Institute for International Economic Policy Working Paper Series
Elliott School of International Affairs
The George Washington University

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IIEP-WP-2009-7

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April 2008

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Regional Economic Integration and Geographic Concentration of Multinational Firms*

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Abstract

A number of theoretical studies have predicted that preferential trade agreements (PTAs) raise outside multinationals' incentive to invest in the participating countries, especially in those that are integrated with larger markets and have lower production costs. The hypothesis has however not been tested empirically. This paper addresses the issue by estimating the impact of PTAs on countries' ability to attract multinationals. The evidence is broadly consistent with expectations. The formation of PTAs leads to an increase in FDI by outside multinationals, but the effect varies sharply with the size of integrated markets and countries' comparative advantage. Countries integrated with larger markets experience a greater increase in total and export-platform FDI. Those with a higher labor endowment also attract more FDI especially in labor-intensive industries, but at the expense of their labor-scarce PTA partners.

Key words: regional economic integration, multinational firms, geographic concentration, market potential, comparative advantage

JEL code: F15, F23

*I am deeply grateful to Jonathan Eaton, Keith Maskus, Jim Markusen, Mike Moore, Pravin Krishna and an anonymous referee for many valuable comments and suggestions. I also wish to thank the seminar participants at George Washington University, Georgetown University, SAIS of Johns Hopkins University, and US International Trade Commission for very helpful feedbacks and discussions.

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1 Introduction

The proliferation of regional economic integration is reshaping the flows of Foreign Direct Investment (FDI). An increasing number of multinational corporations (MNCs) move their production across borders, especially to countries that have lower production costs and better access to large markets. General Motors (GM), for example, recently undertook aggressive job cuts in its German-based subsidiary, Opel, and shut down its plant near Lisbon, Portugal. At the same time as these contractions, it built a new production facility in Poland, a recent member of the European Union (EU).[1] Similarly, the Dutch-based electronics group Philips closed the operations of its Novalux subsidiary in Spain in 2004 and transferred the research and development (R&D) section to France and the manufacturing section to Poland.[2] In fact, the World Investment Report (2005) indicates that these two companies' location adjustment reflects an aggregate trend in FDI. The statistics show that while the total inflow of FDI to the EU rose in 2004, the majority of the EU-15 countries experienced a decrease in new investment. Countries such as Ireland and Spain, which used to be able to attract a large volume of FDI prior to 2004 because of their relative advantage in labor cost and corporate tax in the EU-15, now see investment flow to some of the more competitive new EU members.

Economic theories suggest that when a PTA is formed, firms from outside the region are motivated to move their production to the integrated bloc because the benefit of preferential market access is exclusive to inside firms.[3] The effect is, however, not uniform across integrated countries. Countries that are integrated with a larger number of countries or countries with a larger market size are more likely to experience an increase in FDI. Furthermore, as trade costs fall within the region, firms have a greater incentive to concentrate their production in the country with lower production costs and achieve greater economies of scale. As a result, low-cost countries will receive a greater amount of FDI at the expense of their high-cost PTA partners and become the platforms from which multinationals export to other countries.

This paper seeks to examine the above hypotheses. In particular, it asks: Does regional economic integration increase outside multinationals' investments in the participating countries? Which countries gain multinational firms at the expense of others? And do multinationals indeed adopt some integrated countries as export platforms? While the theoretical literature yields clear predictions on the above questions, little has been done to test them. In fact, very few empirical studies, with the exceptions of Barrel and Pain (1999), Feinberg and Keane (2001), and Ekholm, Forslid and Markusen (2007), have examined the relationship between regional economic integration and FDI. Barrel and Pain (1999) were one of the first to explore the FDI effect of the Single Market Programme implemented in the European Union (EU). They find that the

[1] European Industrial Relations Observatory, October 30, 2006.

[2] European Industrial Relations Observatory, March 3, 2004.

[3] Examples of classic theoretical work in this area include Motta and Norman (1996), Krugman and Venables (1996), Puga and Venables (1997), and Ekholm, Forslid, and Markusen (2007). See Section 2 for a detailed discussion of these studies.

removal of trade barriers within the EU has changed the permeability of national borders and raised FDI in four major European economies. Feinberg and Keane (2001) analyze the effect of trade liberalization between the U.S. and Canada and find that a lower U.S. tariff raises the exports of U.S. multinational affiliates in Canada back to the U.S. A more recent study by Ekholm, Forslid and Markusen (2007) focuses on multinational affiliates' exports to third countries and shows that multinationals located in a free trade area tend to engage in export-platform FDI.

This paper contributes to the above literature in two ways. First, instead of estimating the effect of a single PTA, it examines how the effect of PTAs depends on the size of the integrated region. As shown in Figure 1, which is constructed based on U.S. multinational affiliate sales data in 2002, multinational firms are unevenly distributed across regions. The paper seeks to explain this pattern by introducing the role of regional economic integration. The paper posits that because integrated regions vary in the size of participating countries (e.g., the EU versus the MERCOSUR) the extent to which PTAs can raise member countries' ability to attract foreign investments is different. A member of a larger integrated bloc has preferential access to a larger region and thus offers a stronger incentive for outside firms to invest in the country. The paper also takes into account the fact that countries often belong to more than one preferential trade agreement. In these cases, countries with two or more PTA memberships (e.g., Mexico) become a hub and can export to all the spoke countries at low or zero tariff (e.g., Canada and Japan, both of which have a Free Trade Agreement with Mexico), whereas the same benefit does not necessarily apply between spokes. Firms that seek to minimize trade costs are therefore more likely to locate their production in the hub countries. These hypotheses have been largely ignored in the empirical literature and will be formally tested in this study.

[Figure 1 about here]

This paper also examines how regional economic integration may lead to an asymmetric FDI effect within an integrated bloc. While integration may raise the total volume of foreign direct investment in the region, multinationals' investment incentive can be weakened in some participating countries. This is because the improvement in market access between integrated countries offers firms a greater incentive to concentrate their production geographically and realize economies of scale. As it becomes less costly to export within the integrated region, multinationals' production in less attractive locations, e.g., countries with relatively high production costs, can be replaced by exports from the other production locations in the region. The former countries may therefore experience a decline in inward FDI while their more attractive, low-cost PTA partners witness an increase. This is especially likely when countries in the integrated region are highly heterogeneous. This hypothesis has been established in theoretical studies but largely overlooked in the empirical literature.

The paper is also built on the broader literature that examines the causes of FDI. Two main motives have been established in previous studies. First, firms may choose to invest in a

foreign market to avoid trade costs. This will happen when the benefit of proximity to consumers outweighs the benefit of scale economy, in which case firms are better off engaging in horizontal FDI and duplicating their production in countries with similar factor endowment. This strategy has been referred to as the market access or tariff jumping motive and is formally established in studies such as Markusen (1984) and Markusen and Venables (2000). Firms may also choose to invest abroad because of foreign countries' comparative advantage. When the production process consists of separable stages that require different factor intensities, firms may prefer to locate each stage in a country where the factor used intensively in that stage is abundant. This strategy leads to a vertical type of FDI and is referred to as the comparative advantage motive. It has been examined in influential studies such as Krugman (1984). The above two motives have also been tested in a number of important empirical papers, including Brainard (1997), Markusen and Maskus (1999), Carr, Markusen and Maskus (2001), Markusen and Maskus (2001), and Yeaple (2003). While papers such as Brainard (1997) find mainly evidence of horizontal FDI, Carr, Markusen and Maskus (2001) and Yeaple (2003) lend support to both horizontal and vertical FDI.

This study is closely related to the above strand of literature but focuses on how a decline in trade costs within a bloc may lead multinational firms to adjust their location choices. The paper suggests that while firms from outside the bloc are motivated to move their production to the integrated region because the benefit of preferential market access is exclusive to insiders, they no longer have the incentive to have multiple plants within the region. Not only would they become more geographically concentrated and serve some intra-regional markets through exports, their choice of production locations would be dominated by the comparative advantage factor.

To test these predictions and estimate the role of regional economic integration, this paper constructs a measure of market potential for each potential host country. This measure of market potential is motivated by previous studies including Harris (1954), Krugman (1992), Head and Mayer (2004), and Hanson (2005). It takes into account not only the host-country market size but also the size of other countries (discounted by trade costs). The paper posits that the formation of a preferential trade agreement improves a participating country's market access to its PTA partners and raises its market potential in foreign markets. Countries that are integrated with large markets therefore have a greater ability to attract multinationals. The paper departs from the previous studies, in particular, Head and Mayer (2004), by distinguishing host countries' export markets to (i) MNCs' home country, (ii) countries that have formed a PTA with the host country (excluding MNCs' home country), and (iii) the rest of the world. This distinction makes it possible to estimate the importance of market integration in a country's ability to receive foreign investments.

The empirical evidence is broadly consistent with the hypotheses. First, the paper finds, based on both U.S. and other OECD countries' FDI data, that multinationals do have a greater incentive to invest in a region after economic integration. The effect is however significantly asymmetric across integrated countries and varies sharply with the size of the integrated region and the com-

parative advantage of host countries. Those that are integrated with a larger number of countries or countries with a larger market size experience a greater increase in outside multinationals' activities. Within integrated regions, countries with a greater labor endowment attract more FDI, especially in labor-intensive industries where their capital-abundant PTA partners experience a decline. Regional economic integration is also found to increase export-platform FDI as predicted in the theoretical literature. This effect again rises with the size of countries with which the host is integrated. The paper also estimates the effect of PTAs on intra-bloc FDI and finds that while PTAs significantly raise the investment from outside the region they do not promote intra-regional FDI. This is not surprising considering that regional integration not only lowers MNCs' tariff-jumping motive within the region but also increases the competition from outside MNCs. These findings are robust to the measures of FDI: both affiliate sales and FDI outflow from outside the region are found to rise when the region is integrated.

The paper accounts for the potential issue of omitted variables using the novel approach introduced by Head and Mayer (2004). Specifically, it constructs a generalized measure of market potential that takes into account factors such as the degree of competition in export markets and additional trade costs such as language and national border. This generalized measure serves as a better indicator of export demand and does not change the results qualitatively. The effect of PTA partners on host countries' ability to attract multinationals remains significant. The paper also addresses the potential endogeneity of preferential trade agreements by investigating the economic and political determinants of PTAs. Using a two-stage Instrumental Variable (IV) method, the paper finds that the estimated effect of economic integration on both total and export-platform FDI remains similar.

The rest of the paper is organized as follows. Section 2 outlines the main hypotheses of this paper and the econometric framework. Section 3 describes the data employed in the analysis. Section 4 discusses the main empirical results, while Section 5 presents sensitivity analyses including an alternative data sample, different estimation methodology and approaches to deal with the issues of omitted variables and potential endogeneity of PTAs. Section 6 concludes the paper.

2 Hypotheses and econometric framework

Several theoretical studies, including Motta and Norman (1996), Krugman and Venables (1996), Puga and Venables (1997), and Ekholm, Forslid and Markusen (2007), have formally examined the effect of regional economic integration on multinationals' location decision. Motta and Norman (1996) adopt a game theoretic model of FDI and find that the formation of a preferential trade agreement between two countries can motivate firms in the third country to invest in the integrated region and engage in export-platform FDI. In a two-country two-industry model, Krugman and Venables (1996) show that at lower trade barriers agglomeration force can dominate firms' location decision and lead each industry to concentrate in a single location. Puga and Venables (1997)

consider a more complicated trading system and also find that a fall in trade barriers can lead some member countries to gain industries at the expense of other countries. The recent study by Ekholm, Forslid, and Markusen (2007) introduces country asymmetry to the model. They find that the formation of a free trade area between a large, high-cost country and a small, low-cost country will increase export-platform FDI in the latter country from both inside and outside firms.

In sum, several predictions have been reached in the literature. First, a fall in trade cost between two countries is expected to raise a third-country firm's incentive to produce in the integrated region. This is especially true for countries that are integrated with large markets. However, not all integrated countries will necessarily experience an increase in FDI: those with lower production costs are likely to gain outside multinationals at the expense of their high-cost PTA partners, as multinationals now have a greater incentive to concentrate their production within the region and achieve greater economies of scale. This also leads to the third prediction of the literature: when countries form a preferential trade agreement, multinationals would adopt the country with relatively low production costs as an export platform and export to the other countries from there.

To test these intuitive predictions, the paper estimates the following baseline equation:

$$FDI_{hikt} = \alpha + \beta_1 X_{hikt} + \beta_2 M_{it} + \varphi_{hk} + \gamma_{ik} + \mu_t + \varepsilon_{hikt}, \tag{1}$$

where FDI_{hikt} is the natural log of FDI from home country h to foreign country i in industry k and year t, X_{hikt} represents a vector of home- and host-country characteristics that capture MNCs' market access and comparative advantage motives, φ_{hk} and γ_{ik} are vectors of home- and host-country-industry dummies that control for all country-industry specific factors, μ_t is a vector of time dummies, and ε_{ikt} denotes the error term.[4]

The equation also includes a measure of host countries' status in regional integration, M_{it}, the primary variable of the analysis. The construction of this variable is motivated by previous studies including Harris (1954), Krugman (1992), Head and Mayer (2004) and Hanson (2005). It reflects the total potential demand faced by each host country, taking into account not only the host country's domestic market size but also the size of export markets including respectively its PTA partners and the rest of the world. The exact formula is:

$$M_{it} \equiv Y_{it} + \omega_1 PTA_{iht} \cdot \frac{Y_{ht}}{\tau_{ih}} + \sum_{j \neq i,h} \left[\omega_2 PTA_{ijt} \cdot \frac{Y_{jt}}{\tau_{ij}} + \omega_3 (1 - PTA_{ijt}) \cdot \frac{Y_{jt}}{\tau_{ij}} \right], \tag{2}$$

where M_{it} denotes the market potential of host country i at year t, Y_{it}, Y_{ht} and Y_{jt} represent respectively the market size of host country i, MNCs' home country h, and other country j, PTA_{iht} and PTA_{ijt} are dummy variables that are equal to 1 if host country i has a PTA with, respectively, MNCs' home country and country j, and ω_1, ω_2 and ω_3 are the parameters to be

[4]Note that by including both the cross-section and time fixed effects this paper essentially employs a difference-in-difference estimator to analyze the effect of regional economic integration.

estimated. Note that each non-host country's market size is also weighed by the transport cost of exporting to that country from the host, denoted by τ_{ih} and τ_{ij}. Countries that are geographically distant from the host country are considered to have a smaller weight in the host country's market potential.

It is also noteworthy that a country's PTA partners are divided in equation (2) to MNCs' home country and countries other than the home and host countries. This distinction is important because home-host PTA affects multinationals differently from the PTAs that exclude MNCs' home country. The former captures the effect of economic integration on intra-regional FDI while the latter represents the effect of economic integration on FDI from outside the bloc. As discussed above, PTAs are expected to increase investment by outside multinationals because of improved market accessibility in the integrated region. But this effect is not necessarily true for multinationals inside the bloc. The reason is twofold. First, while PTAs formed between MNCs' home and host countries (such as the NAFTA) lower the cost of (U.S.) affiliates exporting products to the home market and stimulate vertical FDI, they also lower the cost of firms exporting from home to the foreign market. Firms are thus less likely to undertake horizontal FDI in which the incentive to avoid trade costs is the original motive to invest abroad. Home-host PTAs can also decrease intra-regional FDI because of the increased investment and production by outside multinationals. For example, if the EU multinationals increase their investment in Mexico after NAFTA was formed, the increased competition can adversely affect U.S. multinationals.

To examine how the effect of economic integration may depend on the characteristics of integrated countries, Equation (1) is modified as follows:

$$FDI_{hikt} = \alpha + \beta_1 X_{hikt} + \beta_2 M_{it} + \beta_3 X_{hikt} \cdot PTA_{it} + \varphi_{hk} + \gamma_{ik} + \mu_t + \varepsilon_{hikt}, \tag{3}$$

where a vector of interaction terms, i.e., $X_{hikt} \cdot PTA_{it}$, is formed between the host-country characteristics and a dummy variable PTA_{it} that identifies integrated host countries at year t. The parameters of the interaction variables β_3 reflect how the effect of preferential trade agreements varies with country attributes.

To test the hypothesis on export-platform FDI, the paper follows Ekholm, Forslid, and Markusen (2007) and considers MNCs' exports to third countries as the dependent variable. The relevant estimation equation is

$$export\_FDI_{hikt} = \alpha + \beta_1 X'_{hikt} + \beta_2 M^e_{it} + \varphi_{hk} + \gamma_{ik} + \mu_t + \varepsilon_{hikt}, \tag{4}$$

where X'_{hikt} is the corresponding vector of explanatory variables and M^e_{it} is the host country's export market potential in countries other than MNCs' home characterized as

$$M^e_{it} \equiv \sum_{j \neq i,h} \left[\omega_2 PTA_{ijt} \cdot \frac{Y_{jt}}{\tau_{ij}} + \omega_3 (1 - PTA_{ijt}) \cdot \frac{Y_{jt}}{\tau_{ij}} \right]. \tag{5}$$

In addition to host countries' market potential, the following explanatory variables are included to test MNCs' market access and comparative advantage motives. First, the paper controls for the host-country sectoral tariff rates on multinationals' home country and expects a positive correlation between the two. The home-country sectoral tariff rates on each host country are also included. In contrast to the host-country tariff, this tariff is expected to adversely affect multinationals, especially those that seek to export their final products from foreign affiliates to the home market. Freight cost between home and host countries is also included as a measure of trade costs and expected to have an ambiguous effect on FDI. While a greater freight cost motivates firms to supply foreign markets through local production instead of exports, it discourages multinationals from undertaking vertical FDI and exporting back home.

Following the existing empirical literature, a country's factor endowment ratio, i.e., K/L, is used to represent the country's comparative advantage.[5] It is not only included independently but also interacted with industries' capital intensity to test the hypothesis that capital-abundant countries attract capital-intensive multinationals whereas labor-abundant countries attract more labor-intensive firms. Finally, the estimations also take into account countries' corporate tax rate and expect a negative correlation with the level of FDI.

3 Data

The main dataset employed in this paper is taken from the U.S. Bureau of Economic Analysis (BEA). This dataset reports the sales and exports of U.S. majority owned affiliates in major manufacturing industries and 40 countries during the period between 1986 and 1999.[6] Sections 5.1 and 5.2 consider an alternative dataset that is obtained from the OECD FDI database and include additional source countries such as Germany, Italy, Portugal and Japan. Including these countries, in particular, the EU members, enables the paper to examine the robustness of the estimates, especially the estimated effect of PTAs on intra-regional FDI.[7] This dataset however does not report information on export-platform FDI, i.e., exports of multinationals to third countries. It also contains a large number of missing values at the industry level, which lead the analysis in Sections 5.1 and 5.2 to use country-level FDI data.

A summary of the BEA dataset is provided in Table 1. First, the affiliate sales is divided

[5] Sectoral unit labor costs would be another possible measure of comparative advantage. Such information can be obtained from the International Labor Organization, Bureau of Labor Statistics, and the UNIDO database, but there are many missing values in these datasets which would reduce the sample size substantially.

[6] Table A.1 lists the included countries. Because the BEA switched the industry classification from SIC to NAICE in 1999, the data of affiliate sales and exports is recorded in SIC codes until 1999. These data cannot be matched with the data after 1999 because of the level of aggregation. As a result, the sample period is between 1986 and 1999.

[7] Section 5 also considers an alternative measure of FDI, i.e., the level of FDI outflow. While affiliate sales have been adopted by the majority of existing studies (e.g., Brainard, 1997; Carr, Markusen and Maskus, 2001; Yeaple, 2003; Ekholm, Forslid and Markusen, 2007) as the measure of FDI, using FDI flow data allows the paper to directly verify that the effect of regional economic integration in increasing multinationals' geographic concentration is not only reflected in their sales and exports but also their investment activities.

by host regions consisting of Western Europe, North America, South America, Southeast Asia, and Australia-New Zealand, all of which have reached at least one preferential trade agreement by 1999. Two observations are noteworthy. First, the volume of total affiliate sales has grown at an annual rate of 13% between 1986 and 1998. Second, the percentage of total affiliate sales by affiliates located in South America has increased from 3% to 6% from 1986 to 1998, while the percentage of sales by affiliates located in Canada and Mexico has declined from 18% to 15%.

[Table 1 about here]

The data is then divided by sales destinations. The first category is the percentage of affiliate sales to local consumers. This category captures the horizontal type of FDI that is undertaken to avoid trade costs and access local markets. This component of multinationals' activities is dominant in all regions with the possible exception of Southeast Asia. The importance of this component has, however, declined over time implying that U.S. multinationals have become relatively less local-market oriented. The second category of affiliate sales is the percentage of sales exported back to the U.S. This category reflects U.S. multinationals' comparative advantage motive which leads them to move production abroad and serve U.S. consumers through exports. Table 1 shows that this component of affiliate sales has grown significantly in Canada and Mexico especially since 1994 when the NAFTA was formed, but has fallen in South America and Southeast Asia. The last category is the share of affiliate sales exported to third countries (excluding the host country and the U.S.), which is also defined as export-platform FDI. This part of affiliate sales is viewed as a combination of horizontal and vertical FDI and is highest in Western Europe and Southeast Asia.

Table 2 compares affiliate sales and exports between integrated (i.e., countries that have at least one PTA) and non-integrated countries (i.e., those that do not belong to any PTA). As shown, the level of total affiliate sales is generally higher in integrated countries, especially in machinery and transport industries. The same observation applies to the level of affiliate exports while the difference between integrated and non-integrated countries is widened. The percentage of exported affiliate sales is unambiguously greater in integrated countries, consistent with the hypothesis that regional economic integration increases multinationals' incentive to serve third countries via exports and concentrate their production in export platforms.

[Table 2 about here]

Now consider the data used to construct the explanatory variables. This paper takes into account all the preferential trade agreements that were implemented in the sample period and in the sample countries.[8] Specifically, a dummy variable PTA_{ijt} is constructed to take the value of 1 when host country i has a preferential trade agreement with another country j at year t and 0 otherwise. Real GDP measured in 1995 U.S. dollars is adopted to measure the market size of host

[8] Table A.2 lists the preferential trade agreements included in the main dataset.

and other countries and is obtained from the World Bank's World Development Indicators. The distance between the host and another country is used to proxy for transport cost. It is measured by the straight-line distance between nation's capitals in thousand kilometers and taken from the City Distance Calculator provided by VulcanSoft.

To measure the host-country tariff rates on the U.S. in a particular industry, the import-weighted average is obtained based on tariff rates at disaggregate industries. Both the tariff and import data are obtained from the COMTRADE database. The sectoral tariff rates imposed by the U.S. on the host country are available from the dataset described in Feenstra (1996). An ad valorem measure of freight and insurance cost is also included in the paper and constructed based on the U.S. import data recorded in Feenstra (1996).

To construct countries' factor endowment ratio, each country's capital stock is obtained by the perpetual inventory method outlined in Leamer (1984). In particular, the depreciation rate is assumed as 7% and the initial value of capital stocks is taken from far enough in the past so that the impact of the initial value on the estimated time series is small. The data of countries' labor force size is available at the World Development Indicators. Industries' capital intensity is measured by the share of capital expenditure in value added. This data is taken from the NBER-CES manufacturing industry database and the U.S. Annual Survey of Manufacturers. The paper also follows the method discussed in Hines and Rice (1994) and obtains a measure of applied corporate tax for each host country.

4 Empirical evidence

4.1 The effect of regional economic integration on multinationals

The estimations in this section proceed by first measuring a host country's status of economic integration with either a dummy variable or a simple count of PTA partners. The results are reported in the second and third columns of Table 3. The results show that regional economic integration on average exerts a significant and positive effect on outside MNCs' activities in integrated countries. Specifically, having an additional PTA partner raises a country's affiliate sales by 11%.[9]

[Table 3 about here]

In the fourth column, the status of regional economic integration is represented by a simplified measure of market potential that takes into account only the host country's domestic market size

[9]Since the paper includes both Customs Union and FTA in the consideration of regional economic integration, it is reasonable to expect that they may exert different impacts on FDI. This is possible because the former requires all the members to impose a uniform external tariff system (against outside countries including the U.S.) while the latter does not. However, since the level of the host country's tariff against the U.S. is included in the estimation, the difference between the two types of PTAs is at least partially captured. In Section 4.2, the paper examines how host countries' difference in tariffs relative to their PTA partners may affect affiliate sales to different extents. This would essentially separate Customs Union from Free Trade Agreement.

and the size of PTA partners (i.e., assuming $\omega_1 = 1$, $\omega_2 = 1$, and $\omega_3 = 0$ in equation (2)). The results indicate that a 1% increase in a host country's market potential in these markets leads to a 1.04% increase in U.S. multinationals' affiliate sales. This suggests that multinationals' activities increase not only with the number of PTA partners a country has but also the market size of these countries.

Finally, the last column of Table 3 reports the results based on the measure of market potential defined in equation (2). This measure of market potential includes, in addition to the host-country domestic market size, (i) the market size of MNCs' home country if there exists a PTA between the home and host, (ii) the market size of other PTA partners, and (iii) the rest of the world.[10] The relative importance of these different groups, i.e., $\hat{\omega}_1$, $\hat{\omega}_2$ and $\hat{\omega}_3$, is estimated in a Nonlinear Least-Square model. The results show that a 1% increase in a host country's aggregate market potential leads to a 6.3% increase in affiliate sales. The weight of PTA partners that excludes multinationals' home country is however 23% ($= 0.63/0.51 - 1$) greater than the weight of unintegrated countries. This suggests that the former group plays a more important role than the latter in determining the host country's ability to attract MNCs.

Note in all the above specifications PTAs formed between home and host countries are treated separately. As discussed in Section 2, this distinction is important because, in contrast to the PTAs formed between host and other countries, the effect of home-host PTAs captures the impact of regional integration on intra-bloc FDI. On the one hand, they encourage multinationals to engage in vertical FDI and supply home-country consumers via exports, especially when the PTA partner countries are complementary in comparative advantage. On the other hand, they discourage horizontal FDI in PTA partner countries and promote intra-regional trade. Furthermore, because they raise the inflow of FDI from outside the bloc, the increased competition from outside multinationals can also reduce intra-bloc FDI. The estimates in Table 3 suggest that the PTAs formed between the U.S. and host countries do not have a significant effect on U.S. FDI.[11]

The estimated effect of other host-country variables also appears largely consistent with the expectations. First, the evidence suggests a significant comparative advantage motive for U.S. multinationals. Countries with a greater labor endowment tend to have greater affiliate sales, especially in labor-intensive industries. The U.S. tariff on host countries also has the expected impact, suggesting that some U.S. MNCs engage in vertical FDI and supply home consumers with foreign production. Freight cost is negatively associated with multinationals' activities. As discussed in Section 2, this result can be attributed to either the negative effect of transport cost on multinationals' exports to the home country or the role of distance in raising the fixed cost of

[10] For host countries that do not have any PTAs, their market potential is the sum of their domestic market size and group (iii) (i.e., the market size of the rest of the world), with the value of groups (i) and (ii) (i.e., the market size of integrated countries) equal to zero. For host countries that have adopted a PTA in a certain year, the value of group (ii) becomes positive in that year while the value of (iii) decreases, but the unweighted sum of (ii) and (iii) remains the same.

[11] This result can however be driven by the inclusion of U.S. and host-country tariffs in the existing specifications, which at least partially control for the PTAs that exist between the U.S. and host countries.

investment (such as the the monitoring cost). Multinationals' tariff-jumping motive is also confirmed in the table. A 1% increase in the tariff imposed by the host country raises multinationals' affiliate sales by about 0.8%. The effect of corporate tax is statistically insignificant, which can be partially due to the use of country-industry fixed effect.[12]

4.2 Geographic concentration of multinationals within integrated regions

While the above results suggest that regional economic integration does raise outside multinationals' activities in integrated countries, the effect is expected to vary across countries. Given multinationals' increased incentive to concentrate their production geographically, some countries are likely to gain multinationals at the expense of others, especially their PTA partners. This section hence evaluates the following questions: Do outside multinationals indeed become more concentrated within the integrated region? What types of host countries gain more FDI? Which countries lose? To address these issues, equation (3) is estimated where the PTA dummy variable is interacted with host-country characteristics. Table 4 reports the results.

[Table 4 about here]

As seen in the upper part of Table 4, labor-abundant countries receive a greater increase in multinationals' affiliate sales than labor-scarce countries after forming preferential trade agreements. This is especially true for labor-intensive industries. This finding suggests that countries in an integrated region will gain FDI in industries where they have a comparative advantage at the cost of countries that have a comparative disadvantage in these same industries. The result similarly holds for countries with a lower corporate tax. The effect of PTAs also depends on the freight cost of exporting to the host countries from the U.S.: those that require a higher shipping cost experience a greater increase in multinationals' activities after integration.[13] These results are broadly consistent with the hypotheses outlined in Section 2.

Next, instead of comparing the effect of regional economic integration across all integrated countries, the rest of this section compares each individual country with its PTA partners only. The motivation for this comparison is that with free market access between integrated countries a country is most likely to gain FDI from its PTA partners and vice versa. To test this hypothesis, the difference between a host country's characteristics and the average of its PTA partners is calculated, i.e., $\Delta X_{hikt} \equiv X_{hikt} - \bar{X}_{hjkt}\big|_{PTA_{ijt}=1}$, and interacted with the PTA dummy variable. This measure captures the host country's advantage or disadvantage in FDI determinants relative to their PTA partners. The lower part of Table 4 reports the estimates. As expected, countries that are relatively more labor abundant than their PTA partners receive a greater increase in affiliate sales in labor intensive industries. Multinationals also tend to increase their activities in countries that require a higher freight cost than their PTA partners.

[12] Host countries' GDP is included separately in these columns and found to be positively correlated with multinationals' affiliate sales.

[13] Table 4 reports a selected list of estimates. The complete table is available upon request.

Figures 2-4 depict the estimated marginal effect of an additional PTA partner for each host country.[14] The figures suggest that there exists a statistically significant correlation between country-specific estimates and capital-labor endowment ratio. It is clear that not all integrated countries gain multinationals. In the food industry, for example, labor-abundant countries, such as Thailand, Malaysia, Peru and Chile, experience an increase in multinationals' activities, whereas capital-abundant countries such as most EU members see a decline. This finding is not surprising provided that food manufacturing is a labor-intensive industry. The sign of correlation is reversed for the chemical (for the European countries) and electrical appliance industries as they require a relatively high capital intensity. In particular, the positive impact of regional integration in the electrical appliance industry is exclusive to a few industrial countries (e.g., Ireland, Switzerland and Denmark); every other country witnesses a decline in FDI. These findings further suggest an increasing concentration of multinational firms within integrated blocs.

[Figures 2-4 about here]

4.3 Export-platform FDI

The geographic concentration of multinational firms as a result of regional economic integration should also lead to an increase in export-platform FDI. This prediction has been made in many theoretical studies including Motta and Norman (1996) and Ekholm, Forslid, and Markusen (2007). With a decline in trade costs within an integrated bloc, exporting from intra-regional production location can be less costly than establishing a local production plant. Multinational firms therefore are more likely to engage in export-platform FDI than dispersed FDI. To test this hypothesis, equation (4) is estimated where U.S. multinationals' exports to third countries is adopted as the dependent variable.[15]

As seen in Table 5, forming a preferential trade agreement does raise the exports of multinational affiliates.[16] This effect also rises with the number of preferential trading partners (as suggested in the third column) and the size of these partners (as suggested in the fourth column). When the market size of integrated and unintegrated countries is taken into account separately, the results indicate that the weight of PTA partners significantly exceeds that of the rest of the world. This implies that preferential market access to other markets raises a country's attractiveness as

[14] Because the paper includes a country-industry fixed effect, it cannot estimate country specific effects of the PTA dummy variable. This variable will be perfectly correlated with the fixed effect if a country has a PTA throughout the sample period. Country specific effects of an additional PTA partner are hence estimated instead.

[15] One drawback of the BEA export data is that it does not distinguish between integrated export markets and the rest of the world. As a result, the effect of economic integration is estimated based on U.S. multinationals' exports to all third countries (countries other than the host and home countries). Explanatory variables are accordingly adjusted for this estimation. First, the host country's GDP is no longer included on the right hand side. Second, the U.S. market is also excluded from the measure of market potential, because the current dependent variable, i.e., multinationals' exports to third countries, does not include the exports back to the U.S. For the same reason, the U.S. tariff rates on the host country are also dropped from the estimation. As a robustness check, the paper considered including the host country's GDP in the regressions and found it does not have a significant effect.

[16] The size of the sample is significantly reduced because of the missing values in the export data.

the export platform. Comparative advantage is also a significant determinant of export-platform FDI. Host countries with a greater labor endowment tend to experience a larger increase in the exports of multinational affiliates.

[Table 5 about here]

5 Sensitivity analysis

5.1 Including additional source countries

The empirical results have so far been obtained based on U.S. multinationals' activities abroad. This section explores the sensitivity of the results by including additional source countries, namely, Germany, Italy, Portugal, Finland and Japan. The choice of these countries is determined by the availability of outward FDI data obtained from the OECD FDI database.[17] The inclusion of these source countries, in particular, Germany, Italy, Portugal and Finland, allows the paper to estimate the effect of PTAs (in particular, the EU) on intra- and extra-bloc FDI using a broader set of home countries. Note however because of the large number of missing values at the sector level, the analysis here is based on country-level affiliate sales. The explanatory variables are accordingly adjusted for this change and closely follow the existing literature (e.g., Brainard, 1997; Carr *et al.,* 2001).

The results are presented in Table 6. As seen in the last column, while the host country's aggregate market potential continues to have a positive effect on the level of affiliate sales, the PTA formed between home and host countries is found to exert a negative effect. This finding implies that the formation of a PTA can significantly lower MNCs' tariff-jumping motive in the integrated bloc and, furthermore, by raising the FDI from outside multinationals lead to a replacement effect on inside firms.

[Table 6 about here]

5.2 Alternative measure of FDI: FDI inflow

In addition to multinationals' affiliate sales and exports, the effect of economic integration should also be reflected in the flows of FDI. This section considers FDI flow as an alternative dependent variable and examines whether regional economic integration leads to additional entries and investments by outside multinationals.[18]

Results are obtained for the same set of countries as in Table 6. As seen in Table 7, regional economic integration does lead to a greater amount of FDI inflow to the integrated countries. This

[17] The UNCTAD FDI database has also been considered. It has a similar coverage as the OECD dataset.

[18] This also helps the paper establish that the results obtained in the previous sections are not solely driven by the effect of reduced trade barriers on exports of existing firms but also firms' increasing concentration and investments in the region.

effect also rises with the number of PTA partners the host country has (see the third column) and the size of the PTA partners (see the fourth column). The PTA between home and host countries, however, does not have a significant effect on the level of FDI flow. These findings are similarly shown in the last column where the market size of PTA partners is separated from that of the rest of the world. The results there indicate that while a host country's aggregate market potential is positively associated with its receipt of FDI flow, the importance of export markets is greater when they have a preferential trade relationship with the host country.

[Table 7 about here]

5.3 Poisson Quasi-MLE

The paper has so far used either linear or nonlinear Least-Square estimations. As a robustness analysis, this section considers Poisson quasi-MLE as an alternative estimator. The study by Santos Silva and Tenreyro (2006) points out that Poisson quasi-MLE can be more attractive than Least-Square estimators when the variance of the error term is a function of the covariates, in which case the conditional expectation of the logged error term in the log-form estimation equation will not be zero. Head and Ries (2008) have adopted this approach and found that estimates produced in this method are smaller than the Least-Square estimates and remarkably robust to the treatment of zeros and missing values in the FDI data.[19]

This section follows Head and Ries (2008) and uses the fixed-effect Poisson QMLE. Results are obtained for both U.S. multinationals' affiliate sales and exports to third countries and reported in Table 8.[20] Similar to the findings of Head and Ries (2008), most parameters in Table 8, such as the coefficient of host-country capital-labor ratio, have decreased in magnitude compared to the estimates in Tables 3 and 5. The parameters of the number of PTA partners and integrated market potential are, however, adjusted upward in some cases. Countries integrated with a larger number of partners or partners with a larger market size experience a greater increase in the activities of outside multinationals.

[Table 8 about here]

5.4 Omitted variables

As described in Section 2, this paper includes country-industry and year fixed effects in all estimations to respectively control for sectoral host-country variables and time factors that may have a significant effect on multinationals' activities. However, the issue of omitted variables can still arise in the existing econometric framework. For example, it is possible that the estimated effect of PTA has captured the effect of some other factors such as border and language. It is also possible

[19] More details on the robustness and efficiency properties of Poisson QMLE are provided in Wooldridge (2002).

[20] The Poisson QMLE has also been used to estimate FDI from the countries considered in Sections 5.1 and 5.2. The results are largely similar to Table 7.

that the current measure of market potential has excluded some important market characteristics, such as the degree of competition, which can significantly affect the demand in host countries and their ability to attract multinationals. To account for these issues, this section adopts an approach considered in Head and Mayer (2004) and constructs a generalized measure of market potential (and export market potential) for each host country.

The procedure proceeds in two steps. First, a standard trade equation is estimated where the dependent variable is the natural log of imports of country j from country i denoted by Q_{ijt}. More specifically, the equation is characterized as

$$Q_{ijt} = EX_{it} + IM_{jt} + \lambda Z_{ijt} + \varepsilon_{ijt}, \tag{6}$$

where $\lambda Z_{ijt} \equiv \lambda_1 \ln \tau_{ij} + \lambda_2 B_{ij} + \lambda_3 B_{ij} \times L_{ij} + \lambda_4 PTA_{ijt}$. In the above equation, EX_{it} denotes the exporter-year fixed effect, IM_{jt} represents the importer-year fixed effect, and Z_{ijt} is a vector of bilateral market access variables. In particular, Z_{ijt} includes $\ln \tau_{ij}$, the natural log of distance between the capitals of the importer and exporter countries, B_{ij}, a dummy variable that is equal to 1 if the trading countries share a border and 0 otherwise, and L_{ij}, a dummy variable that is equal to 1 when the two countries share a common language. Furthermore, following Head and Mayer (2004), the equation allows the border effect to differ across importing countries dependent on whether it speaks the same language as the exporting country. This hypothesis has been largely supported by the empirical literature; see, for example, Chen (2004).

To estimate equation (6), a dataset that covers the trade flows between 80 countries is used. The results are reported in Table 9. As shown, the estimated effect of bilateral market access, including distance, border, language and PTA, is broadly consistent with the vast literature that estimates trade flows using gravity equation.[21] These estimates, along with the estimated importer-year fixed effect $\widehat{IM}_{jt}$, are used in the second stage to construct a generalized measure of market potential.

[Table 9 about here]

Specifically, in the second stage $\exp(\widehat{IM}_{jt})$ (which takes into account factors such as the degree of market competition) is adopted as a proxy for the importing country's market demand in a particular year, and $\exp[\widehat{\lambda}_1 \ln \tau_{ij} + B_{ij}(\widehat{\lambda}_2 + \widehat{\lambda}_3 L_{ij})]$ (which takes into account the relative importance of distance, border and language in trade) is used as a proxy for the trade cost for country i to export to country j. The product of these two factors, $\exp[\widehat{IM}_{jt} + \widehat{\lambda}_1 \ln \tau_{ij} + B_{ij}(\widehat{\lambda}_2 + \widehat{\lambda}_3 L_{ij})]$, represents the trade-cost weighted import demand in market j faced by exporters in country i, i.e., $\widehat{Y}_{jt}/\widehat{\tau}_{ij}$. Then, using the estimates of $\widehat{Y}_{jt}/\widehat{\tau}_{ij}$ the aggregate market potential for each host

[21] For a comprehensive review in this area, see, for example, Anderson and van Wincoop (2003).

country i defined in equation (2) is rewritten as

$$\widehat{M}_{it} \equiv \widehat{Y}_{it} + \omega_1 PTA_{iht} \frac{\widehat{Y}_{ht}}{\widehat{\tau}_{ih}} + \sum_{j \neq i,h} \left[\omega_2 PTA_{ijt} \frac{\widehat{Y}_{jt}}{\widehat{\tau}_{ij}} + \omega_3 (1 - PTA_{ijt}) \frac{\widehat{Y}_{jt}}{\widehat{\tau}_{ij}} \right], \tag{7}$$

where each potential importing country's demand is further weighted by its PTA status with host country i. Similarly, the export market potential defined in equation (5) becomes

$$\widehat{M}^e_{it} \equiv \sum_{j \neq i,h} \left[\omega_2 PTA_{ijt} \frac{\widehat{Y}_{jt}}{\widehat{\tau}_{ij}} + \omega_3 (1 - PTA_{ijt}) \frac{\widehat{Y}_{jt}}{\widehat{\tau}_{ij}} \right]. \tag{8}$$

As in Section 4, the goal is to estimate ω_1, ω_2 and ω_3 — the importance of PTA partners relative to the rest of the world in determining a country's ability to attract multinationals.

As shown in Table 10, host countries' aggregate market potential $\widehat{M}_{it}$ is positively correlated with U.S. multinationals' affiliate sales. The market demand in the PTA partners, in particular, provides a powerful stimulus to multinationals, whereas the market size of unintegrated countries appears to reduce multinationals' activities in the host country. This result is not surprising because when the host countries do not have preferential market access to a foreign market, the multinational firm may find it more profitable to serve that foreign market through local production than exports from its existing affiliates. This decision will in turn dilute the sales of the multinational firm in the existing host countries. Host countries' export market potential $\widehat{M}^e_{it}$ is also found to be positively correlated with multinationals' export-platform FDI. The market demand of PTA partners, in particular, contributes significantly to a country's receipt of export-platform FDI.

[Table 10 about here]

5.5 Endogeneity of economic integration

The concern of endogeneity of PTA may also arise in the context of this paper. There are two potential sources of endogeneity. First, a host country's PTA status or market potential in its PTA partners can be correlated with unobserved factors in the residual term. The approach adopted in the above section, to a certain extent, accounted for this issue. However, the causality between a country's PTA status and its receipt of FDI may still be questionable. It can be argued that countries' adoption of preferential trade agreements is an effort to attract outside multinationals. This section thus employs the Instrumental Variable (IV) method to correct for the potential endogeneity of PTA and establish the causal effect of PTA on multinationals' affiliate sales.

While a large theoretical literature has been established to address the economic determinants of PTAs (see, for example, the seminal work by Krugman, 1991a, 1991b; Frankel, 1997; Frankel *et. al*, 1995, 1996 and 1998), the empirical literature on this topic is only recently built by Magee (2003) and Baier and Bergstrand (2004, 2007). This paper follows the theoretical and econometric

framework of Baier and Bergstrand (2004) and estimates the determinants of two countries' sharing of a preferential trade agreement, PTA_{ijt}. As in Baier and Bergstrand (2004), the paper considers that two countries will form a PTA only if the PTA leads to a positive net welfare gain for both countries and that the level of welfare gain is a function of trade creation and trade diversion.

In particular, three categories of economic determinants are included. First, countries with a similarly large market size are expected to experience a greater trade creation from the formation of a PTA and thus have a higher probability of reaching an agreement. Countries with a large difference in factor endowment (and consequently in comparative advantage) are also predicted to derive a greater trade creation after forming a PTA. Their differences in factor endowment from the rest of the world are however expected to increase the possibility of trade diversion and decrease the probability of a PTA. Finally, the welfare gain from forming a PTA is predicted to be greater between natural trading partners, i.e., countries that are geographically close to each other but remote from the rest of the world.

In addition to the above economic determinants, a political variable is included in the estimation of PTA. A large political science literature (see, for example, Gowa and Mansfield, 1993) argues that preferential trade agreements generate a "security" externality and nations often choose to internalize this externality by forming a PTA with an ally. This argument suggests that countries with a closer political alliance are more likely to form preferential trade agreements. To measure the degree of political alliance between two countries, this paper adopts the "affinity" index described in Gartzke, Jo and Tucker (1999). This index represents countries' similarity in votes at the United Nations' General Assembly.[22]

The exact estimation equation is as follows:

$$\begin{aligned}\Pr\left(PTA_{ijt}=1\right) &= \Phi\left[\theta_1\cdot\frac{1}{2}(\ln Y_{it}+\ln Y_{jt})+\theta_2\left|\ln Y_{it}-\ln Y_{jt}\right|+\theta_3\left|\ln\frac{K_{it}}{L_{it}}-\ln\frac{K_{jt}}{L_{jt}}\right|\right. \\ &\left.+\theta_4\cdot\frac{1}{2}\sum_{k=i,j}\left|\ln\frac{K_{kt}}{L_{kt}}-\ln\frac{K_{ROW,t}}{L_{ROW,t}}\right|+\theta_5\ln\tau_{ij}+\theta_6 remote_{ij}+\theta_7 alliance_{ijt}+\varepsilon_{ijt}\right].\end{aligned} \tag{9}$$

In this equation, $\Phi(.)$ denotes the cumulative probability function, $1/2(\ln Y_{it}+\ln Y_{jt})$ represents two countries' average in natural-log GDP, $|\ln Y_{it}-\ln Y_{jt}|$ is their absolute difference, $|\ln(K_{it}/L_{it})-\ln(K_{jt}/L_{jt})|$ reflects two countries' difference in factor endowment ratio,[23] and $1/2\sum_{k=i,j}|\ln(K_{kt}/L_{kt})-\ln(K_{ROW,t}/L_{ROW,t})|$ is their difference from the rest of the world. Furthermore, the estimation equation includes $\ln\tau_{ij}$, the distance between two countries' capital cities, and $remote_{ij}$, their

[22] The level of political alliance may also affect two countries' probability of sharing a PTA through influencing the negotiation costs.

[23] The square of this variable is also included in the estimation to examine if the correlation between countries' factor endowment difference and probability of having a PTA is monotonic.

remoteness from the rest of world, with

$$remote_{ij} \equiv continent_{ij} \cdot \frac{1}{2}\left[\ln \sum_{k \neq i,j} \tau_{ik}/(N-1) + \ln \sum_{k \neq i,j} \tau_{jk}/(N-1)\right] \tag{10}$$

where $continent_{ij}$ is a dummy variable that is equal to 1 if countries i and j are located in the same continent and 0 otherwise. The political alliance variable is denoted by $alliance_{ijt}$ and is an index that varies between -1 and 1. A higher value of the affinity index represents a greater similarity in two countries' votes at the United Nations General Assembly.

An additional note needs to be made about the estimation of equation (9). Because the dependent variable, PTA_{ijt}, is countries' status in sharing a PTA at a certain time, it is possible that this variable has a causal effect on some of the explanatory variables, such as GDP, and lead to potential endogeneity. To avoid this possibility, the explanatory variables are lagged by 10 years such that the data are taken from far enough in the past for most countries.[24] An alternative approach is to estimate countries' decision to form a PTA, i.e., $\Delta PTA_{ijt} \equiv PTA_{ijt} - PTA_{ijt-1}$, instead of their status of sharing an agreement.[25] Based on a panel of 65 countries, Probit estimates are obtained for both specifications.[26]

[Table 11 about here]

As shown in Table 11, countries with a greater GDP average are indeed more likely to have a preferential trade agreement. The probability also increases with two countries' similarity in GDP. Countries with a greater difference in relative factor endowment are found to have a higher likelihood of sharing a PTA, as expected from the literature. But this effect diminishes when the factor endowment difference exceeds a certain threshold value. The natural trading partner hypothesis is also supported by the data: countries that are geographically proximate to each other and remote from the rest of the world are more likely to reach a PTA. The degree of political alliance is also found to be positively associated with the probability of economic integration. Countries are significantly more likely to form a PTA with their political allies. One surprising result, however, is the finding that countries' probability of sharing a PTA rises with their differences in relative factor endowment from the rest the world even though the theoretical literature has predicted a greater trade-diversion effect in this case. The findings also remain robust when a country-pair fixed effect is included (see the third and fifth columns) and when countries' decision to form a PTA is considered as the alternative dependent variable (see columns under the heading of (2)).[27]

[24] However, for countries that formed a PTA before 1986, i.e., the initial EU members, the endogeneity of the explanatory variables may still exist. Hence, as discussed next an alternative approach that estimates the decision to form a PTA instead of the status of sharing a PTA is adopted.

[25] For country pairs that formed a PTA at year T, the value of ΔPTA_{ijt} is considered missing for all $t > T$.

[26] The sample countries are mainly determined by the availability of the capital formation data.

[27] A Linear Probability model is adopted when the fixed effect is included in the estimation. The reason to do so is to avoid the incidental parameter problem that arises in Probit models in the presence of fixed effect.

In the second stage of the endogeneity analysis, the fitted probability of sharing a PTA, i.e., $\widehat{\Pr}(PTA_{ijt}=1)$, is obtained based on estimates reported in the third column of Table (11) and used to calculate countries' fitted market potentials. In particular, the host countries' aggregate market potential is now[28]

$$\widetilde{M}_{it} \equiv Y_{it} + \omega_1 \widehat{\Pr}(PTA_{iht}=1) \cdot \frac{Y_{ht}}{\tau_{ih}} + \sum_{j \neq i,h} \left[\omega_2 \widehat{\Pr}(PTA_{ijt}=1) \cdot \frac{Y_{jt}}{\tau_{ij}} + \omega_3 \widehat{\Pr}(PTA_{ijt}=0) \cdot \frac{Y_{jt}}{\tau_{ij}} \right], \tag{11}$$

while the export market potential is

$$\widetilde{M}^{e}_{it} \equiv \sum_{j \neq i,h} \left[\omega_2 \widehat{\Pr}(PTA_{ijt}=1) \cdot \frac{Y_{jt}}{\tau_{ij}} + \omega_3 \widehat{\Pr}(PTA_{ijt}=0) \cdot \frac{Y_{jt}}{\tau_{ij}} \right]. \tag{12}$$

The effect of the fitted market potential on MNCs' affiliate sales and exports is then estimated using the nonlinear Least Squares method as in Section 4. The results are summarized in Table 12. As shown in the second column of Table 12, the fitted aggregate market potential continues to exert a significant and positive effect on the level of affiliate sales. In particular, a 1% increase in the fitted aggregate market potential leads to a 0.92% increase in multinationals' affiliate sales. This effect further rises with the country's probability of sharing a PTA with other countries, as suggested by the positive parameter of $\Pr(PTA_{ijt}=1)$ and the negative parameter of $\Pr(PTA_{ijt}=0)$. This finding also holds for the level of exports by multinationals. A country that is more likely to form a PTA with other markets receives a greater export-platform FDI.

[Table 12 about here]

6 Conclusion

This paper examines the effect of regional economic integration on countries' ability to attract multinationals from outside the bloc. The results indicate that improved market accessibility within an integrated region leads to an increase in outside multinationals' activities. The effect is, however, highly asymmetric across integrated countries. Countries that are integrated with larger markets experience a greater increase in FDI. Within an integrated region, countries with a larger labor endowment attract more multinationals especially in labor-intensive industries, whereas capital-abundant countries experience a decline in FDI. Regional economic integration also leads to a rise of export-platform FDI. Countries with preferential access to large export markets are particularly more likely to become the platforms from which multinationals export to third countries. The paper has also examined the effect of PTA on intra-bloc FDI and found that while economic integration raises outside multinationals' incentive to invest in the region, the

[28] The fitted value of market potential was also calculated based on the predicted probability of signing a PTA, i.e., $P(\Delta PTA_{ijt}=1)$, and found to exert a qualitatively similar effect on the affiliate sales.

effect does not apply to multinationals within the region. The paper has also undertaken a number of sensitivity analyses, including adopting Poisson Quasi-MLE as an alternative estimator and addressing the issues of omitted variables and endogeneity of PTAs. The results remain largely similar.

The evidence presented in this paper conveys an important message to host-country policy makers. Not every country benefits from economic integration in their receipt of foreign direct investment. Some gain at the expense of others. Countries with a relatively large labor endowment or a favorable tax policy, for example, are likely to divert outside multinationals away from their labor-scarce and high-tax PTA partners. This effect can generate substantial economic consequences for both types of countries. Countries that do experience an increase in FDI may benefit from MNCs' technology spillover to the domestic industries, but often have to deal with the crowding-out effect of increased competition. Countries that witness a decrease in multinationals' activities face the impacts of losing FDI, which include a potential increase in total unemployment. As preferential trade agreements become an increasingly popular approach to liberalize trade, understanding firms' location preferences in the context of regional integration is crucial for countries' selection of optimal preferential trading partners.

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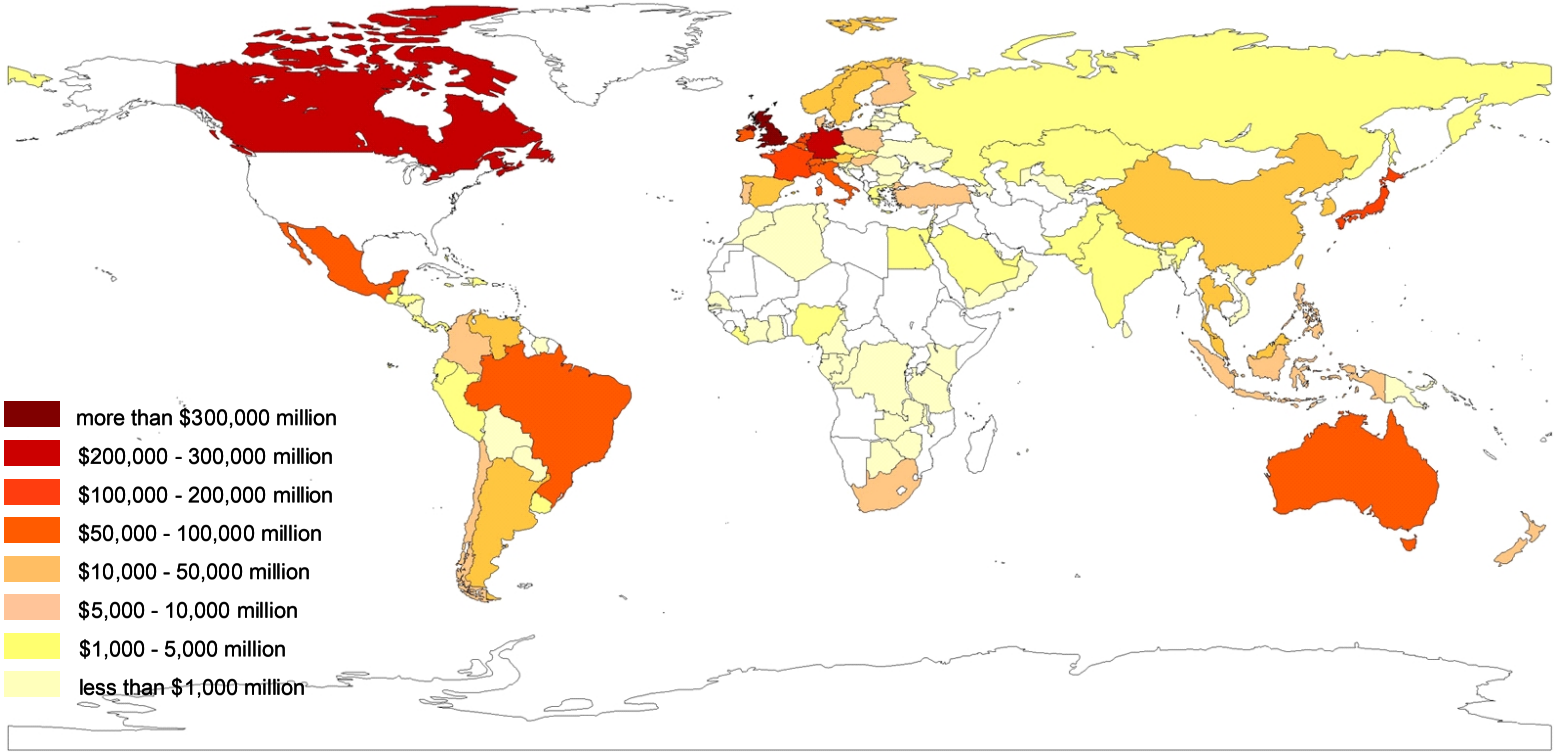

Figure 1: The geographical distribution of U.S. multinationals by affiliate sales in 2002

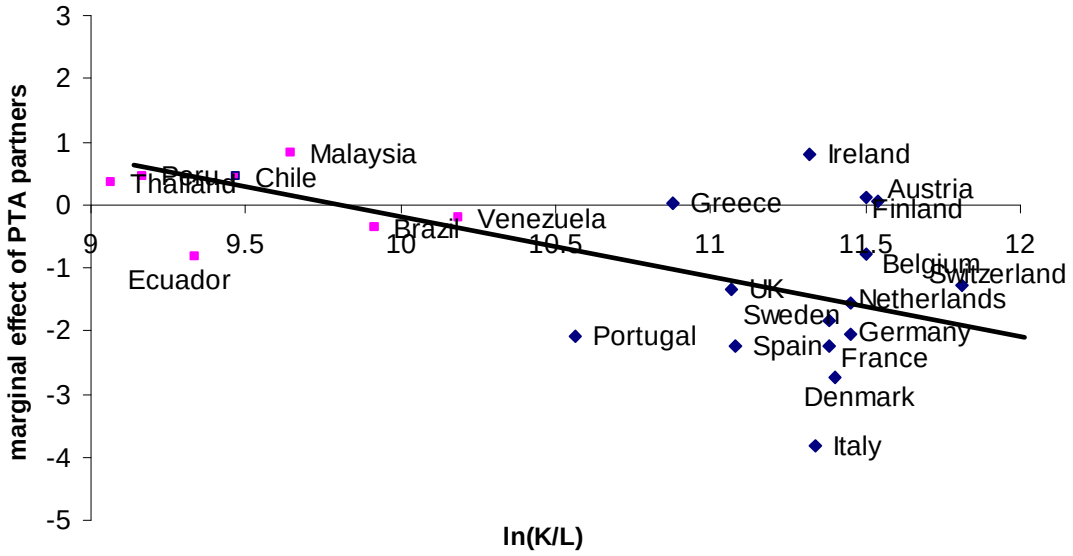

Figure 2: The correlation between country-specific marginal effect of PTA partners and relative factor endowment—the food industry: the slope is -0.71 with a p-value of 0.01 (only statistically significant estimates are included)

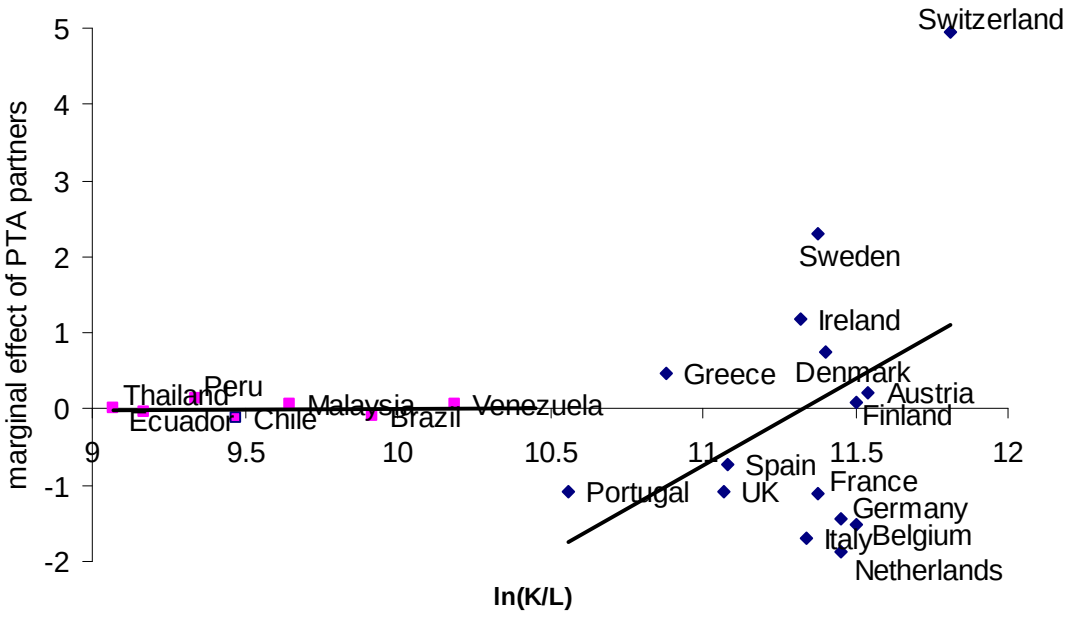

Figure 3: The correlation between country-specific marginal effect of PTA partners and relative factor endowment—the chemicals industry: the slope is 2.37 for the European countries with a p-value of 0.10 and insignificant for the others (only statistically significant estimates are included)

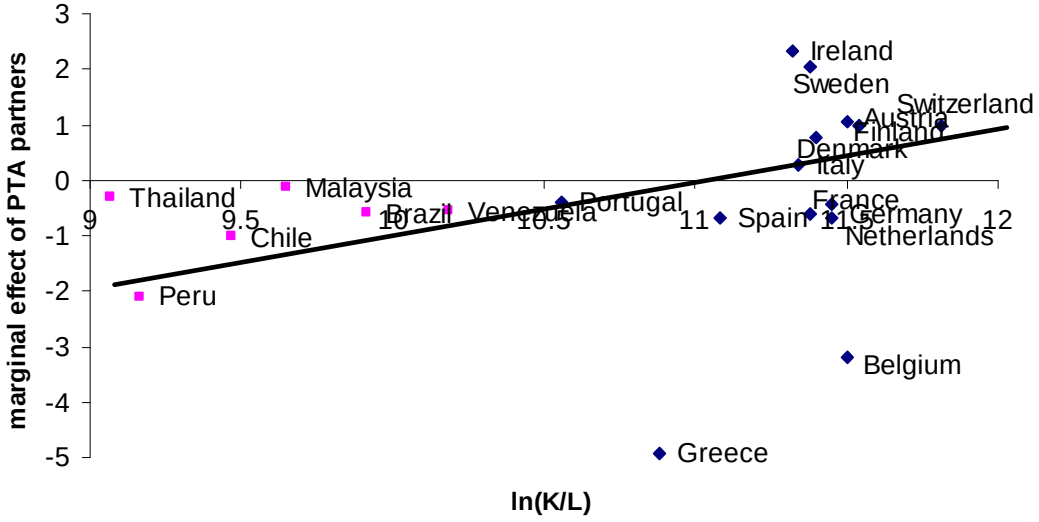

Figure 4: The correlation between country-specific marginal effect of PTA partners and relative factor endowment—the electrical appliances industry: the slope is 1.05 with a p-value of 0.09 (only statistically significant estimates are included)

Table 1: The distribution of U.S. multinational affiliate sales across geographic regions and sales destinations (in millions of U.S. dollars)

Host regions/Sales destinations	1986	1990	1994	1998
World	720,069 (100%)	1,208,349 (100%)	1,435,901 (100%)	1,971,909 (100%)
Western Europe (15 countries)	359,438 (49%)	647,098 (53%)	725,336 (50%)	1,000,725 (50%)
Local sales	66%	68%	67%	63%
Exports back to the U.S.	3%	3%	3%	5%
Exports to third countries	29%	28%	29%	31%
North America	133,950 (18%)	197,997 (16%)	233,245 (16%)	303,019 (15%)
Local sales	72%	73%	69%	66%
Exports back to the U.S.	24%	23%	28%	30%
Exports to third countries	3%	3%	2%	3%
South America	37,622 (5%)	53,755 (4%)	65,466 (4%)	122,075 (6%)
Local sales	85%	86%	85%	82%
Exports back to the U.S.	8%	6%	5%	4%
Exports to third countries	6%	7%	9%	12%
Southeast Asia	23,377 (3%)	51,260 (4%)	85,580 (6%)	118,091 (6%)
Local sales	35%	47%	49%	43%
Exports back to the U.S.	29%	22%	19%	22%
Exports to third countries	35%	30%	31%	34%
Australia-New Zealand	25,258 (3%)	43,809 (3%)	64,346 (4%)	58,308 (3%)
Local sales	88%	85%	86%	84%
Exports back to the U.S.	2%	4%	3%	3%
Exports to third countries	8%	10%	10%	13%

Table 2: A comparison of affiliate sales and exports between integrated and unintegrated countries

	Food	Chemicals	Metals	Machinery	Electrical	Transport
Affiliate sales						
$PTA_{ij} = 1$ $(\forall j)$	6.77	7.23	5.47	6.15	6.38	5.29
$PTA_{ij} = 0$ (for all j)	5.47	6.21	4.37	4.07	5.93	2.95
t statistic	6.90	6.78	5.50	6.91	2.19	6.08
Affiliate exports						
$PTA_{ij} = 1$ $(\forall j)$	4.69	5.75	4.13	5.27	5.19	3.79
$PTA_{ij} = 0$ (for all j)	2.03	3.63	2.33	2.21	4.09	1.09
t statistic	8.94	9.69	6.61	8.54	3.86	7.40
Share of exports in affiliate sales						
$PTA_{ij} = 1$ $(\forall j)$	0.23	0.29	0.30	0.56	0.32	0.36
$PTA_{ij} = 0$ (for all j)	0.09	0.14	0.16	0.26	0.14	0.03
t statistic	3.59	5.18	4.27	1.23	7.26	8.60

Note: Both affiliate sales and affiliate exports are measured in natural log.

Table 3: The impact of regional economic integration on multinational affiliate sales

Dependent variable: affiliate sales	OLS	OLS	OLS	Nonlinear LS
KL endowment ratio	-0.65***	-0.63**	-0.83***	-0.80***
	(0.30)	(0.30)	(0.30)	(0.28)
KL endowment ratio×capital intensity	3.68*	2.74	3.92*	6.60***
	(2.25)	(2.23)	(2.22)	(2.28)
capital intensity	-33.88	-23.31	-36.47	-65.82***
	(25.11)	(24.95)	(24.73)	(25.46)
corporate tax	0.07	0.06	0.05	0.08
	(0.04)	(0.04)	(0.04)	(0.04)
freight	-0.13***	-0.12***	-0.12**	-0.14***
	(0.05)	(0.05)	(0.05)	(0.05)
host country's tariff on the U.S.	0.08*	0.08*	0.08*	0.11**
	(0.05)	(0.05)	(0.05)	(0.05)
U.S. tariff on the host country	-0.09	-0.08	-0.10*	-0.14***
	(0.06)	(0.06)	(0.06)	(0.05)
domestic market size	0.57**	0.64***		
	(0.28)	(0.27)		
PTA with the U.S.	0.03	0.12		
	(0.26)	(0.26)		
PTA with third countries	0.08*			
	(0.05)			
number of integrated third countries		0.02*		
		(0.01)		
integrated market potential			1.04***	
			(0.29)	
aggregate market potential				6.48***
				(1.30)
weight of PTA with home (ω_1)				-0.02
				(0.04)
weight of other PTA partners (ω_2)				0.63**
				(0.33)
weight of ROW (ω_3)				0.51*
				(0.28)
Country-industry fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
number of observations	1450	1450	1450	1450
R square	0.97	0.97	0.97	0.97
Root MSE	0.50	0.50	0.50	0.49

Notes: (i) integrated market potential $\equiv Y_{it} + PTA_{iht} \cdot \frac{Y_{ht}}{\tau_{ih}} + \sum_{j \neq i,h} PTA_{ijt} \cdot \frac{Y_{jt}}{\tau_{ij}}$;
aggregate market potential $\equiv$
$M_{it} \equiv Y_{it} + \omega_1 PTA_{iht} \cdot \frac{Y_{ht}}{\tau_{ih}} + \sum_{j \neq i,h} \left[\omega_2 PTA_{ijt} \cdot \frac{Y_{jt}}{\tau_{ij}} + \omega_3 (1 - PTA_{ijt}) \cdot \frac{Y_{jt}}{\tau_{ij}} \right]$;
(ii) all variables are measured in natural log except capital intensity and PTA dummy;
(iii) standard errors are reported in the parentheses;
(iv) ***, **, and * represent significance at 1%, 5%, and 10% level respectively.

Table 4: The asymmetric impact of regional economic integration

Dependent variable: affiliate sales	(1)
PTA×	
KL endowment ratio	-0.78***
	(0.28)
KL endowment ratio×capital intensity	10.63***
	(3.40)
capital intensity	-122.06***
	(36.17)
corporate tax	-0.17*
	(0.11)
freight	0.24***
	(0.08)
host country's tariff on the U.S.	-0.15
	(0.12)
U.S. tariff on the host country	0.05
	(0.06)
number of observations	1450
R square	0.97
Root MSE	0.49
Dependent variable: affiliate sales	(2)
PTA×	
ΔKL endowment ratio	0.01
	(0.09)
ΔKL endowment ratio×capital intensity	2.79***
	(1.18)
capital intensity	-39.57***
	(13.17)
Δcorporate tax	0.09
	(0.07)
Δfreight	0.18***
	(0.05)
Δhost country's tariff on the U.S.	-0.05
	(0.06)
ΔU.S. tariff on the host country	-0.07
	(0.09)
number of observations	1450
Root MSE	0.49
R square	0.97

Notes: (i) all variables are measured in natural log except capital intensity and PTA; (ii) the rest of the estimates are not reported but available upon request; (iii) standard errors are reported in the parentheses; (iv) ***, **, and * represent significance at 1%, 5%, and 10% level respectively.

Table 5: The impact of regional economic integration on export-platform FDI

Dependent variable: exports to third countries	OLS	OLS	OLS	Nonlinear LS
KL endowment ratio	-0.49*	-0.71*	-0.46*	-0.79*
	(0.29)	(0.39)	(0.26)	(0.51)
KL endowment ratio×capital intensity	2.20	1.99	2.32	3.69
	(3.89)	(3.88)	(3.89)	(3.89)
capital intensity	-15.38	-14.61	-18.79	-34.09
	(44.18)	(44.03)	(44.13)	(44.08)
corporate tax	-0.01	-0.03	-0.00	0.00
	(0.06)	(0.06)	(0.06)	(0.06)
freight	-0.13*	-0.14*	-0.14*	-0.12
	(0.08)	(0.08)	(0.08)	(0.10)
host country's tariff on the U.S.	0.22***	0.24***	0.22***	0.24***
	(0.07)	(0.07)	(0.07)	(0.07)
PTA with third countries	0.39***			
	(0.11)			
number of integrated third countries		0.36***		
		(0.09)		
integrated export market potential			0.02***	
			(0.00)	
aggregate export market potential				0.57*
				(0.35)
weight of other PTA partners (ω_2)				0.92**
				(0.50)
weight of ROW (ω_3)				0.02
				(0.02)
Country-industry fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
number of observations	830	830	830	830
R square	0.96	0.96	0.96	0.96
Root MSE	0.49	0.49	0.49	0.49

Notes: (i) integrated export market potential $\equiv \sum_{j \neq i,h} \left(PTA_{ijt} \cdot \frac{Y_{jt}}{\tau_{ij}} \right)$,
agg. export market potential $\equiv M_{it}^e \equiv \sum_{j \neq i,h} \left[\omega_2 PTA_{ijt} \cdot \frac{Y_{jt}}{\tau_{ij}} + \omega_3 (1 - PTA_{ijt}) \cdot \frac{Y_{jt}}{\tau_{ij}} \right]$;
(ii) all variables are measured in natural log except capital intensity and PTA dummy;
(iii) standard errors are reported in the parentheses;
(iv) ***, **, and * represent significance at 1%, 5%, and 10% level respectively.

Table 6: Sensitivity analysis I: including non-U.S. multinationals

Dependent variable: affiliate sales	OLS	OLS	OLS	Nonlinear LS
KL endowment ratio difference	-0.50	-0.49	-0.50	-0.48***
	(0.33)	(0.33)	(0.34)	(0.16)
corporate tax	-0.41	-0.40	-0.39	-0.38
	(0.33)	(0.33)	(0.33)	(0.35)
distance	-1.14***	-1.12***	-1.12***	-1.18***
	(0.12)	(0.13)	(0.09)	(0.08)
ave. of host- and home-country GDP	1.48	1.59	1.69	1.82
	(1.29)	(1.30)	(1.25)	(1.51)
diff. of host- and home-country GDP	-0.34***	-0.34***	-0.33***	-0.31***
	(0.06)	(0.05)	(0.05)	(0.04)
PTA between host and home country	-0.05	-0.06		
	(0.28)	(0.29)		
PTA between host and third countries	0.59**			
	(0.31)			
host's number of PTA partners		0.004		
		(0.00)		
host's integrated market potential			0.03***	
			(0.01)	
host's aggregate market potential				1.72***
				(0.62)
weight of PTA with home (ω_1)				-0.05**
				(0.02)
weight of other PTA partners (ω_2)				0.31***
				(0.06)
weight of ROW (ω_3)				0.22**
				(0.12)
Host-country fixed effect	Yes	Yes	Yes	Yes
Home-country fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
number of observations	949	949	949	949
R square	0.89	0.89	0.89	0.89
Root MSE	1.18	1.18	1.18	1.17

Notes: (i) integrated market potential $\equiv Y_{it} + PTA_{iht} \cdot \frac{Y_{ht}}{\tau_{ih}} + \sum_{j \neq i,h} \left(PTA_{ijt} \cdot \frac{Y_{jt}}{\tau_{ij}} \right)$,
aggregate market potential $\equiv$
$M_{it} \equiv Y_{it} + \omega_1 PTA_{iht} \cdot \frac{Y_{ht}}{\tau_{ih}} + \sum_{j \neq i,h} \left[\omega_2 PTA_{ijt} \cdot \frac{Y_{jt}}{\tau_{ij}} + \omega_3 (1 - PTA_{ijt}) \cdot \frac{Y_{jt}}{\tau_{ij}} \right]$;
(ii) all variables are measured in natural log except capital intensity and PTA dummy;
(iii) standard errors are reported in the parentheses;
(iv) ***, **, and * represent significance at 1%, 5%, and 10% level respectively.

Table 7: Sensitivity analysis II: the impact of regional economic integration on FDI flow

Dependent variable: FDI inflow	OLS	OLS	OLS	Nonlinear LS
KL endowment ratio difference	-0.22***	-0.11	-0.10	-0.11
	(0.07)	(0.07)	(0.07)	(0.08)
corporate tax	0.05	-0.02	0.03	-0.03
	(0.22)	(0.22)	(0.22)	(0.22)
distance	-1.77***	-1.79***	-1.74***	-1.84***
	(0.06)	(0.06)	(0.05)	(0.06)
ave. of host- and home-country GDP	2.29***	2.84***	2.68***	2.61***
	(0.66)	(0.70)	(0.68)	(0.73)
diff. of host- and home-country GDP	-0.35***	-0.33***	-0.32***	-0.33***
	(0.04)	(0.04)	(0.04)	(0.04)
PTA between host and home country	-0.09	-0.23		
	(0.14)	(0.15)		
PTA between host and third countries	0.43***			
	(0.17)			
host's number of PTA partners		0.02***		
		(0.01)		
host's integrated market potential			0.03***	
			(0.01)	
host's aggregate market potential				3.72**
				(2.07)
weight of PTA with home (ω_1)				1.90
				(1.37)
weight of other PTA partners (ω_2)				5.01***
				(0.88)
weight of ROW (ω_3)				3.92***
				(0.56)
Host-country fixed effect	Yes	Yes	Yes	Yes
Home-country fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
number of observations	12,660	12,660	12,660	12,660
R square	0.45	0.44	0.44	0.45
Root MSE	4.03	4.03	4.03	4.03

Notes: (i) integrated market potential $\equiv Y_{it} + PTA_{iht} \cdot \frac{Y_{ht}}{\tau_{ih}} + \sum_{j \neq i,h} \left(PTA_{ijt} \cdot \frac{Y_{jt}}{\tau_{ij}} \right)$,
aggregate market potential $\equiv$
$M_{it} \equiv Y_{it} + \omega_1 PTA_{iht} \cdot \frac{Y_{ht}}{\tau_{ih}} + \sum_{j \neq i,h} \left[\omega_2 PTA_{ijt} \cdot \frac{Y_{jt}}{\tau_{ij}} + \omega_3 (1 - PTA_{ijt}) \cdot \frac{Y_{jt}}{\tau_{ij}} \right]$;
(ii) all variables are measured in natural log except capital intensity and PTA dummy;
(iii) standard errors are reported in the parentheses;
(iv) ***, **, and * represent significance at 1%, 5%, and 10% level respectively.

Table 8: Sensitivity analysis III: estimation results based on the Poisson Quasi-MLE

Dependent variable:	Poisson QMLE			
(1) affiliates sales; (2) exports to third countries	(1)		(2)	
KL endowment ratio	0.11	-0.08**	-0.14	0.57
	(0.44)	(0.04)	(1.21)	(1.14)
KL endowment ratio×capital intensity	0.59	0.37	-0.26	-1.60
	(2.82)	(2.99)	(7.31)	(4.63)
capital intensity	0.44	3.38	12.24	25.82
	(32.55)	(34.30)	(82.90)	(48.67)
corporate tax	-0.00	-0.01	0.12	0.09
	(0.04)	(0.04)	(0.07)	(0.07)
freight	-0.11***	-0.11***	-0.17**	-0.23***
	(0.05)	(0.05)	(0.10)	(0.07)
host country's tariff on the U.S.	0.04*	0.05*	0.19**	0.16***
	(0.02)	(0.03)	(0.08)	(0.06)
U.S. tariff on the host country	0.00	-0.01		
	(0.04)	(0.04)		
domestic market size	1.88***			
	(0.29)			
PTA between host and home country	0.25			
	(0.25)			
host's number of PTA partners	0.02**		0.07**	
	(0.01)		(0.03)	
integrated market potential		2.00***		
		(0.32)		
integrated export market potential				0.01**
				(0.00)
Country-industry fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
number of observations	1450	1450	1450	1450
Wald chi2	880.1	992.7	490.2	503.4
Prob>chi2	0.00	0.00	0.00	0.00

Notes: (i) integrated market potential $\equiv Y_{it} + PTA_{iht} \cdot \frac{Y_{ht}}{\tau_{ih}} + \sum_{j \neq i,h} \left(PTA_{ijt} \cdot \frac{Y_{jt}}{\tau_{ij}} \right)$,
integrated export market potential $\equiv \sum_{j \neq i,h} \left(PTA_{ijt} \cdot \frac{Y_{jt}}{\tau_{ij}} \right)$;
(ii) dependent variable is measured in absolute level, and explanatory
variables are measured in natural log except capital intensity;
(iii) standard errors are reported in the parentheses;
(iv) ***, **, and * represent significance at 1%, 5%, and 10% level respectively.

Table 9: Sensitivity analysis IV: addressing omitted variables (the first-stage trade equation)

Dependent variable: imports	OLS
distance	-1.346***
	(0.042)
border	0.636***
	(0.058)
border × language	0.919***
	(0.029)
PTA dummy	0.298***
	(0.039)
exporter-year fixed effect	Yes
importer-year fixed effect	Yes
number of observations	56044
R square	0.60
Root MSE	1.86

Notes: (i) standards errors are reported in the parentheses; (ii) ***, **, and * represent significant at 1%, 5%, and 10% respectively.

Table 10: Sensitivity analysis IV: addressing omitted variables (the second-stage estimation with a generalized measure of market potential)

Dependent variable:	Nonlinear LS	
(1) affiliate sales; (2) exports to third countries	(1)	(2)
KL endowment ratio	-1.00***	-0.63*
	(0.31)	(0.35)
KL endowment ratio×capital intensity	4.64**	1.15
	(2.24)	(3.99)
capital intensity	-44.49**	-5.80
	(25.03)	(45.33)
corporate tax	0.05	-0.05
	(0.04)	(0.06)
freight	-0.13***	-0.12
	(0.05)	(0.10)
host country's tariff on the U.S.	0.09*	0.21***
	(0.05)	(0.07)
U.S. tariff on the host country	-0.14**	
	(0.07)	
aggregate market potential	0.89***	
	(0.27)	
aggregate export market potential		0.16*
		(0.10)
weight of PTA with home (ω_1)	0.15	
	(0.67)	
weight of other PTA partners (ω_2)	0.34**	0.16*
	(0.18)	(0.09)
weight of ROW (ω_3)	-1.06***	0.10
	(0.29)	(0.17)
Country-industry fixed effect	Yes	Yes
Year fixed effect	Yes	Yes
number of observations	1450	830
R square	0.97	0.96
Root MSE	0.49	0.49

Notes: (i) agg. market potential $\equiv$
$\widehat{M}_{it} \equiv \widehat{Y}_{it} + \omega_1 PTA_{iht} \frac{\widehat{Y}_{ht}}{\widehat{\tau}_{ih}} + \sum_{j \neq i,h} \left[\omega_2 PTA_{ijt} \frac{\widehat{Y}_{jt}}{\widehat{\tau}_{ij}} + \omega_3 (1 - PTA_{ijt}) \frac{\widehat{Y}_{jt}}{\widehat{\tau}_{ij}} \right]$,
agg. export marke potential $\equiv \widehat{M}^e_{it} \equiv \sum_{j \neq i,h} \left[\omega_2 PTA_{ijt} \frac{\widehat{Y}_{jt}}{\widehat{\tau}_{ij}} + \omega_3 (1 - PTA_{ijt}) \frac{\widehat{Y}_{jt}}{\widehat{\tau}_{ij}} \right]$;
(ii) all variables are measured in natural logs except capital intensity;
(iii) standard errors are reported in the parentheses;
(iv) ***, **, and * represent significance at 1%, 5%, and 10% level respectively.

Table 11: Sensitivity analysis V: addressing potential endogeneity of PTA (the first-stage estimation of the probability of PTA)

Dependent variable: (1) PTA; (2) PTA decision	(1)		(2)	
	Probit	FE Linear Prob	Probit	FE Linear Prob
GDP average	0.317***	0.222***	0.145***	0.058***
	(0.009)	(0.015)	(0.022)	(0.004)
difference in GDP	-0.111***	0.016	-0.117***	-0.005
	(0.009)	(0.014)	(0.020)	(0.004)
difference in KL endowment ratio	0.904***	0.074***	0.837***	0.034***
	(0.049)	(0.029)	(0.117)	(0.008)
squared difference in KL endowment ratio	-0.306***	-0.008	-0.282***	-0.003**
	(0.014)	(0.005)	(0.039)	(0.002)
difference in KL endowment ratio from the ROW	0.266***	0.112***	0.088*	0.027***
	(0.023)	(0.043)	(0.049)	(0.010)
distance	-0.976***	—	-0.567***	—
	(0.022)		(0.037)	
remoteness	0.078***	—	0.034***	—
	(0.004)		(0.008)	
affinity	0.419***	0.114***	0.352***	0.013**
	(0.055)	(0.033)	(0.118)	(0.007)
Pair fixed effect	No	Yes	No	Yes
number of observations	29120	29120	25727	25727
(Pseudo) R square	0.55	0.77	0.25	0.15
Log likelihood	-5704.3	—	-1185.4	—

Notes: (i) standards errors are reported in the parentheses; (ii) ***, **, and * represent significant at 1%, 5%, and 10% respectively.

Table 12: Sensitivity analysis V: addressing potential endogeneity of PTA (the second-stage estimation)

Dependent variable:	Nonlinear LS	
(1) affiliate sales; (2) exports to third countries	(1)	(2)
KL endowment ratio	-0.35	-0.69*
	(0.29)	(0.40)
KL endowment ratio×capital intensity	1.23	2.66
	(2.25)	(3.87)
capital intensity	-4.06	-21.86
	(25.10)	(43.92)
corporate tax	-0.03	0.00
	(0.05)	(0.06)
freight	-0.17***	-0.12
	(0.05)	(0.10)
host country's tariff on the U.S.	0.11**	0.24***
	(0.05)	(0.07)
U.S. tariff on the host country	-0.07	
	(0.06)	
instrumented market potential	0.92***	
	(0.26)	
instrumented export market potential		0.19***
		(0.06)
weight of $\Pr(PTA_{ih}=1)$ (ω_1)	6.45	
	(7.79)	
weight of $\Pr(PTA_{ij}=1\|j\neq i,h)$ (ω_2)	122.58**	400.16**
	(61.64)	(220.10)
weight of $\Pr(PTA_{ij}=0\|j\neq i,h)$ (ω_3)	-3.70***	1.86
	(0.57)	(2.08)
Country-industry fixed effect	Yes	Yes
Year fixed effect	Yes	Yes
number of observations	1450	830
R square	0.97	0.96
Root MSE	0.44	0.48

Notes:
(i) instrumented market potential $\equiv \widetilde{M}_{it} \equiv Y_{it} + \omega_1 \widehat{\Pr}(PTA_{iht}=1)\cdot\frac{Y_{ht}}{\tau_{ih}} +$
$\sum_{j\neq i,h}\left[\omega_2\widehat{\Pr}(PTA_{ijt}=1)\cdot\frac{Y_{jt}}{\tau_{ij}} + \omega_3\widehat{\Pr}(PTA_{ijt}=0)\cdot\frac{Y_{jt}}{\tau_{ij}}\right]$,
instrumented export market potential $\equiv \widetilde{M}^e_{it} \equiv$
$\sum_{j\neq i,h}\left[\omega_2\widehat{\Pr}(PTA_{ijt}=1)\cdot\frac{Y_{jt}}{\tau_{ij}} + \omega_3\widehat{\Pr}(PTA_{ijt}=0)\cdot\frac{Y_{jt}}{\tau_{ij}}\right]$;
(ii) all variables are measured in natural log except capital intensity;
(iii) standard errors are reported in the parentheses;
(iv) ***, **, and * represent significance at 1%, 5%, and 10% level respectively.

Table A.1: The list of countries in the sample

Argentina	Finland	Malaysia	Spain
Australia	France	Mexico	Sweden
Austria	Germany	Netherlands	Switzerland
Belgium	Greece	New Zealand	Taiwan
Brazil	Hong Kong	Norway	Thailand
Canada	Indonesia	Peru	Turkey
Chile	Ireland	Philippines	United Kingdom
Colombia	Israel	Portugal	Venezuela
Costa Rica	Italy	Singapore	
Denmark	Japan	South Africa	
Ecuador	Luxembourg	South Korea	

Table A.2: The list of included Preferential Trade Agreements

EC	EC-Romania
EFTA	EFTA-Romania
EC-Switzerland and Liechtenstein	EFTA-Bulgaria
EC-Iceland	EC-Bulgaria
EC-Norway	NAFTA
EC-Algeria	Costa Rica-Mexico
EC-Syria	Canada-Israel
CER	Turkey-Israel
United States-Israel	Canada-Chile
EC-Andorra	Turkey-Romania
MERCOSUR	EC-Tunisia
EFTA-Turkey	Mexico-Nicaragua
EFTA-Israel	Turkey-Bulgaria