(Job Market Paper)

Investment Liberalization and International Trade:

The Effect of BITs on the Extensive and Intensive Margins of Exports

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Abstract:

This paper investigates the effect of Foreign Direct Investment **(**FDI) on the extensive and intensive product margins of exports while considering bilateral investment treaties (BITs) as an investment liberalization policy in order to address and reduce the endogeneity concern between exports and FDI in the literature. The model in this paper theoretically demonstrates that investment liberalization increases the extensive product margin through lowering the variable cost of selling abroad and it decreases the intensive margin through lowering both the fixed investment cost and the variable cost of selling abroad. By virtue of a detailed dataset of 190 countries from 1988 to 2006, this paper provides empirical evidence that BITs promote the exports from both developed and developing countries significantly. They increase the extensive margin of developed countries' exports while decreasing the intensive margin significantly. However, BITs raise both the extensive and intensive margins of exports from developing countries.

1. Introduction

Globalization has not only spurred international trade greatly but also naturally enhanced the capital mobility worldwide. Due to the large volume and unique advantage of both international trade and FDI in stimulating growth and development, many scholars have been contributing to this still growing literature focusing on various aspects of international trade and FDI, including the structure and changing patterns of these two types of major global flows across countries, different economic impacts and location choices. Two central research questions are mainly addressed in the literature of the interaction between international trade and FDI: (1) Whether FDI substitutes or complements trade? (2) What are the causal relations between trade and FDI?

Traditional theoretical models in international trade, as well as conventional wisdom, always postulate that a firm chooses between exports and FDI, based on factors such as transportation costs, firm-level fixed costs, and trade barriers[1]. For instance, Helpman et al. (2004) develop a monopolistic competition model in which firms choose between exporting (a home country centralization) and FDI (a replication strategy in the foreign country). In their model, firms with different productivity level choose either exports or FDI depending on which strategy offers a higher profit. Schmeiser (2013) derives the gravity equations for product-level exports and FDI from the theoretical choice model, assuming firms choose to serve a country through either exports or FDI. Such an assumption is also widely applied in the literature of FDI. For example, Markusen (2001)'s model considers the choice for a multinational corporation (MNC) between exporting and a subsidiary, using a strategic-behavior approach to analyze how property rights, enforceable contracts, and intellectual property protection influence FDI into host economies.

[1] For example, Brainard (1997) offers "proximity-concentration tradeoff" to explain why FDI may displace trade. In addition, Markusen and Venables (1998) state that multinationals locate subsidiaries near different markets when plant-level specific fixed costs are low.

However, the empirical evidence often demonstrates a different perspective that exports and FDI are complementary[2]. This study also provides descriptive evidence through calculating the correlation between exports and FDI outflows/outward stock of 169 countries and regions from 1990 to 2014[3]. Table B1 in Appendix B displays the correlation between exports of goods & services (as the percentage of GDP) and FDI outflows (as the percentage of gross fixed capital) 1990-2014. This table shows that 112 out of 169 (69%) countries and regions have the positive correlation between exports and FDI outflows. This ratio is even higher among developed countries. About 81% developed countries show the positive correlation. Correlation between exports of goods & services (as the percentage of GDP) and FDI outward stock (as the percentage of GDP) 1990-2014 (Table B2) demonstrates that 127 out of 172 (74%) countries and regions have the positive correlation between exports and FDI outward stock. At a minimum, these two tables corroborate most of the empirical findings that exports and FDI are complementary.

Several studies address the importance of intrafirm transfer to explain the identified empirical complementary relationship between exports and FDI. Others emphasize that the substitutive or complementary relationship is determined by the type of FDI. This paper finds the substitutive effect of FDI on the intensive product margin of exports and the complementary effect of FDI on the extensive margin. MNCs view exports and FDI as two substitutive ways to serve the foreign market. If MNCs

[2] For example, Bouras and Raggad (2015) illustrate the complementary relationships between total exports and total FDI, between manufacturing exports and FDI as well as between non-manufacturing exports and FDI, focusing on 10 developing and non-developing countries from 1988 to 2012. Mullen and Williams (2011) examine how Canada's exports to OECD countries is influenced by outward and inward direct investment stocks to/from those countries. Using country-level data from 1989–2007, they emphasize that outward FDI merely displaces exports and that inward FDI strongly promotes intra-firm based export growth. Aizenman and Noy (2006) find a strong two-way positive linkage between trade and FDI.

[3] The dataset of exports comes from World Development Indicators, which contains information on exports for more than 200 countries and regions over the period 1960–2014. The dataset of FDI outflow and FDI outward stock both come from UNCTAD FDI/MNE database, which contains information on bilateral FDI for around 195 countries and regions over the period of 1990-2015.

establish or acquire foreign affiliates to produce a product abroad, they reduce the export of such product. Admittedly, FDI decreases the intensive margin of exports. This argument is consistent with the existing theoretical postulation that exports and FDI are substitutes. Meanwhile, the variety of exported goods increases because of such investment. Two factors contribute to this increase in the variety of exported goods. The first factor comes from "economic complementarity," which is the investment abroad by a downstream firm could create demands for parts and components, leading to an increase in exports by upstream firms in a home country. For example, the investment of automakers in foreign countries is likely to promote the exports of part suppliers from the home country. The second one is called "statistical complementarity," which is the expansion of a firm's product in a given foreign market could promote demands for the firm's other products (Head and Ries 2004, Nishitateno 2013)[4]. If the positive effect of FDI on the extensive margin of exports dominates the negative effect on the intensive margin, the identified complementary relationship between aggregate exports and FDI in numerous empirical papers could be justified.

By examining the effect on the extensive and intensive margins of exports separately, this paper addresses the aggregate bias in identifying the actual substitutive or complementary relationship between exports and FDI. For example, Nishitateno (2013) points out that the firm-, industry- and country-level aggregate dataset might illustrate a complementary relationship due to economic or statistical complementarity between products, even though FDI substitutes for exports at the product level. This paper attempts to capture the economic and statistical complementarity on the extensive product margin of exports while exploring the true substitutive effect on the intensive margin.

One of the empirical challenges in addressing the relationship between exports and FDI is the endogeneity. For instance, firms may decide to export for reasons unrelated to FDI, such as improved

[4] Brainard (1997) shows the possible statistical complementary channels, such as after-sale services, commitment-to-market effects on consumers as well as more efficient distribution.

productivity. Once export begins, the need for building an affiliate abroad may increase. This situation leads to a classic reverse causality problem: the growth of exports could result in the growth of FDI and not vice versa. This paper uses bilateral investment treaties (BITs) as an investment liberalization policy to increase FDI from developed to developing countries and analyzes how this policy could affect exports. This approach is an analogy to consumer theory that FDI substitutes for exports if reducing the "price" of FDI decreases demand for exports whereas FDI complements exports if reducing the "price" of FDI increases demand for exports. In this paper, BITs are expected the exogenously lowers the "price" of FDI (the cost of FDI).

This paper also contributes the literature of BITs by providing the effect of BITs on the extensive and intensive margins of exports. A large number of papers have shown that trade liberalization, such as the WTO or preferential trade agreements (PTAs), will promote exports (for example, Dutt 2013). However, the literature on BITs is not only considerably small but concentrated in the field of legal and political science rather than economics (Bergstrand and Egger 2013). Even though some papers have shown the positive effect of BITs on FDI, few papers (for example, Egger and Merlo 2012) extend the study of BITs to other economic activities.

Another contribution of this paper is providing the evaluation of U.S. international policy. According to the Office of the United States Trade Representative, BITs are designed to promote U.S. exports[5]. By examining the effect of BITs on the extensive and intensive margins of exports, this paper not only evaluates the effectiveness of BITs but also provides a mechanism through which BITs promote exports.

In the rest of this paper, section 2 presents the literature review and section 3 presents the theoretical model. Section 4 presents the econometric models and data, together with the discussion about the

[5] https://ustr.gov/trade-agreements/bilateral-investment-treaties

estimation results in section 5. The last section concludes the paper and provides future development of this study.

2. Literature Review

Several studies have shown the importance of intrafirm transfer in identifying the complementary relationship between exports and FDI. For example, Head and Ries (2001) conclude with the complementary relationship between exports and FDI, using 25 years of data on 932 Japanese manufacturing firms. They demonstrate the importance of intrafirm transfer by showing that firms that are unlikely to supply intermediate goods to overseas production affiliates exhibit substitution relationship between exports and FDI[6].

Seminal theoretical studies by Markusen (1997, 2002) argue that whether FDI promotes or replaces exports is determined by the type of FDI. Markusen and Maskus (2001) show that vertical FDI, where MNCs locate certain stages of production in foreign countries, is likely to stimulate exports; horizontal FDI, where MNCs replicate similar plants in foreign countries, is likely to replace exports. Amiti and Wakelin (2003) empirically corroborate Markusen (1997, 2002) by estimating the effect of investment costs on exports with the dataset of 36 countries from 1986 to 1994. They find that investment liberalization increases exports when source country and host country differ in relative skill endowments

[6] Several papers have also pointed out the intrafirm transfer as the potential explanation for the observed complementary relationship between exports and FDI. For example, Grubert and Mutti (1991) and Lipsey and Weiss (1984) find the evidence that FDI increases exports of intermediate goods. Sachs and Shatz (1994) provide evidence of a complementary relationship between exports and FDI for the United States that may largely reflect the role of intra-firm trade. Blonigen (2001) shows that Japanese investment in the US complements the exports of related intermediate products from Japan to the United States. Clausing (2000) shows a complementary relationship between foreign investment activity (as measured by affiliate sales) and intra-firm trade. Nishitateno (2013) illustrates a complementary relationship between FDI by upstream Japanese's automobile firms (i.e. parts suppliers) and exports of intermediate goods (i.e. auto parts) from Japan, covering 32 products and 49 host countries from 1993 to 2008.

and when trade costs between them are low, whereas investment liberalization reduces exports when two countries have similar relative skill endowments and size, as well as have moderate to high level of trade costs. Aizenman and Noy (2006) also point out that a developing country experiencing rapid improvement in its productivity will attract growing inflows of vertical FDI, increasing thereby its international trade.[7]

In the empirical work of examining the linkage between exports and FDI, one concern is the endogeneity (spurious relationship) between these two flows. A complementary relationship between exports and FDI might simply result from an unobserved factor. For example, at the aggregate level, an exogenous increase in foreign demands of home country's products might generate the rise in exports and FDI simultaneously. At the firm level, more productive firms serve the foreign market by both exports and FDI, yet it does not indicate that more FDI leads to higher exports.

Instrumental-variable techniques have been adopted in order to address the endogeneity in the literature. However, the challenge of this method is finding appropriate instruments that directly affect FDI but do not belong to the exports equation[8][9]. Another solution to address the endogeneity issue is cross-price elasticity approach. Grubert and Mutti (1991) initiate this approach by interpreting the corporate income tax as part of the cost of FDI. They show that high corporate income taxes in the destination country tend to lower exports to that country and this result supports the complementarity relationship between exports

[7] Horst (1976) also states that manufacturing activities of foreign affiliates tend to reduce the exports of final goods from the home country, whereas ancillary activities of foreign affiliates may increase exports. Such ancillary activities include distribution, repairs, technical assistance, and adaptation of products in order to suit local preferences. It proposes that the possible complementary relationship in the empirical papers is resulting from inadequate differentiation between manufacturing and ancillary activities in the FDI dataset.

[8] A valid instrument must be 1) closely correlated with FDI, 2) not related to the error term of the exports equation, and 3) has no direct effect on exports.

[9] Blomström et al. (1988) use membership of the EEC as an instrument for affiliate sales, but this instrument is criticized by Head and Ries (2004) that the European Community levies a common external tariff and it has a direct effect on exports. The instrumental variable of average employee compensation used in Clausing (2000) is also criticized since it does not just affect exports decisions by changing FDI. Higher wages in the destination country can stimulate exports directly regardless of the level of FDI in the host country.

and FDI. One seminal empirical paper by Amiti and Wakelin (2003) estimates the effect of investment costs on exports, based on the theoretical model of Markusen (1997, 2002). They use a simple average of several impediments to investment, such as government restrictions on foreign companies acquiring domestic control, immigration rules covering hiring and firing practices, restrictions on raising capital and anti-trust laws, as a measure of investment costs. Several papers have also shown that lower costs of doing business environment increase bilateral trade flow (Anderson and Marcouiller 2002; Anderson and van Wincoop 2004; Kneller et al. 2008).

Another strand of the empirical papers examines the effect of trade liberalization on FDI (Martens 2008; Liargovas and Skandalis 2011; Zakaria et al. 2014). Even though trade openness, which is usually calculated as the sum of export and import divided by GDP, is widely used in several papers, this measure still struggles with endogeneity because of being contaminated by FDI data. Hence the estimation might be biased in the analysis of the trade openness's effect on FDI. However, it is not easy to conduct a comprehensive study about the effect of exogenous trade liberalization policy on FDI since there is no multi-country bilateral FDI dataset available before most countries' trade liberalization date[10]. Therefore, examining the effect of investment liberalization on exports is the best way to study the linkage between exports and FDI with the endogeneity concern and with the available dataset.

3. Theoretical Model

The theoretical model in this paper is based on Kneller et al. (2008), which extend the simplified version of the heterogeneous firm models with trade in Head and Ries (2003, 2004) and incorporate productivity hierarchy of domestic exporters and multinationals in Helpman et al. (2004). The main difference

[10] According to the liberalization date published from Wacziarg and Welch (2008), which proxies for the date when countries reached a threshold of broad reforms including macroeconomic stabilization, privatization, trade opening, and the end of interventionist states (such as communism), most of the countries, especially developed countries, have trade liberalization dates before the time when comprehensive bilateral FDI dataset is available.

between the model in Kneller et al. (2008) and my model is that Kneller et al. (2008)'s model demonstrates the effect of investment liberalization on the firm-level extensive and intensive margins, whereas my model illustrates the effect on product-level margins. Kneller et al. (2008) show that investment liberalization increases both the number of exporting firms and the average exports per firm through lowering the variable cost of selling abroad. This model demonstrates that investment liberalization increases the variety of exported products through lowering the variable cost of selling abroad, yet it decreases the average value of exported products through lowering both the fixed investment cost and the variable cost of selling abroad.

In this model, each firm faces a downward-sloping demand curve and produces one intermediate (upstream) good and one final (downstream) good. In addition, each firm chooses between two production strategies to serve the foreign market: 1) the first strategy is called "centralization", where the firm locates both upstream and downstream production in the home country and exports to the foreign country; 2) the second strategy is called "branching", where the firm performs only the upstream production at home but moves the downstream production to the foreign country (Head and Ries 2004). Each firm chooses the production strategy that yields higher profit based on factors such as transportation costs, trade barriers as well as fixed costs.

3. 1. Model Setup

The demand curve is

$$q_i = M * (A - p_i)$$

where i is the firm index, p_i is firm-level price, M and A are market size and demand shifter respectively that are assumed to be exogenous to each firm.

The production technology of final good is following Leontief production function:

$$q_i = \varphi_i * \min(l_i, m_i)$$

where l_i is the quantity of labor, m_i is intermediate inputs, and φ_i is total factor productivity.

The production technology of intermediate good is constant to scale technology: one unit of output requires one unit of labor. In a competitive market of intermediate good, the price of the intermediate good is the wage.

Each firm i has either centralization or branching strategy to service the foreign market. With the centralization strategy, the firm is still a domestic firm, and it exports the final good (X_C). This domestic firm faces a fixed exporting cost F_X , and per unit transportation cost of the final good τ_D . With the branching strategy, the firm is an MNC, and it exports intermediate good (X_B). This MNC faces a fixed FDI cost F_I , and per unit transportation cost of the intermediate good τ_U . Here, $F_I > F_X$ since FDI involves much more operation in the foreign country than exporting; $\tau_U < \tau_D$, since the final good is more expensive than intermediate good to transport.

The profit of the centralization strategy is [11]

$$\pi_C = p_X q_X - C_X q_X - \tau_D q_X - \theta q_X - F_X$$

Substituting $q_X = M_F * (A - p_X)$ (M_F is the foreign market size) and $C_X = \frac{2W_H}{\varphi}$ (W_H is the wage in the home country)[12] into the profit function,

[11] It equals to the revenue from selling abroad, minus the production cost of final goods, minus the transportation cost of final goods, minus overseas the variable cost of selling abroad[11], and minus fixed exporting cost.

[12] Based on the final good production function, the firm needs $\frac{1}{\varphi}$ unit labor and $\frac{1}{\varphi}$ unit intermediate good in order to produce one unit of final good q_X in the home country. Meanwhile, the production of one unit intermediate good

$$\pi_C = \left(A - \frac{q_X}{M_F} - \frac{2W_H}{\varphi} - \tau_D - \theta \right) q_X - F_X$$

Profit maximization gives us

$$q_X^* = \frac{M_F}{2}\left(A - \frac{2W_H}{\varphi} - \tau_D - \theta \right)$$

$$\pi_C = \frac{M_F}{4}\left[A - \left(\frac{2W_H}{\varphi} + \tau_D + \theta \right) \right]^2 - F_X \qquad [1]$$

And the value of exported final good

$$X_C = p_X q_X = \frac{M_F}{4}\left[A^2 - \left(\frac{2W_H}{\varphi} + \tau_D + \theta \right)^2 \right] \qquad [2]$$

The profit function of the branching strategy is[13].

$$\pi_B = p_B q_B - C_B q_B - \frac{\tau_U}{\varphi} q_B - \theta q_B - F_I$$

Plugging the demand function and the marginal production cost function[14] into the profit function,

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requires one unit of labor. Hence, the firm requires $\frac{2}{\varphi}$ unit labor in order to produce one unit of final good q_X in the home country, and then the marginal production cost of final goods is $C_X = \frac{2W_H}{\varphi}$.

[13] It equals to the revenue from selling abroad, minus the production cost of final goods, minus the transportation cost of intermediate goods, minus the overseas cost of exporting intermediate goods, minus fixed FDI cost.

[14] In order to produce one unit of final good q_B, the firm needs $\frac{1}{\varphi}$ labor in the home country and $\frac{1}{\varphi}$ labor in the foreign country. With this strategy, the firm only needs to transport $\frac{1}{\varphi}$ units of intermediate good from home

$$\pi_B = \left(A - \frac{q_B}{M_F} - \frac{W_F + W_H + \tau_U}{\varphi} - \theta \right) q_B - F_I$$

Profit maximization gives us

$$q_B^* = \frac{M_F}{2}\left(A - \frac{W_F + W_H + \tau_U}{\varphi} - \theta \right)$$

$$\pi_B = \frac{M_F}{4}\left[A - \left(\frac{W_F + W_H + \tau_U}{\varphi} + \theta \right) \right]^2 - F_I \qquad [3]$$

Thus, the value of the intra-firm trade between headquarter and foreign affiliates is

$$X_B = W_H \frac{q_B}{\varphi} = \frac{M_F}{2\varphi} W_H \left(A - \frac{W_F + W_H + \tau_U}{\varphi} - \theta \right) \qquad [4]$$

This model is in line with the early theoretical literature on location choice that exports and FDI are substitutive ways to serve the foreign market. The firm chooses to export when there are advantages of concentrating production at the domestic plant (economies of scale) and chooses FDI when achieving proximity to the foreign market is more tempting. This model is also consistent with the literature about intra-firm complementarity between exports and FDI (Head and Ries 2003, 2004) that FDI promotes exports through stimulating exports of intermediate goods in the vertically integrated firms. This model is also in line with the models of productivity hierarchy across domestic exporters and multinationals (Helpman et al. 2004) that the most productive firms engage in FDI, firms with intermediate productivity level export, and the least productive firms only serve the domestic market.

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country for each unit of final good. Hence, the marginal cost of production is $C_B = \frac{W_F + W_H}{\varphi}$ (W_F is the wage in the foreign country).

3. 2. Firm Productivity

Based on [1] and [3], profit functions are increasing with firm productivity (φ) in both centralization and branching strategies. The firm chooses centralization strategy if $\pi_C(\varphi)>0$ and $\pi_C(\varphi)>\pi_B(\varphi)$, and it chooses branching if $\pi_B(\varphi)>0$ and $\pi_B(\varphi)>\pi_C(\varphi)$.

Let φ_X denote the exporting productivity threshold, which is the minimum productivity for the firm to export; and let φ_I denote the FDI productivity threshold, which is the minimum productivity for the firm to have FDI. φ_X and φ_I can be calculated by $\pi_C(\varphi_X)=0$ and $\pi_C(\varphi_I)=\pi_B(\varphi_I)$ respectively, then[15]

$$\varphi_X=\frac{2W_H}{\mathrm{A}-\sqrt{\frac{4F_X}{M_F}}-\tau_D-\theta}$$

The productivity threshold of exporting φ_X increases with trade costs, and the productivity threshold of FDI φ_I increases with FDI costs (Figure 1)[16][17].

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[15] $\mathrm{A}>\sqrt{\frac{4F_X}{M_F}}+\tau_D+\theta$

[16] Just following Kneller et al. (2008), I also assume that FDI and export co-exist in this model and the productivity threshold of exporting φ_X is lower than productivity threshold of FDI φ_I.

[17] The slope of π_B is greater than the slope of π_C, that is $\frac{\partial\pi_C}{\partial\varphi}<\frac{\partial\pi_B}{\partial\varphi}$, if $W_H-W_F-\tau_U<0$ and $\frac{W_H-W_F-\tau_U}{\varphi}+\tau_D>0$

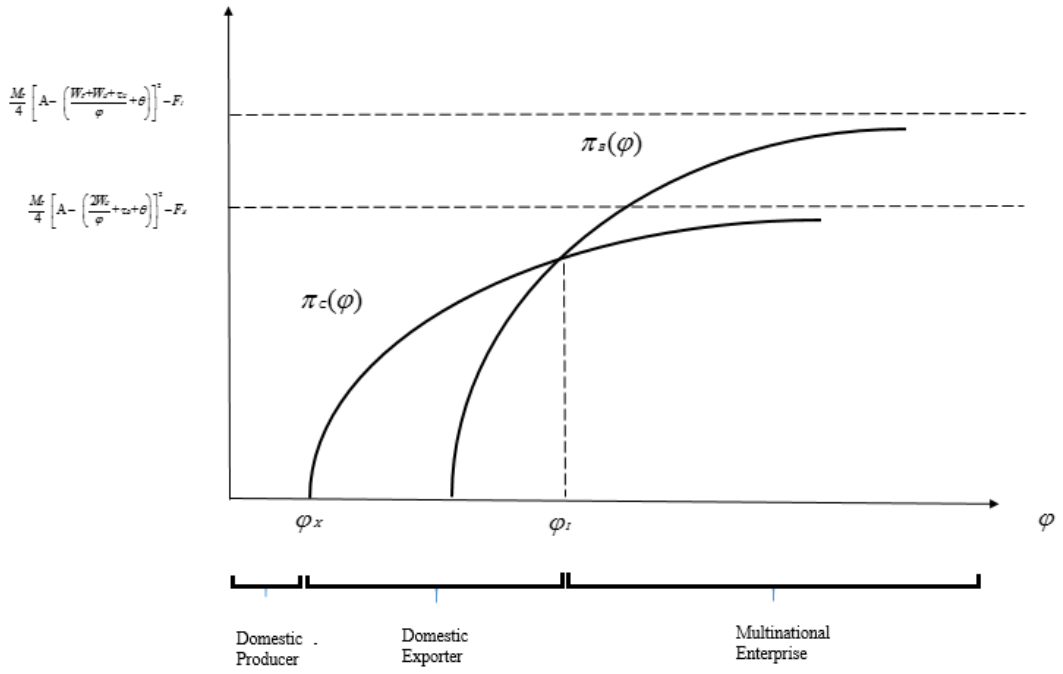

Figure 1

3. 3. Extensive and Intensive Margins of Product-Level Exports

Suppose there are N (N is endogenous) exporting firms in the home country, and initially all firms have centralization strategy. Hence, the extensive margin of product-level exports, defined as the number of exported products from the home country, is N . The intensive margin, defined as the average value of exported products, is

$$\sum_{i=1}^{N} \frac{M_F}{4N} \left[\mathrm{A}^2 - \left(\frac{2W_H}{\varphi_i} + \tau_D + \theta \right)^2 \right] \qquad [5]$$

Suppose now a positive fraction of firms, λ , has productivity higher than φ_I in the productivity distribution. Thus, these λN firms adopt branching strategy, exporting intermediate goods to the foreign country and manufacturing final goods there. Hence, λN firms who have vertical FDI export λN types

of intermediate goods, while $(1-\lambda)N$ firms who have centralization strategy export $(1-\lambda)N$ types of final goods.

The extensive margin is still

$$EX = (1-\lambda)N + \lambda N = N \qquad [6]$$

The intensive margin[18] is

$$IM = \frac{\int_{\varphi_I}^{\varphi_{\max}} \frac{M_F W_H}{2\varphi_i} \left(A - \frac{W_F + W_H + \tau_U}{\varphi_i} - \theta \right) d\varphi_i + \int_{\varphi_X}^{\varphi_I} \frac{M_F}{4} \left[A^2 - \left(\frac{2W_H}{\varphi_i} + \tau_D + \theta \right)^2 \right] d\varphi_i}{N} \qquad [7]$$

Based on this IM function above, the average value of exported products decreases, as more firms export intermediate goods instead of final goods. It is because that the value of final goods is higher than the value of intermediate goods[19]. Therefore, the intensive margin of exports with both centralization and branching strategies is lower than that with only centralization strategy. IM function is a decreasing function of λ ($\frac{\partial IM}{\partial \lambda} < 0$).

3. 3. 1. Investment Liberalization

Investment liberalization leads to a decrease in the fixed investment cost of producing final goods in the foreign country (F_I), and in the variable cost of selling abroad (θ).

[18] $\varphi_{\max}$ is the exogenous maximum productivity.

[19] $X_C > X_B$ if $A > \frac{2W_H}{\varphi} + \tau_D + \theta$ and $\frac{W_F + \tau_U - W_H}{\varphi} > \tau_D + 2\theta$

As F_I decreases, the FDI productivity threshold decreases as well ($\frac{\partial \varphi_I}{\partial F_I} > 0$). Hence, less productive firms, who only export the final goods to serve the foreign market if there is no investment liberalization, adopt branching strategy, in other words, λ increases ($\frac{\partial \lambda}{\partial F_I} < 0$). However, the exporting productivity threshold stays the same with lowering F_I ($\frac{\partial \varphi_X}{\partial F_I} = 0$), thus the number of firms exporting to the foreign country is stable ($\frac{\partial N}{\partial F_I} = 0$).

As θ decreases, the FDI productivity threshold decreases ($\frac{\partial \varphi_I}{\partial \theta} > 0$) and hence more firms invest abroad ($\frac{\partial \lambda}{\partial \theta} < 0$). Meanwhile, the exporting productivity threshold decreases as well ($\frac{\partial \varphi_X}{\partial \theta} > 0$) and hence more firms enter the international market ($\frac{\partial N}{\partial \theta} < 0$).

3. 3. 2. Investment Liberalization Increases the Extensive Margin

On the one hand, the extensive margin of exports stays the same with lowering F_I. It is because the decrease in the variety of exported final goods offsets the increase in the variety of exported intermediate goods. More specifically, with lowering F_I, more existing exporting firms invest abroad and produce the final goods in the foreign market (since $\frac{\partial \lambda}{\partial F_I} < 0$), hence the variety of exported final goods ($(1-\lambda)N$) decreases. Meanwhile, the variety of exported intermediate goods (λN) increases since MNCs export the intermediates goods to the foreign country in order to support the final goods production there.

On the other hand, as θ declines, the extensive margin of exports increases due to the decrease in the exporting productivity threshold. With lowering θ, more firms enter the international market (since

$\frac{\partial N}{\partial \theta} < 0$), and hence the variety of exported products increases. Even though the FDI productivity threshold declines with lowering θ as well, it does not affect the extensive margin, since the decrease in the variety of exported final goods cancels out the increase in the variety of exported intermediate goods.

3. 3. 3. Investment Liberalization Decreases the Intensive Margin

The intensive margin of exports declines, as F_I decreases with investment liberalization. It is because lowering F_I encourages more existing exporting firms to adopt branching strategy (since $\frac{\partial \lambda}{\partial F_I} < 0$) and in turn leads to a lower intensive margin (since $\frac{\partial IM}{\partial \lambda} < 0$).

The effect of lowering θ on the intensive margins is more complicated. On the one hand, the intensive margin is an increasing function of θ ($\frac{\partial IM}{\partial \theta} < 0$). More specifically, a reduction in θ raises the exports of existing exporters and in turn increases the average exports per product. On the other hand, a reduction in θ allows less efficient firms to export with a lower exporting productivity threshold, and it also allows less efficient firms to produce abroad since it lowers FDI productivity threshold as well. The productivity distribution with new exporting firms shifts down, which decreases the intensive margin. This decline in the intensive margin dominates if lowering θ leads to a higher reduction in φ_X than in φ_I (see Appendix A1). Thus, a decrease in θ leads to a lower intensive margin.

In summary, the effect of investment liberalization on aggregate exports equals to the effect on the extensive margin plus the effect on the intensive margin. Based on the model above, investment liberalization increases the extensive margin through lowering the variable cost of selling abroad, yet it decreases the intensive margin through lowering both the fixed investment cost and the variable cost of selling abroad. If the increase in the extensive margin dominates the decrease in the intensive margin, the

empirical work will find the positive effect of investment liberalization on aggregate exports, as indicated in voluminous empirical studies in the literature. For simplicity, this model assumes that each firm produces one intermediate (upstream) good and one final (downstream) good. In addition, it only considers two strategies for firms to serve the foreign market and there are other strategies available. For example, firms might place the upstream plant abroad and keep the domestic downstream production, and then firms export the final good back to the foreign market (Kneller et al. 2008). Firms could also license the production process or the brand to a foreign firm (Head and Ries 2003). Since there are various channels affecting exports and FDI, the impact of investment liberalization on the extensive and intensive margins ultimately requires empirical evidence.

4. Empirical Methodology

4. 1. Hypotheses

The first hypothesis is: *BITs increase the extensive margin of exports while decreasing the intensive margin of exports. Meanwhile, this positive effect of BITs on the extensive margin of exports dominates the negative effect on the intensive margin, and hence BITs significantly increase aggregate exports.*

The second hypothesis is*: BITs with the stronger provision leads to further higher extensive margin of exports and even lower intensive margin of exports.*

Based on the model in the previous section, this paper concludes that investment liberalization increases the extensive margin and decreases the intensive margin.

This section relates the theory to the empirical work and briefly discusses how BITs decrease the fixed investment costs and the variable costs of selling abroad as well as how BITs attract FDI. Prior to the modern proliferation of BITs, the customary international law provided weak protections to foreign

investment, yet the protections under the customary international law were dramatically weakened in the 1960s, as newly independent countries began threatening foreign investment with nationalization and regulation (Bubb and Rose-Ackerman 2007). At the same time, the attempts to construct a multilateral regulation of foreign investment, akin to the multilateral agreement for trade under the WTO, have failed due to the disagreement on some basic investment liberalization issues within potential members. Hence, since the first BIT signed by West Germany and Pakistan in 1959, the number of BITs have increased tremendously, making BIT one of the most widely used international agreement for protecting and influencing foreign investment. For example, from 1959 to 2002, nearly 2200 individual BITs were formed (Salacuse and Sullivan 2005)[20]. Several studies have illustrated a strong positive effect of BITs on FDI[21], and most countries are convinced that BITs do attract FDI[22]. From the perspective of developing countries, the hopes of BITs are boosting investor confidence and resulting in greater inflows of FDI. At the same time, developed countries enter BITs in order to protect the foreign investors and lower the risk of foreign investments. Admittedly, BITs lower the overall transaction costs of investing abroad by strengthening the legal environment and by ensuring that both home and host countries are fully engaged

[20] The basic structure of any BIT includes eight topics: 1) scope of application; 2) conditions for the entry of foreign investment; 3) general standards of treatment of foreign investments; 4) monetary transfers; 5) operational conditions of the investment; 6) protection against expropriation and dispossession;7) compensation for losses; and 8) investment dispute settlement (Salacuse and Sullivan 2005).

[21] For example, Egger and Pfaffermay (2004) show that BITs promote FDI outward stock and that ratified BIT has a stronger positive effect on FDI outward stock from OECD countries than those merely signed BIT, using a large panel of OECD data. Salacuse and Sullivan (2005) illustrate that the presence of a BIT between the United States and a developing country strongly promotes FDI outflowing from the United States to that developing country, compared to the U.S. outflow to developing countries with no U.S. BIT. Neumayer and Spess (2005), looking at 119 countries between 1970 and 2001, find that the number of BIT has a large positive impact on subsequent FDI inflows to developing countries, and this impact is stronger for countries with weaker institutions. Egger and Merlo (2007) conclude that ratified BITs increase bilateral FDI outward stock from the OECD countries both in short-run and long-run. Berger et al. (2013) confirm that BIT stimulates bilateral FDI flows between 28 source and 83 (developing) host countries from 1978 to 2004 with more advanced methodologies to address the endogeneity of BITs. Egger and Merlo (2012) analyze the effect of BITs on German multinational corporations' foreign activity from 1996 to 2005. They find a positive effect of BITs on the firm-level extensive and intensive margins, more specifically, BIT raises the number of multinational firms in the host country as well as the average FDI stock and fixed asset per firm.

[22] Some studies still doubt the effectiveness of BIT in attracting FDI (Yackee 2007, Tobin and Rose-Ackerman 2005).

in resolving any disputes (Tobin and Rose-Ackerman 2005; Tobin and Busch 2010), and BITs lower fixed set-up costs (Egger and Merlo, 2012).

In order to test the sensitivity of the above conclusion, the second hypothesis also includes how BITs with stronger investment provision contribute to the effect on the extensive and intensive margins. Several papers in the studies of BITs emphasize two essential features related to liberalization and protection of foreign investment. The first feature is the guarantee of market access for foreign investors, for example, the extent to which BITs include provisions on national treatment (NT) in the pre-establishment phase. The second feature is the degree to which BITs include a strong investor-state dispute settlement (ISDS) mechanism. Such degree is the very key to assure that foreign investments are effectively protected from discriminatory or abusive treatment in the host country (Neumayer et al. 2016). Some studies have shown that BITs with stringent investment provisions attract more FDI inflows than BITs without such provisions (Berger et al. 2011, 2013; Büthe and Milner 2014). Hence, BITs with stricter provision are expected to increase the extensive margin of exports and decrease the intensive margin further.

4. 2. Data

The dependent variable is the log of exports (or the extensive and intensive margins of exports). This 6-digit annual data about annual bilateral trade flows is from Dutt et al. (2013). The extensive margin of exports in Dutt et al. (2013) (Dutt extensive margin) is a simple count of the variety of products exported from the exporter i to the importer j, and the intensive margin (Dutt intensive margin) is the average value of exports per product traded. Hence, the aggregate exports equal to the Dutt extensive margin times Dutt intensive margin. The extensive margin of exports for a given country pair in Feenstra and Kee (2008) (FK extensive margin) and the intensive margin (FK intensive margin) are similar to these in Dutt et al. (2013). The only difference is that products are given weights for each destination country j proportional to the total value of exports from all countries to j in Feenstra and Kee (2008), with the weights being

time invariant averages over the sample period. FK extensive margin is the fraction of goods sold by the exporter i in the destination country j, and each product is weighted by its importance (averaged over time) in world exports to this destination. FK intensive margin is the market share that the exporter i has in the destination country's total spending on the products that the exporter sells there (please refer to Dutt et al. 2013 for more details).

Two datasets are used to capture independent variables of interest. The first dataset is the date of BIT enforced, and it is from UNCTAD (United Nations Conference on Trade and Development) database of International Investment Agreements (IIAs). As mentioned in UNCTAD, the number of BITs has grown steadily, and it increases from 385 by 1989 to 2,265 in 2003, covering 176 countries. The second dataset is the BITs with strict provisions on ISDS and pre-establishment NT. This sample covers 21 developed source countries and 87 developing host countries over the period 1978 to 2004, and it is from Neumayer et al. (2016).

Other traditional gravity variables, such as GDP, geographic distance, linguistic similarities, RTA, contiguity, and colonial links, are from the CEPII bilateral distance database[23] as well as from Dutt et al. (2013). GDP in CEPII dataset comes mainly from the World Bank Development Indicators (WDI). Geographic distance measures the population-weighted great circle distance between large cities of the two countries. The linguistic similarity is measured as a dummy variable, which equals to one if the country pair shares a common official language; I also use whether a common language is spoken by at least 9% of the population as another measure of linguistic similarity. RTA (regional trade agreement) equals to 1 if the regional trade agreement is in force between a country pair. Contiguity is a dummy variable, which equals to 1 if a country pair shares a common border. The colony variable measures whether a country pair had a colonial relationship and the common colonizer variable measures whether a

[23] http://www.cepii.fr/cepii/en/bdd_modele/presentation.asp?id=6

country pair had a common colonizer. Same country captures whether a country pair was part of the same country (for example, Georgia and Russia). Developed and developing country classification is based on UN classification.[24] Tables in Appendix A2 present the summary statistics for the variables used in this paper. The main dataset has 231,501 observations, including 190 exporting countries and 168 importing countries (Table A2.1). The dataset with heterogeneous BITs has 12,915 (or extended 36,106 observations) (Table A2.2 and Table A2.3).

4. 3. Econometric Specifications

This paper adopts gravity-type models, following the empirical papers in the literature. Gravity model has been widely used to estimate the effects of various policies and variables on international trade and it has successfully explained a significant fraction of variations in international trade.

The first specification of the standard gravity equations for the trade volume is mentioned in Baier and Bergstrand (2007).

$$\log Trade_{ijt} = \beta_1 BIT_{ijt} + \beta_2 \log GDP_{it} + \beta_3 \log GDP_{jt} + \beta_4 \log DIST_{ijt} + \beta_5 LANG_{ijt} + \beta_6 FTA_{ijt} + \chi_i + \mu_t + \varepsilon_{ijt} \quad (1)$$

$Trade_{ijt}$ indicates five dependent variables:

1) the bilateral exports from country i (exporter) to country j (importer) at time t;

2) the extensive margin of exports from country i (exporter) to country j (importer) at time t, based on Dutt et al. (2013) (Dutt extensive margin);

3) the extensive margin of exports from country i (exporter) to country j (importer) at time t, based on Feenstra and Kee (2008) (FK extensive margin);

[24] http://www.un.org/en/development/desa/policy/wesp/wesp_current/2014wesp_country_classification.pdf

4) the intensive margin of exports from country i (exporter) to country j (importer) at time t, based on Dutt et al. (2013) (Dutt intensive margin);
5) the intensive margin of exports from country i (exporter) to country j (importer) at time t, based on Feenstra and Kee (2008) (FK intensive margin).

BIT_{ijt} is a dummy variable, and it equals to one if exporter i has BIT with importer j at time t. GDP_{it} is GDP of exporter i at time t, GDP_{jt} is GDP of importer j at time t, $DIST_{ijt}$ is the distance between exporter i and importer j, $LANG_{ijt}$ is whether a country pair has a common language, FTA_{ijt} is whether a country pair has a free trade agreement, χ_i is exporter fixed effects (or exporter&importer fixed effects), μ_t is year fixed effects.

While the fixed-effects estimation controls for time-invariant unobserved country heterogeneity, two empirical concerns still remain. First, there could be unobserved time-varying economic factors, which simultaneously affect both exports and BIT. On the one hand, if a contemporaneous shock is positively correlated with the dependent variable (export) and the main independent variable (BIT) in this study, or if that shock is negatively correlated with these two variables, then the effect of BIT on exports might be overestimated. On the other hand, if that contemporaneous shock is only positively correlated with the dependent variable (export) yet negatively correlated with the main independent variable (BIT), or vice versa, then the estimation could be underestimated instead. The former situation would be more likely to happen. For example, the government of one country might attempt to protect intellectual property in certain years, which might promote the exports to that country and potentially improve the likelihood of this country forming a BIT with other countries. Thus, if such potential effect is omitted, the estimation will be overestimated. The second concern is the endogeneity of exports. For example, reverse causality, where BIT occurs due to high levels of exports, would introduce a positive correlation between exports and BIT, and hence the estimates would be biased upwards (overestimation). In order to address these

econometric issues, the second econometric specification includes more control variables as well as the time-varying exporter and importer dummies. Using the time-varying exporter and importer dummies not only reduces the potential bias generated from omitted variables, mismeasurement and potential endogeneity in the analysis, it also captures the world trade pattern and the change in the HS-6 classification (Dutt et al. 2013).

The second specification of the gravity equations for the trade volume is based on Dutt et al. (2013)

$$\log Trade_{ijt} = \beta_1 BIT_{ijt} + \beta Z_{ijt} + \chi_{it} + \mu_{jt} + \varepsilon_{ijt} \quad (2)$$

Z_{ijt} is a vector of country pair gravity control variables. Besides of three control variables mentioned in the first specification ($DIST_{ijt}$, $LANG_{ijt}$ and FTA_{ijt}), other control variables include:

Both in WTO, a dummy variable for whether both countries in a country pair are members of GATT/WTO.

None in WTO, a dummy variable for whether neither two countries in a country pair are members of GATT/WTO.

GSP, a dummy for whether a country pair has a generalized system of preferences, which is a scheme of trade preferences granted by developed countries to developing countries on a non-reciprocal basis, and it promotes mostly the exports of developing countries;

Contiguity, a dummy variable for whether a country pair shares a common border;

Common language is spoken by at least 9% of the population, a dummy variable for whether a country pair shares a common language that is spoken by at least 9% of the population;

Colonial relationship, a dummy variable for whether a country pair had ever been in a colonial relationship;

Common colonizer, a dummy variable for whether a country pair had a common colonizer (for example, Singapore and Malaysia);

Same country, a dummy variable for whether a country pair had been part of the same country (for example, Georgia and Russia).

χ_{it} are exporter-year dummies; μ_{jt} are importer-year dummies. Since this specification considers exporter-year and importer-year dummies, other control variables about country characteristics, such as GDP, are removed.

Based on the hypotheses, in the regression of aggregate exports, a positive and significant estimate of β_1 is expected, indicating that exporters that have involved in BITs enjoy increased exports compared with their pre-accession days. In addition, in the regression of the extensive margin, a positive and significant estimate of β_1 is expected as well, indicating that exporters that have involved in BIT enjoy increased the extensive margin of exports compared with their pre-accession days. Furthermore, in the regression of the intensive margin, a negative and significant estimate of β_1 is expected, indicating that exporters that have involved in BIT should have a lower intensive margin of exports compared with their pre-accession days.

As mentioned in the hypotheses section, developed and developing countries have different perspectives when entering BITs. Developed countries enter BITs to protect the investment abroad whereas developing countries use BITs to attract greater FDI inflows. Thus, BITs are expected to promote FDI from developed countries to developing countries, and hence generate different effects on the exports of developed countries and of developing countries. In order to capture such different effects, I separate the

dummy variable BIT into developed countries' BIT and developing countries' BIT in the next specification.

$$\log Trade_{ijt} = \beta_d BIT\_DVED_{ijt} + \beta_i BIT\_DING_{ijt} + \beta_2 \log GDP_{it} + \beta_3 \log GDP_{jt} + \beta_4 \log DIST_{ijt} + \beta_5 LANG_{ijt} + \beta_6 FTA_{ijt} + \chi_i + \mu_t + \varepsilon_{ijt} \quad (1')$$

$$\log Trade_{ijt} = \beta_d BIT\_DVED_{ijt} + \beta_i BIT\_DING_{ijt} + \beta Z_{ijt} + \chi_{it} + \mu_{jt} + \varepsilon_{ijt} \quad (2')$$

BIT_DVED_{ijt} is a dummy variable. It equals to one if exporter i is a developed country and has a BIT with importer j at time t. BIT_DING_{ijt} is also a dummy variable. It equals to one if exporter i is a developing country and has a BIT with importer j at time t.

Since BITs are expected to increase FDI outflows from developed countries to developing countries, the outflow from developed countries promotes the extensive margin of exports due to economic and statistical complementarity, while it decreases the intensive margin due to the substitution effect. Therefore, the coefficient of BIT_DVED_{ijt}, β_d, is expected to be positive and significant in the regression of total exports as well as in the extensive margin of exports, yet it should be negative and significant in the regression of the intensive margin.

This paper further relaxes the assumption of homogeneous BITs and extends the analysis to evaluate the effects of various BITs on the extensive and intensive margins of exports. The specification (1') and (2') are extended to include two more independent variables in order to further evaluate the effect of BITs with stronger provisions.

$$\log Trade_{ijt} = \beta_d BIT\_DVED_{ijt} + \beta_i BIT\_DING_{ijt} + \beta_{ds} BITS\_DVED_{ijt} + \beta_{is} BITS\_DING_{ijt} + \beta_2 \log GDP_{it} + \beta_3 \log GDP_{jt} + \beta_4 \log DIST_{ijt} + \beta_5 LANG_{ijt} + \beta_6 FTA_{ijt} + \chi_i + \mu_t + \varepsilon_{ijt} \quad (1'')$$

$$\log Trade_{ijt} = \beta_d BIT\_DVED_{ijt} + \beta_i BIT\_DING_{ijt} + \beta_{ds} BITS\_DVED_{ijt} + \beta_{is} BITS\_DING_{ijt} + \beta Z_{ijt} + \chi_{it} + \mu_{jt} + \varepsilon_{ijt} \quad (2'')$$

One added variable is $BITS\_DVED_{ijt}$. This dummy variable equals to one if exporter i is a developed country and has stronger BIT provisions with importer j at time t. The other added variable is $BITS\_DING_{ijt}$. This dummy variable equals to one if exporter i that is a developing country and has stronger BIT provisions with importer j at time t. In the estimation, stronger BIT provisions include strong investor-state dispute settlement (ISDS) and national treatment (NT).

Since BITs with stronger investment provisions are expected to promote more FDI outflows from developed countries to developing countries, they result in further higher extensive margin of exports from developed countries and even lower intensive margin of developed countries. Therefore, the coefficient of $BITS\_DVED_{ijt}$, β_{ds}, is expected to be positive and significant in the regression of total exports as well as in the extensive margin of exports, yet it should be negative and significant in the regression of the intensive margin.

In case dependent variables in the sample might not be independent, all the standard errors in these regression results are adjusted for clustering on country pairs since several variables are measured at the country pair level[25].

5. Analysis Results

5.1 Baseline Regression

[25] If I use the standard formula to calculate the standard error (with N in it), the standard error would be too small. Too small standard errors lead to narrow confidence intervals that and low p-values, hence inflate type I error rates.

The basic gravity model results are reported in Table 1. Column (1) - (3) indicate the effect of BIT on total exports. Column (1) shows the regression with exporter and year fixed effects, column (2) includes exporter, importer and year fixed effects, and column (3) includes the exporter-year and importer-year fixed effects. Column (4) - (6) indicate the effect of BIT on Dutt extensive margin, and column (7) -(9) indicate the effect on FK extensive margin. Column (10) - (12) indicate the effect of BIT on Dutt intensive margin, and column (13) - (15) indicate the effect of BIT on FK intensive margin.

The estimated coefficients of BIT in column (1) - (3) are all positive and significant, indicating that BITs significantly promote exports. The estimated coefficient of BIT in column (3) is slightly lower than the estimated coefficients in column (1) and (2), implying a potential overestimation with only exporter (and importer) and year fixed effects. As methodology section indicated, the different implications of the BIT on the extensive and intensive margins make it essential to treat two types of effects separately. Once this is done, the average result of aggregate exports obscures a significant difference between the effect on the extensive margin and on the intensive margin. On one hand, the estimated coefficients of BIT on the extensive margin (column 4-9) are all positive, and they are economically and statistically significant. The coefficient of BIT on the extensive margin of exports reported in column 6 of table 1 is 0.431, which implies that the extensive margin of exports on average increases about 53.88 percent more [exp (0.431)– 1] by virtue of BIT. As shown in column (4) -(9), this economic and statistical significance is robust to a large number of alternative specification and estimation of extensive margin. On the other hand, the estimated coefficient of BIT on the intensive margin is negative with exporter-year and importer-year fixed effects. However this result is not quite robust. For example, it is positive and significant with country and year fixed effects, yet it turns to be negative (insignificant) with exporter-year and importer-year fixed effects. There are plausible reasons to believe that the behavior of some exporters or importers in certain years may dominate the variations and hence generates different results when controlling for exporter-year and importer-year.

5.2 Asymmetry Between Developed and Developing Countries

As developed and developing countries have different agenda when entering BITs, it is essential to treat two groups of countries differently in evaluating the effect of BITs on exports. Once this is done following specification (1') and (2'), the results in Table 2 clearly illustrate a significant difference between the behavior of developed countries and of developing countries. The estimated coefficients of both *BIT_DVED* and *BIT_DING* in column (1) - (3) are all positive and significant, indicating that BITs significantly promote exports of both developed and developing countries. The estimated coefficients of *BIT_DVED* are lower than the estimated coefficients of *BIT_DING* in column (1) - (3). It suggests that BITs with developing countries might be more efficient than those with developed countries in promoting total exports.

For developed countries, the estimated coefficients of BIT on the extensive margin and the intensive margin exhibit a significant difference. On the one hand, the coefficients of BIT on the extensive margin are still positive and significant. The coefficient for BIT on the extensive margin reported in column (6) of Table 2 is 0.496, which implies that the extensive margin of exports from developed countries on average increases about 64.21 percent [exp (0.496)–1] because of BIT. As shown in column (4) -(9), this economic and statistical significance is robust to a large number of specifications and estimations. On the other hand, the coefficients of BIT on the intensive margin of developed countries are negative and significant. The coefficient for BIT on the intensive margin reported in column (12) of Table 2 is -0.23, which implies that the intensive margin of developed countries on average declines about 20.55 percent [exp (-0.23)–1] due to BIT. As shown in column (10) -(15), this economic and statistical significance is robust to a large number of alternative specification and estimation as well. Adding the two coefficients (0.496 and -0.23) together, I could see that BITs enforced by developed countries increase bilateral exports by approximately 30.4 percent [exp (0.496-0.23)–1]. For developing countries, the estimated coefficients of BIT on both the extensive and intensive margins of exports are positive and significant

(except for column 12 and 15). Other gravity control variables work well. Country pair that is farther away trades less, while richer countries trade more. These traditional gravity effects are economically and statistically significant and are in line with estimates in the literature (except for FTA[26]).

The regression results in Table 2 corroborate the findings in the literature that BIT indeed promotes FDI from developed countries to developing countries. As FDI outflows from developed countries, the intensive margin of exports from developed countries declines due to the "substitution effect" while the extensive margin of exports rises due to the "statistical complementarity" and/or "economic complementarity" effects. However, BIT enforced by developing countries promotes both the extensive and intensive margins of exports. A possible contribution to this significant increase in both the extensive and intensive margins in developing countries is exported-oriented FDI, which usually refers to a situation where the output of a foreign affiliate is largely exported rather than sold in the host country (Ekholm et al. 2007). The increased extensive and intensive margins might also be encouraged by productivity improvement or economic growth stimulated by FDI. Several studies have shown the role of FDI as an instrumental tool in boosting productivity and economic growth in developing countries. FDI often constitutes physical capitals in the investment within host countries, and investors generally exert significant controls in the procedure of production and management. Hence, compared to other portfolio investments, FDI is the vehicle of technology and knowledge transfer across borders and is especially beneficial to the increase of productivity and the accumulation of human capital in developing countries. Currently, no theoretical or empirical work (as far as I understand) has provided any formal explanation to compare the effect of a BIT entered by developed countries with the one entered by developing countries on the intensive margin of exports. This topic beyond the discussion of this paper, and it awaits further research.

[26] One possible explanation for the negative FTA is that FTA, GSP, and WTO involve different degrees of liberalization, hence there might be any contamination from each other (Subramanian and Wei 2007)

5.3 Heterogeneous BITs

This section further relaxes the assumption of homogeneous BITs and extends the analysis to evaluate the effects of various BITs on the extensive and intensive margins. Following the specification (1'') and (2''), this section provides the results about the additional effects of BITs with stronger provisions, such as strong investor-state dispute settlement (ISDS) and national treatment (NT).

In Table 3, $BITS\_DVED_{ijt}$ is a dummy variable. It equals to one if exporter i is a developed country and has a BIT with ISDS provision at time t. $BITS\_DING_{ijt}$ is a dummy variable. It equals to one if exporter i is a developing country and has a BIT with ISDS provision at time t. Similarly, in Table 4, $BITS\_DVED_{ijt}$ denotes developed country i has a BIT with ISDS or NT provision and $BITS\_DING_{ijt}$ denotes developing country i has a BIT with ISDS or NT provision at time t. Table 5 and 6 replicate the regression with an extended sample of heterogeneous BITs.

Column (1) -(3) still indicate the positive effect of BITs on total exports in these three tables. Column (4) -(6) indicate the positive effect on Dutt extensive margin, and column (7) -(9) indicate the positive effect on FK extensive margin. Column (10) -(12) indicate the negative effect on Dutt intensive margin, and column (13) – (15) indicate the negative effect on FK intensive margin.

In Table 3-6, the estimated coefficients of BIT_DVED_{ijt} (here it could be an enforced BIT or just signed BIT by developed countries) on the extensive margin are positive and significant, and they are still negative and significant on the intensive margin, indicating that the estimations in the previous section are robust across samples. In these three tables, the estimated coefficients of $BITS\_DVED_{ijt}$ on the extensive margin are mostly positive, whereas these coefficients in regression of the intensive margin are mostly negative. The estimation results indicate that BITs with stronger provisions have a further positive effect on the extensive margin of exports, while having more negative effect on the intensive margin. It

confirms with the prediction that BITs complements the extensive margin of exports while substituting for the intensive margin.

6. Conclusion

This paper investigates the effect of FDI on the product-level extensive and intensive margins of exports while considering bilateral investment treaties (BITs) as an investment liberalization policy in order to reduce the endogeneity concern between exports and FDI in the literature.

The model in this paper theoretically demonstrates that investment liberalization increases the extensive margin through lowering the variable cost of selling abroad, yet it decreases the intensive margin through lowering both the fixed cost and the variable cost of selling abroad. The empirical results provide evidence that BITs enforced by developed countries increase on average about 64.21 percent extensive margin of exports and decrease on average 20.55 percent intensive margin of exports. Combining the two effects together, BITs enforced by developed countries increase bilateral exports on average by approximately 30.4 percent. However, BITs enforced by developing countries raise both the extensive and intensive margins of exports. These findings are empirically robust, and they are both economically and statistically significant.

By focusing on the product-level extensive and intensive margins of exports, this paper offers insights into the microeconomic mechanisms underlying which firms adjust their exports and investment decisions when facing investment liberalization. These findings are consistent with the theoretical models that MNCs view exports and FDI as substitutive ways to serve the foreign market. MNCs reduce the exporting of a certain product after establishing or acquiring foreign affiliates to produce that product abroad, and hence the intensive margin of product-level exports decreases. Meanwhile, the variety of

exported products increases because of such investment. This demonstrated positive effect of FDI on the extensive margin of exports dominates the negative effect on the intensive margin, which corroborates the identified complementary relationship between aggregate exports and FDI in numerous empirical studies.

At the same time, these findings raise several critical research questions as well. For example, why the investment liberalization decreases the developed countries' intensive margin of exports while having a positive effect on developing countries? How investment liberalization increases the extensive margin of exports, by economic complementarity, statistical complementarity or simply by the entrance of MNCs in the international market? So far, research into the extensive and intensive margins of exports only focuses on the firm level (exclude Dutt et al. 2013), for example, firms' entry and exit due to change of trade costs or investment costs. Within the past ten years, a recent theoretical and empirical literature has emphasized the important role of multi-product firms in international trade (Lopresti 2016). It is, therefore, important to understand the nature of firm-product level decisions and how such decisions are altered by the changing trade or investment environment in analyzing the linkage between exports and FDI. Future research could extend the current theoretical model with the framework of multi-product firms and further explore the relationship between trade and FDI with the more detailed firm- product-level data, which is just readily available for many countries in recent years.

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Table 1 Baseline regression

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
VARIABLES	*ln(Export)*			*ln((Dutt Extensive Margin)*			*ln(FK Extensive Margin)*			*ln(Dutt Intensive Margin)*			*ln(FK Intensive Margin)*		
	Total export			*Number of exported products*			*Weighted Number of exported products*			*Average value of exports per product*			*Weighted Average value of exports per product*		
BIT	0.582***	0.517***	0.410***	0.456***	0.447***	0.431***	0.420***	0.436***	0.421***	0.126***	0.070***	-0.021	0.010	0.081***	-0.011
	(0.030)	(0.030)	(0.030)	(0.018)	(0.018)	(0.018)	(0.021)	(0.022)	(0.022)	(0.021)	(0.021)	(0.021)	(0.023)	(0.020)	(0.021)
ln(GDP of exporter)	0.437***	0.444***		0.198***	0.204***		0.261***	0.268***		0.239***	0.240***		0.180***	0.175***	
	(0.030)	(0.030)		(0.016)	(0.015)		(0.023)	(0.022)		(0.025)	(0.025)		(0.024)	(0.023)	
ln(GDP of importer)	0.979***	0.811***		0.416***	0.349***		0.403***	0.925***		0.564***	0.463***		-0.243***	-0.113***	
	(0.005)	(0.030)		(0.003)	(0.014)		(0.004)	(0.024)		(0.004)	(0.026)		(0.004)	(0.026)	
ln(Distance)	-1.413***	-1.505***	-1.450***	-0.878***	-0.976***	-0.931***	-0.873***	-0.999***	-0.973***	-0.535***	-0.529***	-0.519***	-0.506***	-0.506***	-0.477***
	(0.017)	(0.019)	(0.020)	(0.011)	(0.012)	(0.012)	(0.013)	(0.014)	(0.014)	(0.011)	(0.012)	(0.013)	(0.011)	(0.011)	(0.012)
Common language	0.961***	0.898***	0.380***	0.770***	0.706***	0.397***	0.895***	0.673***	0.376***	0.190***	0.192***	-0.017	0.199***	0.225***	0.004
	(0.037)	(0.039)	(0.062)	(0.021)	(0.023)	(0.035)	(0.028)	(0.028)	(0.044)	(0.027)	(0.027)	(0.046)	(0.027)	(0.026)	(0.045)
FTA	0.065	-0.014	-0.076	0.136***	-0.065**	-0.123***	-0.084***	-0.343***	-0.386***	-0.071**	0.051*	0.047	0.139***	0.329***	0.310***
	(0.040)	(0.042)	(0.047)	(0.027)	(0.027)	(0.029)	(0.032)	(0.033)	(0.036)	(0.027)	(0.028)	(0.031)	(0.028)	(0.027)	(0.031)
Both in WTO			0.218			0.473***			0.190*			-0.255**			0.028
			(0.146)			(0.090)			(0.113)			(0.104)			(0.108)
None in WTO			0.199			-0.119			0.133			0.318***			0.066
			(0.158)			(0.097)			(0.120)			(0.111)			(0.114)
GSP			0.542***			0.280***			0.407***			0.263***			0.135***
			(0.049)			(0.024)			(0.032)			(0.038)			(0.037)
Contiguity			0.414***			0.350***			0.122			0.063			0.291***
			(0.097)			(0.072)			(0.080)			(0.053)			(0.053)
Common lang (9%)			0.204***			0.125***			0.105**			0.079*			0.099**
			(0.062)			(0.035)			(0.045)			(0.046)			(0.044)
Colony			1.031***			0.626***			0.520***			0.405***			0.510***
			(0.097)			(0.063)			(0.073)			(0.059)			(0.057)
Common colonizer			0.987***			0.542***			0.639***			0.445***			0.348***
			(0.053)			(0.029)			(0.037)			(0.039)			(0.036)
Same country			0.652***			0.506***			0.521***			0.146*			0.131*
			(0.148)			(0.102)			(0.109)			(0.076)			(0.076)
Observations	231,501	231,501	231,501	231,501	231,501	231,501	231,501	231,501	231,501	231,501	231,501	231,501	231,501	231,501	231,501
R-squared	0.720	0.740	0.757	0.791	0.819	0.839	0.584	0.637	0.665	0.452	0.499	0.529	0.392	0.449	0.485
Exporter FE	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Importer FE		Yes			Yes			Yes			Yes			Yes	
Year FE	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Exporter-Year FE			Yes			Yes			Yes			Yes			Yes
Importer-Year FE			Yes			Yes			Yes			Yes			Yes

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Dependent variables in column (1-3) are ln(export), dependent variables in column (4-6) are Dutt extensive margin of exports, dependent variables in column (7-9) are FK extensive margin of exports, dependent variables in column (10-12) are Dutt intensive margin of exports, and dependent variables in column (13-15) are FK intensive margin of exports. Dutt extensive margin is a simple count of the variety of products exported from the exporter and Dutt intensive margin is the average value of exports per product traded. FK extensive margin is the fraction of goods sold by the exporter in the destination country and each product is weighted by its importance (averaged over time) in world exports to this destination, whereas FK intensive margin is the market share that the exporter has in the destination country's total spending on the products that the exporter sells there.

Table 2 Asymmetry between developed and developing countries

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	ln(Export)			*ln((Dutt Extensive Margin)*			*ln(FK Extensive Margin)*			*ln(Dutt Intensive Margin)*			*ln(FK Intensive Margin)*		
	Total export			*Number of exported product*			*Weighted Number of exported product*			*Average value of exports per product*			*Weighted Average value of exports per product*		
BIT_DVED	0.374***	0.330***	0.265***	0.454***	0.472***	0.496***	0.204***	0.414***	0.421***	-0.080***	-0.142***	-0.230***	-0.078***	-0.084***	-0.155***
	(0.036)	(0.037)	(0.037)	(0.028)	(0.026)	(0.025)	(0.030)	(0.030)	(0.030)	(0.020)	(0.022)	(0.023)	(0.025)	(0.024)	(0.024)
BIT_DING	0.615***	0.519***	0.389***	0.433***	0.382***	0.338***	0.525***	0.385***	0.345***	0.181***	0.137***	0.051	0.002	0.135***	0.043
	(0.045)	(0.043)	(0.044)	(0.023)	(0.022)	(0.023)	(0.030)	(0.028)	(0.028)	(0.036)	(0.033)	(0.034)	(0.036)	(0.031)	(0.033)
ln(GDP of exporter)	0.435***	0.443***		0.199***	0.206***		0.257***	0.270***		0.236***	0.237***		0.180***	0.173***	
	(0.030)	(0.030)		(0.016)	(0.015)		(0.023)	(0.022)		(0.025)	(0.025)		(0.024)	(0.023)	
ln(GDP of importer)	0.983***	0.813***		0.419***	0.348***		0.404***	0.925***		0.565***	0.465***		-0.242***	-0.111***	
	(0.005)	(0.030)		(0.003)	(0.014)		(0.004)	(0.024)		(0.004)	(0.026)		(0.004)	(0.026)	
ln(Distance)	-1.429***	-1.518***	-1.461***	-0.886***	-0.983***	-0.937***	-0.885***	-1.007***	-0.980***	-0.543***	-0.535***	-0.525***	-0.509***	-0.511***	-0.481***
	(0.017)	(0.019)	(0.020)	(0.011)	(0.012)	(0.012)	(0.013)	(0.014)	(0.014)	(0.011)	(0.012)	(0.013)	(0.011)	(0.011)	(0.012)
Common language	0.956***	0.900***	0.382***	0.771***	0.711***	0.404***	0.888***	0.677***	0.382***	0.185***	0.190***	-0.022	0.198***	0.223***	0.000
	(0.037)	(0.039)	(0.062)	(0.021)	(0.023)	(0.035)	(0.028)	(0.028)	(0.044)	(0.027)	(0.027)	(0.046)	(0.027)	(0.026)	(0.045)
FTA	0.055	-0.025	-0.090*	0.125***	-0.080***	-0.142***	-0.089***	-0.357***	-0.404***	-0.070**	0.055**	0.053*	0.140***	0.332***	0.314***
	(0.040)	(0.042)	(0.048)	(0.027)	(0.027)	(0.030)	(0.032)	(0.034)	(0.037)	(0.027)	(0.028)	(0.031)	(0.028)	(0.027)	(0.031)
Both in WTO			0.221			0.471***			0.190*			-0.250**			0.031
			(0.147)			(0.091)			(0.113)			(0.104)			(0.108)
None in WTO			0.194			-0.114			0.135			0.309***			0.059
			(0.158)			(0.097)			(0.121)			(0.111)			(0.114)
GSP			0.539***			0.283***			0.409***			0.257***			0.131***
			(0.049)			(0.024)			(0.032)			(0.039)			(0.037)
Contiguity			0.411***			0.364***			0.131			0.047			0.281***
			(0.098)			(0.073)			(0.081)			(0.053)			(0.053)
Common lang (9%)			0.202***			0.123***			0.103**			0.079*			0.099**
			(0.063)			(0.035)			(0.045)			(0.046)			(0.044)
Colony			1.042***			0.629***			0.526***			0.413***			0.516***
			(0.097)			(0.064)			(0.073)			(0.059)			(0.057)
Common colonizer			0.995***			0.545***			0.643***			0.450***			0.352***
			(0.054)			(0.029)			(0.037)			(0.039)			(0.036)
Same country			0.656***			0.501***			0.519***			0.156**			0.138*
			(0.149)			(0.103)			(0.110)			(0.076)			(0.077)
Observations	231,501	231,501	231,501	231,501	231,501	231,501	231,501	231,501	231,501	231,501	231,501	231,501	231,501	231,501	231,501
R-squared	0.720	0.740	0.757	0.791	0.818	0.839	0.583	0.637	0.665	0.452	0.499	0.529	0.392	0.449	0.485
Test (F-value)	136.28	100.72	57.54	279.40	254.77	258.35	164.12	153.94	148.40	22.09	32.58	54.59	4.94	17.06	22.30
BIT_DVED = BIT_DING															
Exporter FE	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Importer FE		Yes			Yes			Yes			Yes			Yes	
Year FE	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Exporter-Year FE			Yes			Yes			Yes			Yes			Yes
Importer-Year FE			Yes			Yes			Yes			Yes			Yes

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Dependent variables in column (1-3) are ln(export), dependent variables in column (4-6) are Dutt extensive margin of exports, dependent variables in column (7-9) are FK extensive margin of exports, dependent variables in column (10-12) are Dutt intensive margin of exports, and dependent variables in column (13-15) are FK intensive margin of exports. Dutt extensive margin is a simple count of the variety of products exported from the exporter and Dutt intensive margin is the average value of exports per product traded. FK extensive margin is the fraction of goods sold by the exporter in the destination country and each product is weighted by its importance (averaged over time) in world exports to this destination, whereas FK intensive margin is the market share that the exporter has in the destination country's total spending on the products that the exporter sells there.

Table 3 Heterogeneous BITs

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	ln(Export)			*ln((Dutt Extensive Margin)*			*ln(FK Extensive Margin)*			*ln(Dutt Intensive Margin)*			*ln(FK Intensive Margin)*		
	Total export			*Number of exported product*			*eighted Number of exported produ*			*verage value of exports per produc*			*ted Average value of exports per pr*		
BIT_DVED	0.517***	0.387***	0.261***	0.283***	0.456***	0.407***	0.190***	0.524***	0.475***	0.234***	-0.069	-0.146**	0.146**	-0.137**	-0.214***
	(0.085)	(0.092)	(0.095)	(0.052)	(0.052)	(0.054)	(0.058)	(0.069)	(0.074)	(0.053)	(0.068)	(0.071)	(0.062)	(0.062)	(0.067)
BIT_DING	0.548***	0.349***	0.354***	0.396***	0.360***	0.362***	0.412***	0.435***	0.429***	0.153*	-0.011	-0.008	-0.045	-0.085	-0.075
	(0.103)	(0.099)	(0.103)	(0.049)	(0.046)	(0.047)	(0.063)	(0.062)	(0.064)	(0.089)	(0.081)	(0.086)	(0.088)	(0.078)	(0.082)
BITS_DVED	-0.226*	-0.087	0.132	0.449***	0.107	0.222***	0.414***	-0.081	0.051	-0.675***	-0.194*	-0.089	-0.613***	-0.007	0.082
	(0.132)	(0.143)	(0.154)	(0.084)	(0.078)	(0.083)	(0.099)	(0.100)	(0.109)	(0.092)	(0.104)	(0.112)	(0.103)	(0.094)	(0.105)
BITS_DING	-0.016	0.055	-0.044	0.087	-0.093*	-0.157***	0.282***	-0.115	-0.157**	-0.102	0.149	0.113	-0.304***	0.170*	0.113
	(0.115)	(0.111)	(0.114)	(0.057)	(0.052)	(0.053)	(0.068)	(0.070)	(0.073)	(0.097)	(0.092)	(0.095)	(0.095)	(0.088)	(0.092)
ln(GDP of exporter)	0.423***	0.433***		0.150***	0.171***		0.305***	0.329***		0.272***	0.263***		0.113*	0.104	
	(0.071)	(0.069)		(0.035)	(0.034)		(0.067)	(0.065)		(0.061)	(0.061)		(0.064)	(0.063)	
ln(GDP of importer)	1.064***	0.889***		0.405***	0.212***		0.476***	0.671***		0.659***	0.677***		-0.146***	0.218**	
	(0.017)	(0.082)		(0.010)	(0.037)		(0.014)	(0.071)		(0.014)	(0.074)		(0.014)	(0.085)	
ln(Distance)	-1.054***	-1.101***	-1.096***	-0.580***	-0.632***	-0.633***	-0.655***	-0.576***	-0.589***	-0.474***	-0.470***	-0.462***	-0.349***	-0.525***	-0.506***
	(0.039)	(0.046)	(0.052)	(0.022)	(0.026)	(0.028)	(0.030)	(0.033)	(0.038)	(0.029)	(0.032)	(0.037)	(0.031)	(0.031)	(0.035)
Common language	0.552***	0.666***	0.163	0.594***	0.524***	0.199***	0.534***	0.576***	0.210**	-0.042	0.142**	-0.035	0.030	0.090	-0.047
	(0.089)	(0.091)	(0.150)	(0.045)	(0.049)	(0.067)	(0.063)	(0.065)	(0.102)	(0.068)	(0.069)	(0.121)	(0.072)	(0.066)	(0.115)
FTA	0.060	-0.159*	-0.152	-0.020	-0.307***	-0.274***	-0.184***	-0.498***	-0.424***	0.080	0.148**	0.123*	0.279***	0.339***	0.273***
	(0.080)	(0.086)	(0.095)	(0.049)	(0.051)	(0.055)	(0.061)	(0.065)	(0.070)	(0.058)	(0.062)	(0.069)	(0.067)	(0.060)	(0.066)
GSP			0.298***			0.222***			0.299***			0.077			-0.000
			(0.087)			(0.040)			(0.061)			(0.069)			(0.065)
Contiguity			0.135			-0.050			-0.240			0.184			0.374***
			(0.193)			(0.146)			(0.163)			(0.117)			(0.108)
Common lang (9%)			0.403***			0.275***			0.357***			0.128			0.046
			(0.145)			(0.063)			(0.098)			(0.118)			(0.110)
Colony			0.715***			0.421***			0.347***			0.295***			0.368***
			(0.152)			(0.087)			(0.113)			(0.104)			(0.094)
Common colonizer			-0.268			0.213			0.394			-0.481			-0.662*
			(0.529)			(0.253)			(0.301)			(0.436)			(0.394)
Same country			0.527			0.618*			0.653*			-0.090			-0.126
			(0.418)			(0.333)			(0.365)			(0.179)			(0.170)
Observations	12,915	12,915	12,915	12,915	12,915	12,915	12,915	12,915	12,915	12,915	12,915	12,915	12,915	12,915	12,915
R-squared	0.787	0.814	0.825	0.876	0.898	0.912	0.701	0.749	0.770	0.493	0.553	0.578	0.426	0.518	0.552
F-test1 *BIT_DVED = BIT_DING*	32.99	13.48	8.51	47.92	62.2	52.26	27.3	45.77	37.54	11.16	0.51	2.13	2.9	2.75	5.16
F-test2 *BITS_DVED = BITS_DING*	1.46	0.35	0.48	15.55	2.73	8.57	17.91	1.53	2.54	27.44	3.56	1.14	22.95	1.92	0.96
Exporter FE	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Importer FE		Yes			Yes			Yes			Yes			Yes	
Year FE	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Exporter-Year FE			Yes			Yes			Yes			Yes			Yes
Importer-Year FE			Yes			Yes			Yes			Yes			Yes

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Dependent variables in column (1-3) are ln(export), dependent variables in column (4-6) are Dutt extensive margin of exports, dependent variables in column (7-9) are FK extensive margin of exports, dependent variables in column (10-12) are Dutt intensive margin of exports, and dependent variables in column (13-15) are FK intensive margin of exports. $BITS\_DVED_{ijt}$ is a dummy variable for exporter i that is a developed country and it has BIT with ISDS provision at time t; $BITS\_DING_{ijt}$ is a dummy variable for exporter i that is a developed country and it has BIT with ISDS provision at time t

Table 4 Heterogeneous BITs

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	ln(Export)			*ln((Dutt Extensive Margin)*			*ln(FK Extensive Margin)*			*ln(Dutt Intensive Margin)*			*ln(FK Intensive Margin)*		
	Total export			*Number of exported product*			*eighted Number of exported produc*			*verage value of exports per produc*			*ted Average value of exports per pr*		
BIT_DVED	0.517***	0.387***	0.261***	0.282***	0.456***	0.406***	0.189***	0.524***	0.475***	0.235***	-0.068	-0.145**	0.147**	-0.137**	-0.213***
	(0.085)	(0.092)	(0.095)	(0.052)	(0.052)	(0.054)	(0.058)	(0.069)	(0.074)	(0.053)	(0.068)	(0.071)	(0.062)	(0.062)	(0.067)
BIT_DING	0.549***	0.349***	0.355***	0.397***	0.361***	0.363***	0.415***	0.437***	0.432***	0.152*	-0.011	-0.008	-0.048	-0.088	-0.077
	(0.104)	(0.099)	(0.103)	(0.049)	(0.046)	(0.047)	(0.063)	(0.063)	(0.065)	(0.089)	(0.081)	(0.086)	(0.089)	(0.078)	(0.082)
BITS_DVED	-0.226*	-0.086	0.131	0.451***	0.109	0.223***	0.416***	-0.081	0.051	-0.677***	-0.195*	-0.092	-0.614***	-0.005	0.080
	(0.133)	(0.144)	(0.154)	(0.084)	(0.078)	(0.083)	(0.099)	(0.100)	(0.109)	(0.092)	(0.104)	(0.113)	(0.103)	(0.095)	(0.105)
BITS_DING	-0.017	0.055	-0.046	0.085	-0.094*	-0.158***	0.277***	-0.119*	-0.161**	-0.102	0.149	0.113	-0.297***	0.174*	0.116
	(0.115)	(0.111)	(0.114)	(0.057)	(0.052)	(0.053)	(0.068)	(0.070)	(0.073)	(0.097)	(0.092)	(0.096)	(0.096)	(0.088)	(0.092)
ln(GDP of exporter)	0.423***	0.433***		0.150***	0.170***		0.304***	0.329***		0.273***	0.263***		0.113*	0.104	
	(0.071)	(0.069)		(0.035)	(0.034)		(0.067)	(0.065)		(0.061)	(0.061)		(0.064)	(0.063)	
ln(GDP of importer)	1.064***	0.889***		0.405***	0.212***		0.476***	0.671***		0.660***	0.677***		-0.145***	0.218**	
	(0.017)	(0.082)		(0.010)	(0.037)		(0.014)	(0.071)		(0.014)	(0.074)		(0.014)	(0.085)	
ln(Distance)	-1.054***	-1.101***	-1.096***	-0.580***	-0.632***	-0.634***	-0.655***	-0.576***	-0.589***	-0.474***	-0.470***	-0.462***	-0.349***	-0.525***	-0.507***
	(0.039)	(0.046)	(0.053)	(0.022)	(0.026)	(0.028)	(0.030)	(0.033)	(0.038)	(0.029)	(0.032)	(0.037)	(0.031)	(0.031)	(0.035)
Common language	0.552***	0.666***	0.163	0.594***	0.524***	0.198***	0.534***	0.576***	0.210**	-0.042	0.142**	-0.035	0.030	0.090	-0.047
	(0.089)	(0.091)	(0.150)	(0.045)	(0.049)	(0.067)	(0.063)	(0.065)	(0.102)	(0.068)	(0.069)	(0.121)	(0.072)	(0.066)	(0.115)
FTA	0.060	-0.159*	-0.152	-0.020	-0.307***	-0.274***	-0.184***	-0.498***	-0.424***	0.081	0.148**	0.123*	0.280***	0.339***	0.273***
	(0.080)	(0.086)	(0.095)	(0.049)	(0.051)	(0.055)	(0.061)	(0.065)	(0.070)	(0.058)	(0.062)	(0.069)	(0.067)	(0.060)	(0.066)
GSP			0.298***			0.222***			0.299***			0.076			-0.001
			(0.087)			(0.040)			(0.061)			(0.069)			(0.065)
Contiguity			0.134			-0.050			-0.240			0.184			0.374***
			(0.193)			(0.146)			(0.163)			(0.117)			(0.108)
Common lang (9%)			0.403***			0.275***			0.357***			0.128			0.045
			(0.145)			(0.063)			(0.098)			(0.118)			(0.110)
Colony			0.716***			0.421***			0.348***			0.294***			0.367***
			(0.152)			(0.086)			(0.112)			(0.104)			(0.094)
Common colonizer			-0.269			0.212			0.393			-0.481			-0.662*
			(0.529)			(0.253)			(0.301)			(0.436)			(0.394)
Same country			0.527			0.617*			0.653*			-0.090			-0.125
			(0.418)			(0.333)			(0.365)			(0.179)			(0.170)
Observations	12,915	12,915	12,915	12,915	12,915	12,915	12,915	12,915	12,915	12,915	12,915	12,915	12,915	12,915	12,915
R-squared	0.787	0.814	0.825	0.876	0.898	0.912	0.701	0.749	0.770	0.493	0.553	0.578	0.425	0.518	0.552
F-test1 *BIT_DVED = BIT_DING*	32.89	13.39	8.48	47.65	61.87	51.88	27.33	45.78	37.46	11.23	0.51	2.09	2.94	2.79	5.12
F-test2 *BITS_DVED = BITS_DING*	1.46	0.34	0.48	15.63	2.77	8.64	17.62	1.63	2.66	27.63	3.58	1.15	22.66	2.01	0.98
Exporter FE	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Importer FE		Yes			Yes			Yes			Yes			Yes	
Year FE	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Exporter-Year FE			Yes			Yes			Yes			Yes			Yes
Importer-Year FE			Yes			Yes			Yes			Yes			Yes

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Dependent variables in column (1-3) are ln(export), dependent variables in column (4-6) are Dutt extensive margin of exports, dependent variables in column (7-9) are FK extensive margin of exports, dependent variables in column (10-12) are Dutt intensive margin of exports, and dependent variables in column (13-15) are FK intensive margin of exports. $BITS\_DVED_{ijt}$ is a dummy variable for exporter i that is a developed country and it has BIT with ISDS or NT provision at time t; $BITS\_DING_{ijt}$ is a dummy variable for exporter i that is a developed country and it has BIT with ISDS or NT provision at time t

Table 5 Heterogeneous BITs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
VARIABLES	*ln(Export)*			*ln((Dutt Extensive Margin)*			*ln(FK Extensive Margin)*			*ln(Dutt Intensive Margin)*			*ln(FK Intensive Margin)*		
	Total export			*Number of exported product*			*'eighted Number of exported produc*			*verage value of exports per produc*			*ted Average value of exports per pr*		
BIT_DVED	0.502***	0.378***	0.248***	0.265***	0.437***	0.407***	0.209***	0.470***	0.427***	0.237***	-0.059	-0.159**	0.130**	-0.092	-0.179***
	(0.083)	(0.089)	(0.093)	(0.051)	(0.050)	(0.053)	(0.056)	(0.066)	(0.070)	(0.051)	(0.065)	(0.068)	(0.060)	(0.059)	(0.064)
BIT_DING	0.532***	0.325***	0.337***	0.391***	0.351***	0.356***	0.432***	0.413***	0.417***	0.141	-0.026	-0.019	-0.076	-0.088	-0.080
	(0.102)	(0.098)	(0.102)	(0.049)	(0.046)	(0.048)	(0.059)	(0.059)	(0.062)	(0.088)	(0.079)	(0.084)	(0.087)	(0.076)	(0.080)
BITS_DVED	-0.154	-0.047	0.185	0.494***	0.145*	0.265***	0.435***	0.004	0.156	-0.648***	-0.192*	-0.079	-0.583***	-0.051	0.029
	(0.129)	(0.139)	(0.151)	(0.082)	(0.077)	(0.083)	(0.097)	(0.097)	(0.105)	(0.088)	(0.099)	(0.107)	(0.101)	(0.092)	(0.102)
BITS_DING	0.017	0.060	-0.045	0.098*	-0.090*	-0.155***	0.263***	-0.096	-0.136*	-0.081	0.150*	0.110	-0.260***	0.156*	0.092
	(0.114)	(0.111)	(0.114)	(0.056)	(0.052)	(0.054)	(0.064)	(0.067)	(0.070)	(0.096)	(0.091)	(0.095)	(0.094)	(0.087)	(0.091)
ln(GDP of exporter)	0.399***	0.413***		0.173***	0.196***		0.289***	0.326***		0.227***	0.217***		0.112**	0.087*	
	(0.060)	(0.058)		(0.030)	(0.028)		(0.047)	(0.045)		(0.051)	(0.050)		(0.050)	(0.050)	
ln(GDP of importer)	1.042***	0.928***		0.398***	0.362***		0.467***	0.900***		0.645***	0.565***		-0.156***	0.028	
	(0.017)	(0.061)		(0.009)	(0.030)		(0.013)	(0.053)		(0.014)	(0.054)		(0.013)	(0.059)	
ln(Distance)	-1.062***	-1.085***	-1.082***	-0.601***	-0.643***	-0.647***	-0.668***	-0.588***	-0.612***	-0.461***	-0.442***	-0.435***	-0.338***	-0.497***	-0.470***
	(0.039)	(0.045)	(0.052)	(0.022)	(0.026)	(0.028)	(0.030)	(0.032)	(0.036)	(0.030)	(0.031)	(0.036)	(0.030)	(0.029)	(0.033)
Common language	0.539***	0.685***	0.154	0.592***	0.525***	0.196***	0.544***	0.589***	0.247**	-0.053	0.161**	-0.042	0.023	0.096	-0.093
	(0.086)	(0.088)	(0.150)	(0.045)	(0.049)	(0.067)	(0.062)	(0.064)	(0.099)	(0.065)	(0.066)	(0.120)	(0.070)	(0.062)	(0.113)
FTA	0.045	-0.151*	-0.133	-0.059	-0.342***	-0.301***	-0.204***	-0.543***	-0.492***	0.104*	0.191***	0.168**	0.294***	0.391***	0.359***
	(0.081)	(0.087)	(0.096)	(0.051)	(0.053)	(0.056)	(0.064)	(0.066)	(0.070)	(0.060)	(0.063)	(0.069)	(0.068)	(0.060)	(0.066)
GSP			0.333***			0.238***			0.320***			0.095			0.013
			(0.085)			(0.040)			(0.058)			(0.066)			(0.061)
Contiguity			0.128			-0.063			-0.240			0.191*			0.368***
			(0.192)			(0.150)			(0.165)			(0.114)			(0.108)
Common lang (9%)			0.428***			0.273***			0.325***			0.155			0.103
			(0.145)			(0.062)			(0.094)			(0.118)			(0.109)
Colony			0.728***			0.425***			0.341***			0.304***			0.387***
			(0.152)			(0.088)			(0.113)			(0.101)			(0.089)
Common colonizer			-0.079			0.256			0.522**			-0.334			-0.601
			(0.480)			(0.206)			(0.249)			(0.416)			(0.397)
Same country			0.520			0.611*			0.599*			-0.091			-0.079
			(0.398)			(0.338)			(0.361)			(0.166)			(0.159)
Observations	36,106	36,106	36,106	36,106	36,106	36,106	36,106	36,106	36,106	36,106	36,106	36,106	36,106	36,106	36,106
R-squared	0.786	0.812	0.825	0.878	0.899	0.913	0.702	0.749	0.772	0.487	0.547	0.575	0.425	0.514	0.552
Exporter FE	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Importer FE		Yes			Yes			Yes			Yes			Yes	
Year FE	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Exporter-Year FE			Yes			Yes			Yes			Yes			Yes
Importer-Year FE			Yes			Yes			Yes			Yes			Yes

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Dependent variables in column (1-3) are ln(export), dependent variables in column (4-6) are Dutt extensive margin of exports, dependent variables in column (7-9) are FK extensive margin of exports, dependent variables in column (10-12) are Dutt intensive margin of exports, and dependent variables in column (13-15) are FK intensive margin of exports. $BITS\_DVED_{ijt}$ is a dummy variable for exporter i that is a developed country and it has BIT with ISDS provision at time t; $BITS\_DING_{ijt}$ is a dummy variable for exporter i that is a developed country and it has BIT with ISDS provision at time t

Table 6 Heterogeneous BITs

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	ln(Export)			*ln((Dutt Extensive Margin)*			*ln(FK Extensive Margin)*			*ln(Dutt Intensive Margin)*			*ln(FK Intensive Margin)*		
	Total export			*Number of exported product*			*eighted Number of exported produ*			*verage value of exports per produc*			*ted Average value of exports per pr*		
BIT_DVED	0.502***	0.378***	0.248***	0.264***	0.436***	0.407***	0.209***	0.470***	0.427***	0.238***	-0.059	-0.159**	0.130**	-0.092	-0.179***
	(0.083)	(0.089)	(0.093)	(0.051)	(0.050)	(0.053)	(0.056)	(0.066)	(0.070)	(0.051)	(0.065)	(0.068)	(0.060)	(0.059)	(0.064)
BIT_DING	0.533***	0.325***	0.337***	0.391***	0.351***	0.357***	0.433***	0.414***	0.418***	0.141	-0.026	-0.019	-0.077	-0.089	-0.080
	(0.103)	(0.098)	(0.102)	(0.049)	(0.046)	(0.048)	(0.059)	(0.059)	(0.062)	(0.088)	(0.080)	(0.085)	(0.087)	(0.076)	(0.080)
BITS_DVED	-0.154	-0.046	0.185	0.495***	0.146*	0.265***	0.435***	0.004	0.156	-0.649***	-0.192*	-0.080	-0.583***	-0.050	0.029
	(0.129)	(0.139)	(0.151)	(0.082)	(0.077)	(0.083)	(0.097)	(0.097)	(0.106)	(0.088)	(0.099)	(0.107)	(0.101)	(0.092)	(0.102)
BITS_DING	0.017	0.060	-0.046	0.098*	-0.090*	-0.156***	0.261***	-0.098	-0.138*	-0.081	0.151*	0.110	-0.258***	0.158*	0.093
	(0.114)	(0.111)	(0.114)	(0.056)	(0.052)	(0.054)	(0.064)	(0.067)	(0.070)	(0.097)	(0.091)	(0.095)	(0.095)	(0.087)	(0.091)
ln(GDP of exporter)	0.399***	0.413***		0.172***	0.196***		0.289***	0.326***		0.227***	0.217***		0.112**	0.087*	
	(0.060)	(0.058)		(0.030)	(0.028)		(0.047)	(0.045)		(0.051)	(0.050)		(0.050)	(0.050)	
ln(GDP of importer)	1.042***	0.928***		0.398***	0.362***		0.467***	0.900***		0.645***	0.565***		-0.156***	0.028	
	(0.017)	(0.061)		(0.009)	(0.030)		(0.013)	(0.053)		(0.014)	(0.054)		(0.013)	(0.059)	
ln(Distance)	-1.062***	-1.085***	-1.082***	-0.601***	-0.643***	-0.647***	-0.668***	-0.588***	-0.612***	-0.461***	-0.442***	-0.435***	-0.338***	-0.497***	-0.470***
	(0.039)	(0.045)	(0.052)	(0.022)	(0.026)	(0.028)	(0.030)	(0.032)	(0.036)	(0.030)	(0.031)	(0.036)	(0.030)	(0.029)	(0.033)
Common language	0.539***	0.685***	0.154	0.592***	0.525***	0.196***	0.543***	0.589***	0.247**	-0.053	0.161**	-0.042	0.024	0.097	-0.093
	(0.086)	(0.088)	(0.150)	(0.045)	(0.049)	(0.067)	(0.062)	(0.064)	(0.099)	(0.065)	(0.066)	(0.120)	(0.070)	(0.062)	(0.113)
FTA	0.045	-0.151*	-0.133	-0.059	-0.342***	-0.301***	-0.204***	-0.542***	-0.492***	0.104*	0.191***	0.168**	0.295***	0.391***	0.359***
	(0.081)	(0.087)	(0.096)	(0.051)	(0.053)	(0.056)	(0.064)	(0.066)	(0.070)	(0.060)	(0.063)	(0.069)	(0.068)	(0.060)	(0.066)
GSP			0.333***			0.238***			0.320***			0.095			0.013
			(0.085)			(0.040)			(0.058)			(0.066)			(0.061)
Contiguity			0.128			-0.063			-0.240			0.191*			0.368***
			(0.192)			(0.150)			(0.165)			(0.114)			(0.108)
Common lang (9%)			0.428***			0.274***			0.325***			0.155			0.103
			(0.145)			(0.062)			(0.094)			(0.118)			(0.109)
Colony			0.729***			0.425***			0.341***			0.304***			0.387***
			(0.152)			(0.088)			(0.113)			(0.101)			(0.089)
Common colonizer			-0.079			0.256			0.522**			-0.334			-0.601
			(0.480)			(0.206)			(0.249)			(0.416)			(0.397)
Same country			0.520			0.611*			0.599*			-0.091			-0.079
			(0.398)			(0.338)			(0.361)			(0.166)			(0.159)
Observations	36,106	36,106	36,106	36,106	36,106	36,106	36,106	36,106	36,106	36,106	36,106	36,106	36,106	36,106	36,106
R-squared	0.786	0.812	0.825	0.878	0.899	0.913	0.702	0.749	0.772	0.487	0.547	0.575	0.425	0.514	0.552
Exporter FE	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Importer FE		Yes			Yes			Yes			Yes			Yes	
Year FE	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Exporter-Year FE			Yes			Yes			Yes			Yes			Yes
Importer-Year FE			Yes			Yes			Yes			Yes			Yes

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Dependent variables in column (1-3) are ln(export), dependent variables in column (4-6) are Dutt extensive margin of exports, dependent variables in column (7-9) are FK extensive margin of exports, dependent variables in column (10-12) are Dutt intensive margin of exports, and dependent variables in column (13-15) are FK intensive margin of exports. $BITS\_DVED_{ijt}$ is a dummy variable for exporter i that is a developed country and it has BIT with ISDS or NT provision at time t; $BITS\_DING_{ijt}$ is a dummy variable for exporter i that is a developed country and it has BIT with ISDS or NT provision at time t

Appendix A

A1. Theoretical framework

The intensive product margin, the average value of exported goods, is the total value of exported intermediate goods and of exported final goods divided by N firms.

$$IM = \frac{\int_{\varphi_I}^{\varphi_{\max}} \frac{M_F W_H}{2\varphi_i} \left(A - \frac{W_F + W_H + \tau_U}{\varphi_i} - \theta \right) d\varphi_i + \int_{\varphi_X}^{\varphi_I} \frac{M_F}{4} \left[A^2 - \left(\frac{2W_H}{\varphi_i} + \tau_D + \theta \right)^2 \right] d\varphi_i}{N}$$

The intensive margin could be rewritten as

$$IM = \frac{\frac{M_F W_H}{2} (A - \theta) \left[\ln(\varphi_{\max}) - \ln(\varphi_I) \right] + \frac{M_F W_H (W_F + W_H + \tau_U)}{2} \left(\frac{1}{\varphi_{\max}} - \frac{1}{\varphi_I} \right)}{N}$$

$$+ \frac{\frac{M_F}{2} \left[A^2 - (\tau_D + \theta)^2 \right] (\varphi_I - \varphi_X) - M_F W_H (\tau_D + \theta) \left[\ln(\varphi_I) - \ln(\varphi_X) \right] + M_F W_H^2 \left(\frac{1}{\varphi_I} - \frac{1}{\varphi_X} \right)}{N}$$

The effect of lowering the variable cost of selling abroad (θ) on the intensive margin depends on $\frac{\partial IM}{\partial \theta}$.If $\frac{\partial IM}{\partial \theta} > 0$, a lower θ results in a decreased IM .

$$\frac{\partial IM}{\partial \theta}=\frac{-\frac{M_F W_H}{2}\ln\left(\varphi_{\max}\right)-\frac{M_F W_H A}{2}\frac{1}{\varphi_I}\frac{\partial \varphi_I}{\partial \theta}-\frac{M_F W_H \theta}{2}\frac{1}{\varphi_I}\frac{\partial \varphi_I}{\partial \theta}-\frac{M_F W_H}{2}\ln\left(\varphi_I\right)-M_F W_H \tau_D \frac{1}{\varphi_I}\frac{\partial \varphi_I}{\partial \theta}}{\frac{\partial N}{\partial \theta}}$$

$$+\frac{-\frac{M_F W_H\left(W_H-W_F-\tau_U\right)}{2}\frac{1}{\varphi_I^2}\frac{\partial \varphi_I}{\partial \theta}-\frac{M_F}{2}\left[\left(\tau_D+\theta\right)^2-A^2\right]\left(\frac{\partial \varphi_I}{\partial \theta}-\frac{\partial \varphi_X}{\partial \theta}\right)-M_F\left(\tau_D+\theta\right)\left(\varphi_I-\varphi_X\right)}{\frac{\partial N}{\partial \theta}}$$

$$+\frac{+M_F W_H \ln\left(\varphi_X\right)+M_F W_H \theta\frac{1}{\varphi_X}\frac{\partial \varphi_X}{\partial \theta}+M_F W_H \tau_D \frac{1}{\varphi_X}\frac{\partial \varphi_X}{\partial \theta}+M_F W_H^2\frac{1}{\varphi_X^2}\frac{\partial \varphi_X}{\partial \theta}}{\frac{\partial N}{\partial \theta}}$$

$$\frac{\partial IM}{\partial \theta}=\frac{-\frac{M_F W_H}{2}\ln\left(\varphi_{\max}\right)-\frac{M_F W_H}{2}\ln\left(\varphi_I\right)+M_F W_H \ln\left(\varphi_X\right)}{\frac{\partial N}{\partial \theta}} \quad [1]$$

$$+\frac{-\frac{M_F W_H\left(W_H-W_F-\tau_U\right)}{2}\frac{1}{\varphi_I^2}\frac{\partial \varphi_I}{\partial \theta}-\frac{M_F W_H \tau_D}{2}\frac{1}{\varphi_I}\frac{\partial \varphi_I}{\partial \theta}}{\frac{\partial N}{\partial \theta}} \quad [2]$$

$$+\frac{-M_F\left(\tau_D+\theta\right)\left(\varphi_I-\varphi_X\right)}{\frac{\partial N}{\partial \theta}} \quad [3]$$

$$+\frac{-\frac{M_F W_H(A+\theta+\tau_D)}{2}\frac{1}{\varphi_I}\frac{\partial \varphi_I}{\partial \theta}+M_F W_H\left(\theta+\tau_D+\frac{W_H}{\varphi_X}\right)\frac{1}{\varphi_X}\frac{\partial \varphi_X}{\partial \theta}+\frac{M_F}{2}\left[A^2-\left(\tau_D+\theta\right)^2\right]\left(\frac{\partial \varphi_I}{\partial \theta}-\frac{\partial \varphi_X}{\partial \theta}\right)}{\frac{\partial N}{\partial \theta}} \quad [4]$$

$$\frac{\partial IM}{\partial \theta}=[1]+[2]+[3]+[4]$$

First of all, the denominator $\frac{\partial N}{\partial \theta} < 0$ since lower the cost related to the overseas business environment leads to more firms in the international market. $\frac{\partial \varphi_I}{\partial \theta} > 0 \frac{\partial \varphi_X}{\partial \theta} > 0, \ln\left(\varphi_{\max}\right) - \ln\left(\varphi_X\right) > 0$ and $\ln\left(\varphi_I\right) - \ln\left(\varphi_X\right) > 0$ because $\varphi_{\max} > \varphi_I > \varphi_X$.

Then $[1] > 0$, since the numerator in [1]

$$-\frac{M_F W_H}{2}\ln\left(\varphi_{\max}\right) - \frac{M_F W_H}{2}\ln\left(\varphi_I\right) + M_F W_H \ln\left(\varphi_X\right) = -\frac{M_F W_H}{2}\left[\ln\left(\varphi_{\max}\right) - \ln\left(\varphi_X\right)\right] - \frac{M_F W_H}{2}\left[\ln\left(\varphi_I\right) - \ln\left(\varphi_X\right)\right] < 0$$

In addition, $[2] > 0$. The numerator in [2]

$$-\frac{M_F W_H\left(W_H - W_F - \tau_U\right)}{2}\frac{1}{\varphi_I^2}\frac{\partial \varphi_I}{\partial \theta} - \frac{M_F W_H \tau_D}{2}\frac{1}{\varphi_I}\frac{\partial \varphi_I}{\partial \theta} = -\frac{M_F W_H}{2}\frac{1}{\varphi_I}\frac{\partial \varphi_I}{\partial \theta}\left(\frac{W_H - W_F - \tau_U}{\varphi_I} + \tau_D\right) < 0$$

Furthermore $[3] > 0$. The numerator in [3] $-M_F\left(\tau_D + \theta\right)\left(\varphi_I - \varphi_X\right) < 0$

Finally, The numerator in $[4] < 0$ if $\frac{\partial \varphi_X}{\partial \theta} > \frac{\partial \varphi_I}{\partial \theta}$ and $A > W_H\left(\frac{1}{\varphi_X}\frac{\partial \varphi_X}{\partial \theta} - \frac{1}{\varphi_I}\frac{\partial \varphi_I}{\partial \theta}\right) / \left(\frac{\partial \varphi_X}{\partial \theta} - \frac{\partial \varphi_I}{\partial \theta}\right) + \tau_D + \theta$

$$-\frac{M_F W_H (A + \theta + \tau_D)}{2}\frac{1}{\varphi_I}\frac{\partial \varphi_I}{\partial \theta} + M_F W_H\left(\theta + \tau_D + \frac{W_H}{\varphi_X}\right)\frac{1}{\varphi_X}\frac{\partial \varphi_X}{\partial \theta} + \frac{M_F}{2}\left[A^2 - \left(\tau_D + \theta\right)^2\right]\left(\frac{\partial \varphi_I}{\partial \theta} - \frac{\partial \varphi_X}{\partial \theta}\right)$$

$$= -\frac{M_F W_H (A + \theta + \tau_D)}{2}\left(\frac{1}{\varphi_I}\frac{\partial \varphi_I}{\partial \theta} - \frac{1}{\varphi_X}\frac{\partial \varphi_X}{\partial \theta}\right) - M_F W_H\sqrt{\frac{4F_X}{M_F}}\frac{1}{\varphi_X}\frac{\partial \varphi_X}{\partial \theta} + \frac{M_F}{2}\left(A + \tau_D + \theta\right)\left(A - \tau_D - \theta\right)\left(\frac{\partial \varphi_I}{\partial \theta} - \frac{\partial \varphi_X}{\partial \theta}\right)$$

$$= -\frac{M_F (A + \theta + \tau_D)}{2}\left[\left(A - \tau_D - \theta\right)\left(\frac{\partial \varphi_X}{\partial \theta} - \frac{\partial \varphi_I}{\partial \theta}\right) - W_H\left(\frac{1}{\varphi_X}\frac{\partial \varphi_X}{\partial \theta} - \frac{1}{\varphi_I}\frac{\partial \varphi_I}{\partial \theta}\right)\right] - M_F W_H\sqrt{\frac{4F_X}{M_F}}\frac{1}{\varphi_X}\frac{\partial \varphi_X}{\partial \theta}$$

Hence, summing up [1] to [4], $\frac{\partial IM}{\partial \theta} > 0$. Therefore, a lower θ results in a decreased IM.

A2.

Table A2.1 Summary statistics

VARIABLES	Observations	Mean	Std. Dev.	Min	Max
In(Export)	231,501	14.562	3.912	0.000	26.435
Dutt_Extensive	231,501	3.431	2.335	0.000	8.503
Dutt_Intensive	231,501	11.130	2.277	0.000	21.870
FK_Extensive	231,501	-4.121	2.616	-18.303	1.227
FK_Intensive	231,501	-4.970	2.219	-19.713	1.102
BIT enforced	231,501	0.139	0.346	0.000	1.000
Any BIT enforced	32,082 (13.86%)				

Table A2.2 Summary statistics

VARIABLES	Observations	Mean	Std. Dev.	Min	Max
In(export)	12,915	16.90	3.60	0.00	26.01
Dutt_Extensive	12,915	4.55	2.28	0.00	8.50
Dutt_Intensive	12,915	12.35	1.95	0.00	19.66
FK_Extensive	12,915	-3.05	2.37	-15.67	0.00
FK_Intensive	12,915	-5.24	1.88	-18.47	0.24
BITs	12,915	0.26	0.44	0.00	1.00

VARIABLES	Observations	Percentage
No BITs	10,034	77.69
Any BITs	2,881	22.31
BITs with ISDS	1,604	12.42
BITs with Weak/Moderate ISDS	480	3.72
BITs with Strong ISDS	1,124	8.7
BITs with ISDS or NT	1,607	12.44

A2.3 Filled in the missing variables about heterogeneous BIT

The original dataset about heterogeneous BIT 1978-2002 is only available in every three years -1978, 1981, 1984, 1987, 1990, 1993,1996, 1999 and 2002. I filled the gap in the dataset by assuming that BITs, as well as the provisions in BITs, are unlikely to change in these missing years. For example, in original heterogeneous BIT dataset, dummy variable BIT between the United States and the Czech Republic

equals to zero in the year of 1978, 1981, 1984, 1987 and 1990, while it changes to one in the year of 1993, 1996, 1999 and 2002. This is also true with the dummy variable BIT with strong ISDS between these two countries. I referred to UNCTAD database of International Investment Agreements (IIAs) and found that BIT is signed in 1991. Hence I recorded the missing dummy variable BIT as zero between the United States and the Czech Republic in the year of 1979, 1980, 1982, 1983, 1985, 1986, 1988 and 1989, while recorded it as one in the year of 1991, 1992, 1994, 1995, 1997, 1998, 2000, and 2001. Similarly, I record the missing dummy variable BIT with strong ISDS using the same strategy. Since this strategy fills in two-years observation in every three years, the dataset is expected to be tripled. The new dataset with export and heterogeneous BITs increases from 12,915 to 36,106 observations, and it is almost tripled as expected.

Table A2.3 Summary statistics

VARIABLES	Observations	Mean	Std. Dev.	Min	Max
In(export)	36,106	16.93	3.57	0.00	26.09
Dutt_Extensive	36,106	4.54	2.29	0.00	8.50
Dutt_Intensive	36,106	12.39	1.93	0.00	19.66
FK_Extensive	36,106	-3.07	2.37	-16.31	0.00
FK_Intensive	36,106	-5.19	1.86	-18.47	0.24
BITs	36,106	0.21	0.40	0.00	1.00

VARIABLES	Observations	Percentage
No BITs	28,699	79.49
Any BITs	7,407	20.51
BITs with ISDS	4,132	11.44
BITs with Weak/Moderate ISDS	1,055	2.92
BITs with Strong ISDS	2,779	7.7
BITs with ISDS or NT	4,135	11.45

Appendix B

Table B1: Correlation between Exports of goods and services (as percentage of GDP) and FDI outflows (as percentage of gross fixed capital) from 1990 to 2014

Correlation between Exports of goods and services (as % of GDP) and FDI outflows (as % of gross fixed capital) 1990-2014					
	Country Name	Country Code	Correlation	Positive Correlation	Developed Countries
1	Afghanistan	AFG	-0.450	No	No
2	Albania	ALB	0.755	Yes	No
3	Algeria	DZA	0.424	Yes	No
4	Angola	AGO	-0.171	No	No
5	Antigua and Barbuda	ATG	-0.283	No	No
6	Argentina	ARG	-0.255	No	No
7	Armenia	ARM	-0.257	No	No
8	Australia	AUS	0.276	Yes	Yes
9	Austria	AUT	0.746	Yes	Yes
10	Azerbaijan	AZE	0.212	Yes	No
11	Bahamas	BHS	-0.409	No	No
12	Bahrain	BHR	0.148	Yes	No
13	Bangladesh	BGD	0.496	Yes	No
14	Barbados	BRB	0.071	Yes	No
15	Belarus	BLR	0.002	Yes	No
16	Belgium	BEL	0.474	Yes	Yes
17	Belize	BLZ	-0.255	No	No
18	Benin	BEN	0.303	Yes	No
19	Bermuda	BMU	-0.551	No	No
20	Bolivia, Plurinational State of	BOL	-0.442	No	No
21	Bosnia and Herzegovina	BIH	0.382	Yes	No
22	Botswana	BWA	-0.046	No	No
23	Brazil	BRA	0.440	Yes	No
24	Brunei Darussalam	BRN	0.230	Yes	No
25	Bulgaria	BGR	0.449	Yes	Yes
26	Burkina Faso	BFA	0.803	Yes	No
27	Burundi	BDI	0.556	Yes	No
28	Cabo Verde	CPV	-0.647	No	No
29	Cambodia	KHM	0.048	Yes	No
30	Cameroon	CMR	0.171	Yes	No
31	Canada	CAN	0.771	Yes	Yes
32	Central African Republic	CAF	0.412	Yes	No

33	Chad	TCD	-0.409	No	No
34	Chile	CHL	0.389	Yes	No
35	China	CHN	0.286	Yes	No
36	Colombia	COL	-0.044	No	No
37	Congo	COG	0.012	Yes	No
38	Congo, Democratic Republic of the	COD	0.360	Yes	No
39	Costa Rica	CRI	0.032	Yes	No
40	Croatia	HRV	0.284	Yes	Yes
41	Cyprus	CYP	-0.113	No	Yes
42	Czech Republic	CZE	0.676	Yes	Yes
43	Côte d'Ivoire	CIV	0.023	Yes	No
44	Denmark	DNK	0.115	Yes	Yes
45	Dominica	DMA	-0.394	No	No
46	Dominican Republic	DOM	0.210	Yes	No
47	Ecuador	ECU	-0.289	No	No
48	Egypt	EGY	0.431	Yes	No
49	El Salvador	SLV	-0.135	No	No
50	Equatorial Guinea	GNQ	-0.111	No	No
51	Estonia	EST	-0.434	No	Yes
52	European Union	EUU	0.288	Yes	No
53	Fiji	FJI	-0.114	No	No
54	Finland	FIN	0.296	Yes	Yes
55	France	FRA	0.209	Yes	Yes
56	Gabon	GAB	0.158	Yes	No
57	Gambia	GMB	0.083	Yes	No
58	Georgia	GEO	0.266	Yes	No
59	Germany	DEU	0.391	Yes	Yes
60	Ghana	GHA	0.024	Yes	No
61	Greece	GRC	0.384	Yes	Yes
62	Grenada	GRD	-0.554	No	No
63	Guatemala	GTM	0.422	Yes	No
64	Guinea	GIN	0.313	Yes	No
65	Guinea-Bissau	GNB	-0.010	No	No
66	Guyana	GUY	-0.024	No	No
67	Haiti	HTI	0.139	Yes	No
68	Honduras	HND	0.173	Yes	No
69	Hong Kong, China	HKG	0.849	Yes	No
70	Hungary	HUN	0.599	Yes	Yes
71	Iceland	ISL	-0.433	No	Yes
72	India	IND	0.686	Yes	No

73	Indonesia	IDN	-0.253	No	No
74	Iran, Islamic Republic of	IRN	0.092	Yes	No
75	Iraq	IRQ	0.116	Yes	No
76	Ireland	IRL	0.762	Yes	Yes
77	Israel	ISR	0.713	Yes	No
78	Italy	ITA	0.507	Yes	Yes
79	Jamaica	JAM	0.650	Yes	No
80	Japan	JPN	0.851	Yes	Yes
81	Jordan	JOR	-0.298	No	No
82	Kazakhstan	KAZ	-0.105	No	No
83	Kenya	KEN	0.027	Yes	No
84	Korea, Republic of	KOR	0.948	Yes	No
85	Kuwait	KWT	0.531	Yes	No
86	Kyrgyzstan	KGZ	-0.050	No	No
87	Latin America and the Caribbean	LCN	0.763	Yes	No
88	Latvia	LVA	0.437	Yes	Yes
89	Least developed countries (LDCs)	LDC	0.541	Yes	No
90	Lebanon	LBN	0.763	Yes	No
91	Libya	LBY	0.369	Yes	No
92	Lithuania	LTU	0.278	Yes	Yes
93	Luxembourg	LUX	0.605	Yes	Yes
94	Macao, China	MAC	0.152	Yes	No
95	Madagascar	MDG	-0.423	No	No
96	Malawi	MWI	-0.349	No	No
97	Malaysia	MYS	-0.090	No	No
98	Mali	MLI	0.229	Yes	No
99	Malta	MLT	0.320	Yes	Yes
100	Mauritania	MRT	0.306	Yes	No
101	Mauritius	MUS	-0.615	No	No
102	Mexico	MEX	0.614	Yes	No
103	Moldova, Republic of	MDA	-0.216	No	No
104	Mongolia	MNG	0.233	Yes	No
105	Montenegro	MNE	0.328	Yes	No
106	Morocco	MAR	0.685	Yes	No
107	Mozambique	MOZ	0.224	Yes	No
108	Namibia	NAM	-0.457	No	No
109	Netherlands	NLD	0.147	Yes	Yes
110	New Zealand	NZL	-0.148	No	Yes
111	Nicaragua	NIC	0.666	Yes	No
112	Niger	NER	-0.038	No	No

113	Nigeria	NGA	-0.022	No	No
114	North America	NAC	0.717	Yes	No
115	Norway	NOR	0.539	Yes	Yes
116	Oman	OMN	0.620	Yes	No
117	Pakistan	PAK	-0.559	No	No
118	Panama	PAN	-0.160	No	No
119	Papua New Guinea	PNG	-0.293	No	No
120	Paraguay	PRY	-0.041	No	No
121	Peru	PER	0.235	Yes	No
122	Philippines	PHL	-0.214	No	No
123	Poland	POL	0.056	Yes	Yes
124	Portugal	PRT	-0.148	No	Yes
125	Qatar	QAT	0.457	Yes	No
126	Romania	ROU	-0.288	No	Yes
127	Russian Federation	RUS	0.208	Yes	No
128	Rwanda	RWA	0.474	Yes	No
129	Saint Kitts and Nevis	KNA	-0.280	No	No
130	Saint Lucia	LCA	-0.736	No	No
131	Saint Vincent and the Grenadines	VCT	-0.491	No	No
132	Saudi Arabia	SAU	0.163	Yes	No
133	Senegal	SEN	-0.070	No	No
134	Serbia	SRB	0.634	Yes	No
135	Seychelles	SYC	0.041	Yes	No
136	Sierra Leone	SLE	0.100	Yes	No
137	Singapore	SGP	0.507	Yes	No
138	Slovakia	SVK	0.070	Yes	Yes
139	Slovenia	SVN	0.121	Yes	Yes
140	Solomon Islands	SLB	-0.028	No	No
141	South Africa	ZAF	-0.280	No	No
142	South Asia	SAS	0.700	Yes	No
143	Southern Africa	ZAF	-0.135	No	No
144	Spain	ESP	0.434	Yes	Yes
145	Sri Lanka	LKA	-0.225	No	No
146	Swaziland	SWZ	-0.096	No	No
147	Sweden	SWE	0.451	Yes	Yes
148	Switzerland	CHE	0.366	Yes	Yes
149	Thailand	THA	0.516	Yes	No
150	Timor-Leste	TLS	0.092	Yes	No
151	Togo	TGO	0.311	Yes	No
152	Tonga	TON	-0.277	No	No

153	Trinidad and Tobago	TTO	0.180	Yes	No
154	Tunisia	TUN	0.589	Yes	No
155	Turkey	TUR	0.670	Yes	No
156	Uganda	UGA	0.199	Yes	No
157	Ukraine	UKR	0.147	Yes	No
158	United Arab Emirates	ARE	0.055	Yes	No
159	United Kingdom	GBR	-0.116	No	Yes
160	United Republic of Tanzania	TZA	0.074	Yes	No
161	United States	USA	0.691	Yes	Yes
162	Uruguay	URY	0.354	Yes	No
163	Vanuatu	VUT	0.018	Yes	No
164	Venezuela, Bolivarian Republic of	VEN	0.148	Yes	No
165	Viet Nam	VNM	0.803	Yes	No
166	World	WLD	0.590	Yes	No
167	Yemen	YEM	0.4181	Yes	No
168	Zambia	ZMB	-0.0595	No	No
169	Zimbabwe	ZWE	-0.0633	No	No

Table B2: Correlation between Exports of goods and services (as the percentage of GDP) and FDI outward stock (as the percentage of GDP) from 1990 to 2014

Correlation between Exports of goods and services (as % of GDP) and FDI outward stock (as % of GDP) 1990-2014

	Country Name	Country Code	Correlation	Positive Correlation	Developed Countries
1	Albania	ALB	0.883	Yes	No
2	Algeria	DZA	0.404	Yes	No
3	Angola	AGO	-0.180	No	No
4	Antigua and Barbuda	ATG	-0.818	No	No
5	Argentina	ARG	0.930	Yes	No
6	Armenia	ARM	-0.182	No	No
7	Aruba	ABW	0.180	Yes	No
8	Australia	AUS	0.691	Yes	Yes
9	Austria	AUT	0.914	Yes	Yes
10	Azerbaijan	AZE	0.443	Yes	No
11	Bahamas	BHS	-0.416	No	No
12	Bahrain	BHR	-0.394	No	No
13	Bangladesh	BGD	-0.561	No	No

14	Barbados	BRB	-0.445	No	No
15	Belarus	BLR	-0.063	No	No
16	Belgium	BEL	0.705	Yes	Yes
17	Belize	BLZ	-0.466	No	No
18	Benin	BEN	0.609	Yes	No
19	Bermuda	BMU	-0.785	No	No
20	Bolivia, Plurinational State of	BOL	-0.025	No	No
21	Bosnia and Herzegovina	BIH	0.590	Yes	No
22	Botswana	BWA	0.192	Yes	No
23	Brazil	BRA	0.603	Yes	No
24	Brunei Darussalam	BRN	0.048	Yes	No
25	Bulgaria	BGR	0.700	Yes	Yes
26	Burkina Faso	BFA	0.894	Yes	No
27	Burundi	BDI	-0.566	No	No
28	Cabo Verde	CPV	0.104	Yes	No
29	Cambodia	KHM	-0.469	No	No
30	Cameroon	CMR	0.019	Yes	No
31	Canada	CAN	0.227	Yes	Yes
32	Central African Republic	CAF	0.628	Yes	No
33	Chad	TCD	-0.800	No	No
34	Chile	CHL	0.576	Yes	No
35	China	CHN	0.236	Yes	No
36	Colombia	COL	0.081	Yes	No
37	Congo	COG	0.221	Yes	No
38	Congo, Democratic Republic of the	COD	0.456	Yes	No
39	Costa Rica	CRI	-0.255	No	No
40	Croatia	HRV	0.567	Yes	Yes
41	Cyprus	CYP	-0.501	No	Yes
42	Czech Republic	CZE	0.929	Yes	Yes
43	Côte d'Ivoire	CIV	0.497	Yes	No
44	Denmark	DNK	0.888	Yes	Yes
45	Dominica	DMA	-0.821	No	No
46	Dominican Republic	DOM	-0.582	No	No
47	Ecuador	ECU	0.135	Yes	No
48	Egypt	EGY	-0.080	No	No
49	El Salvador	SLV	-0.094	No	No
50	Equatorial Guinea	GNQ	-0.558	No	No
51	Estonia	EST	0.378	Yes	Yes
52	European Union	EUU	0.950	Yes	No
53	Fiji	FJI	0.194	Yes	No

54	Finland	FIN	0.698	Yes	Yes
55	France	FRA	0.773	Yes	Yes
56	Gabon	GAB	0.138	Yes	No
57	Georgia	GEO	0.250	Yes	No
58	Germany	DEU	0.905	Yes	Yes
59	Ghana	GHA	0.075	Yes	No
60	Greece	GRC	0.824	Yes	Yes
61	Grenada	GRD	-0.822	No	No
62	Guatemala	GTM	0.790	Yes	No
63	Guinea	GIN	0.372	Yes	No
64	Guinea-Bissau	GNB	0.200	Yes	No
65	Guyana	GUY	0.253	Yes	No
66	Haiti	HTI	0.059	Yes	No
67	Honduras	HND	0.140	Yes	No
68	Hong Kong, China	HKG	0.908	Yes	No
69	Hungary	HUN	0.852	Yes	Yes
70	Iceland	ISL	0.584	Yes	Yes
71	India	IND	0.921	Yes	No
72	Indonesia	IDN	0.254	Yes	No
73	Iran, Islamic Republic of	IRN	0.385	Yes	No
74	Iraq	IRQ	0.083	Yes	No
75	Ireland	IRL	0.769	Yes	Yes
76	Israel	ISR	0.624	Yes	No
77	Italy	ITA	0.819	Yes	Yes
78	Jamaica	JAM	-0.054	No	No
79	Japan	JPN	0.815	Yes	Yes
80	Jordan	JOR	0.629	Yes	No
81	Kazakhstan	KAZ	-0.158	No	No
82	Kenya	KEN	0.847	Yes	No
83	Kiribati	KIR	-0.159	No	No
84	Korea, Republic of	KOR	0.927	Yes	No
85	Kuwait	KWT	-0.059	No	No
86	Kyrgyzstan	KGZ	-0.029	No	No
87	Lao People's Democratic Republic	LAO	0.274	Yes	No
88	Latin America and the Caribbean	LCN	0.839	Yes	No
89	Latvia	LVA	0.547	Yes	Yes
90	Least developed countries (LDCs)	LDC	0.672	Yes	No
91	Lebanon	LBN	0.941	Yes	No
92	Liberia	LBR	0.794	Yes	No
93	Libya	LBY	0.451	Yes	No

94	Lithuania	LTU	0.878	Yes	Yes
95	Luxembourg	LUX	0.810	Yes	Yes
96	Macao, China	MAC	0.391	Yes	No
97	Madagascar	MDG	0.026	Yes	No
98	Malawi	MWI	0.579	Yes	No
99	Malaysia	MYS	-0.145	No	No
100	Mali	MLI	-0.684	No	No
101	Malta	MLT	0.494	Yes	Yes
102	Mauritania	MRT	0.383	Yes	No
103	Mauritius	MUS	-0.731	No	No
104	Mexico	MEX	0.755	Yes	No
105	Moldova, Republic of	MDA	0.446	Yes	No
106	Mongolia	MNG	-0.015	No	No
107	Montenegro	MNE	0.074	Yes	No
108	Morocco	MAR	0.766	Yes	No
109	Mozambique	MOZ	-0.448	No	No
110	Namibia	NAM	-0.200	No	No
111	Netherlands	NLD	0.874	Yes	Yes
112	New Zealand	NZL	0.544	Yes	Yes
113	Nicaragua	NIC	0.827	Yes	No
114	Niger	NER	-0.143	No	No
115	Nigeria	NGA	0.342	Yes	No
116	North America	NAC	0.724	Yes	No
117	Norway	NOR	0.386	Yes	Yes
118	Oman	OMN	0.886	Yes	No
119	Pakistan	PAK	-0.774	No	No
120	Panama	PAN	-0.192	No	No
121	Papua New Guinea	PNG	0.650	Yes	No
122	Paraguay	PRY	0.217	Yes	No
123	Peru	PER	0.832	Yes	No
124	Philippines	PHL	-0.415	No	No
125	Poland	POL	0.853	Yes	Yes
126	Portugal	PRT	0.639	Yes	Yes
127	Qatar	QAT	0.575	Yes	No
128	Romania	ROU	0.178	Yes	Yes
129	Russian Federation	RUS	0.004	Yes	No
130	Rwanda	RWA	0.804	Yes	No
131	Saint Kitts and Nevis	KNA	-0.545	No	No
132	Saint Lucia	LCA	-0.770	No	No
133	Saint Vincent and the Grenadines	VCT	-0.894	No	No

134	Samoa	WSM	-0.183	No	No
135	Saudi Arabia	SAU	0.378	Yes	No
136	Senegal	SEN	0.068	Yes	No
137	Serbia	SRB	0.800	Yes	No
138	Seychelles	SYC	0.783	Yes	No
139	Singapore	SGP	0.748	Yes	No
140	Slovakia	SVK	0.695	Yes	Yes
141	Slovenia	SVN	0.866	Yes	Yes
142	Solomon Islands	SLB	0.766	Yes	No
143	South Africa	ZAF	0.522	Yes	No
144	South Asia	SAS	0.910	Yes	No
145	Southern Africa	ZAF	0.464	Yes	No
146	Spain	ESP	0.710	Yes	Yes
147	Sri Lanka	LKA	-0.512	No	No
148	Swaziland	SWZ	0.062	Yes	No
149	Sweden	SWE	0.860	Yes	Yes
150	Switzerland	CHE	0.963	Yes	Yes
151	Syrian Arab Republic	SYR	0.712	Yes	No
152	Thailand	THA	0.599	Yes	No
153	The former Yugoslav Republic of Macedonia	MKD	0.198	Yes	No
154	Timor-Leste	TLS	-0.066	No	No
155	Togo	TGO	0.655	Yes	No
156	Tonga	TON	-0.446	No	No
157	Trinidad and Tobago	TTO	0.160	Yes	No
158	Tunisia	TUN	0.647	Yes	No
159	Turkey	TUR	0.712	Yes	No
160	Uganda	UGA	0.622	Yes	No
161	Ukraine	UKR	0.172	Yes	No
162	United Arab Emirates	ARE	0.855	Yes	No
163	United Kingdom	GBR	0.534	Yes	Yes
164	United States	USA	0.679	Yes	Yes
165	Uruguay	URY	0.119	Yes	No
166	Vanuatu	VUT	0.169	Yes	No
167	Venezuela, Bolivarian Republic of	VEN	-0.142	No	No
168	Viet Nam	VNM	0.802	Yes	No
169	World	WLD	0.941	Yes	No
170	Yemen	YEM	0.647	Yes	No
171	Zambia	ZMB	0.687	Yes	No
172	Zimbabwe	ZWE	0.337	Yes	No