extensive margins, we first construct a country-level panel data set that links greenfield manufacturing FDI projects to the number of unique products host countries export. Specifically, we use the fDiMarkets data to identify all new greenfield manufacturing investment projects made by MNCs across countries between 2003 and 2017 and to construct measures of total new FDI projects for each country and year. We then trace the number of unique HS 6-digit products exported by countries in the UN Comtrade data set between 2004 and 2017 (the time frame lagged one year after the FDI data). To ensure the comparability of products across time and space, we use our `concordance` package to link each product to its latest nomenclature in HS Revision 2017.[25] We then use 100 USD as a threshold for counting whether a product is exported from a country in a given year to reduce data noise stemming from unusual small transactions (e.g., test shipment or non-business private shipment) or measurement errors. Additionally, we narrowed our sample to countries that consistently reported exports of at least 100 manufacturing products (out of 4,746 potential

[22] Data are also more limited for non-manufacturing industries. Although we believe that investments in other sectors (e.g., services) will also affect trade profiles and policymaking, it is notoriously difficult to gather such data at the firm and product levels.

[23] We use NAICS to minimize any potential measurement errors, as it is the categorization system used by fDiMarkets. Depending on data availability, future studies may adopt various other industry classification systems by using our open-source software package, concordance, available at `https://cran.r-project.org/package=concordance`.

[24] See Appendix Table A.3 for the breakdown of FDI projects by host country.

[25] The trade data include three different versions of HS codes during this period: HS Rev. 2002, HS Rev. 2007, and HS Rev. 2012.

manufacturing products at the HS 6-digit level) throughout the period in order to reduce the influence of countries that under-report or do not report at all in some years. Lastly, we merge the two measures with additional country-level control covariates (GDP, population size, regime type, and export volume), yielding a balanced panel data set of 105 countries from 2004 to 2017.[26]

Exploring the data, we find several cases where host countries began to export new products after receiving new greenfield FDI in related industries. For example, Vietnam exported 3,246 unique products in 2003, and in ten years, by 2013, the number had increased to 3,962. The set of added products included "clock or watch parts; dial"(HS 911430), the top exported product of Rhythm Precision Vietnam, a subsidiary of the Japanese clock-making firm Rhythm Watch which first invested and built its manufacturing plant in Hanoi back in November 2005. In Section 4, we conduct a more systematic test of the effect of FDI on extensive margins using a broader set of host countries.

Product-Level Data in Vietnam. To examine whether FDI increases intensive margins or trade liberalization at a more granular product level, we turn to the case of Vietnam and link project-level manufacturing greenfield FDI to HS 6-digit trade volumes and tariff rates using customs data provided by Datamyne.[27] The data contains records of all export and import products that passed through Vietnamese ports, including detailed information such as exporter/importer firm names, product HS codes at the 8-digit level, and invoice values between January 2018 and April 2020. With this declaration-level data, we can thus observe the set of products each firm exported and imported from Vietnam. For example, the top five exporters in 2018 identified in this customs data include Intel Products (a subsidiary of Intel, headquartered in the United States), Samsung Electronics (South Korea), Fuhong Precision Component (a subsidiary of Focus PC Enterprises, Hong Kong), AAC Technology (a Hong Kong-listed Apple supplier (Financial Times, 2019)), and New Wing Interconnect Technology (a subsidiary of Hon Hai Precision Electronics, Taiwan).

To be sure, data missingness is often a concern when relying on customs declarations. Thus, we check whether the Vietnamese customs data are consistent with existing measurements of trade volume. Appendix Figure A.1 shows that export volumes from the customs data are consistent

[26] We rely on the World Bank's World Development Indicators for data on GDP and population, Marshall and Gurr (2017) for polity2 scores, and UN Comtrade for data on export volume.

[27] Datamyne is a commercial database available at `https://www.datamyne.com/`.

with those obtained from UN Comtrade at the aggregated HS 2-digit product level, with only a few exceptions involving shipbuilding industries (HS 89) and security-sensitive products.

Matching firm names across multiple data sources is another challenging task. Although the customs data come with the exporting/importing firm names, they are often only available in Vietnamese, while firm names in fDi Markets are in English. What makes the task even more challenging is that firm names are not necessarily consistent within or across the two datasets (e.g. 'British American Tabacco' vs. 'BAT'), and many similar firm names exist (e.g. 'Samsung' and 'Samsun CSA'). Furthermore, firm names may change over time (e.g. 'Matsushita' to 'Panasonic'). To address these issues, we carefully matched individual firm names between the FDI data and the customs data manually. Using the exporter-name (importer-name) search function in Datamyne, we searched for firm names that appeared in fDi Markets data. When there were multiple results in the customs data that contained our search term, we Google-searched each of the exporter (importer) names to ensure that they were linked to the MNC of interest. As a result, we were able to find export products for 243 parent-MNCs involved in 365 manufacturing greenfield FDI projects and import products for 323 parent-MNCs engaged in 449 projects.[28]

Using the linkage information above between products and FDI projects through specific MNCs, we were then able to compute a product-level measure of the total number of new manufacturing greenfield FDI projects associated with each product in a given year. For our intensive margin analysis, we then create a dichotomous version of the measure, where a value of one indicates that there exists at least one new manufacturing greenfield FDI project associated with a product before a given year and zero otherwise.

Although our approach allows an exact matching of HS products to each firm, we note two limitations. First, the customs data is limited to the years after 2018. For FDI projects in

[28] For validation, we compared the import (export) products to upstream (downstream) products linked to the NAICS code of each FDI project using the U.S. Input-Output table (available from the Bureau of Economic Analysis (BEA) (`https://apps.bea.gov/industry/xls/io-annual/Supply_2007_2012_DET.xlsx`) and our `concordance` package. The motivation is that a firm's imports or exports should track closely with the products upstream or downstream of the firm's core FDI activity. In support of our FDI-trade linkages based on customs data, the set of upstream (downstream) products associated with each FDI project's NAICS industry covers, on average, 89% (82%) of the HS 6-digit import (export) products we obtain through the customs data.

the earlier years, for which customs data are unavailable (before 2017), we make an assumption that firms were exporting (importing) the same products that they exported (imported) after 2018. While not ideal, we contend that this assumption is reasonable as establishing firm-specific production facilities involves substantial sunk costs, and thus MNCs have incentives to maintain similar production operations. Second, matching exporter or importer names to MNCs may not completely capture all the products traded by these firms. For example, although NIKE has been heavily producing in Vietnam, we do not observe NIKE's name in exporter records. This is likely because NIKE is exporting through multiple local contracting firms. Indeed, one of NIKE's contracting firms, TAE KWANG VINA, appears in the customs data as one of the top footwear exporters in Vietnam. In this regard, the estimates that we present in Section 4 can be seen as conservative. This is because MNCs' contractors can also increase imports or exports, and thus if we exclude MNCs' transactions through their contractors, we will likely underestimate MNCs' overall trade effects.

We merge our product-level measures of FDI association with measurements of other product-level characteristics used in our analyses. These measures include, e.g., product differentiation, upstreamness/downstreamness, intermediateness, etc. Note that constructing product-specific covariates requires researchers to carefully navigate across various classification systems. For example, Rauch (1999) classifies each 4-digit Standard International Trade Classification (SITC) code by whether it is "differentiated" or not. Building on Rauch's classification, we measure the level of product differentiation for each HS 6-digit product by matching HS codes to SITC codes and then computing the share of matched codes that are classified as "differentiated." To measure upstreamness/downstreamness, we rely on the estimates from Antràs et al. (2012) and Antràs and Chor (2013) for 40 countries between 1995 and 2011. Since these estimates were computed at the International Standard Industrial Classification (ISIC) 2-digit level, we matched HS 6-digit codes to ISIC 2-digit codes and then computed the weighted average of the estimates for each of our HS products.[29] We calculate intermediateness based on the share of HS 6-digit codes that include either the word "part(s)", "intermediate", or "component" in its description. We make all measures publicly available through our concordance package. Overall, our product-level panel

[29] Since our panel extends beyond 2011, we use 2011 estimates for all subsequent years.

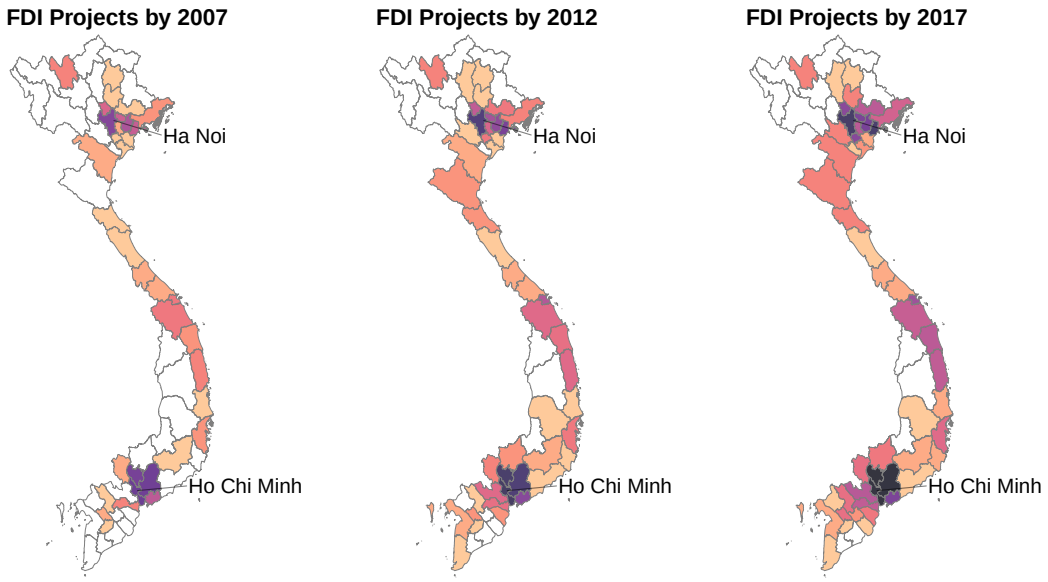

Figure 2: **Increase in Manufacturing Greenfield FDI Projects in Vietnam, 2003–2017**. The color scale corresponds to the cumulative number of new greenfield FDI projects observed in each province in the period 2003–2007 (left), 2003–2012 (center), and 2003–2017 (right). The shading is proportional to the logged cumulative count.

data set consists of 5,115 unique HS 6-digit products across 15 years (2003–2017).[30]

Empirical advantages aside, Vietnam represents a theoretically important case to focus on because Vietnam has become one of the top recipients of greenfield FDI and an integral part of GVCs (Malesky, Gueorguiev, and Jensen, 2015). According to fDi Intelligence (Financial Times), Vietnam was by far the top-ranked emerging economy in their Greenfield FDI Performance Index in 2014 and 2015, receiving around 6.5 times more greenfield FDI compared to the size of its economy (Financial Times, 2016). Figure 2 illustrates the increase and regional concentration in these FDI projects in Vietnam over time. Meanwhile, the volume of Vietnamese trade also exponentially increased over this period. As shown in Figure A.2 in the Appendix, our data indicate that Vietnam scores high on both its total number of incoming greenfield FDI projects relative to the size of its economy and its growth in total export volume. Lastly, Vietnam has actively sought preferential trade agreements after joining the World Trade Organization (WTO) in 2007. Table A.2 in the Appendix shows that Vietnam is now deeply embedded in a network of multiple bilateral free trade agreements and regional trade agreements.

[30] Products missing product differentiation and upstreamness/downstreamness measurements (270 products in total) are omitted from the panel. See Appendix Table A.1 for summary statistics.

Anecdotal evidence abounds on how FDI affected Vietnam's trade profile. For example, crude petroleum used to be the largest source of exports for Vietnam in 2000 (OEC, 2020). Following an influx of greenfield investments in textile by MNCs from Taiwan (e.g., Tainan Spinning), Japan (e.g., Teijin Frontier), and South Korea (e.g., Youngone) in the early 2000s, textile became the largest export industry in Vietnam by 2010. By 2019, MNCs' subsidiaries in Vietnam accounted for 70% of textile and garment export revenues (Nguyen, 2020). Similarly, following Samsung's greenfield investments in the late 2000s, electronics and communication equipment became the top export industry in Vietnam by 2018. In 2017, Samsung alone accounted for almost a quarter of Vietnam's total exports (The Economist, 2019).

4 Empirical Findings

We present below empirical analyses of our data. In Section 4.1, we first investigate whether new greenfield manufacturing FDI projects expand the number of unique HS 6-digit exports at the country level (i.e., the extensive margin), using our country-level panel data set. Next, we examine whether they increase trade volume at the product level (i.e., the intensive margin). To accurately evaluate this, we turn to the case of Vietnam and use our product-level data. Section 4.2 examines whether products directly associated with greenfield FDI in Vietnam, made by MNCs from various home countries between 2003 and 2014, enjoyed deeper tariff cuts in Vietnam's 2015 bilateral free trade agreement with South Korea. To assess the external validity of our findings, we also expand the analysis to include trade agreements signed by nearly forty host countries.

4.1 Effects of FDI on Trade Profiles

4.1.1 Extensive Margin

We begin by evaluating whether countries with new inward FDI projects were more likely to experience a substantial expansion in their extensive margins of trade. To be sure, the expansion of extensive margins should depend on the baseline number of exported goods and other economic factors. For example, countries that have already received significant foreign investments, such as China, the U.S., India, and Russia, tend to have less room for expansion as they are already exporting a wide variety of products (see Figure B.1 in the Appendix). To address this issue, we fit a set of regression models to the country-level panel data (2004–2017) discussed in Section 3.2 and

estimate the effect of inward FDI on a country's extensive margin in the following year, controlling for the extensive margin in the previous year and other covariates as follows:

$$Y_{it} = \beta X_{i,t-1} + \rho Y_{i,t-1} + \delta \mathbf{Z}_{i,t-1} + \gamma_t + \epsilon_{it}, \tag{4}$$

where Y_{it} is the number of unique HS 6-digit products that country i exported at time t, the binary indicator $X_{i,t-1}$ denotes whether country i had at least one new inward manufacturing greenfield FDI project at $t-1$, and $Y_{i,t-1}$ denotes the dependent variable lagged by one year to account for baseline levels of extensive margins.[31] Variables $\mathbf{Z}_{i,t-1}$ include a set of covariates for country i at $t-1$ (logged GDP, logged population, polity 2, and logged total export volume in USD), and γ_t denotes year fixed-effects. We cluster standard errors by country to account for within-country correlations of errors.

Consistent with **Hypothesis 1**, we find that countries with at least one new inward manufacturing greenfield FDI project in a given year add over 45 more products to their extensive margins in the subsequent year, holding other factors constant. Table 1 summarizes the results across various model specifications. Note that our main specifications in columns (1) and (2) do not include country fixed-effects. This is because it is well-known that the OLS estimate of β will suffer from significant "Nickell bias" if we include both country fixed-effects and a lagged dependent variable in models covering relatively short time periods (Nickell, 1981). As a robustness check, we analyze results only exploiting within-country variation by including country fixed-effects without the lagged dependent variable in columns (3) and (4). Our findings are robust to these model specifications, as shown in the table. Moreover, when we use the within-country change in extensive margin from the previous year as an alternative measure of the dependent variable (columns (5) and (6)), we find that new inward greenfield FDI projects in a country are associated with an around 3% increase in the country's extensive margin. Overall, the estimated effects are substantively large and stable in magnitude across models.

4.1.2 Intensive Margin

Next, we turn to the Vietnamese product-level panel data (2003–2017) discussed in Section 3.2 to conduct a close within-country test of FDI's effect on trade volume (**Hypothesis 2**). One

[31] To test for unit root, we conducted the Augmented Dickey-Fuller test for panel data and rejected the null that all series are unit roots.

DV:	Extensive Margin (t)				Δ Extensive Margin (%)	
	(1)	(2)	(3)	(4)	(5)	(6)
FDI (t-1, binary)	46.988***	45.237***	56.298*	53.646*	3.030*	2.977*
	(12.666)	(12.823)	(26.105)	(25.433)	(1.508)	(1.486)
GDP (t-1, logged)	13.001*	7.336	240.729	344.089*	0.064	−0.008
	(6.227)	(6.486)	(153.122)	(158.062)	(1.145)	(1.042)
Population (t-1, logged)	−5.538	−4.375	281.140	348.429	0.500	0.514
	(3.810)	(3.807)	(468.910)	(491.091)	(0.486)	(0.470)
Polity 2 (t-1)	−0.741	−0.496	−9.442	−9.486	−0.064	−0.063
	(0.849)	(0.838)	(6.883)	(6.932)	(0.099)	(0.096)
Export value (t-1, logged)	−2.359	4.233	30.237	50.729	−1.188	−1.112
	(6.010)	(6.521)	(33.254)	(49.879)	(0.810)	(0.726)
Extensive Margin (t-1)	0.973***	0.970***				
	(0.008)	(0.008)				
Constant	−123.353				17.806**	
	(79.368)				(6.322)	
N	1470	1470	1470	1470	1470	1470
Countries	105	105	105	105	105	105
Years	14	14	14	14	14	14
FE: year		✓		✓		✓
FE: iso3c			✓	✓		
R^2	0.99	0.99	0.98	0.98	0.017	0.024
Adj. R^2	0.99	0.99	0.979	0.979	0.013	0.012
BIC	18616.5	18687.5	20342.1	20417.4	12335.9	12419.5
Log Likelihood	-9282.7	-9270.8	-9770	-9760.2	-6146.1	-6140.5

Note: standard errors clustered by country in parentheses. + p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Table 1: **New Greenfield FDI and the Expansion of Extensive Margins**. Using the country-level panel data set described in Section 3.2, we find that new inward manufacturing greenfield FDI projects are associated with larger extensive margins (HS 6-digit export products) in the following year. Columns (1) to (4) show coefficients estimated using OLS regressions with/without a lagged dependent variable and with/without year and country fixed-effects. Columns (5) and (6) present results with the dependent variable operationalized as the percent change in a country's extensive margin between $t-1$ and t.

main concern when examining the product-level effect of FDI on trade volume is that MNCs may choose to invest in a country given its pre-existing trade environment (Büthe and Milner, 2008; Antràs, 2015) and political institutions (Jensen, 2003, 2008; Li, Resnick et al., 2003; Pandya, 2014a; Pinto, 2013; Nunn and Trefler, 2014), leading to a potential selection bias. To address this concern, we use a DiD identification strategy combined with a matching method to account for any confounding due to pre-treatment covariates and time trends (Imai, Kim, and Wang, 2021).

Difference-in-Differences. The outcome variable Y_{kt} is the annual export (import) volume of product k in year t from (by) Vietnam to (from) the world. The treatment variable X^*_{kt} is a dichotomous variable indicating whether, since the beginning of our study in 2003, there has been at least one new greenfield investment associated with product k before year t. Formally,

$X^*_{kt} = \mathbb{1}\{\sum_{t'=2003}^{t} X_{kt'} > 0\}$, where X_{kt} denotes the total number of greenfield FDI projects associated with product k in year t. In other words, we consider the very first year of MNC investments related to product k as the treatment while taking the "staggered adoption" approach for our estimation. This is because we are interested in analyzing the long-term effects of FDI as trade volume tends to grow gradually over time once a manufacturing facility is established. Note that because fDi Markets data only started in 2003, products associated with greenfield investments made before 2003 are considered unrelated to FDI at the outset of our analyses and will only be considered treated when additional FDI projects are associated with the product after 2003. As such, the approach will give us a more conservative estimate of the effect of FDI. When the outcome is Vietnamese export volume, we measure X_{kt} based on the exports of each FDI firm. In contrast, when the outcome is Vietnamese import volume, we measure X_{kt} through import declarations of each FDI firm. Moreover, in the latter case, when associating FDI projects to imports, we only link imports of products above the median level of upstreamness (discussed in Section 3) to be consistent with our theoretical framework.

For each treated product k whose treatment status changes from 0 to 1 in year t, we create a set of control products k' based on the history of treatment status:

$$\mathcal{M}_{kt} = \{k' : k' \neq k, X_{k't'} = 0 \ \forall t' \leq t\}. \tag{5}$$

That is, we compare each FDI-associated product against a set of other products with no connections to greenfield investments. To make a tighter comparison, we restrict and refine this matched set based on their similarity in pre-treatment covariates. First, we draw products from those in the same HS section. For example, the control set for product HS 854231 (electronic integrated circuits) consists of other similar products within the HS Section XVI category for machinery and mechanical appliances. Second, we put heavier weights (see $w_{k't}$ in equation (6)) on products that are similar regarding the following pre-treatment characteristics: Vietnamese average MFN tariff rate, import/export volume in the rest of the world (logged), mean import/export volume across all importing/exporting countries (logged), whether Vietnam reports import/export of any positive volume (binary), the number of countries Vietnam imports from or exports to, product differentiation, intermediateness, and upstreamness/downstreamness.[32]

[32] Product differentiation and intermediateness are time-invariant variables.

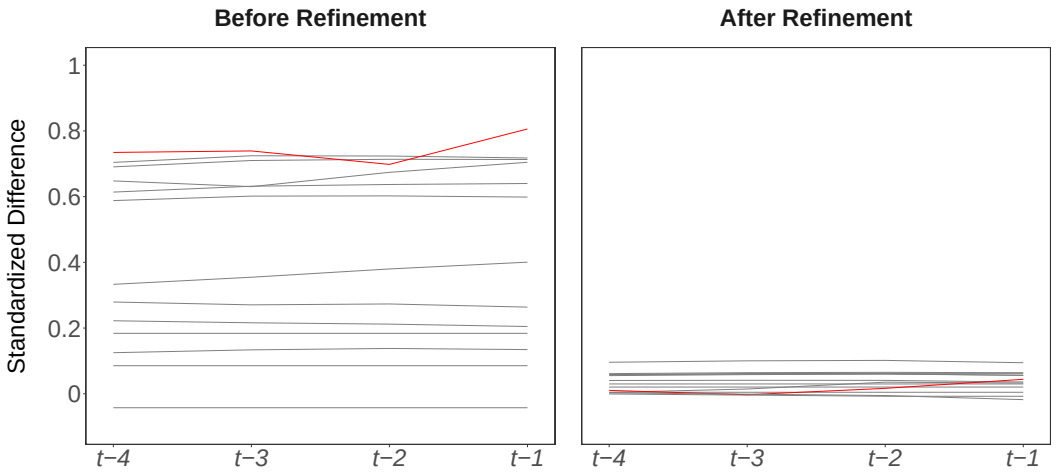

Figure 3: **Improved Covariate Balance Using the CBPS Weighting Method**. The figure shows the average covariate balance (standardized difference) between each treated unit and control units (y-axis) at each pre-treatment period (x-axis) for various covariates. Red lines indicate the average balance for the outcome variable (logged export volume), while grey lines represent the balance for the set of pre-treatment covariates discussed in Section 4.1.2. Compared to matching only on HS Section codes as shown in the left panel, the right panel demonstrates that standardized differences shrink substantially when applying the CBPS weighting method to control units. See Appendix Table B.1 for details.

Given the matched set for each FDI-related product, we then use the following non-parametric DiD estimator to evaluate the effect of FDI on the changes in trade volume:

$$\hat{\beta} = \frac{1}{\sum D_{kt}} \sum_{k \in K} \sum_{t=L+1}^{T-F} D_{kt} \left\{ (Y_{k,t+F} - Y_{k,t-1}) - \sum_{k' \in \mathcal{M}_{kt}} w_{k't} (Y_{k',t+F} - Y_{k',t-1}) \right\} \tag{6}$$

where $D_{kt} = 1$ if X^*_{kt} changed from 0 to 1 in year t, L represents the number of years for which we match treatment history (lag), and F is the future year we estimate the effects (lead). We weight each control unit using the weights $w_{k't}$ obtained by the covariate balancing propensity score (CBPS) (Imai and Ratkovic, 2014) method that balances the full set of covariates and the lagged dependent variable.[33]

Figure 3 shows that the proposed refinement method significantly improves the covariate balance between the products associated with FDI projects and those in the matched sets that are not associated with any projects. The left panel shows substantial differences between the two types of goods before the refinement. In fact, the mean differences for some of the covariates, such

[33] Compared to other refinement algorithms like the mahalanobis distance matching or the standard propensity score weighting, the CBPS weighting yielded better covariate balance.

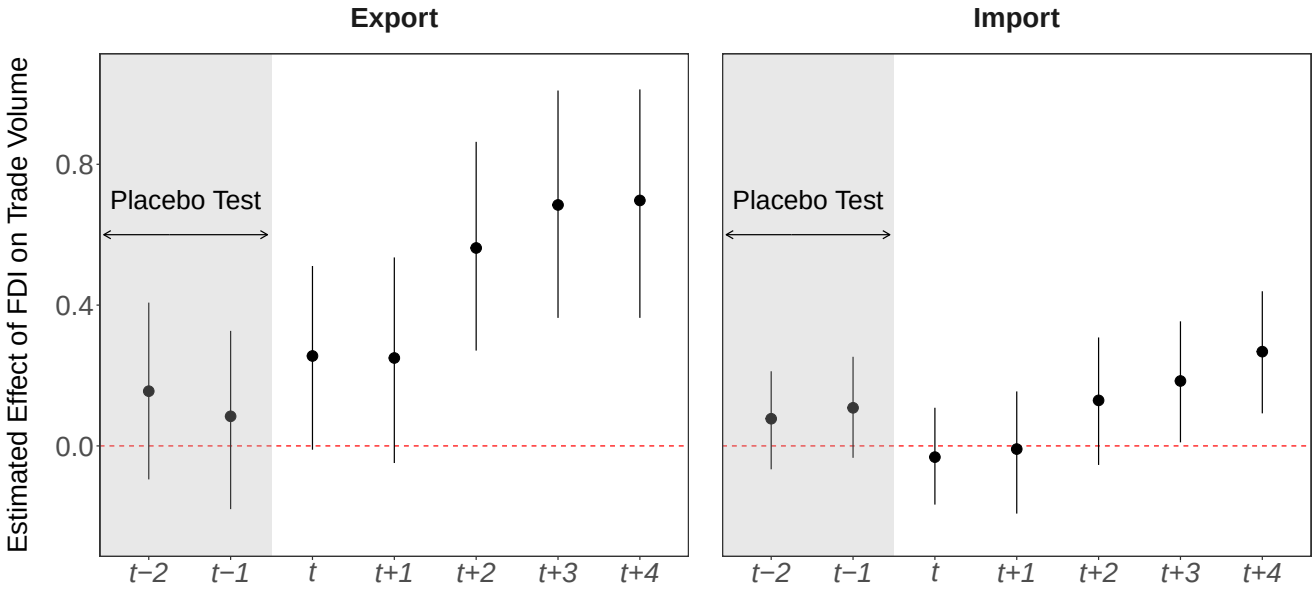

Figure 4: **Effects of FDI on Trade Volume**. This figure presents the estimated effects of a new manufacturing greenfield FDI project on the logged export volume (left) and import volume (right) of associated HS 6-digit products at $t + k$ for $k \in \{0, 1, 2, 3, 4\}$. The vertical bars represent 95% confidence intervals. Results show that a new manufacturing greenfield FDI project is estimated to increase the export volume of associated products by up to 100% within four years while increasing the import volume by up to 30%. In contrast, point estimates for time placebo tests (shaded in grey) are generally small and imprecisely estimated. See Appendix Table B.2 for details.

as the number of importing countries, exceed 0.7 standard deviations in terms of their respective variability. Furthermore, without the refinement, the outcome variable logged export volume (red line) shows an increasing trend, suggesting a potential violation of the parallel trend assumption. In contrast, the right panel shows that mean covariate differences, including those for the outcome variable, are substantially smaller after the refinement, with relatively flat changes across the four pre-treatment periods. These results further justify the DiD identification strategy.[34]

Consistent with **Hypothesis 2**, we find that new manufacturing greenfield FDI projects increase both the export and import volume of FDI-related products in subsequent years. Moreover, the effects are persistent and grow over time. As shown in the left panel of Figure 4, a new manufacturing greenfield FDI project made at year t increases the export volume of associated HS 6-digit products from around 30% at time t to 100% at time $t + 4$. While the effect size is more moderate for imports, a new FDI project is still estimated to increase the import volume of as-

[34] See Appendix Figure B.2 for similar improvements in the covariate balance for our import volume analyses.

sociated upstream products by approximately 30% at time $t+4$. To ensure the validity of the parallel trend assumption, we also conduct a set of time placebo tests. Here, we estimate the effect of greenfield investment at time t on the differences in trade volume in the pre-treatment periods at $t-1$ and $t-2$. As expected, we find small and imprecisely estimated effects on pre-treatment trade volumes.

Overall, we find that new manufacturing greenfield FDI projects lead to increased trade of FDI-associated products between Vietnam and the rest of the world. Together with the cross-country evidence on the extensive margin, the findings support our theory that greenfield investments change both the extensive and intensive margins of trade for host countries.

4.2 Effects of FDI on Trade Liberalization

We turn to investigate the effect of FDI on trade liberalization. We begin by analyzing product-level tariff cuts in the 2015 Korea–Vietnam bilateral FTA.[35] In the ten years between 2009 and 2019, South Korea has become Vietnam's third-fastest-growing export market (after the U.S. and China) and second-fastest-growing import market (after China).[36] Furthermore, as discussed in Section 3, examples of MNCs investing in Vietnam to facilitate final product exports to and intermediate product imports from large markets abound. As such, the FTA is a valuable case to test whether FDI has influenced trade policy outcomes through GVCs in ways consistent with our theoretical framework.

We conduct two analyses, one focusing on Korea's tariff cuts for Vietnamese products and the other on Vietnam's tariff cuts for Korean products. We fit the Tobit model below to a subset (2003–2014) of our product-level data discussed in Section 3.2:

$$
\begin{aligned}
Y_k^* &= \alpha_{j[k]} + \sum_{t=l}^{L} \beta_t X_{kt} + \delta \boldsymbol{Z}_k + \epsilon_k, \\
Y_k &= \begin{cases} Y_k^* & \text{if } Y_k^* > 0 \\ 0 & \text{if } Y_k^* \leq 0 \end{cases}
\end{aligned} \tag{7}
$$

[35] The FTA was signed on May 5th, 2015, and entered into force on December 20th, 2015. (`https://investmentpolicy.unctad.org/international-investment-agreements/treaties/treaties-with-investment-provisions/3587/korea-republic-of---viet-nam-fta-2015-`)

[36] See `https://oec.world/en/profile/country/vnm`.

where the outcome variable Y_k^* measures the depth of liberalization based on the logged difference between the MFN tariff rate and the FTA preferential rate. Following our theory, we focus on Vietnamese tariff reduction for their imported products from Korea while also analyzing the changes in Korean import tariffs towards Vietnamese exports. We compute our measures based on the tariff-line data from Barari and Kim (2020).[37] To facilitate consistent product comparisons across the two countries, we compute the mean tariff cut for HS 6-digit product k using the rates of all HS 10-digit tariff-line products within the same HS 6-digit category. We then log-transform the measure to account for the skewed distribution of the variable. Note that the outcome variable is time-invariant, and thus our analysis leverages the variation across products.

The variable $\alpha_{j[k]}$ represents industry fixed-effects at the HS section level (HS section j corresponding to HS 6-digit product k) that account for industry-level characteristics that may affect both FDI inflows and tariff cuts. The key predictor X_{kt} is a dichotomous variable measuring whether there were any new greenfield manufacturing FDI projects in Vietnam associated with product k for the first time in period t. Since it takes time for the political coalitions we identified in Section 2.2 to materialize, we expect a stronger effect of FDI on trade liberalization for the products associated with earlier FDI projects. Thus, we estimate the effect of FDI across four separate periods (β_t) to distinguish short-term and long-term effects. Estimating time-varying effects would also allow us to empirically examine whether the timing of FDI matters and rule out any potential sorting effects, e.g., observing any spurious correlations due to MNC's investment in anticipation of FTA signing. Similar to the previous section, we link products to FDI projects based on the customs data.

The variables $\boldsymbol{Z}_k$ represent an array of product-level controls aggregated over time by taking their mean values between 2003 and 2014. They include Vietnamese import/export volume (logged), import/export volume in the rest of the world (logged), mean import/export volume across all importing/exporting countries (logged), the number of countries Vietnam imports from or exports to, product differentiation, intermediateness, and upstreamness/downstreamness.

Consistent with our expectations, we find that HS 6-digit products linked to greenfield manufacturing FDI projects in Vietnam generally enjoy larger tariff cuts from both Korea and Vietnam

[37] Barari and Kim (2020) compiles product-level tariff data from UNCTAD's Trade Analysis Information System (TRAINS) and the World Bank's World Integrated Trade Solution (WITS) database.

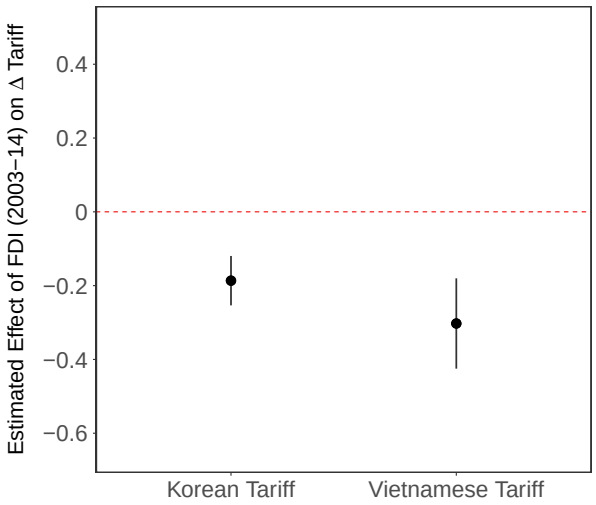

Figure 5: **Aggregate Effects of FDI on Tariff Cuts: 2003–2014.** This figure presents the estimated effect of the occurrence of greenfield manufacturing FDI projects between 2003 and 2014 (binary) on the average HS 6-digit product-level tariff cut (logged) in the 2015 South Korea–Vietnam FTA. The left estimate shows that Vietnamese export products associated with MNCs' FDI projects in Vietnam experienced about 19% deeper Korean tariff cuts. The right estimate shows that Vietnamese import products associated with MNCs' FDI projects in Vietnam enjoyed 30% deeper Vietnamese tariff cuts. The figure shows point estimates and 95% confidence intervals based on heteroskedasticity-robust standard errors.

in the 2015 FTA. Figure 5 presents the aggregate effect of FDI across the entire period between 2003 and 2004 and shows that FDI-associated Vietnamese export products received about 19% deeper tariff cuts from Korea compared to products that are similar but unrelated to any FDI projects. Meanwhile, FDI-associated Vietnamese import products received around 30% deeper tariff cuts from Vietnam.

Importantly, we find more pronounced effects among the products tied to earlier FDI projects. As shown in Figure 6, Vietnamese exports to Korea associated with earlier greenfield manufacturing FDI projects (i.e., between 2003 and 2005) tend to receive 27% deeper tariff cuts (far left estimate in the left panel). Meanwhile, Korean exports to Vietnam associated with earlier FDI projects enjoy 44% deeper tariff cuts (far left estimate in the right panel).[38] These large substantive effects provide supportive evidence for links between FDI and trade policymaking.

[38] Using 3-year windows yields a more reasonable sample size in each period t to estimate the effects precisely (see Appendix Table C.2 for details). We find similar patterns when estimating the effects by year (see Appendix Figure C.1).

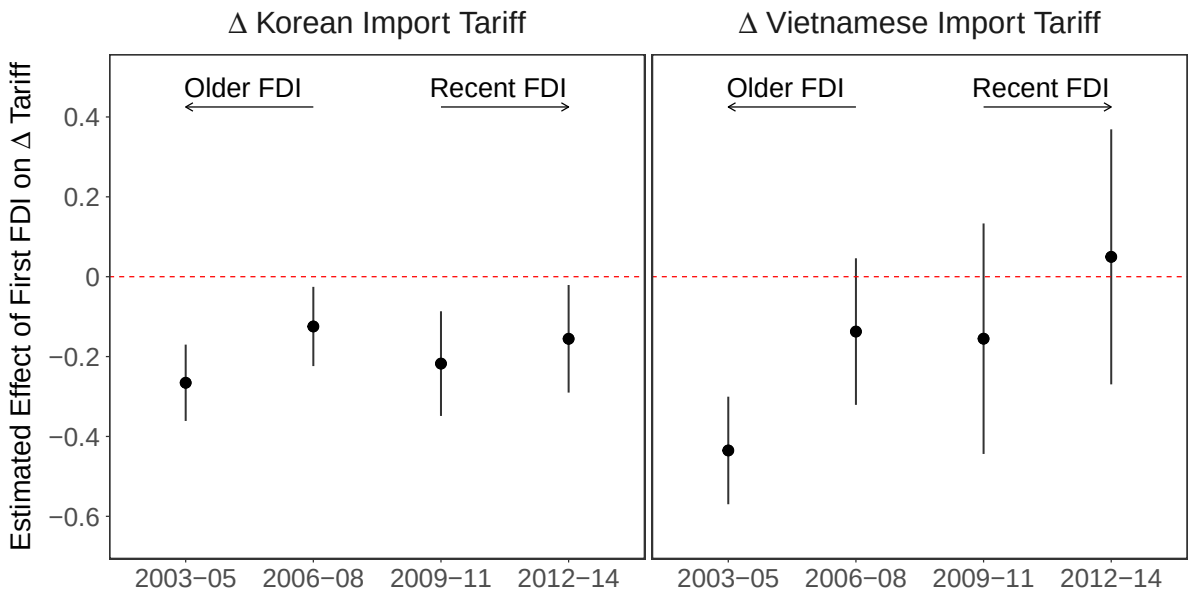

Figure 6: **Effects of FDI on Tariff Cuts**. This figure presents the estimated effect of the first occurrence of greenfield manufacturing FDI projects (x-axis) on the average HS 6-digit product-level tariff cut (logged) in the 2015 Korea–Vietnam FTA. The left panel shows that Korea offered larger tariff cuts to Vietnamese export products that were linked to MNCs' FDI projects in Vietnam. The right panel shows a similar effect regarding Vietnam's tariff cuts for Korean export (i.e., Vietnamese import) products. In both cases, products associated with FDI made first in 2003–2005 experienced deeper tariff cuts than those associated with recent FDI in 2012–2014. The panels present point estimates and 95% confidence intervals based on heteroskedasticity-robust standard errors. See Appendix Table C.1 for details.

We find relatively weaker estimated effects for products associated with recent FDI projects. For example, products linked to FDI projects made between 2012 and 2014 (or just 1–3 years before the FTA) receive only a 16% larger tariff cut from Korea. Furthermore, Vietnam's tariff cuts for Korean products linked to recent FDI projects turn statistically indistinguishable from zero. There are two potential reasons for this difference over time. First, consistent with our argument, building political coalitions with local contractors and other MNCs within the host country takes time. That is, MNCs are likely to have more established value chain networks the longer they participate in the local economy, which will, in turn, help them build more extensive and stronger political coalitions (Manger, 2012). Given that our FDI data draws on project announcements, effects may take even longer to observe, as project implementation also needs time. Second, MNCs may select into investing in Vietnam based not only on the current level of import tariffs but also on their anticipated tariff benefits or cuts in subsequent years. In fact,

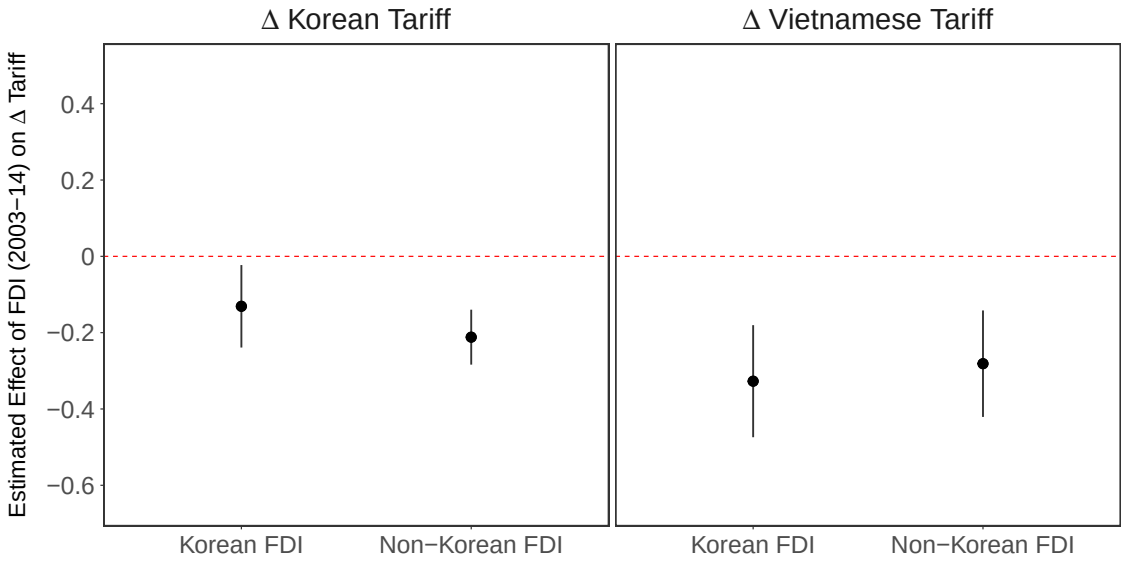

Figure 7: **Effects of Korean and Non-Korean FDI in Vietnam on Tariff Cuts.** This figure presents the overall estimated effect of FDI occurrence (2003–2014) on tariff cuts by FDI origin country. The left estimate in each panel focuses on the effect of Korean MNCs' FDI, while the right estimate focuses only on the effect of FDI from non-Korean MNCs. The panels present point estimates and 95% confidence intervals based on heteroskedasticity-robust standard errors.

the Vietnamese government frequently offers low or zero import tariffs on newly investing foreign firms' inputs (see, e.g., Vietnam Briefing, 2015), which lowers MNCs' incentives to engage in political activities to reduce trade barriers in the short term. Overall, however, the aggregate tariff reduction effect of FDI across our entire sample period is precisely estimated (Figure 5).

We show in Figure 7 that the tariff reduction effect we find is not simply driven by Korean MNCs' FDI in Vietnam. Disaggregating the overall effect of FDI by origin, Korean vs. non-Korean, we find that both types led to tariff cuts in the 2015 FTA. The left panel shows that Vietnamese export products associated with Korean FDI enjoyed deeper Korean tariff cuts by about 13% compared to those unrelated to any FDI projects. Meanwhile, Vietnamese export products associated only with non-Korean FDI also experienced tariff cuts by about 21%. The right panel shows that Vietnamese import products associated with Korean FDI (only non-Korean FDI) experienced Vietnamese tariff cuts by around 33% (28%). These results suggest that MNCs' FDI activities can influence trade politics and policy outcomes in third-party countries beyond their home and host.

Lastly, we evaluate the external validity of our findings by expanding our analysis to include

trade agreements signed by thirty-eight host countries between 2003 and 2015. We identify these countries based on hosts with at least one FTA entered into force during the sample period, product-level variation in inward FDI projects, and available data for host or partner covariates.[39] For each host country, we focus on its latest FTA during the sample period and estimate the effect of inward FDI projects on the host and partner's tariff cuts in the FTA. We focus on the latest FTA because our FDI data only started in 2003, and as discussed earlier, it takes time for FDI's effects to realize. Unlike the Korea-Vietnam FTA case, however, we could not match FDI projects to tariffs at a fine-grained firm-product level without systematic customs data across countries. Consequently, we rely on the concordance between NAICS 3-digit industry codes and HS 4-digit product codes to obtain HS products corresponding to each FDI project. Since this approach can be noisier, we fit the following varying-intercept model to leverage information across industries and countries (i.e., partial pooling) while also accounting for the complex hierarchical structure of our data:

$$Y_{ig} \sim N(\alpha + \eta_i + \theta_{h[g]} + \beta \mathbf{X}_i + \gamma \mathbf{Z}_g, \sigma_y^2), \tag{8}$$

where Y_{ig} is the deepest logged tariff cut within each HS 4-digit product g in each host country i's latest FTA during our sample period.[40] The fixed intercept is denoted by α, the varying intercept for each HS 2-digit group $h[g]$ that g belongs to is represented by $\theta_{h[g]}$, and η_i denotes the varying intercept for host country i. The covariates $\mathbf{X_i}$ include the key predictor, cumulative binary FDI (up to the year before the FTA entered into force), as well as the GDP per capita (logged) and polity2 scores of host and partner countries (in the year before the FTA entered into force). The HS 4-digit level covariates $\mathbf{Z_g}$ include mean import/export volume across all importing/exporting countries (logged), total world export volume (logged), product differentiation, intermediateness, and upstreamness/downstreamness.[41]

[39] For FTA data, we rely on the Design of Trade Agreements (DESTA) Database. See `https://www.designoftradeagreements.org/`. Appendix Table C.3 shows the list of the hosts and their FTAs included in the analysis.

[40] That is, $Y_{ig} = -\max_{\forall g_k \in g} \{\log((MFN_{ig_k} - applied_{ig_k}) + 1)\}$, where g_k represents 6-digit product k within each 4-digit category g. Measuring the deepest tariff cut also helps reduce noise, given less precise concordances between FDI projects and HS products. To account for any potential tariff phase-outs, we use 2021 preferential tariff rates from the WITS database.

[41] Appendix C.2.2 presents further details about the multilevel model and implementation.

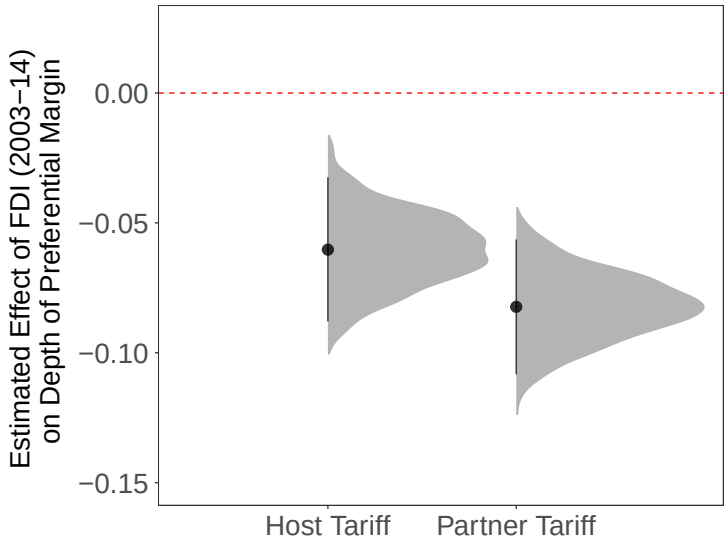

Figure 8: **Effects of FDI on Tariff Cuts: 38 Host Countries and their Latest FTAs between 2003 and 2015.** This figure presents the estimated effects of FDI's occurrence on the deepest HS 4-digit product-level tariff cut (logged) implemented in a host country's FTA. The left estimate shows the effect on the host's tariffs, and the right estimate shows the effect on the FTA partner's tariff. In both cases, FDI-associated products enjoyed deeper tariff cuts. The figure presents point estimates, posterior distributions, and 95% confidence intervals based on Bayesian estimates from varying intercept models.

Consistent with our previous findings, we find substantial tariff reductions by both host and partner countries across products associated with host countries' inward FDI. Figure 8 shows the posterior distributions and the 95% credible intervals (vertical line) of FDI's effects estimated with Bayesian inference. The results suggest that, on average, FDI-associated products experienced 6% deeper tariff cuts from the host country and 8% deeper cuts from the partner country (see Figure C.2 for convergence diagnostics). Taken together, our findings provide strong empirical support for **Hypothesis 3**, suggesting that governments are more inclined to liberalize trade policies for products directly linked to MNCs' FDI activities, even when compared to similar products within the same industry.

5 Concluding Remarks

Many scholars have contributed significantly to our understanding of the determinants of trade preferences and MNCs' location choices. While it is well-known that MNCs are important political actors in trade policymaking, the prevailing theoretical frameworks in the political economy of trade still rely on the assumption that trade patterns and preferences reflect the innate differences

in countries' underlying factor endowments. Meanwhile, the literature on the politics of FDI tends to focus on the determinants of firms' investment decisions while being generally silent about the subsequent implications of foreign investments on international trade and trade politics outcomes of related products, which may, in turn, affect future FDI decisions. Such gaps in the literature have led scholars to argue that we should "recast the separate study of trade and FDI into the study of global production in which trade and FDI are inextricably linked" (Pandya, 2016). We contribute to this effort by directly relating the two distinct firm-level activities, i.e., FDI and trade.

The new data sets we construct reveal highly detailed information about the connections between the two activities at the firm-product level. We find that greenfield FDI fundamentally alters the host country's trade profile regarding the number of newly traded products and trade volumes. We also find that MNCs' presence affects the host country's trade negotiation with, and market access to and from, other third-party nations beyond the host and home country pairs. Specifically, Vietnamese trade margins significantly expanded due to increased FDI from various countries. Moreover, the products imported and exported by these MNCs received substantially deeper tariff cuts in the bilateral FTA between Vietnam and South Korea. We further confirm these findings based on large-scale cross-country analyses.

More research can be conducted on the implications of these findings. As a spur to this research, we offer some initial speculations here. For one, the composition of foreign investments across industries can be a promising way to obtain more accurate measures of domestic trade preferences. We expect local labor, foreign capital, and their partners in the GVCs to form a political coalition that demands open trade and monetary policies. In this regard, the conventional view that emphasizes political cleavages either along factoral or sectoral lines within country boundaries is obsolete at best. As such, scholars should evaluate the distributional consequences of trade within and outside of GVCs. Additionally, our findings in Section 4.2 suggest that governments may face unique political constraints when setting policies toward goods or services with significant value chain linkages. Although it is notoriously difficult to observe firm-level political activities, especially in developing nations, future research should further examine political coalitions along GVCs more directly. Finally, by clearly revealing substantial differences in trade policies towards goods produced and exported by MNCs compared to other domestically

produced products, our study highlights that trade policymaking goes far beyond national and product boundaries. Perhaps most ambitiously, future research should strive to close the gap between FDI and international trade by directly incorporating network structures formed by MNCs and their upstream and downstream partners or products.

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Appendix A Data

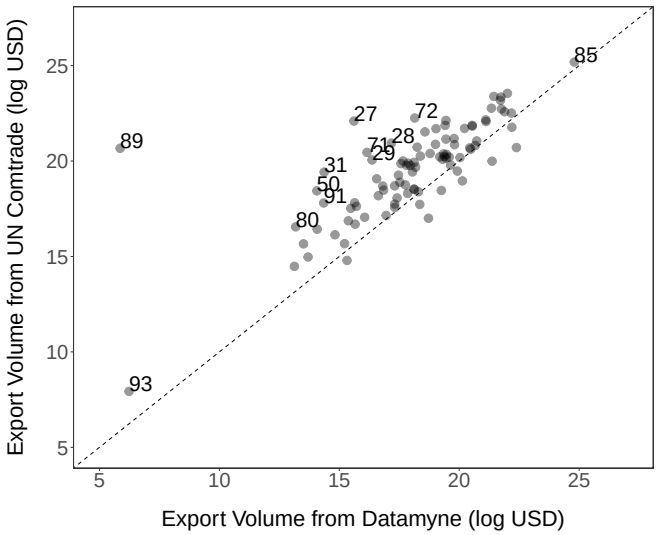

Figure A.1: **Validating Vietnamese Customs Data Against UN Comtrade Data, 2018**. This figure plots 2018 log export volumes at the HS 2-digit level from UN Comtrade data (y-axis) against those obtained through Datamyne's export declarations (x-axis). Data from the two sources are largely consistent as most products fall along the 45-degree line. The only exceptions are HS 89 (Ships, boats and floating structures) and security-sensitive products.

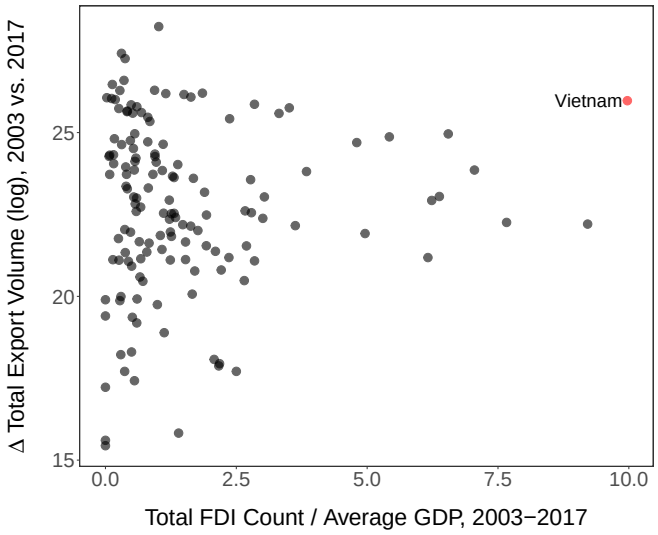

Figure A.2: **Greenfield FDI and Growth in Export Volumes**. This figure plots the change in a country's three-year average export volume in 2003 vs. 2017 (y-axis) against the total number of greenfield manufacturing FDI projects it received during the same period normalized by its average GDP in billion USD (x-axis).

Statistic	N	Mean	St. Dev.	Median	Min	Max
Export volume (logged)	76,725	10.743	5.305	11.8	0	24
Import volume (logged)	76,725	13.391	3.667	14.0	0	23
Export-related FDI (cumulative binary, Customs)	76,725	0.111	0.315	0	0	1
Import-related FDI (cumulative binary, Customs)	76,725	0.253	0.435	0	0	1
ROW export volume (logged)	76,725	19.981	1.803	20.014	6.738	28.045
ROW import volume (logged)	76,725	20.006	1.762	20.023	1.386	28.177
Mean export (logged)	76,725	15.696	1.542	15.688	6.046	23.433
Mean import (logged)	76,725	15.179	1.603	15.143	1.386	23.235
Number of countries Vietnam exports to	76,725	8.881	14.720	3	0	120
Number of countries Vietnam imports from	76,725	10.536	9.637	8	0	80
Vietnamese average MFN tariff rate	76,681	12.398	14.808	5.000	0.000	140.000
Intermediateness	76,725	0.055	0.229	0	0	1
Upstreamness	76,725	2.195	0.627	2.026	1.221	3.644
Downstreamness	76,725	2.458	0.278	2.463	1.724	2.996
Differentiation (Rauch-N)	76,725	0.594	0.484	1	0	1
Homogeneous goods (Rauch-W)	76,725	0.070	0.253	0	0	1

Table A.1: **Summary Statistics for Product-Level Panel Data.** The data consist of 5,115 unique HS 6-digit products (HS Revision 2017) over 15 years (2003–2017).

Name	Entry Into Force
Association of Southeast Asian Nations (ASEAN) FTA: Vietnam accession	1995
Association of Southeast Asian Nations (ASEAN) FTA: Laos and Myanmar accession	1997
Association of Southeast Asian Nations (ASEAN) FTA: Cambodia accession	1999
United States–Vietnam	2001
Association of Southeast Asian Nations (ASEAN)–China	2005
Association of Southeast Asian Nations (ASEAN)–China on Services	2007
Association of Southeast Asian Nations (ASEAN)–Japan	2008
Association of Southeast Asian Nations (ASEAN)–Korea on Services	2009
Japan–Vietnam	2009
Association of Southeast Asian Nations–Australia–New Zealand FTA (AANZFTA)	2010
Association of Southeast Asian Nations (ASEAN): Trade in Goods (ATIGA)	2010
Association of Southeast Asian Nations (ASEAN)–India	2010
Association of Southeast Asian Nations (ASEAN)–Korea	2010
Chile–Vietnam	2014
Korea–Vietnam	2015
Eurasian Economic Union (EAEU)–Vietnam	2016
Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP)	2018
Association of Southeast Asian Nations (ASEAN) FTA: Hong Kong accession	2019
European Union (EU)–Vietnam	2020
Cuba–Vietnam	2020
United Kingdom–Vietnam	2021

Table A.2: **FTAs Signed by Vietnam, 1995–2021**.

Host Country	Total	Manufacturing
United States	20173	4692
China	18644	6335
United Kingdom	14392	1328
India	11372	2583
Germany	11039	1303
France	7662	1311
Spain	6079	840
Russia	5618	1743
Mexico	4916	2027
Singapore	4875	386
Australia	4821	295
Poland	4521	1352
Brazil	4497	1451
Canada	4257	681
Romania	3554	823
Vietnam	3275	1186
Japan	2779	150
Ireland	2719	268
Netherlands	2703	233
Malaysia	2618	627
Thailand	2613	1195
Italy	2487	251
Belgium	2319	454
Hungary	2253	893
Czechia	2132	683
Turkey	2058	684
Indonesia	1935	658
South Africa	1832	302
Switzerland	1804	109
South Korea	1786	385
Philippines	1710	288
Bulgaria	1629	350
Saudi Arabia	1439	229
Colombia	1413	162
Argentina	1347	391
Sweden	1346	154
Austria	1321	221
Ukraine	1304	226
Denmark	1183	51
Slovakia	1177	479
Finland	1168	98
Chile	1075	119
Morocco	969	259
Egypt	947	191
Portugal	904	131
Peru	793	86
Lithuania	725	153
Bahrain	672	49
New Zealand	606	61
Croatia	603	73
Oman	597	63
Kazakhstan	570	141
Costa Rica	551	113

Host Country	Total	Manufacturing
Latvia	520	80
Israel	498	37
Greece	484	23
Estonia	478	137
Norway	475	30
Pakistan	471	108
Tunisia	428	118
Algeria	421	110
Cambodia	416	74
Azerbaijan	392	37
Sri Lanka	375	77
Jordan	349	38
Georgia	318	34
Luxembourg	310	20
Belarus	305	71
Tanzania	303	42
Slovenia	296	61
North Macedonia	290	85
Uganda	254	39
Uruguay	242	48
Dominican Republic	231	26
Zambia	221	53
Armenia	216	12
Ethiopia	203	92
Guatemala	181	24
Ecuador	172	30
Côte d'Ivoire	171	34
El Salvador	162	29
Namibia	143	19
Cyprus	142	6
Rwanda	140	16
Moldova	137	44
Nicaragua	134	34
Albania	116	24
Botswana	116	14
Senegal	112	18
Zimbabwe	107	21
Mauritius	105	6
Bolivia	102	12
Cameroon	87	18
Paraguay	85	30
Jamaica	78	7
Kyrgyzstan	51	11
Madagascar	48	8
Fiji	43	2
Burundi	34	1
Malawi	28	2
Guyana	23	4
Eswatini	22	5
Gambia	18	2
Benin	17	2
Suriname	9	3

Table A.3: **Total and Manufacturing Inward Greenfield FDI Projects by Host Country, 2003–2017**. This table shows the number of total greenfield FDI projects (second column) and manufacturing projects (third column) between 2003–2017 recorded in fDi Markets data for each of the 105 host countries used in the analyses in Table 1.

Appendix B Effects of FDI on Trade Profiles

B.1 Extensive Margin

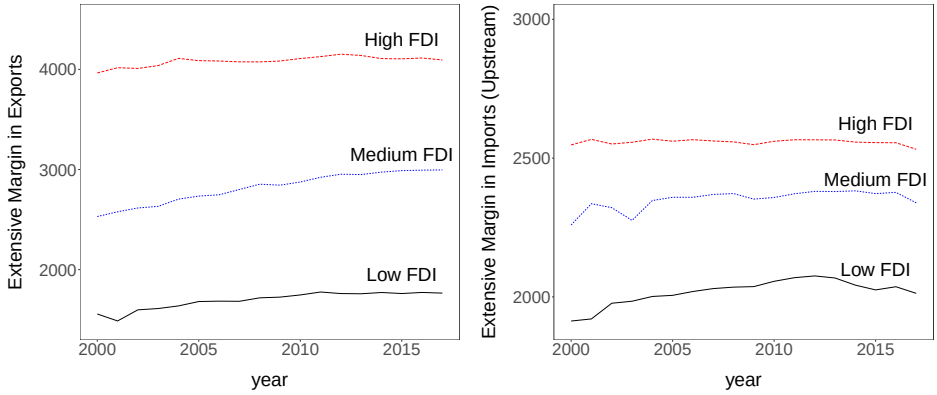

Figure B.1: **Extensive Margins in Trade across Years by Levels of Inward FDI**. This figure shows the average extensive margin in manufacturing exports (left panel) and imports (right panel) each year for each country group. FDI country groupings are created based on terciles of total inward FDI projects between 2003 and 2017. Countries with more total inward FDI projects had, on average, larger extensive margins in exports and imports of manufacturing products to begin with. Over time, these countries saw a larger growth in newly exported products, as opposed to more moderate growth in newly imported products. Extensive margin is measured based on the number of unique HS 6-digit products. The country sample includes 105 countries used in the analyses for Table 1.

B.2 Intensive Margin

	Before refinement				After refinement			
Variable	$t-4$	$t-3$	$t-2$	$t-1$	$t-4$	$t-3$	$t-2$	$t-1$
Export volume (logged, $t-1$)	0.73	0.74	0.70	0.81	0.01	0.00	0.02	0.04
Mean export volume (logged)	0.59	0.60	0.60	0.60	0.06	0.06	0.06	0.06
Mean import volume (logged)	0.61	0.63	0.64	0.64	0.06	0.06	0.06	0.06
Number of countries Vietnam exports to	0.33	0.35	0.38	0.40	0.00	0.01	0.04	0.03
Number of countries Vietnam imports from	0.65	0.63	0.67	0.70	0.10	0.10	0.10	0.09
ROW export volume (logged)	0.70	0.72	0.72	0.72	0.06	0.06	0.06	0.06
ROW import volume (logged)	0.69	0.71	0.71	0.71	0.06	0.06	0.07	0.06
Vietnamese average MFN tariff rate	0.22	0.22	0.21	0.20	0.00	0.00	−0.01	−0.02
Intermediateness	0.09	0.09	0.09	0.09	0.00	0.00	0.00	0.00
Upstreamness	0.12	0.13	0.14	0.13	0.04	0.04	0.04	0.04
Downstreamness	0.28	0.27	0.27	0.26	0.00	0.00	−0.01	−0.01
Differentiation (Rauch-N)	0.18	0.18	0.18	0.18	0.02	0.02	0.02	0.02
Homogeneous goods (Rauch-W)	−0.04	−0.04	−0.04	−0.04	0.03	0.03	0.03	0.03

Table B.1: **Improved Covariate Balance using the CBPS Weighting Method: Export Analysis**. This table presents the average covariate balance (standardized difference) between treated and control units across various variables at different pre-treatment periods ($t-4$ to $t-1$) before and after refinement. The results here are plotted in Figure 3.

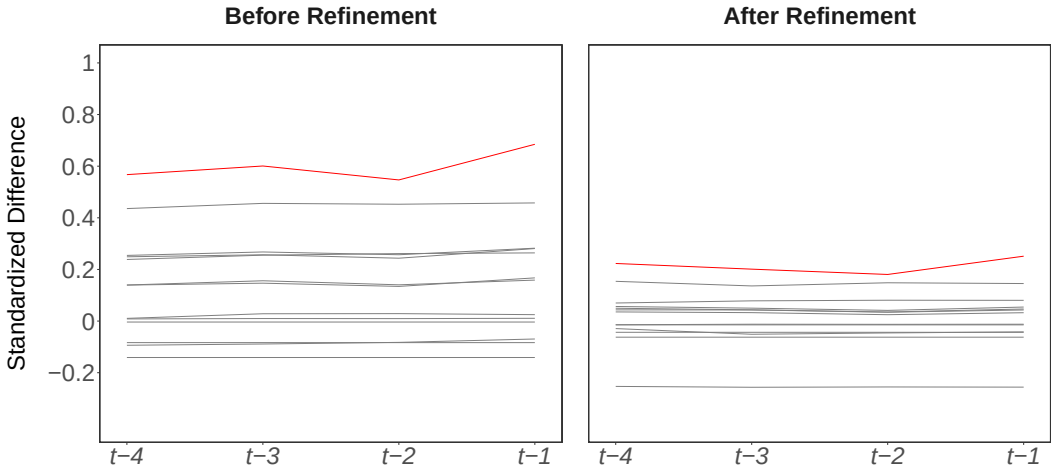

Figure B.2: **Improved Covariate Balance using the CBPS Weighting Method: Import Analysis**. This figure shows the average covariate balance (standardized difference) between treated and control units (y-axis) at each pre-treatment period (x-axis) for various covariates. Red lines indicate the average balance for the outcome variable (logged import volume), while grey lines represent the balance for the set of pre-treatment covariates discussed in subsection 4.1.2). Similar to Figure 3, this figure shows that standardized differences shrink substantially when applying the CBPS weighting method to control units.

	Export	Import
$t-2$	0.155	0.077
	(0.130)	(0.071)
$t-1$	0.084	0.108
	(0.128)	(0.075)
t	0.255	−0.032
	(0.135)	(0.070)
$t+1$	0.250	−0.009
	(0.147)	(0.090)
$t+2$	0.562	0.129
	(0.153)	(0.088)
$t+3$	0.685	0.184
	(0.164)	(0.085)
$t+4$	0.697	0.268
	(0.164)	(0.089)

Note: Bootstrapped standard errors in parentheses.

Table B.2: **Effects of FDI on Trade Volume: Estimates**. This table presents the estimated effects of a new manufacturing greenfield FDI project on the logged export volume (second column) and import volume (third column) of associated HS 6-digit products plotted in Figure 4.

Appendix C Effects of FDI on Trade Liberalization

C.1 Korea-Vietnam FTA Analysis

	ΔKorean Tariff	ΔVietnamese Tariff
FDI (for Export), 2003-05	−0.266***	
	(0.049)	
FDI (export-related), 2005-08	−0.125*	
	(0.051)	
FDI (export-related), 2009-11	−0.218**	
	(0.067)	
FDI (export-related), 2012-14	−0.156*	
	(0.069)	
FDI (import-related), 2003-05		−0.435***
		(0.069)
FDI (import-related), 2005-08		−0.137
		(0.094)
FDI (import-related), 2009-11		−0.155
		(0.147)
FDI (import-related), 2012-14		0.050
		(0.163)
ROW export (logged)	−0.106	−0.527***
	(0.102)	(0.147)
ROW import (logged)	−0.444***	−1.072***
	(0.112)	(0.178)
Mean export (logged)	0.078	0.476***
	(0.099)	(0.142)
Mean import (logged)	0.576***	1.261***
	(0.106)	(0.167)
Vietmanese export (logged)	0.008	−0.025**
	(0.005)	(0.009)
Vietmanese import (logged)	0.015	0.019
	(0.010)	(0.014)
Num. of exporting countries	−0.011	−0.246***
	(0.022)	(0.034)
Num. of importing countries	−0.023	0.519***
	(0.035)	(0.055)
Rauch-N	−0.078*	−0.459***
	(0.037)	(0.053)
Rauch-W	−0.043	−0.136+
	(0.072)	(0.074)
Intermediateness	−0.195***	0.099
	(0.047)	(0.098)
Upstreamness	0.023	0.765***
	(0.051)	(0.096)
Downstreamness	−0.743***	−0.589***
	(0.132)	(0.129)
N	5115	5115
BIC	12583.1	13728.2
Log Likelihood	-6125	-6697.6

Note: Robust standard errors in parentheses.
+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001

Table C.1: **Effects of FDI on Tariff Cuts: Estimates**. This table presents the estimated effect of the first occurrence of greenfield manufacturing FDI projects in each three-year period on the average HS 6-digit product-level tariff cut (logged) in the 2015 Korea–Vietnam FTA. The second column corresponds to the left panel of Figure 6, and the third column corresponds to the right panel.

Year	Export-Related FDI	Import-Related FDI
2003	90	584
2004	62	222
2005	102	152
2006	114	138
2007	114	142
2008	70	51
2009	55	45
2010	22	35
2011	40	44
2012	31	28
2013	33	19
2014	42	59

Table C.2: **Products Newly Associated with FDI Projects in Vietnam.** This table shows the number of products linked to FDI projects in Vietnam for the first time through MNCs' export and import activities.

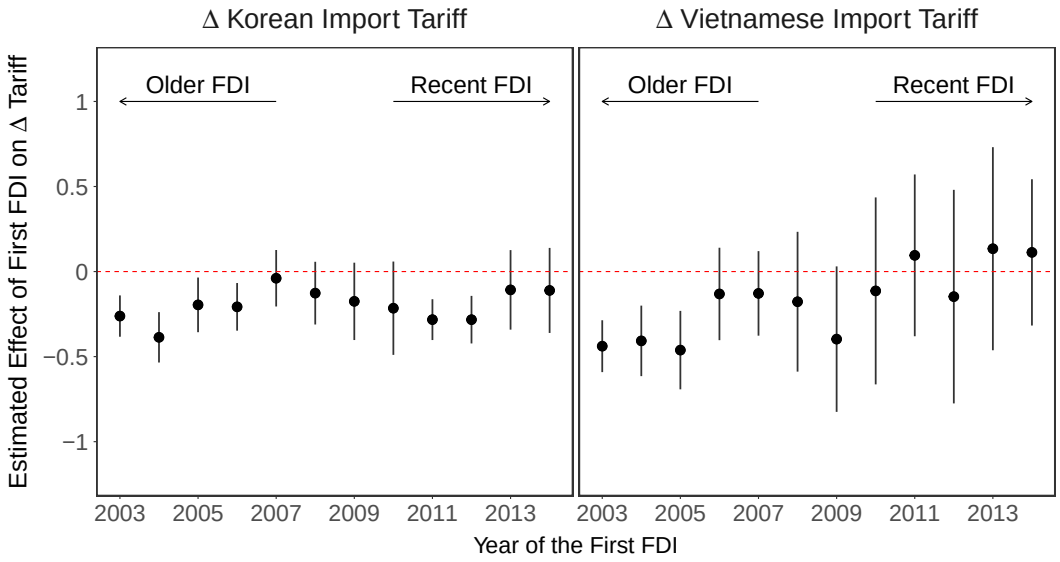

Figure C.1: **Effects of FDI on Tariff Cuts by Year.** This figure presents the estimated effect of the first occurrence of greenfield manufacturing FDI projects on the average HS 6-digit product-level tariff cut (logged) in the 2015 South Korea–Vietnam FTA. The left panel shows that Vietnamese export products linked to earlier FDI projects in Vietnam generally received deeper tariff cuts from Korea. The right panel shows a similar effect when focusing on Vietnam's tariff cuts for Korean export products (i.e. Vietnamese import products). The panels present point estimates and 95% confidence intervals based on heteroskedasticity-robust standard errors.

C.2 Cross-country Analysis

C.2.1 Data Sample

Host	Partner	Year
Albania	Turkey	2008
Australia	China	2015
Bahrain	United States	2006
Belarus	Serbia	2009
Canada	Honduras	2014
Switzerland	China	2014
Chile	Thailand	2015
Colombia	Mexico	2011
Costa Rica	Peru	2013
Cuba	El Salvador	2012
Algeria	Tunisia	2010
Ecuador	Guatemala	2013
Egypt	Turkey	2007
Georgia	Turkey	2008
Guatemala	Ecuador	2013
Honduras	Canada	2014
Indonesia	Pakistan	2013
Israel	Jordan	2006
Jordan	Canada	2012
Japan	Australia	2015
South Korea	New Zealand	2015
Moldova	Croatia	2004
Mexico	Panama	2015
Mozambique	Malawi	2006
Nicaragua	Taiwan	2008
New Zealand	South Korea	2015
Oman	United States	2009
Pakistan	Indonesia	2013
Peru	Mexico	2012
Philippines	Japan	2008
Singapore	Taiwan	2014
El Salvador	Cuba	2012
Tunisia	Algeria	2010
Turkey	Malaysia	2015
Taiwan	Singapore	2014
Uruguay	Venezuela	2009
United States	Panama	2012
Vietnam	South Korea	2015

Table C.3: **38 Host Countries and their Latest FTAs Between 2003 and 2015.**

C.2.2 Bayesian Multilevel Model Details

In the model described in equation (8), we use weakly informative priors, employing improper flat priors for each element of β and γ, t-distribution for the population intercept α, and half-t distribution for each standard deviation as follows:

$$\begin{gathered}
\eta_i \sim N(0, \sigma_\eta^2), \quad \theta_{h[g]} \sim N(0, \sigma_\theta^2) \\
\beta_m \sim U(-\infty, \infty), \quad \gamma_n \sim U(-\infty, \infty) \\
\alpha \sim T(\nu_\alpha, \mu_\alpha, \tau_\alpha) \\
\sigma_y \sim T(\nu_y, \mu_y, \tau_y), \quad \sigma_\eta \sim T(\nu\theta, \mu_\eta, \tau_\eta), \quad \sigma_\theta \sim T(\nu\theta, \mu_\theta, \tau_\theta),
\end{gathered}$$

where we set degrees of freedom at 3 for each of $\nu_\alpha, \nu_y, \nu_\eta, \nu_\theta$, the mode at 0 for $\mu_y, \mu_\eta, \mu_\theta$, -1.1 (0) for μ_α in the host tariff (partner tariff) analysis reflecting the median of Y_{ig}, and the scale parameters at 2.5 for $\tau_\alpha, \tau_y, \tau_\eta, \tau_\theta$. The coefficients are estimated with 5 chains with 3000 iterations each (among which 1000 are used as a warmup, and the posteriors are thinned by 10). The potential scale reduction factors ($\hat{R}$) are all below 1.05, indicating convergence. The trace plots below for the main effects (Appendix Figure C.2) also suggest convergence.

C.2.3 Convergence Diagnostics

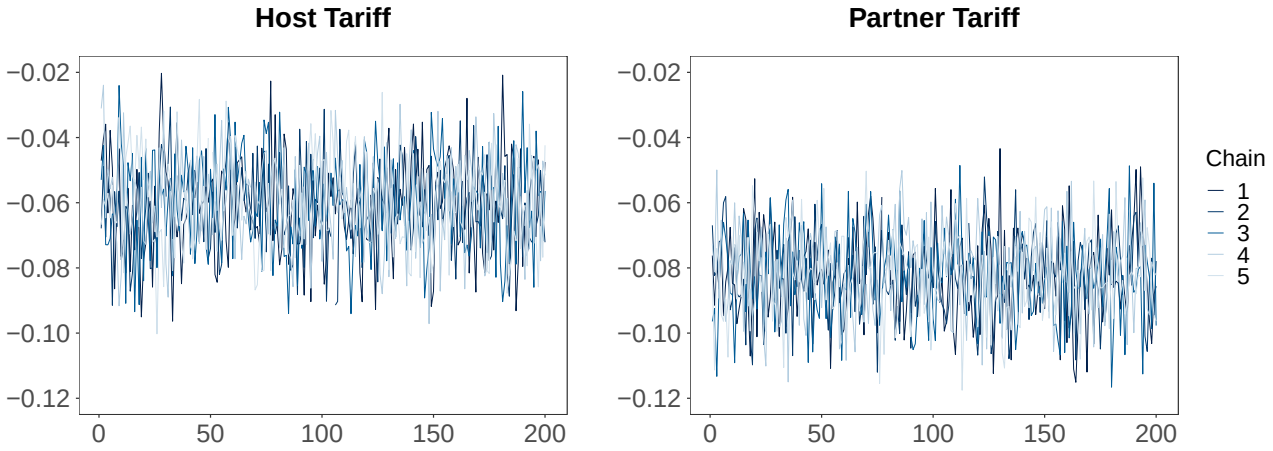

Figure C.2: **Trace Plots for Estimated Effects of FDI.** This figure presents the sampled values of the estimated effect of FDI (y-axis) across each thinned iteration after the burn-in period (x-axis) for each chain. The left panel presents those for the host tariff analysis, and the right panel represents those for the partner tariff analysis. In both cases, the trace plots suggest convergence.