The Political Economy of Preferential Trade Arrangements: An Empirical Investigation*

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March 28, 2016

Abstract

In this paper, we develop a political economy model to study the decision of representative democracies to join a preferential trading arrangement (PTA), distinguishing between free trade areas (FTA) and customs unions (CU). Our theoretical analysis suggests that income inequality and bilateral trade imbalances are important factors in determining the formation of PTAs, while it points out that differences in the production structure among prospective member countries is an important factor in determining whether a CU or an FTA will emerge in equilibrium. Our empirical analysis, covering a sample of 124 countries over the period 1950-2000, lends strong support for the predictions of the model.

JEL classification numbers: F13
Keywords: Free Trade Areas, Customs Unions, Trade Imbalances, Income Inequality

*We are grateful to seminar participants at the 10th Australasian Trade Workshop at the University of Sydney, and at the DEGIT XX meetings in Geneva, at the 2015 meetings of the Southern Economic Association and at Southern Illinois University for helpful comments and discussions.

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1 Introduction

The last decades have seen a rapid growth in the number of preferential trading agreements (PTAs) in place between countries. As of January 2014, the World Trade Organization (WTO) has been notified of 435 PTAs, 377 of which are currently in force.[1] Most countries are members of more than one PTA, and only three countries are currently not engaged in any form of preferential trade liberalization.[2] At the same time, while these agreements are pervasive, they do take different forms. In particular, the formation of free trade areas (FTAs) is by far more common than that of customs unions (CUs), with nine FTAs in force for each CU.[3] What drives a country's decision to form a PTA? Which factors shape the choice of the type of PTA to be established? The goal of this paper is to help answering these questions by developing a political economy model of the formation of PTA, which allows us to characterize the factors that affect the decision to form a PTA, and those that matter in the choice of its type (FTA or CU). We then assess the predictions of our theoretical framework on a large sample of countries covering the period 1950-2000.

Our theoretical analysis is based on a three–country, multiple good setting in which two prospective member countries strategically interact to choose the tariff levels applied vis a vis each other and the rest of the world, whereas the rest of the world implements most favorite nation tariffs. The underlying economic structure is the oligopolistic trade model used in many studies of trade regionalism (Freund 2000, Krishna 1998, Ornelas 2005b, Saggi 2006, Ornelas 2007 and Facchini, Silva and Willmann 2013.), in which 'small' countries are able to influence their import prices because markets are segmented and firms are price setters. In each country, individuals derive income from labor supply, and from the profits generated by the oligopolistic firms in which they have a stake, and whose ownership is unevenly distributed among the population. Building upon this structure, we model the working of a representative democracy, where the citizenry in each prospective member country chooses the trade policy regime (PTA or multilateral) and elected representatives determine the actual tariffs to be implemented. This framework builds on the model developed by Facchini, Silva and Willmann (2013) and extends it to allow for a large number of goods, the presence of trade imbalances and FDI between prospective member countries.

The trade policy regime choice is described by means of a four–stage game. In the first stage, each perspective member country holds a sequence of votes to choose between a non–discriminatory MFN trade policy, a free trade agreement or a customs union. In the second stage, voters choose

[1] Information available at http://www.wto.org/english/tratop_e/region_e/region_e.htm.

[2] Note that this list includes both WTO and non-WTO members. According to the WTO, only the Republic of Congo, Mauritania, South Sudan and Mongolia are not part of any PTAs.

[3] Source: Our calculations are based on information available from the WTO's Regional Preferential Agreement database. More information can be obtained at http://rtais.wto.org/UI/publicsummarytable.aspx

the representative, who will then select the tariff policy in stage three. Under a MFN trade regime, the policy will be non–discriminatory. If a preferential agreement is instead in place, trade will be unencumbered between member countries. Moreover, tariffs will be coordinated if a CU is formed, whereas the members will set trade policies autonomously in the case of an FTA. In the last stage of the game, firms compete on quantities, taking as given the trade policy set in the third stage.

In this model, the individual with the median profit ownership share is pivotal, and as it is standard in the literature (see Alesina and Rodrik 1994 and Dutt and Mitra 2002) we assume that he receives a fraction of the profits which is lower than the population's average. Our analysis delivers several interesting results. First, we find that as tariffs are coordinated in a customs union, in this setting the median voter will strategically delegate power to a more protectionist representative. This does not occur instead in the absence of cooperation on tariff setting, namely when a free trade area or an MFN regime is chosen. This result mirrors previous findings in Facchini, Silva and Willmann (2013). We then turn to consider how three different forces affect the trade regime choice for the prospective member countries, i.e. the extent of trade imbalances, geographic specialization and cross–border foreign direct investment.

Our analysis indicates that trade imbalances and income inequality play a key role in shaping the decision to form a PTA. To understand the role played by trade imbalances, note that in our model, preferential access received by a prospective member country tends to increase that country's aggregate welfare by raising the profits of the firms owned by local residents and based there. At the same time, preferential access granted to a partner country tends to reduce aggregate welfare. If bilateral trade is unbalanced, the degree of market access exchanged between prospective members is unequal. In particular, the greater the trade imbalances, the less politically viable is the formation of a PTA in the prospective member country facing a trade deficit, and as a result, the less likely will be a PTA to emerge in equilibrium. As for the role played by income inequality, note that as wealth becomes more concentrated, the profit motive in the median voter's objective function becomes less relevant, and as a result the PTA formation becomes less likely.

Our results also indicate that – if a PTA is established – differences in the production structure and the extent of cross border foreign direct investment between the perspective member countries play a key role in determining the emergence of an FTA or a CU. To understand this point, note that in our model strategic delegation emerges in a CU, and not in an FTA. Its extent is greater, the more misaligned are the interests of the median voters in the two prospective member countries, i.e. the more asymmetric is the production structure, and the less pervasive is cross–border ownership. Greater strategic delegation leads to higher external tariffs being chosen under a CU, making this arrangement less desirable than an FTA from the point of view of the median voter.

Our empirical analysis brings these predictions to a large panel dataset, covering more than one hundred countries over the period 1950-2000. We model the decision to form a CU or FTA as a two-stage process, in which a country pair first chooses whether to establish a PTA and subsequently determines its type. This idea is captured using a Probit model with sample selection (Van de Ven and Van Pragg 1981).[4] The econometric results lend support to our theoretical predictions. In particular, we find that the greater the income inequality and the bilateral trade imbalances, the less likely it is for a PTA to emerge in equilibrium. In line with the predictions of the model, we also find that the greater the asymmetries in the production structure between prospective member countries, and the smaller the extent of cross–border ownership, the more likely it is for an FTA to emerge in equilibrium compared to a CU. Our findings are robust to the inclusion of additional controls in both the selection and the main equation of our model, and to alternative definitions of the key dependent variables – based on both *de jure* and *de facto* criteria.

Our paper is related to two main strands of the literature. First, we build on the empirical studies that have investigated the economic determinants of the formation of PTAs. In their pioneering contribution, Baier and Bergstrand (2004) show that economic size, size asymmetry, distance, and degree of remoteness play an important role in explaining the emergence of a PTA between a pair of countries. Egger and Larch (2008) extend this analysis by accounting for the *domino effect* suggested by Baldwin (1995), using a panel dataset strategy. More specifically, they investigate how the formation of a PTA between two countries can induce other trading partners to either join this existing agreement (enlargement) or to create their own PTA (foundation) to mitigate their losses in relative market access. More recently, Baldwin and Jaimovichi (2012) build on this idea and develop a theoretically-grounded measure of interdependency among PTAs.[5] While we build on this literature by accounting for the drivers of PTA formation emphasized in these earlier contributions, we extend it by focusing on the role of income inequality and trade imbalances in the decision to form a PTA, and by explicitly considering the factors affecting the choice between an FTA and a CU.

Second, our paper is also related to the theoretical literature that has emphasized the role of politics in the formation of PTAs.[6] In an early contribution, Grossman and Helpman (1995) develop a lobbying model, in which the governments of prospective member countries trade off

[4]There is a significant range of applications that use the Probit with sample selection model. Boyes et al. (1989) use this model to obtain estimates of loan default probabilities, while Johnston et al. (2009) apply it to measure the probability of misreporting a health condition (hypertension). Herring (2005) considers the take up health insurance decision for individuals who are offered health coverage.

[5]Other important papers in this literature are Chen and Joshi (2010) and Bergstrand and Egger (2013). In particular, Chen and Joshi allow for the possibility of hub-and-spoke patterns to emerge, whereas Bergstrand and Egger consider instead the determinants of the joint formation of PTAs and bilateral investment agreements (BITs). More recently, Baier, Bergstrand and Moriutto (2014) have investigated in greater detail the role played by the domino effect.

[6]There is also a large body of theoretical work that has investigated the formation of PTAs from a normative perspective. For a recent review of the literature, see Freund and Ornelas (2010).

aggregate welfare against campaign contributions in their decision to join an FTA. Importantly, throughout their analysis they assume the external tariffs to be constant, and show that the formation of an FTA is politically feasible if trade is balanced, and trade diversion is pervasive. Ornelas (2005) extends this framework by allowing for the endogenous determination of external tariffs. By eliminating intra-bloc barriers, the creation of an FTA lowers the incentives of import competing firms to lobby for higher external tariffs, inducing a reduction in the rents from lobbying (tariff complementarity).[7] This reduces the political viability of welfare decreasing FTAs, contrary to the earlier findings by Grossman and Helpman (1995). Facchini, Silva and Willmann (2013) extend this analysis by modeling the working of a representative democracy and explicitly considering the choice between the formation of a FTA and a CU.[8] We extend our previous analysis by theoretically examining the role played by trade imbalances and cross-border ownership in shaping the decision to form a PTA and its type, and by empirically assessing the role of these factors on a large panel data set.

The rest of the paper is organized as follows. Section 2 presents the basic setup of the model, while Section 3 characterizes the conditions for the political viability of the establishment of a PTA, and for the choice between an FTA and a CU. In Section 4, we present our main predictions and describe our dataset. Section 5 presents our econometric strategy and describes the econometric results. Section 6 concludes.

2 The Model

To study the formation of preferential trade agreements, we extend a standard oligopolistic model of trade that has been used in several analyses of regionalism (Krishna 1998, Freund 2000, Ornelas 2005b, 2007). Our setting will allow us to study how the decision to form a PTA and its type depend on: (i) bilateral trade imbalances; (ii) degree of geographic specialization; (iii) cross-border ownership of firms and (iv) income inequality within each prospective member country. Consider a three–country, $n+1$–good economy, where countries A and B are prospective members, while country F is an aggregate entity that stands for the rest of the world. Good 0 is a basic good that is produced in all three countries, using only labor according to the identity production technology $X_0 = L_0$. This good is freely traded and serves as the numéraire. As a result, if this good is produced in equilibrium, wages will be equal to 1. Moreover, trade of good 0 guarantees

[7] As recently shown by Liu and Ornelas (2014) the potential destruction of protectionist rents associated to the establishment of FTAs can critically reduce the incentive of authoritarian groups to seek power, thus making democracies last longer.

[8] In a stylized lobbying model Richardson (1994) also models the choice between joining an FTA and a CU, highlighting how an FTA might be more desirable from the point of view of a lobby than a CU, since "...in an FTA a domestic industry needs to lobby only the domestic government for a particular tariff, whereas, in a CU, a given tariff requires that a larger legislative group be courted".

that the balanced trade condition is satisfied for each country.

Goods 1 through n are instead produced by oligopolistic firms, with a measure one of firms located in country F in each industry. Assume that country A has a measure α (with $0.5 \leq \alpha \leq 1$) of firms located in that country in a fraction ϕ of the industries, while country B has a measure $1-\alpha$ of firms in these industries. The reverse happens in the remaining $1-\phi$ fraction of industries. For tractability, let A have a measure α of each industry in goods $i = 1, ..., \phi n$, while B has a measure α in goods $j = \phi n+1, ..., n$.[9] Note that industries are mirror images of each other and, as a result, the parameter ϕ captures the share of exporting industries relative to importing industries for a member country. This implies that the parameter ϕ also captures the pervasiveness of bilateral trade imbalances between prospective member countries A and B. In this sense, our model follows Grossman and Helpman (1995) in considering trade imbalances on a bilateral level and across goods 1 through n. Notice that parameter α also represents an important economic feature of the model. In this case, it represents the degree of geographic specialization in production. Our notation suggests that the higher α, the higher the degree of geographic concentration of the production of a good in a prospective member country.

Introducing notation that will be useful later on, let $x^i_{A,B}$ be the quantity of good i produced by a firm located in country A and consumed in country B. Since a measure α of firms in industries 1 through ϕn are located in country A, the amount of good i, produced in country A, and consumed in country B is given by $\alpha x^i_{A,B}$ for $i = 1, ..., n\phi$. The n oligopolistic goods are produced using only labor according to a constant returns to scale production function, which gives rise to a constant marginal cost of production c (in terms of the numéraire). Oligopolistic firms compete in quantities (Cournot competition). In this framework we can also allow for cross-border ownership of the firms based in A and B. This will be important in order to carry out robustness tests of our main theoretical predictions. In particular, we assume that a measure β (with $0 \leq \beta \leq 1$) of the firms in each industry located in a given member country is owned by individuals located in that country, while the remainder is owned by individuals located in the partner country.[10] We use the terminology "uniform"("unbalanced") degree of cross-border ownership to describe a situation where parameter β is close to 0.5 (0 or 1).

We model trade policy by assuming that each country can apply tariffs on trade with its

[9] For example, consider a situation where n equals 10 and ϕ equals 0.6. In this case, country A has a greater measure of firms in goods 1 through 6, while country B has a greater measure of firms in goods 7 through 10. A similar setting has been used by Grossman and Helpman (1995).

[10] For example, if $\beta = 0.75$ then individuals living in country A own 75 percent of the firms located in that country in each industry, while 25 percent of the firms located in country A in each industry are owned by individuals located in country B. Note that if $\beta = 1$ then there is no scope for cross-border ownership, while $\beta = 0.5$ implies that member countries equally share profits generated by firms in each country. Finally, a value of $\beta = 0$ describes the maximum level of cross-border ownership, as all the profits generated by firms located in a particular member country accrue to the residents of the other.

partners, unless a preferential trade agreement is in place. Denote by $t_{s,d}$ the tariff applied by country $d \in \{F, A, B\}$ on imports from country $s \in \{F, A, B\}$, where clearly $t_{d,d} = 0$. Country d's tariff matrix is described by $\mathbf{t}_d = (t_{A,d}, t_{B,d}, t_{F,d})$. The tariffs applied by the various countries can be denoted more synthetically in matrix form by $\mathbf{t} = (\mathbf{t}_F, \mathbf{t}_A, \mathbf{t}_B)$ where the tariff on products traded between PTA members is zero, as are the elements on the diagonal.

The population in each country consists of a continuum of individuals of mass one. Each individual supplies one unit of labor, but individuals differ in the stake they own of the profitable oligopolistic firms. We denote by $\gamma_{s,l}$ the fraction of the oligopolistic sector's profits allocated to individual l in country s. We assume that the oligopolistic sector's distribution of profits is the same in countries A and B. Without loss of generality, we normalize the fraction of the profits received by the average voter to one ($\overline{\gamma} = 1$). Typical wealth distributions then imply that the share of profits received by the median voter γ^m is such that $\gamma^m \leqslant 1$ (Alesina and Rodrik 1994). Following Dutt and Mitra (2002), γ^m can also be considered an inverse index of inequality – or an index of equality in the distribution of assets.

Preferences are identical across countries and individuals, and can be described by the following quasi-linear, quadratic, and additively separable, utility function:

$$u(x) = x^0 + \sum_{i=1}^{n\phi} u_i(x^i) + \sum_{j=n\phi+1}^{n} u_j(x^j) \tag{1}$$

where $u_i(x^i) = Hx^i - \frac{x^{i2}}{2}$ and $u_j(x^j) = Hx^j - \frac{x^{j2}}{2}$. This implies that the demand for good i and j takes, respectively, the form $x^i = H - p^i$ and $x^j = H - p^j$. The assumptions on the supply and demand sides of the model ensure that markets are segmented. Given these preferences, the indirect utility of individual l in country A can be written as follows:

$$v\left(\mathbf{t}, \gamma_{A,l}\right) = 1 + \pi_{A,l} + TR_A + CS_A \tag{2}$$

which represents the summation of income and consumer surplus. In this case, income derived from supply of labor equals 1, $\pi_{A,l}$ represents the profits accrued by individual l residing in country A, and TR_A represents the tariff revenue raised in country A and that is assumed to be entirely rebated lump-sum to the citizens of that country. We can re-write expression (2) to highlight the different dimensions of the model using parameters ϕ, α,and β, as follows,

$$\begin{aligned}
v\left(\mathbf{t},\gamma_{A,l}\right) &= 1+\gamma_{A,l}\sum_{i=1}^{n\phi}\left(\alpha\beta\pi_A^i\left(\mathbf{t}\right)+\left(1-\alpha\right)\left(1-\beta\right)\pi_B^i\left(\mathbf{t}\right)\right) \\
&+\gamma_{A,l}\sum_{j=n\phi+1}^{n}\left(\left(1-\alpha\right)\beta\pi_A^j\left(\mathbf{t}\right)+\alpha\left(1-\beta\right)\pi_B^j\left(\mathbf{t}\right)\right) \\
&+\sum_{i=1}^{n\phi}t_{F,A}^i x_{F,A}^i\left(\mathbf{t}_A\right)+\sum_{j=n\phi+1}^{n}t_{F,A}^j x_{F,A}^j\left(\mathbf{t}_A\right) \\
&+\sum_{i=1}^{n\phi}\left(1-\alpha\right)t_{B,A}^i x_{B,A}^i\left(\mathbf{t}_A\right)+\sum_{j=n\phi+1}^{n}\alpha t_{B,A}^j x_{B,A}^j\left(\mathbf{t}_A\right) \\
&+\sum_{i=1}^{n\phi}\left[u\left(x_A^i\left(\mathbf{t}_A\right)\right)-p_A^i\left(\mathbf{t}_A\right)x_A^i\left(\mathbf{t}_A\right)\right]+\sum_{j=n\phi+1}^{n}\left[u(x_A^j\left(\mathbf{t}_A\right))-p_A^j\left(\mathbf{t}_A\right)x_A^j\left(\mathbf{t}_A\right)\right]
\end{aligned} \tag{3}$$

where $\pi_A^i\left(\mathbf{t}\right)=\sum_d\left[p_d^i-c-t_{A,d}^i\right]x_{A,d}^i=\sum_d\pi_{A,d}^i\left(\mathbf{t}\right)$ represents the profits generated by a firm producing good i located in country A, and a similar definition applies to $\pi_B^i\left(\mathbf{t}\right)$. Moreover, in the case of industries i where production is geographically concentrated in country A, total sales in A are described by $x_A^i=x_{F,A}^i+\alpha x_{A,A}^i+\left(1-\alpha\right)x_{B,A}^i$, whereas total sales in A of the output of industries j where production is geographically concentrated in country B, are given by $x_A^j=x_{F,A}^j+(1-\alpha)x_{A,A}^j+\alpha x_{B,A}^j$ for $j=n\phi+1,...,n$. The first line represents labor income and profits accrued by individual l in industries where production is geographically concentrated in country A, while the second line captures instead the profits earned by the individual in industries where production is geographically concentrated in country B. The third and fourth lines represent tariff revenues collected by country A on imports from different sources, while the last line describes consumer surplus. As said above, tariff revenues are rebated lump-sum to the citizenry and are entirely kept by the importing country. However, profits generated by firms located in a country might instead accrue to the residents of the partner country due to cross-border ownership. The indirect utility of an individual based in country B is defined analogously.

As for the sequence of events, we consider a four stage game among the three countries where different trade policy regimes can be chosen by countries A and B. In the first stage, each prospective member holds a sequence of votes to choose between a non–discriminatory "most-favored-nation" trade policy, a free trade area or a customs union. In the second stage, the population of each country elects a representative who will, in the third stage, decide the countries' tariff policy. If no preferential agreement is in place, each country's representative will choose the non–discriminatory tariffs to be applied on all trade. If a preferential agreement is in place, then the representatives of countries A and B decide tariffs on country F. In this case, the formation of a free trade area does not require cooperation between elected representatives to decide tariffs on country F, whereas we follow the literature in assuming that the formation of a customs union does. In stage four, firms compete in quantities, taking as given the trade policy that has been set during the third stage. We solve the model backwards, starting from stage four.

2.1 Stage 4: Production and Consumption Choices

In the fourth stage of the model, firms make production choices taking as given the tariff matrix $\mathbf{t}$. If a preferential agreement between countries A and B is in place, then $t^i_{A,B} = t^i_{B,A} = 0$ for all i and the same applies for all j. Otherwise, countries apply MFN tariffs on imports. Notice that country F always applies MFN tariffs on goods imported from A and B, and that the tariffs chosen by F do not affect the equilibrium in A and B, since markets are segmented in this model. This allows us to focus on the equilibrium outcomes in countries A and B.

In general terms, a country s' firm producing good i solves the following problem with respect to country d's market:

$$\max_{x^i_{s,d}} \left[p^i_d - c - t^i_{s,d}\right] x^i_{s,d}$$

where to save on notation we have omitted the fact that quantities and prices are a function of the tariffs. The first order condition is given by:

$$\frac{\partial p^i_d}{\partial x^i_{s,d}} x^i_{s,d} + p^i_d = c + t^i_{s,d} \quad \text{ for all } d \tag{4}$$

Notice that the same applies for any good j. Focusing on country A (a similar analysis applies to B) the equilibrium quantities and prices for industries where production is geographically concentrated in country A ($i = 1, ..., n\phi$) are given by:

$$\begin{aligned} x^i_{A,A} &= \frac{\left[H + (1-\alpha)\, t^i_{B,A} + t^i_{F,A} - c\right]}{3} \\ x^i_{F,A} &= \frac{\left[H + (1-\alpha)\, t^i_{B,A} - 2t^i_{F,A} - c\right]}{3} \\ x^i_{B,A} &= \frac{\left[H - (2+\alpha)\, t^i_{B,A} + t^i_{F,A} - c\right]}{3} \\ p^i_A &= \frac{\left[H + (1-\alpha)\, t^i_{B,A} + t^i_{F,A} + 2c\right]}{3} \end{aligned} \tag{5}$$

whereas for industries where production is geographically concentrated in country B ($j = n\phi +$

$1, ..., n$) we have:

$$\begin{aligned} x^j_{A,A} &= \frac{\left[H + \alpha t^j_{B,A} + t^j_{F,A} - c\right]}{3} \\ x^j_{F,A} &= \frac{\left[H + \alpha t^j_{B,A} - 2t^j_{F,A} - c\right]}{3} \\ x^j_{B,A} &= \frac{\left[H - (3-\alpha)\, t^j_{B,A} + t^j_{F,A} - c\right]}{3} \\ p^j_A &= \frac{\left[H + \alpha t^j_{B,A} + t^j_{F,A} + 2c\right]}{3} \end{aligned} \tag{6}$$

where we assume that $H > c$. As it is clear from expressions (5) and (6), the price of goods in A depends only on the trade policies adopted by that country and does not depend on the trade policy adopted by any other country, because markets are segmented. Moreover, notice that these expressions do not depend directly on the cross-border ownership parameter β. This happens since the demand for oligopolistic goods is not affected by income effects given the assumption of quasilinearity in consumer preferences.

3 Understanding the PTA formation process

In this section we explore the role of different sources of heterogeneity between prospective member countries in explaining the PTA formation process. We start by focusing on the role of bilateral trade imbalances, we turn next to study the effect of differences in industrial structure and the effect of cross–border ownership patterns. In terms of the political process, we model the workings of a representative democracy. Voters in each country select a citizen as their representative, and elected representatives set trade policies. As shown by Facchini, Silva and Willmann (2013), an important feature of this process is the possibility for the median voter to optimally delegate representation to a different citizen.

3.1 Trade Imbalances

As pointed out already by Grossman and Helpman (1995), bilateral trade imbalances between prospective member countries might play an important role in the decision to join a preferential trading arrangement. To model their role and to keep the analysis tractable, we focus on a situation where perfect geographic specialization prevails ($\alpha = 1$) and there is no cross-border ownership ($\beta = 1$). In this case, goods in which production is geographically concentrated in country A (B) are exported by country A (B) and only imported (not produced) by the other prospective member. Remember that in our framework, $\phi = 0.5$ captures the situation in which each A and B

have the same number of exporting industries, and, as a result, trade is balanced between them. If $\phi > 0.5$, A starts running a trade surplus vis a vis B, that increases with ϕ.

We start by focusing on the regimes in which trade policy is set non–cooperatively, namely the MFN and FTA cases. Our framework calls for the population of each country to elect a citizen, who will choose the tariff level to be applied on imports. The objective of each representative is then to find tariffs that maximize his own welfare, given the tariffs chosen by other countries. We represent the share of the representative's profit by using 'hats' and continue to focus our analysis on country A. The representative's problem in the third stage of the game is given by:

$$\max_{t_A} v\left(\mathbf{t}, \widehat{\gamma}_A\right) \tag{7}$$

Assuming that an interior solution exists, the tariff vector chosen by representative $\hat{\gamma}_A$ is given by

$$\mathbf{t}_A = \mathbf{t}_A(\hat{\gamma}_A, \hat{\gamma}_B)$$

In other words, the tariff vector chosen by the representative in country A depends on his identity and potentially also on the identity of the other country's representative. Who will determine trade policies? Note that the voters' problem is unidimensional since they have to choose one representative, and, as shown by Facchini, Silva and Willmann, each voter's indirect utility function satisfies the single-crossing property. As a result, the median voter theorem can be applied and the choice of the representative is the solution to the following problem:

$$\max_{\widehat{\gamma}_A} v\left(\mathbf{t}\left(\widehat{\gamma}_A, \widehat{\gamma}_B\right), \gamma_A^m\right) \tag{8}$$

Solving stage 2 and 3 of the game yields the following:

Lemma 1 *Independently of the extent of trade imbalances, if policies are set non–cooperatively then strategic delegation does not arise in equilibrium. Furthermore, if an FTA is formed, tariffs applied to non–member countries are (weakly) lower than under an MFN arrangement.*

Proof. We start by solving, for a given $\hat{\gamma}_A$, the MFN tariff determination problem. The first order conditions for problem 7 are given by:

$$\begin{aligned} -\frac{\partial p_A^i}{\partial t_A^i}x_A^i + x_{F,A}^i + t_A^i\frac{\partial x_{F,A}^i}{\partial t_A^i} + \widehat{\gamma}_A\frac{\partial \pi_{A,A}^i}{\partial t_A^i} &= 0 \qquad \text{for } i = 1, ..., n\phi \\ -\frac{\partial p_A^j}{\partial t_A^j}x_A^j + \left(x_{F,A}^j + x_{B,A}^j\right) + t_A^j\left(\frac{\partial x_{F,A}^j}{\partial t_A^j} + \frac{\partial x_{B,A}^j}{\partial t_A^j}\right) &= 0 \qquad \text{for } j = n\phi + 1, ..., n \end{aligned} \tag{9}$$

Using equilibrium prices and quantities from 5 and 6 we obtain

$$
\begin{aligned}
t_A^{MFN,i} &= \frac{(H-c)\left(1+2\widehat{\gamma}_A\right)}{11-2\widehat{\gamma}_A} && \text{for } i=1,...,n\phi \\
t_A^{MFN,j} &= \frac{(H-c)}{4} && \text{for } j=n\phi+1,...,n
\end{aligned}
\tag{10}
$$

Importantly, equation 10 indicates that the equilibrium tariffs for country A depend only on the identity of that country's representative and on whether the country produces or not that particular good. Moreover, they do not depend on ϕ, i.e. the share of industries in which country A produces and exports goods. As for the choice of the representative in stage 2 of the game, as shown by Facchini, Silva and Willmann (2013), the median voter cannot do better than representing the country himself, i.e. $\widehat{\gamma}_A = \gamma^m$. The equilibrium MFN tariffs are then described by:

$$
\begin{aligned}
t_A^{MFN,i} &= \frac{(H-c)\left(1+2\gamma^m\right)}{11-2\gamma^m} && \text{for } i=1,...,n\phi \\
t_A^{MFN,j} &= \frac{(H-c)}{4} && \text{for } j=n\phi+1,...,n
\end{aligned}
\tag{11}
$$

We can now turn to the case of FTAs. In this case, free trade prevails between member countries ($t_{A,B}^{FTA,i} = t_{B,A}^{FTA,i} = 0$) and prospective members can set external tariffs independently. The solution to problem 7 is given by:

$$
\begin{aligned}
t_{F,A}^{FTA,i} &= \frac{(H-c)\left(1+2\widehat{\gamma}_A\right)}{11-2\widehat{\gamma}_A} && \text{for } i=1,...,n\phi \\
t_{F,A}^{FTA,j} &= \frac{(H-c)}{11} && \text{for } j=n\phi+1,...,n
\end{aligned}
$$

Also in this case, the median voter in each country does not delegate power for the same reasons discussed for the MFN regime. Thus, the equilibrium external tariffs in the FTA case are given by:

$$
\begin{aligned}
t_{F,A}^{FTA,i} &= \frac{(H-c)\left(1+2\gamma^m\right)}{\left(11-2\gamma^m\right)} && \text{for } i=1,...,n\phi \\
t_{F,A}^{FTA,j} &= \frac{(H-c)}{11} && \text{for } j=n\phi+1,...,n
\end{aligned}
\tag{12}
$$

Comparing expressions (11) and (12) establishes the second part of Lemma 1. ■

The intuition for Lemma 1 is as follows. In the model, the markets for goods i and j are segmented, and as a result the equilibrium prices in country A and B bare no relationship with each other. Moreover, in this non–cooperative setting the tariffs applied by country A can differ from those applied in country B. The median voter is better off by representing his own interests rather than delegating someone else to do so, as he does not have any influence on the partner's decisions. The tariff complementarity result follows the same logic as in Saggi (2006) and Ornelas (2007). In particular the decline in the tariff applied to the non–produced good is the result of the successful effort of the median voter to attenuate the degree of trade diversion generated by the preferential access granted to the partner country.[11]

The main difference between an FTA and a CU is that in the latter member countries cooperate in setting a common trade policy. Following the literature, the trade policy adopted in the case of a CU maximizes the joint surplus of the two countries' representatives, i.e. it solves:

$$\max_{t} v\left(\mathbf{t}, \widehat{\gamma}_A\right) + v\left(\mathbf{t}, \widehat{\gamma}_B\right) \tag{13}$$

where $\hat{\gamma}_A$ and $\hat{\gamma}_B$ are the elected representatives in the two countries and now tariffs applied on trade with country F are equal ($t^i = t^i_{F,A} = t^i_{F,B}$) across countries (but not necessarily across sectors). The resulting tariff vector chosen is given by

$$\mathbf{t}^{CU} = \mathbf{t}^{CU}(\hat{\gamma}_A, \hat{\gamma}_B)$$

As before, in the second stage of the model, in country A the representatives will be chosen by the median voter as the solution to the following problem

$$\max_{\widehat{\gamma}_A} v\left(\mathbf{t}^{CU}\left(\widehat{\gamma}_A, \widehat{\gamma}_B\right), \gamma_A^m\right) \tag{14}$$

We are now ready to state our second result:

Lemma 2 *Independently of the extent of trade imbalances, if trade policy is set cooperatively then strategic delegation occurs, and the elected representative is an individual with an ownership share in the import competing industries twice that of the median voter.*

Proof. The first order conditions of problem (13) for goods $i = 1, ..., n\phi$ are given by

$$-\frac{\partial p^i_A}{\partial t^i} x^i_A + x^i_{F,A} + t^i \frac{\partial x^i_{F,A}}{\partial t^i} + \widehat{\gamma}_A \left(\frac{\partial \pi^i_{A,A}}{\partial t^i} + \frac{\partial \pi^i_{A,B}}{\partial t^i}\right) - \frac{\partial p^i_B}{\partial t^i} x^i_B + x^i_{F,B} + t^i \frac{\partial x^i_{F,B}}{\partial t^i} = 0 \tag{15}$$

and for goods $j = n\phi + 1, ..., n$ by

$$-\frac{\partial p^j_A}{\partial t^j} x^j_A + x^j_{F,A} + t^j \frac{\partial x^j_{F,A}}{\partial t^j} - \frac{\partial p^j_B}{\partial t^j} x^j_B + x^j_{F,B} + t^j \frac{\partial x^j_{F,B}}{\partial t^j} + \widehat{\gamma}_B \left(\frac{\partial \pi^j_{B,A}}{\partial t^j} + \frac{\partial \pi^j_{B,B}}{\partial t^j}\right) = 0 \tag{16}$$

[11] Note that this effect is absent from the model by Grossman and Helpman (1995), since in that framework by assumption external tariffs do not change following the establishment of a free trade area.

Using the symmetry of the demand structure between A and B, we have that $x_A^i = x_B^i$, $x_A^j = x_B^j$, $\pi_{A,A}^i = \pi_{A,B}^i$, $\pi_{B,A}^j = \pi_{B,B}^j$, and $\frac{\partial x_{F,A}^i}{\partial t^i} = \frac{\partial x_{F,B}^i}{\partial t^i}$. We therefore obtain the following common external tariffs:

$$\begin{aligned} t^{CU,i} &= \frac{(H-c)\left(1+2\widehat{\gamma}_A\right)}{\left(11-2\widehat{\gamma}_A\right)} \qquad \text{for } i = 1, ..., n\phi \\ t^{CU,j} &= \frac{(H-c)\left(1+2\widehat{\gamma}_B\right)}{\left(11-2\widehat{\gamma}_B\right)} \qquad \text{for } j = n\phi+1, ..., n \end{aligned} \tag{17}$$

It is clear from (17) that only the identity of country A's representative matters in determining the equilibrium common external tariff in goods 1 through $n\phi$, while only the identity of country B's representative matter in determining the common external tariff for the remaining goods. Importantly, the share of products produced and exported by a prospective member country does not affect the common trade policy. Turning now to the selection of the representatives, as shown by Facchini, Silva and Willmann (2013), strategic delegation occurs and in particular we have that:

$$\widehat{\gamma}_A = \widehat{\gamma}_B = 2\gamma^m. \tag{18}$$

■

To understand the intuition for this result, note that markets are segmented in our model and external tariffs are not directly affected by trade imbalances (i.e. by ϕ). In the case of the CU, both countries A and B benefit from the implementation of a tariff on the imports of good $i = 1, ...n\phi$, because the tariff lowers the exporting price of the firm based in the rest of the world. At the same time, country A gains more than country B from the protection applied to that sector, because it also benefits from profit shifting, whereas the costs of the tariff are equally shared between the two countries. Cooperative tariff setting forces the representatives to internalize the negative externality on country B from a tariff imposed on imports of good i. Anticipating this outcome, the median voter is better off by delegating power to a representative that is more protectionist than himself. Substituting equation (18) in equation (17) we obtain the common external tariff:

$$t^{CU,i} = t^{CU,j} = \frac{(H-c)\left(1+4\gamma^m\right)}{\left(11-4\gamma^m\right)} \quad \text{for any } i \text{ and } j \tag{19}$$

which implies that common external tariffs are higher than external tariffs under an FTA.

We are now ready to compare the welfare levels achieved by the prospective member countries under the three possible trade regimes. In doing so we weigh equally the utility of all individuals and focus on the average voter's indirect utility function, $v(\mathbf{t}, \overline{\gamma})$ as our welfare measure.

The analysis of stages 2 and 3 highlights that equilibrium tariffs as well as the degree of strategic delegation are not influenced by the number of exporting and importing sectors in each member country. However, the pervasiveness of trade imbalances will affect the extent to which each country benefits from preferential access in welfare terms. In particular, we know from the literature that, in our oligopolistic trade framework, countries tend to benefit from preferential trade when they receive preferential access, whereas they tend to lose from it when they grant preferential access.

In a setting similar to ours, but characterized by bilateral balanced trade, Facchini, Silva and Willmann (2013) show that the overall welfare effect of a PTA is positive once we take into account the increase in profits generated by receiving preferential access. When we consider a richer environment, in which partner countries exchange different degrees of market access, this result does not necessarily hold. In particular, under our assumption that $\phi > 0.5$, country A has more exporting sectors than country B, and, as a result, it will run a trade surplus with B. In other words, A will receive greater preferential access from B than it grants to this country, and this will have an important impact on the welfare effects of a PTA for the two countries.

A second key force shaping the welfare impact of a PTA in each prospective member country is represented by the shape of the income distribution, which in turn will affect the extent of strategic delegation emerging in each trade regime. As shown in Lemmata 1 and 2, voters strategically delegate power to more protectionist representatives under a CU regime, while the same is not true in the MFN and FTA cases. If inequality is very low, delegation under a CU leads to very high common external tariffs, at least from the point of view of the average voter. This might make an FTA welfare-enhancing relative to a CU.

To characterize welfare in each country we use the equilibrium tariffs described in expressions (11), (12), and (19), along with equilibrium quantities and prices represented by (5) and (6), to assess the value of the average voter's indirect utility function under the different trade policy regimes. Figure 1 illustrates the resulting welfare ranking for country A (top panel) and B (bottom panel), as we vary relative market access (ϕ) and income inequality (γ^m).[12] As discussed above, as $\phi > 0.5$ increases, country A has a greater trade surplus with B. As we move downwards on the vertical axis, i.e. towards a more balanced distribution of market access, we can see that the FTA and MFN regimes may welfare-dominate a CU if the degree of income inequality is sufficiently low (i.e. γ^m is high).

If we instead move upwards on the vertical axis, the welfare ranking of the various trade regimes diverges between prospective member countries. In particular, as market access becomes more unequal (ϕ moves away from 0.5), the parameter space under which an FTA raises welfare relative to a CU becomes smaller (larger) for the partner country with a bilateral trade surplus (deficit). If inequality in market access exceeds a threshold, a CU welfare–dominates (is dominated

[12] See Appendix for details on how these figures have been constructed.

by) an FTA under any distribution of income from the point of view of the partner country with a bilateral trade surplus (deficit). The intuition for this result can be explained as follows. As we have already discussed, the common external tariffs in the CU are larger than those adopted in the FTA. As a result, profits tend to be greater in the CU than in the FTA. As the the exchange of preferential access becomes more unequal (i.e. $\phi \neq 0.5$), the profits generated by preferential access become more important for the country with a bilateral trade surplus, and less so for that with a deficit. It follows that the size of the parameter space under which CUs raise welfare relative to FTAs increases for the former, while it decreases for the latter.

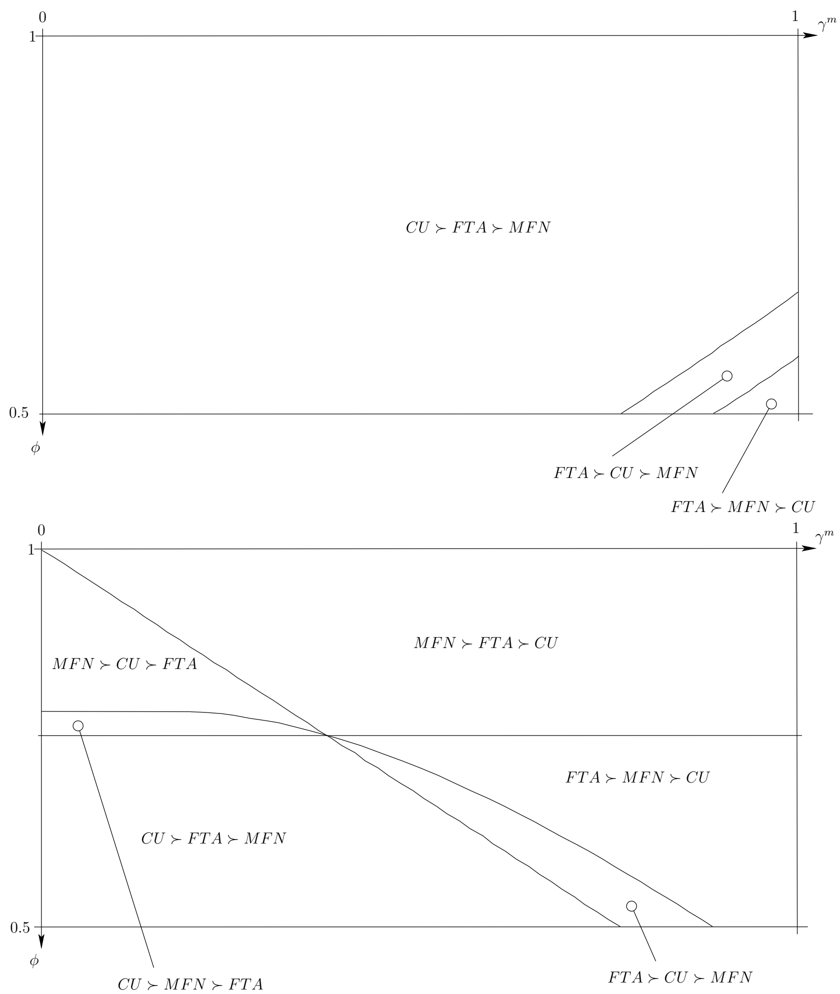

Figure 1: Welfare Ranking

A comparison between the MFN and different PTA regimes yields similar results. If the exchange of market access is balanced (ϕ close to 0.5), the FTA leads to higher welfare than the MFN regime for both A and B, regardless of income distribution. As the exchange of market access becomes more unequal, this result continues to hold for the country with a bilateral trade surplus regardless of income distribution. The opposite is true for the country with a bilateral trade deficit regardless of income distribution. A similar analysis also applies to the case of a CU. Under a balanced exchange of market access, a CU is welfare-enhancing relative to the MFN regime unless income inequality is sufficiently low. As inequality in the exchange of market access increases, the policy space under which a CU raises welfare relative to the MFN regime becomes greater (smaller) in the country with a bilateral trade surplus (deficit). Thus, the general message from the welfare comparison of the different regimes is that the benefits of entering a preferential trade agreement tend to increase (decrease) for the prospective member country with a trade surplus (deficit), the more unequal preferential market access is.

We can now turn to the solution of the first stage of the game, in which the choice of trade policy regime is determined by the median voter. We assume that citizens choose among the different trade policy regimes using a sequence of referenda. In the first referendum, the citizenry chooses between the MFN and the FTA regimes, while, in the second referendum, it decides between the trade regime that wins the first referendum and a CU.[13] For a PTA to be politically viable, the median voter's welfare must increase as the economy moves from a MFN regime to the PTA. To understand the role of the various forces at play in determining whether this is the case, it is useful to decompose the change in the median voter's indirect utility as follows:

$$\Delta v\left(\mathbf{t}^{MFN}, \mathbf{t}^{PTA}, \gamma_A^m\right) = \underbrace{\Delta v\left(\mathbf{t}^{MFN}, \mathbf{t}^{PTA}, \overline{\gamma}_A\right)}_{\text{Social welfare}} - \underbrace{\left(1-\gamma_A^m\right)}_{\text{Inequality}}\underbrace{\left(\Delta\pi_A^1\left(\mathbf{t}^{MFN}, \mathbf{t}^{PTA}\right)\right)}_{\text{Profits}} \tag{20}$$

where 'Δ' represents the change in variables from the MFN regime to a PTA. Since the profits of member countries' firms increase if they are granted preferential access under a PTA, equation (20) highlights that politically viable PTAs must be welfare enhancing. Equation (20) furthermore highlights how profits are less important in determining the political desirability of the PTA, rather than its appeal from the point of view of social welfare, as the median voter receives a lower share of profits than the average voter.

Figure 2 illustrates the political viability of the three trade regimes for country A (top panel) and B (bottom panel).[14] As it can be immediately seen, an FTA will emerge as a political equilibrium, if income inequality is sufficiently low (γ^m is sufficiently high) and if there is a balanced exchange of preferential market access across prospective member countries (ϕ close to 0.5). This is because, as shown in Figure 1, if the exchange of bilateral trade access is balanced then an FTA is welfare-enhancing relative to both the MFN at the CU, regardless of income distribution, and if inequality is sufficiently low, an FTA tends to be politically more appealing than a CU given that profits are less important from the political than from the social welfare perspective.

[13] Alternatively, we could start by considering the decision between the MFN arrangement and a CU and then, in the second stage, pit against each other the winner and the FTA. The two sequences deliver the same outcome.

[14] See Appendix for details of the calculations.

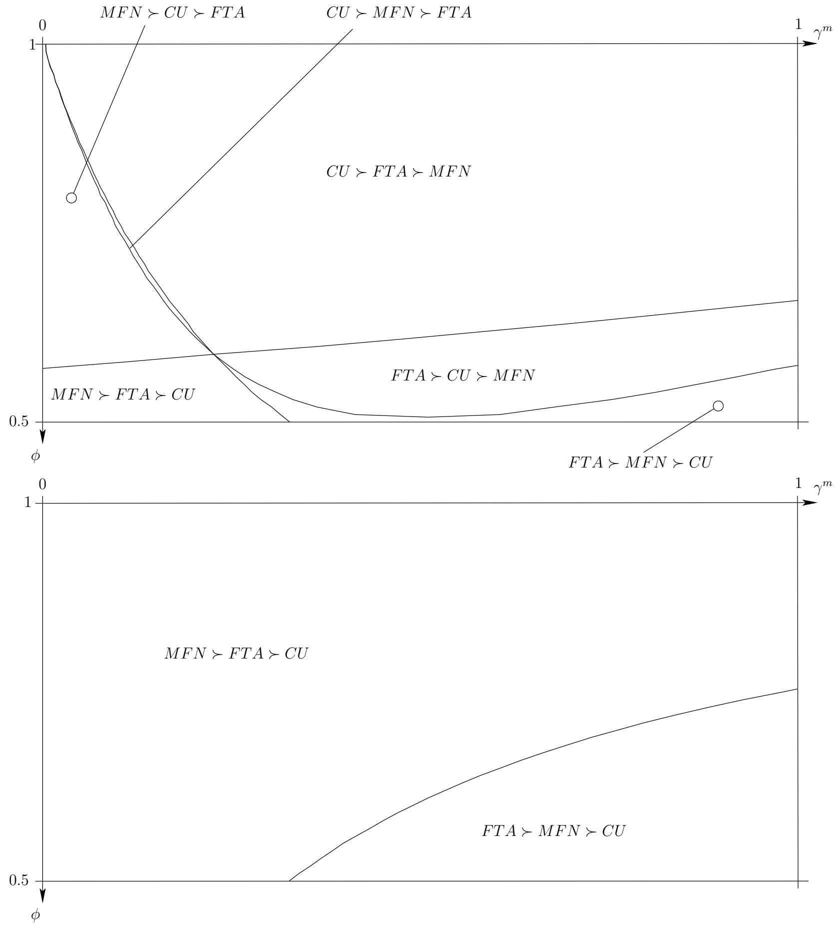

Figure 2: The median voter's rankings

This result is no longer true if the exchange of preferential market access becomes unbalanced. In particular, as ϕ increases, so does the policy space under which a CU is country A's politically preferred choice. At the same time, the policy space in which any PTA is politically viable in country B decreases, and this is true because as ϕ increases, by entering a PTA country B is granting an increasing amount of preferential access to A, while it receives a decreasing amount of preferential access from it. Note also that the interaction between bilateral trade imbalances and income inequality does not play a clear role in determining the political viability of an FTA compared to a CU regime.

Summing up, the presence of bilateral trade imbalances suggests that the political viability of a PTA depends primarily on whether it is supported in the prospective member country with a trade deficit. In fact, as trade imbalances become more severe, the policy space where a PTA is politically viable decreases since the country facing a trade deficit is less keen on granting more preferential access than it receives.

3.2 Geographic Specialization

We now turn to study the effect of varying the degree of geographic specialization - i.e. we assume that a measure α $(0.5 \leqslant \alpha \leqslant 1)$ of firms is located in country A in industries that are geographically concentrated in that country. In this case, each prospective member country is a net exporter of the goods produced in these industries. Each economy continues to be characterized by the presence of n oligopolistic industries but, to keep the analysis tractable, we assume trade to be balanced between the two countries, i.e. $\phi = 0.5$. Furthermore, no cross-border ownership is present ($\beta = 1$).

As in the previous section, we solve the game by first focusing on the non-cooperative trade regimes (FTA and MFN) and turn then to analyze the setting of a common external tariff (CU). We can immediately establish the following:

Lemma 3 *In the presence of imperfect geographic specialization, if trade policies are set non–cooperatively, strategic delegation does not arise in equilibrium. Furthermore, if an FTA is formed, tariffs applied to non–member countries are (weakly) lower than under a MFN arrangement.*

Proof. Focusing on country A (the results are analogous for country B), and following the same logic as in section 3.1, it follows immediately that no strategic delegation will occur in equilibrium in the MFN regime. As a result, the MFN tariff is given by

$$\begin{aligned} t_A^{MFN,i} &= \frac{(H-c)\left(1+2\alpha\gamma^m\right)}{4+7\alpha-2\alpha\gamma^m\left(2-\alpha\right)} \qquad \text{for } i = 1, ..., \frac{n}{2} \\ t_A^{MFN,j} &= \frac{(H-c)\left(1+2\left(1-\alpha\right)\gamma^m\right)}{11-7\alpha-\left(1+\alpha\right)2(1-\alpha)\gamma^m} \qquad \text{for } j = \frac{n}{2}+1, ..., n \end{aligned} \tag{21}$$

and the symmetric production structure of our model implies that $t_A^{MFN,i} = t_B^{MFN,j}$ and $t_A^{MFN,j} = t_B^{MFN,i}$. Note that as long as all goods are produced in both A and B, income inequality matters in determining the level of the MFN tariffs applied to all goods. Furthermore, if sectors are equally spread across the member countries ($\alpha = 1/2$), the tariffs applied on each good are identical.

We can now turn to the FTA regime. Also in this case, no strategic delegation occurs and the equilibrium tariffs are given by:

$$\begin{aligned} t_{F,A}^{FTA,i} &= \frac{(H-c)\left(1+2\alpha\gamma^m\right)}{11-2\alpha\gamma^m} \qquad \text{for } i = 1, ..., \frac{n}{2} \\ t_{F,A}^{FTA,j} &= \frac{(H-c)\left[1+2\left(1-\alpha\right)\gamma^m\right]}{\left[11-2\left(1-\alpha\right)\gamma^m\right]} \qquad \text{for } j = \frac{n}{2}+1, ..., n \end{aligned} \tag{22}$$

and given the symmetry of the model, $t_{F,A}^{FTA,i} = t_{F,B}^{FTA,j}$ and $t_{F,A}^{FTA,j} = t_{F,B}^{FTA,i}$, and if $\alpha = 1/2$ all the tariffs are identical. Comparing equations (21) to (22) establishes the second part of Lemma 3. ■

We can now consider the case of a CU, where the external tariff is chosen so as to maximize the joint welfare of the two countries' representatives. We can establish the following:

Lemma 4 *In the presence of imperfect geographic specialization, if trade policy is set cooperatively, strategic delegation occurs, and the elected representative is an individual with an ownership share in the import competing industries that is higher than that of the median voter. Furthermore, strategic delegation increases with the degree of geographic specialization.*

Proof. The solution to problem 13 is given by the following first order conditions:

$$\begin{aligned} t^{CU,i} &= \frac{(H-c)\left\{1+2\left[\alpha\widehat{\gamma}_A+(1-\alpha)\widehat{\gamma}_B\right]\right\}}{\left\{11-2\left[\alpha\widehat{\gamma}_A+(1-\alpha)\widehat{\gamma}_B\right]\right\}} \qquad \text{for } i=1,...,\frac{n}{2} \\ t^{CU,j} &= \frac{(H-c)\left\{1+2\left[(1-\alpha)\widehat{\gamma}_A+\alpha\widehat{\gamma}_B\right]\right\}}{\left\{11-2\left[(1-\alpha)\widehat{\gamma}_A+\alpha\widehat{\gamma}_B\right]\right\}} \qquad \text{for } j=\frac{n}{2}+1,...,n \end{aligned} \tag{23}$$

It is clear from (23) that the greater the share of profits received by the elected representatives, the higher is the tariff applied to imports from the non-member country. Turning now to the selection of the representative, the solution to problem 14 is given by:

$$\widehat{\gamma}_A = 2\gamma_A^m\left(1-2\alpha+2\alpha^2\right) \tag{24}$$

and $\frac{\partial\widehat{\gamma}}{\partial\alpha}>0$ if $\alpha>\frac{1}{2}$. Finally, the equilibrium common external tariffs are given by:

$$\begin{aligned} t^{CU,i} &= \frac{(H-c)\left[1+4\gamma^m\left(1-2\alpha+2\alpha^2\right)\right]}{\left[11-4\gamma^m\left(1-2\alpha+2\alpha^2\right)\right]} \qquad \text{for } i=1,...,\frac{n}{2} \\ t^{CU,j} &= \frac{(H-c)\left[1+4\gamma^m\left(1-2\alpha+2\alpha^2\right)\right]}{\left[11-4\gamma^m\left(1-2\alpha+2\alpha^2\right)\right]} \qquad \text{for } j=\frac{n}{2}+1,...,n \end{aligned} \tag{25}$$

Note that common external tariffs continue to be higher than the external tariffs under the FTA regime. ■

We turn now to study the political viability of the different regimes. As in section 3.1, a useful intermediate step involves the analysis of the social welfare levels under the three regimes. Two features of our model play an important role in shaping the welfare outcomes. First, as the median is poorer than the average voter, as income inequality increases so does the gap in the trade policy preferences of the median and average voters. Second, the median voter may decide to delegate power instead of representing himself. In particular, strategic delegation exists in the CU, and it increases with geographic specialization, whereas it is not present in the MFN and FTA regimes. This results in a positive relationship between geographic specialization and common external tariffs.

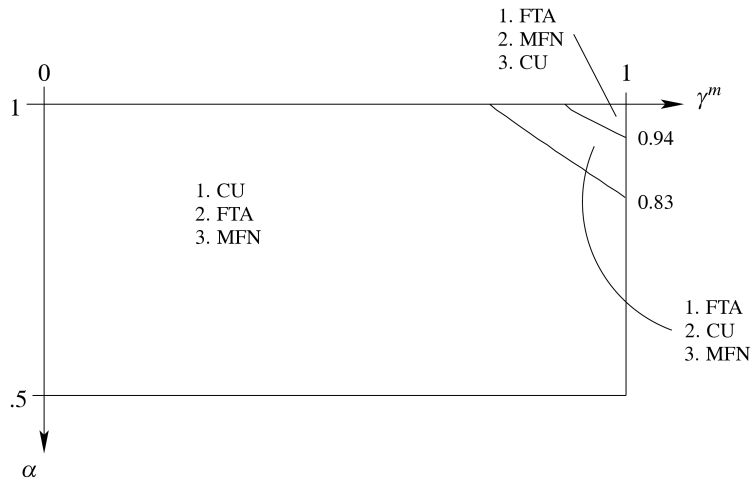

Figure 3: Welfare rankings

Figure 3 illustrates the welfare ranking of the different trade policy regimes for each prospective member country. As we can see, increasing the degree of geographic specialization (α increases), implies that the FTA and MFN welfare dominate the CU if income inequality is sufficiently low. The intuition for this result is that the higher the geographic specialization, the more pronounced becomes strategic delegation in the CU (see equation 24). If income inequality is low, this results in very protectionist representatives being chosen in the CU regime. As countries become instead more similar, the policy space at which a CU welfare dominates both an FTA and the MFN regimes clearly expands, as strategic delegation in the CU becomes less extreme, and the benefits from tariff coordination dominate.

Turning now to the choice of the median voter, his ranking of the possible outcomes is illustrated in Figure 4. As geographic specialization increases, we know from Figure 3 that a CU may be welfare-dominated by both the MFN and FTA regimes if the degree of income inequality is sufficiently low. In this case, the CU will never be chosen by the median voter (see the discussion following equation 20). As countries become more similar, once again the political prospects of a CU increase, as long as the degree of income inequality is not too high (see the bottom right section of Figure 4). Note also that the interaction between geographic specialization and inequality may play an important role in the choice between forming an FTA or a CU. For low to medium ranges of geographic specialization,[15] an FTA is politically more palatable than a CU if income inequality is sufficiently low. Otherwise, a CU will be chosen.

[15] I.e. for $(0.84 < \alpha < 0.9)$.

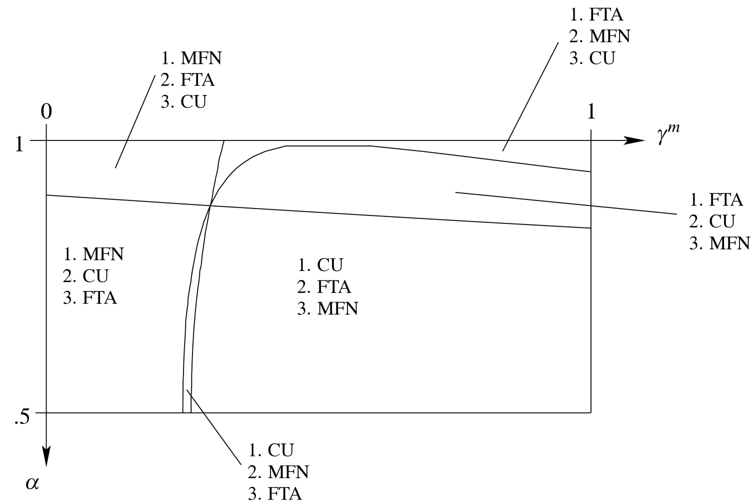

Figure 4: The median voter's rankings

3.3 Cross-border ownership

We now consider the effect of varying the degree of cross border ownership, allowing the parameter β to vary between 0 and 1. Remember that the lower is β, the greater is the degree of cross-border ownership, since a greater share of the profits generated by domestic firms is captured by individuals residing in the partner country. To keep the analysis tractable, we assume perfect geographic specialization ($\alpha = 1$) and trade to be balanced (i.e. $\phi = 0.5$). To simplify the discussion, we will denote scenarios where β is close to 0.5 as those with "uniform" degree of cross-border ownership whereas "unbalanced" cross-border ownership are those with β either close to 0 or to 1.

The analysis of the effects of cross-border ownership and geographic specialization leads to broadly similar conclusions concerning the political feasibility of the three trade regimes considered in our analysis.[16] Starting with the trade policy choice under the various regimes, the first result we obtain is that no strategic delegation emerges under the non–cooperative trade regimes (MFN, FTA). Moreover, the tariffs applied on non-member countries under an FTA take the exact same functional form as those obtained in the presence of geographic specialization. This implies that the equilibrium outcomes under an FTA are characterized by the same functional forms both in the presence of cross–border ownership and geographic specialization. Note though that, differently from our analysis of geographic specialization, in the presence of cross–border ownership the tariffs applied to non-member countries under an FTA can be either higher or lower than under the MFN regime. To understand this result, remember that in the presence of cross-border ownership, the

[16]For this reason, we have omitted a detailed presentation of the analysis, which is available from the authors upon request.

median voter in one country receives a fraction $(1-\beta)$ of the profits of firms based in the other prospective member and as a result, he may benefit from a higher tariff under an FTA relative to the MFN regime depending on the extent of income inequality.

Furthermore, we can show that in the presence of a CU strategic delegation will occur, and its extent is described once again by the functional form described in equation (24). Intuitively, the more unbalanced is cross-border ownership, the more misaligned will be the sectorial interests of the median voters in the prospective member countries, and as a result, the greater will be the degree of strategic delegation. From this result it follows that the equilibrium common external tariff in the case of cross-border ownership takes the same functional form to the equilibrium common external tariff in the case of geographic specialization.

We can now turn to study the political viability of the different regimes, and as before,we start by comparing welfare levels. Broadly speaking, changing the extent of cross border ownership leads to results that are similar to those obtained by changing the extent of geographic specialization. In particular, if cross-border ownership is unbalanced (β close to 1), the formation of a CU may be dominated by an FTA and/or the MFN regime if income inequality is sufficiently low. In this case, the interests of the median voters in the two countries are misaligned. If income inequality is low, the formation of a CU will then lead to the selection of very protectionist representatives (see equation 24). As cross-border ownership becomes more balanced the degree of strategic delegation in the CU declines, and the latter becomes more attractive. Note that at the same time, the FTA welfare dominates the MFN regime regardless of income distribution and of the degree of cross-border ownership – a result reminiscent of what we obtained while discussing geographic specialization.

Turning to the political viability, the ranking of the different trade policy regimes is very similar to that with geographic specialization. In particular, we find that the more unbalanced is cross-border ownership, the more likely will be an FTA to emerge in equilibrium if income inequality is not too high. On the other hand, as the degree of cross-border ownership becomes more uniform, CUs will be formed in equilibrium if cross-border ownership is moderate and if income inequality is not too high.

As already pointed out while discussing the effects of geographic specialization, the interaction between cross-border ownership and inequality may play an important role in the choice between forming an FTA or a CU. In particular, for intermediate ranges of cross-border ownership (0.84 ¡ β ¡ 0.9), the formation of an FTA is politically more palatable than the formation of a CU if income inequality is sufficiently low. Otherwise, a CU might emerge.

4 Main Predictions and Dataset

Our theoretical model allows to formulate a series of hypotheses that can be empirically assessed. Importantly, it enables us to distinguish between factors that directly affect the decision to form a PTA, and those that instead impact the type of PTA that will be chosen. In this section we start by discussing our hypothesis, and will then present the data employed in the analysis.

4.1 Main Predictions

Our first prediction focuses on the role played by income inequality and trade imbalances in determining the political viability of PTAs. Building on the analysis carried out in Section 3, and focusing on Figure 2 to understand the effects of trade imbalances and on Figure 4 for the role of geographic specialization, our model indicates that no PTA will emerge in equilibrium if income inequality is too high. Turning to the role of trade imbalances, our discussion in Section 3.1 highlights how the viability of a PTA crucially depends on the support it gains in the prospective member country with a trade deficit. In particular, the greater the trade imbalances, the less likely will be a PTA to emerge in equilibrium, as a larger amount of preferential access is granted by the country with a trade deficit in exchange for a smaller amount received by the partner country. We can summarize these results in the following:

Hypothesis 1 *(i) If inequality is sufficiently high then a PTA will not emerge in equilibrium; (ii) If trade imbalances are sufficiently high then a PTA will not emerge in equilibrium.*

While income inequality and the pervasiveness of trade imbalances are behind the decision to establish a PTA, our model suggests that these factors do not affect the popularity of FTAs relative to CUs. The equilibrium choice of one PTA regime over the other depends instead on the pervasiveness of geographic specialization. This factor plays an important role because it determines the extent of strategic delegation in a CU, which may lead common external tariffs to be inefficiently high. In fact, if the degree of geographic specialization is very high (α close to 1), equation (24) indicates that the elected representative will be significantly more protectionist than the median voter in the CU regime, whereas no strategic delegation occurs in an FTA. This might make the FTA the equilibrium choice as shown in the upper-right region in Figure 4. If geographic specialization is instead low (α close to 0.5), a CU will emerge. Moreover, as argued in section 3.2, for intermediate levels of geographic specialization, the formation of an FTA becomes politically viable if the degree of income inequality is sufficiently low. Otherwise, a CU may be formed. These results are summarized in the following:

Hypothesis 2 *If a PTA is formed, and the degree of geographic specialization is sufficiently high, then an FTA emerges in equilibrium. Otherwise, a CU will be formed. Moreover, for intermediate levels of geographic specialization, an FTA is more likely to emerge in equilibrium, the smaller is income inequality.*

Our model also suggests that the effect of cross–border ownership on the choice of PTA type is broadly comparable to that of geographic specialization. Our empirical analysis will assess these hypotheses.

4.2 Dataset

To assess the implications of our model, we have collected a large dyadic panel dataset with country-pair information that covers 124 countries over the period 1950-2000, at five–year intervals. We follow Egger and Larch (2008) and Baier, Bergstrand and Feng (2014) in focusing on data at this frequency and the reason behind our choice is that preferential trading arrangements are typically accompanied by long implementation periods, and data at five year intervals are more likely to account for this than higher frequency data. Moreover, like Baier, Bergstrand and Feng (2014) due to data limitations we do not include in our analysis more recently established preferential trading arrangements.

Descriptive statistics for the variables used in this study can be found in Table 1. The different columns reflect the dimensions of the dataset that we want to explore. In particular, column 1 provides the average and standard deviation for each variable in the entire sample, whereas column 2 provides the same information focusing on country-pairs belonging to the same PTA. Column 3 restricts the attention to country-pairs belonging to the same FTA, and column 4 focuses on country-pairs in the same CU.

[Table 1 here]

To capture the presence of a preferential trading arrangement between a country pair, we have used information from Mattevi (2005), who has classified existing agreements based on *de facto* characteristics, distinguishing among FTAs, CUs and partial agreements. Partial agreements typically involve selective sectoral trade liberalization, whereas in FTA and CU trade among members is substantially duty free. In the case of CUs, member countries must have additionally agreed and implemented a common external tariff for the vast majority of products.[17] Given that

[17]This requirement is important as not all negotiated agreements have been implemented. For example MERCOSUR members have agreed and implemented a common external tariff for more than 80 percent of the products they trade, and as a result MERCOSUR is described as a CU in our dataset. On the other hand, the Andean Community have agreed to implement a common external tariff but has failed to follow through with that decision. As such, the Andean community is not described as a CU in our dataset.

our theoretical analysis explains the formation of FTAs and CUs, our empirical work will focus on only these two types of agreements.

In particular, we construct two variables. The first, PTA_{abt}, takes a value of one if at time t a preferential trade agreement is in place between country a and b. The second, FTA_{abt}, characterizes instead different types of agreements, and takes a value of one if at time t a Free Trade Area is in place between country a and b, and zero if instead a CU is in force. Columns 1 and 2 of Table 1 indicate that – out of a total of 24872 country-pair observations included in our sample – 584, or 2.3 percent of the total represent full-fledged preferential trade agreements taking the form of CUs or FTAs. This is in line with findings discussed in Egger and Larch (2008) that report a total number of country pairs belonging to the same FTA or CU equivalent to about 1.5 percent of their total sample. Note also that according to Table 1, 52 percent of the observations is represented by country pairs belonging to an FTA, while the rest belongs to a CU.[18] As several efforts have been carried out to collect information on existing preferential trading arrangements, we have assessed the robustness of our results using alternative datasets made available by Egger and Larch (2008) and Baier, Bergstrand and Feng (2014).

Among the determinants of the formation of a PTA emphasized in the theoretical model, our measure of inequality $INEQ_{abt}$ is given by the net Gini coefficient[19] taken from Solt (2009) Standardized World Income Inequality Database.[20] In particular, we use the highest net Gini coefficient within a country-pair as our model suggests that - ceteris paribus - it will be the country with the highest inequality in a country-pair to find a PTA less politically sustainable. A comparison between columns 1 and 2 of Table 1 suggests that the average inequality of the most unequal country in a pair for the entire sample (41.65) is higher than the average for the most unequal country in a pair that belongs to the same CU or FTA (33.52). This is broadly consistent with Hypothesis 1 from our theoretical model, suggesting that for a PTA to be established, inequality within member countries should be relatively low. Turning to trade imbalances, our measure IMB_{abt} is built using information on bilateral trade flows from the IMF's direction of trade database.[21] In particular, it is defined as the difference between bilateral exports for a country-pair divided by the total bilateral trade of the pair. Our dataset highlights that trade between country pairs is typically highly unbalanced, with a gap between bilateral exports averaging 64% of total bilateral trade. However, the same figure is substantially lower for countries belonging to the same FTA or CU, reaching only 26% of total bilateral trade, or, equivalently, 41% of the average trade imbal-

[18] This is in line with Figure 1 in Freund and Ornelas (2010).

[19] The net Gini coefficient takes into account possible income redistribution promoted by national governments through the tax system. Solt (2009) finds that the degree of inequality on a net-basis is significantly lower than on a gross-basis in particular in developed countries.

[20] Solt standardized previous data on inequality constructed by the United Nations, making information available for 153 countries starting from 1960.

[21] This is the same source used by Subramanian and Wei (2007), among others.

ance recorded for the entire sample. Again, this is in line with Hypothesis 1, suggesting that the PTA's are more likely to emerge when trade imbalances between prospective members countries are low. Interestingly, our data indicate that trade imbalances are higher among FTA members than among members of a CU.

As for the factors that according to our model should determine the type of PTA to be established, we measure the degree of geographic specialization using information on the share of total value added generated from agricultural, manufacturing and service activities in the gross domestic products for each country. More specifically, consider a pair formed by country a and b and denote the service, industry and agriculture share of GDP in country c by SER_c, IND_c and AGR_c respectively. Then, the degree of geographic specialization between countries a and b is defined as

$$GEO_{abt} = |SER_{at} - SER_{bt}| + |IND_{at} - IND_{bt}| + |AGR_{at} - AGR_{bt}| .$$

This index can take values between $[0, 2]$, with a greater value indicating greater specialization.[22] Our choice of indicator is inspired by the index of regional industry specialization described by Krugman (1991), and has the advantage of requiring information that is available from the World Bank World Development Indicators dataset over a long time period and for the large number of countries included in our analysis. Column 1 of Table 1 suggests that on average the country–pairs involved in our sample differ in their reliance on a particular economic activity by 42 percentage points. Country pairs involved in a PTA are more similar (the corresponding figure is 24 percentage points). More importantly, a comparison between columns 3 and 4 reveals that the degree of geographic specialization for members of an FTA is 34 percentage points, which is far greater than the degree of geographic specialization of CU members which is equal to 14 percentage points. This is in line with Hypothesis 2, which suggests that the degree of geographic specialization should be greater among members of an FTA than among members of a CU. One additional prediction of our theoretical analysis is that cross-border ownership should play a role similar to geographic specialization. We assess the extent of cross-border ownership using

$$CROSS_{abt} = \frac{1}{2} \left[\frac{FDI_{abt}}{GDP_{at}} + \frac{FDI_{bat}}{GDP_{bt}} \right]$$

where FDI_{abt} is the inward stock of FDI received by country a originating in country b at time t, taken from the UNCTAD Bilateral FDI Statistics database. Note that the higher is $CROSS_{abt}$, the more symmetric is the degree of cross-border ownership (in terms of our model, the higher is

[22] If the production structure in the two countries is identical, $GEO_{abt} = 0$; on the other hand, if the two countries are completely specialized in a different sector of the economy, $GEO_{abt} = 2$.

$CROSS_{abt}$, the closer is the parameter β to 0.5).

In our analysis we will also control for a series of additional drivers that have been shown in the literature (see Baier and Bergstrand 2004, Egger and Larch 2008) to play a significant role in the formation of a PTA. More specifically, we include information on the total economic size of each country-pair ($GDPSUM_{abt}$), the inverse of the distance between two trade partners ($NATURAL_{ab}$), an indicator for whether countries in a pair are in the same continent ($DCONT_{ab}$), the weighted average of the distance between two trade partners and other trade partner countries ($REMOTE_{abt}$), the asymmetry in the economic size between two trade partners ($GDPSIM_{abt}$), the relative factor endowment asymmetry between two trade partners (DKL_{abt}), the squared-value of the bilateral relative factor asymmetry ($SDKL_{abt}$), and the average relative asymmetry in factor endowments between each country in a country-pair and other trade partners ($DROWKL_{abt}$). The recent literature has also pointed out that the formation of a PTA between countries in a pair may either encourage the formation of other PTAs or may lead to the enlargement of existing agreements. To account for this possibility, we additionally control for the index of interdependence ($INTERD_{abt}$) among PTAs proposed by Egger and Larch (2008) and further developed also by Baldwin and Jaimovichi (2012).[23] We represent this group of additional drivers of the formation of PTAs by the matrix $\mathbf{X}$ and we construct these variables using Subramanian and Wei's (2007) dataset. More details on the exact definitions of each of these variables can be found in Table A of the appendix.

5 Empirical Analysis

This section has two main objectives. First, we will lay out the econometric strategy implemented to assess the predictions of our theoretical analysis. Second, we will present our results, and assess their robustness.

5.1 Specification

Our theoretical analysis suggests to model the formation of a preferential trade agreement as a two-step process, where countries first decide whether to form a PTA (Hypothesis 1) and then agree on its type (Hypothesis 2), i.e. on whether the PTA will be an FTA or a CU. Thus, we have a combination of self-selection into a PTA in the first stage, and a binary decision about its type (CU or FTA) in the second stage, a setting which can be empirically examined using a probit model in the presence of selection developed by Van de Ven and Van Pragg (1981).

[23] We thank the authors for sharing their measure of interdependence with us. See Table A for the exact definition.

Our strategy represents a natural extension of the econometric approaches followed in the literature. For instance, Baier and Bergstrand (2004) specify a probit model on a cross-sectional dataset to investigate the determinants of the formation of preferential trade agreements. Egger and Larch (2008) specify a similar model, but on a panel dataset covering the period 1955-2005 to investigate the role played by interdependence in the formation of PTAs. A similar methodology has also been implemented by Bergstrand and Egger (2013) to analyze the determinants of bilateral investment treaties. As it is well known, in the context of a binary response model, using (country-pair) fixed effects to account for unobservables may give rise to an incidental parameters problem. To address this concern, Chamberlain (1980) suggests to use instead the average of time-variant explanatory variables to obtain consistent estimates of the parameters of interest. Following Egger and Larch (2008) and Baldwin and Jaimovich (2012) we implement this strategy also in all our specifications.[24]

The first stage decision is described by the following specification:

$$PTA_{abt} = \alpha_0 + \alpha_1 INEQ_{ab,t-5} + \alpha_2 IMB_{ab,t-5} + \boldsymbol{\beta}\mathbf{X}_{ab,t-5} + \epsilon_{abt} \tag{26}$$

where PTA_{abt} is a binary variable that takes a value of 1 if a country-pair ab is part of the same CU or FTA in year t, and zero otherwise, and IMB_{abt} and $INEQ_{abt}$ are respectively our measures of trade imbalances and income inequality. Matrix $\mathbf{X}$ contains instead a set of additional drivers of the formation of a PTA that have been identified in the existing literature (see Section 4 more details). As the establishment of a preferential agreement between a pair of countries is likely to affect their overall economic structure, using contemporaneous characteristics of the country pair might lead to parameter estimates that are biased due to reverse causality. To mitigate this concern, we follow Egger and Larch (2008) and Bergstrand and Egger (2013) among others,[25] and lag all right hand side variables. In most specifications we also include year fixed effects to control for common time specific shocks. Our theoretical model provides clear predictions on the expected sign of the coefficients α_1 and α_2. In particular, Hypothesis (1) suggests that the greater is the trade imbalance (IMB_{abt}) within a country-pair, and the greater is the degree of income inequality ($INEQ_{abt}$), the less likely it is for a PTA to emerge in equilibrium. As a result, we expect $\alpha_1 < 0$ and $\alpha_2 < 0$.

[24] In their study of third countries impact on the formation of PTA's, Chen and Joshi (2010) use instead a linear probability model to allow for a rich set of country fixed effects.

[25] In a robustness check, we also report results for a specification in which we lag our right hand side variables by 10 years in order to control for the fact that some PTAs may have a longer phase-in process, obtaining similar results.

The second stage decision is described instead by the following binary model:

$$FTA_{abt} = \theta_0 + \theta_1 GEO_{ab,t-5} + \theta_2 \left(GEO \times INEQ\right)_{ab,t-5} + v_t \tag{27}$$

where FTA_{abt} is a binary variable that equals 1 if an FTA is in place for country-pair ab in year t, and zero if instead a CU is in force. GEO_{abt} is a measure of the degree of geographic specialization for a country-pair. In line with the discussion in Section 3.2, we also control for the interaction between income inequality and geographic specialization. Also in this case, all explanatory variables are lagged to address reverse causality concerns. Our theoretical model provides clear predictions on the expected sign of θ_1 and θ_2. Hypothesis (2) indicates that, if a PTA is formed, the higher the degree of geographic specialization (GEO_{abt}), the more likely is an FTA to emerge as a political equilibrium. As a result, we expect $\theta_1 > 0$. Furthermore, as inequality increases, if a PTA is formed, it is more likely to take the form of a CU. As a result, we expect $\theta_2 < 0$.

5.2 Econometric Results

Table 2 contains our main results, which are presented in two panels. The top panel reports the findings from the estimation of the selection equation (equation 26) modeling the determinants of the PTA formation decision, whereas the lower one contains the estimates of the latent equation (equation 27), describing the choice of PTA type. The specification in column (1) follows directly from the theoretical model, whereas in column (2) we report our benchmark analysis, which accounts also for year fixed effects. To help quantifying the economic magnitudes involved, in column (3) we report the corresponding marginal effects. The latter capture the change in the probability of forming a PTA (respectively forming a Free Trade Area) due to an infinitesimal change in each independent, continuous variable, and a discrete change in the probability for dichotomous variables.

[Table 2 here]

The LR test reported at the bottom of the table indicates that the probit model with sample selection performs better than estimating equations (26) and (27) separately. Furthermore, the empirical findings provide broad support for our theoretical predictions. Focusing on the determinants of the formation of a PTA (upper panel), we find that an increase in income inequality is negatively related to the probability that a PTA will be established between two countries, even if the effect is not statistically significant. Similarly, an increase in bilateral trade imbalances tends also to significantly reduce the likelihood that a PTA will be put in place. These findings are in line with the predictions summarized in Hypothesis 1. As for our control variables, our analysis confirms patterns that have been already uncovered in the existing literature (see in particular Baier and Bergstrand 2004 and Egger and Larch 2008). In particular, we find that a PTA is more likely to emerge if two countries are geographically closer ($NATURAL$) to each other, if they belong to the same continent ($DCONT$), if other country-pairs are part of pre-existing PTAs ($INTERD$), if they are more remote from the rest of the world ($REMOTE$), if their total market size ($GDPSUM$) is larger, if they are more similar in terms of their economic size ($GDPSIM$) and if their factor endowments (DKL) are more dissimilar. As it has been found also in previous studies, the effect of the latter is non linear, and it is increasing, but only up to a point (the sign of $SDKL$ is negative), whereas the likelihood of establishing an agreement is expected to decrease in the relative factor endowment difference between the rest of the world and a given country-pair ($DROWKL$). However, the last prediction is not confirmed by our data.

Turning to the choice of the agreement type (bottom panel of Table 2), we find that if a PTA has been formed, an FTA is more likely to emerge if the production structure of the countries in the pair is more heterogeneous. This effect is stronger, the smaller is the income inequality in the pair. These results provide strong support to the predictions of our theoretical model summarized in Hypothesis 2.

The patterns uncovered in column (1) are confirmed and reinforced when we account also for time varying common shocks in column (2).[26] In particular, the direct effect of inequality in the PTA formation equation is now statistically significant at the 5% level. Moreover, the effects we have identified are economically important, as illustrated by the marginal effects reported in column (3). For instance, a one-standard deviation increase in our measure of inequality decreases the probability that a country-pair forms a PTA by about 1.02 percentage points – a large effect given that in our sample the probability of a country pair belonging to a PTA is only 2.3 percent.[27] The same holds when we consider the determinants of the choice between an FTA and a CU. In particular, a one standard deviation increase in our measure of geographic specialization leads to a 5.65 percentage points increase in the likelihood that an FTA – rather than a CU – will emerge in equilibrium.

The results we have reviewed so far indicate that the basic predictions of our model are supported by the data. At the same time, it is interesting to investigate how well does our benchmark specification predict the actual formation of PTAs and their type. The former can be studied by using the fitted probabilities from the selection equation, and the latter by considering the

[26]We have also run specification (2) using the different interdependence index proposed by Baldwin and Jaimovichi (2012), and obtained similar result. These findings are available from the authors upon request.

[27]Notice that a one-standard deviation increase in our measure of trade imbalance leads to a decrease of 0.28 percentage points in the probability that a country-pair forms a PTA.

fitted probabilities from the latent equation. As we pointed out in section 4.2, the formation of a PTA is a rare event – out of 24782 country-pair observations in our sample, only 584 or 2.3 percent of the total have a PTA in place. Moreover, among country–pairs with a PTA, 52 percent of the observations are represented by FTAs and 48 percent by CUs. Following Bergstrand and Egger (2013) we use this a priori information about the proportion of events (PTA formation and FTA/CU formation) and non–events to form cutoff probabilities for the percent of correctly predicted, both for "true positives" and "true negatives". Focusing on the selection equation, our model successfully predicts 90.3 percent of the observations involving country pairs actually belonging to a PTA. Moreover, our benchmark specification is also able to predict 91.3 percent of the observations involving country pairs that do not belong to a PTA. Turning to choice between an FTA and a CU (described by the latent equation), our model is able to correctly predict 73.4 percent of the 305 country-pairs that belong to the same FTA, whereas it can correctly predict 90.3 percent of the 279 country-pairs that belong to the same CU. Overall, the empirical benchmark model correctly predicts 81.7 percent of the choice between an FTA and a CU for the country-pairs that have decided to form a PTA.

5.3 Robustness checks

In this section, we consider a number of extensions to our benchmark analysis. In Table 3 we focus on additional factors that might affect the choice between the formation of an FTA and a CU. One ancillary prediction of our theoretical model is that the extent of cross-border ownership should play a role similar to geographic specialization in explaining the choice between the formation of an FTA and a CU. In particular, the more symmetric is cross border ownership, the more likely will be for a CU to emerge as the equilibrium PTA choice, and this effect will be stronger, the less unequal is the income distribution in the country pairs. We assess this prediction in column (1) of Table 3 (bottom panel) finding support for this additional implication of our model.[28]

As we already discussed in the introduction of this paper, the literature on the choice between different types of preferential trade agreements is sparse. One interesting framework has been recently proposed by Lake and Yildiz (2014), who consider a three-country model in the presence of geographic asymmetries – i.e. a setting in which some countries are closer to each other than others. In their model, partners that are closer to each other face lower trade costs than those that are further away, and their theoretical analysis indicates that there is a distance cutoff above which an FTA is the only viable PTA choice. This suggests that the greater the distance between

[28] Some caution is due while considering these results. In particular, note that the sample is substantially reduced when we control for cross-border ownership. In this case, the data provided by UNCTAD on bilateral FDI stocks cover at most the years from 1980 to 2000, which restricts the total number of country-pairs that belong to that same FTA or CU to 162 observations.

countries in a pair, the more likely it will be for an FTA rather than a CU to emerge in equilibrium. We assess this prediction in column (2), where in the bottom panel (latent equation) we control for the inverse of the distance between trade partners and, to account for non-linearities, also control for the quadratic term of this measure. Interestingly, we find evidence corroborating this theoretical result: for the average country-pair and year, if they enter a PTA, more closely located countries are more likely to form a CU rather than an FTA. Importantly though, accounting for this additional factor does not affect our main results.[29]

[Table 3 here]

The role of alternative sources of asymmetries across potential member countries in the formation of CUs or FTAs – like those which lead to different market sizes – has also been considered in the literature.[30] For this reason, in column (3) we additionally control for the degree of market size asymmetry for countries in each pair. Our findings confirm that less similar countries are more likely to form an FTA rather than a CU, but importantly accounting for this additional driver does not affect our main results.

In Table 4 we investigate the robustness of our results. As we pointed out before, the number of preferential trading arrangements has rapidly increased over time, and while a large number of them have been reported to the WTO, some have not. Importantly, various efforts have been carried out to collect systematic information on the nature of the various agreements in force, and some of the existing databases focus more on *de jure* criteria, whereas others put more weight on *de facto* considerations. It is therefore important to assess the robustness of our analysis to the use of alternative datasets proposed in the literature. In column (1) we present the result of the analysis when our left hand side variables (PTA formation decision and choice between a CU and an FTA) are constructed using the recent database constructed by Baier, Bergstrand and Feng (2014). In column (2) we use instead the dataset collected by Egger and Larch (2008). While some differences exist, the information contained in the data collected by Mattevi (2005) and in these alternative sources are broadly similar. Importantly, using these alternative measures does not affect our results: the qualitative patterns we have uncovered in column 2 of Table 2 continue to hold, and even the magnitudes of the effects of our main explanatory variables are comparable.

To address reverse causality concerns, our specifications so far have employed five–year lagged values for our explanatory variables. In column (3) we assess the robustness of our findings to the introduction of ten –year lags to capture longer term determinants of the preferential trading

[29] The marginal effect of the variable NATURAL on the latent decision that involves the choice between forming a CU or an FTA equals $\widehat{\theta}_{NAT} + 2\ (NATURAL)\widehat{\theta}_{NAT\_SQR}$. Table 1 indicates that the average value of the variable NATURAL is -6.81 for members of the same PTA (column 2). Then, the results described in column 2 of Table 3 indicate that the marginal effect of this variable is negative for the average country-pair and equal to -0.295.

[30] See for instance Melatos and Woodland (2007) which have used a calibrated general equilibrium model.

arrangement formation process. Once again our results are broadly unaffected. A large fraction of the preferential trading agreements considered in our paper came into force towards the end of the 20th century. In column (4) we thus study whether our model can help explaining the formation of only these most recent agreements, focusing on a single cross–section for the year 2000. While the magnitude of the coefficients are affected – and in particular the role of geographic specialization appears to be bigger, the basic patterns we had uncovered in our benchmark specification continue to hold.

In columns (5) and (6) we assess the robustness of our results to alternative definitions of the variables measuring trade imbalances and income inequality, respectively. In column (5) we measure trade imbalances using the difference between bilateral exports for a country-pair divided by the total trade of the country running a bilateral trade imbalance. The results indicate that the qualitative conclusions of our benchmark analysis are not affected by changing our measure of trade imbalances. In column (6), we replace our baseline measure of inequality based on net income with the gross income-based definition made available by Solt (2009), where possible redistribution mechanisms implemented by national governments are disregarded. The results in column (6) confirm the findings we have uncovered in our benchmark model.

[Table 4 here]

Our theoretical model suggests that trade imbalances should play a key role in shaping the decision to form a PTA. At the same time it does not provide a clear prediction for their role in affecting the choice between a CU or an FTA. In column (7) we explicitly address this question, by directly controlling for the extent of trade imbalances in the latent equation. Our results indicate that trade imbalances does not affect the choice of PTA type. Importantly, the inclusion of this control does not affect our main results.

6 Conclusion

In this paper we have developed a political economy model that provides novel insights on the PTA formation process, distinguishing between those factors that affect the decision to form a PTA, and those that matter in the choice of its type (an FTA or CU). Our analysis points out that bilateral trade imbalances and income inequality matter in the decision to form a PTA, whereas differences in the production structure and in the pervasiveness of cross-border ownership between prospective members are important determinants of the choice between an FTA and a CU.

We have then assessed the implications of our theoretical framework, using a sample of more than 100 countries covering the period 1950-2000. Our analysis provides strong support for the predictions of our model. In particular, we have found that the greater the income inequality and the bilateral trade imbalances, the less likely it is for a PTA to emerge in equilibrium. Furthermore, we also shown that the greater the asymmetries in the production structure between prospective member countries, the more likely it is for an FTA to emerge in equilibrium compared to a CU, and the same holds true for the extent of cross–border ownership.

References

[1] Atkinson, A. B., and Brandolini, A. (2001). "Promises and Pitfalls in the Use of Secondary Data-Sets: Income Inequality in OECD Countries as a Case Study", *Journal of Economic Literature,* vol. 39, pp. 771-800.

[2] Baier, Scott and Bergstrand, Jeffrey (2004) "Economic Determinants of Free Trade Agreements", *Journal of International Economics*, vol. 64 (1), pp. 29–63.

[3] Baier, Scott and Bergstrand, Jeffrey (2007) "Do free trade agreements actually increase members' international trade?", *Journal of International Economics*, vol. 71 (1), pp. 72-95.

[4] Baier, Scott and Bergstrand, Jeffrey and Ronald Mariutto (2014) "Economic Determinants of Free Trade Agreements Revisited: Distinguishing Sources of Interdependence", *Review of International Economics*, vol. 22 (1), pp. 31-58.

[5] Baldwin, Richard (1995) "A Domino Theory of Regionalism", In Baldwin, R., Haaparanta, P., Kiander, J. (Editors), Expanding Membership in the European Union. University Press, Cambridge.

[6] Baldwin, Richard and Jaimovich, Dany (2012) "Are Free Trade Agreements contagious?," *Journal of International Economics*, vol. 88 (1), pp. 1-16.

[7] Bergstrand, Jeffrey and Egger, Peter (2013) "What Determines BITs?", *Journal of International Economics*, vol. 99, pp. 107-122.

[8] Boyes, W. J., D. L. Hoffman and S. A. Low (1989) "An econometric analysis of the bank credit scoring problem", *Journal of Econometrics*, vol. 40, pp. 3-14.

[9] Chase, Kerry (2006) "Multilateralism compromised: the mysterious origins of GATT Article XXIV ", *World Trade Review*, vol. 5, pp. 1–30.

[10] Chen, Maggie Xiaoyang & Joshi, Sumit (2010) "Third-country effects on the formation of free trade agreements", *Journal of International Economics*, vol. 82(2), pp. 238-248.

[11] Egger, Peter and Larch, Mario (2008) "Interdependent Preferential Trade Agreement Memberships: An Empirical Analysis", *Journal of International Economics*, vol. 76 (2), pp. 384–399.

[12] Estevadeordal, Antoni, Freund, Caroline and Ornelas, Emanuel (2008) "Does regionalism affect trade liberalization towards non–members?" *Quarterly Journal of Economics*, vol. 123, pp. 1531-1575.

[13] Facchini, Giovanni, Silva, Peri and Willmann, Gerald (2013) "The customs union issue: Why do we observe so few of them?", *Journal of International Economics*, vol. 90 (1), pp. 136-147.

[14] Foletti, Lillian, Fugazza, Marco, Nicita, Alessandro and Olarreaga, Marcelo (2011) "Smoke in the (Tariff) Water", *World Development*, vol. 34, pp. 248-264.

[15] Freund, Caroline, (2000). "Multilateralism and the endogenous formation of preferential trade agreements "*Journal of International Economics* vol. 52, pp. 359-376.

[16] Freund, Caroline and Emanuel Ornelas (2010) "Regional Trade Agreements", *Annual Review of Economics*, vol. 2, pp. 139-166.

[17] Grossman, Gene and Helpman, Elhanan (1995) "The Politics of Free-Trade Agreements", *American Economic Review*, vol. 85, pp. 667-690.

[18] Herring, Bradley (2005) "The effect of the availability of charity care to the uninsured on the demand for private health insurance", *Journal of Health Economics*, vol 24, pp. 225-252.

[19] Johnston, David, Carol Propper and Michael Shields (2009) "Comparing subjective and objective measures of health: Evidence from hypertension for the income/health gradient", *Journal of Health Economics*, vol. 28, pp. 540-552.

[20] Krishna, Pravin, 1998 "Regionalism and multilateralism: a political economy approach "*Quarterly Journal of Economics*, vol. 113, pp. 227-250.

[21] Krugman, Paul (1991) "Geography and Trade", MIT press.

[22] Lake, James and Halis M. Yildiz (2014) "On the different geographic characteristics of Free Trade Agreements and Customs Unions," Departmental Working Papers 1403, Southern Methodist University, Department of Economics.

[23] Liu, Xuepend and Emanuel Ornelas (2014) "Free Trade Agreements and the Consolidation of Democracy "*American Economic Journal: Macroeconomics*, vol. 6, pp. 29-70.

[24] Mattevi, Elena (2005) "Does membership in preferential trading arrangements affect volumes of trade?", Master's Thesis, Free University of Bolzano.

[25] Melatos, Mark and Alan Woodland (2007) "Endogenous Trade Bloc Formation in an Asymmetric World", *European Economic Review*, vol. 51, pp. 901-924.

[26] Ornelas, Emanuel (2005) "Rent Destruction and the Political Viability of Free Trade Agreements", *Quarterly Journal of Economics*, vol. 120, pp. 1475-1506.

[27] Ornelas, Emanuel, (2005b) "Trade creating free trade areas and the undermining of multilateralism "*European Economic Review* vol. 49, pp. 1717-1735.

[28] Ornelas, Emanuel (2007) "Exchanging Market Access at the Outsiders' Expense - the Case of Customs Unions", *Canadian Journal of Economics,* vol. 40, pp. 207-224.

[29] Richardson, Martin (1994) "Why a free trade area? The tariff also raises" *Economics and Politics* 6, pp. 79–96.

[30] Saggi, Kamal (2006) "Preferential Trade Agreements and Multilateral Tariff Cooperation," *International Economic Review*, vol. 47, pp. 29-57.

[31] Subramanian, Arvind and Wei, Shang-Jin (2007) "The WTO promotes trade, strongly but unevenly," *Journal of International Economics*, vol. 72(1), pp. 151-175.

[32] Solt, Frederick (2009) "Standardizing the World Income Inequality Database", *Social Science Quarterly*, vol. 90, pp. 231-242.

[33] Van de Ven, Wynand and Van Praag, Bernard (1981) "The demand for deductibles in private health insurance : A probit model with sample selection," *Journal of Econometrics*, vol. 17(2), pp. 229-252.

Table 1: Descriptive Statistics

Main Variables	(1) Entire Sample	(2) PTA	(3) FTA	(4) CU
Geographic Specialization (GEO)	42.26	24.45	33.62	14.43
	(25.59)	(18.84)	(20.79)	(8.92)
Inequality (INEQ)	41.65	33.52	33.04	34.04
	(10.21)	(7.35)	(7.41)	(7.26)
Trade-Imbalance (IMB)	0.64	0.26	0.34	0.19
	(0.34)	(0.24)	(0.27)	(0.17)
Matrix X Elements				
INTERD	0.03	0.24	0.21	0.28
	(0.09)	(0.15)	(0.12)	(0.18)
NATURAL	-8.19	-6.81	-7.08	-6.52
	(0.77)	(0.66)	(0.60)	(0.60)
DCONT	0.21	0.76	0.57	0.96
	(0.41)	(0.43)	(0.49)	(0.20)
REMOTE	7.98	8.15	8.06	8.24
	(0.32)	(0.23)	(0.26)	(0.14)
GDPSUM	19.25	20.01	19.74	20.29
	(1.34)	(1.14)	(1.02)	(1.19)
GDPSIM	-2.01	-1.33	-1.37	-1.29
	(1.33)	(0.67)	(0.70)	(0.64)
DKL	1.31	0.59	0.86	0.28
	(0.92)	(0.55)	(0.59)	(0.28)
SDKL	2.57	0.65	1.09	0.16
	(3.02)	(0.90)	(1.02)	(0.30)
DROWKL	0.91	0.82	0.75	0.91
	(0.43)	(0.27)	(0.27)	(0.24)
Number of observations	24782	584	305	279

The table reports average values and standard deviations (in brackets). NATURAL is the natural logarithm of the inverse of the distance between countries in a country-pair; DCONT is a dummy variable equal to one if both countries in a country-pair are located in the same continent and zero otherwise; REMOTE is the country-pair simple average of the natural logarithm of the average of the distance between each country in a country-pair and its trade partners; GDPSUM is the natural logarithm of the sum of the total GDP of countries in a country-pair; GDPSIM is the natural logarithm of 1 minus the squared value of the share of each country's GDP in the total GDP of a country-pair; DKL is the absolute value of the difference of the log of the per-capita income for countries in a country-pair; SDKL is the squared value of DKL; DROWKL is the simple average of the absolute value of the difference between the log of the per-capita income of a country in a country-pair and the log of the average per-capita income of its trade partners. See Section 4.2 for the exact definitions of GEO, INEQ and IMB.

Table 2: Main Results

	Predicted Sign	(1)	(2)	Marginal Effects
PTA decision (selection)				
INEQ	-	-0.004	-0.018**	-0.001**
		(0.008)	(0.008)	(0.000)
IMB	-	-0.272**	-0.250*	-0.008*
		(0.136)	(0.135)	(0.004)
Matrix X Elements				
INTERD	+	1.443**	1.557**	0.049**
		(0.178)	(0.182)	(0.006)
NATURAL	+	0.748**	0.742**	0.023**
		(0.054)	(0.054)	(0.002)
DCONT	+	0.044	0.056	0.002
		(0.084)	(0.085)	(0.003)
REMOTE	+	1.442**	1.754**	0.055**
		(0.298)	(0.308)	(0.010)
GDPSUM	+	1.341**	1.280**	0.040**
		(0.122)	(0.155)	(0.005)
GDPSIM	+	0.351**	0.340*	0.011*
		(0.177)	(0.179)	(0.006)
DKL	+	0.319	0.167	0.005
		(0.266)	(0.269)	(0.008)
SDKL	-	-0.366**	-0.365**	-0.011**
		(0.116)	(0.117)	(0.004)
DROWKL	-	0.991**	1.171**	0.037**
		(0.243)	(0.246)	(0.008)
CU-FTA decision (latent)				
GEO	+	0.047**	0.065**	0.003**
		(0.020)	(0.020)	(0.001)
GEO*INEQ	-	-0.001*	-0.001**	
		(0.001)	(0.001)	
Number of Obs.		24872	24872	24872
Number of Obs. with FTA-CUs		584	584	584
LR test of indep. equations		109.75**	128.89**	128.89**
Year Fixed Effects		No	Yes	Yes

Specifications (1) - (2) are estimated using a probit model with sample selection. Standard errors for estimated coefficients are shown in parentheses. “**” and “*” denotes significance at 5 and 10 level respectively. The marginal effect of geographic specialization (GEO) is computed as the sum of its direct effect plus the effect of its interaction with the average inequality (INEQ) level.

Table 3: Extensions

	Predicted Sign	(1)	(2)	(3)
PTA decision (selection)				
INEQ	-	-0.002	-0.017**	-0.017**
		(0.026)	(0.008)	(0.008)
IMB	-	-1.048**	-0.255*	-0.248*
		(0.469)	(0.137)	(0.136)
Matrix X Elements				
INTERD	+	1.683**	1.596**	1.613**
		(0.471)	(0.182)	(0.181)
NATURAL	+	0.851**	0.725**	0.729**
		(0.142)	(0.055)	(0.055)
DCONT	+	0.525*	0.055	0.050
		(0.269)	(0.086)	(0.085)
REMOTE	+	3.168**	1.776**	1.784**
		(0.960)	(0.313)	(0.309)
GDPSUM	+	1.398**	1.300**	1.281**
		(0.402)	(0.156)	(0.155)
GDPSIM	+	1.074**	0.348*	0.493**
		(0.510)	(0.181)	(0.186)
DKL	+	-1.547**	0.180	0.170
		(0.768)	(0.271)	(0.271)
SDKL	-	0.233	-0.372**	-0.367**
		(0.407)	(0.118)	(0.119)
DROWKL	-	2.539**	1.196**	1.158**
		(0.609)	(0.248)	(0.246)
CU-FTA decision (latent)				
GEO	+	0.022	0.061**	0.064**
		(0.051)	(0.021)	(0.020)
GEO*INEQ	-	-0.001	-0.001**	-0.002**
		(0.001)	(0.001)	(0.001)
CROSS	-	-271.208**		
		(137.099)		
CROSS*INEQ	+	5.391		
		(3.835)		
NATURAL	+		3.728**	4.107**
			(1.345)	(1.337)
NATURAL_SQR	+		0.292**	0.321**
			(0.104)	(0.103)
GDPSIM	+			1.336**
				(0.398)
[GEO]+33.52[GEO*INEQ]=0		0.07	9.30	5.09
(p-value)		(0.788)	(0.002)	(0.024)
Number of obs.		24360	24782	24782
Number of obs. PTAS		162	584	584
LR test of indep. equations		25.80**	73.88**	79.56**
Year Fixed Effects		Yes	Yes	Yes

Probit models with sample selection. Standard errors are shown in parentheses. “**” and “*” denotes significance at 5 and 10 level respectively.

Table 4: Robustness Checks

	Predicted Sign	(1) BBF (2014)	(2) EL (2008)	(3) 10-Year Lags	(4) Year 2000	(5) Alt. IMB	(6) Alt. INEQ	(7) IMB in latent
PTA decision (selection)								
INEQ	-	-0.015**	-0.012**	-0.032**	-0.034**	-0.014*	-0.009*	-0.018**
		(0.008)	(0.004)	(0.009)	(0.006)	(0.008)	(0.005)	(0.008)
IMB	-	-0.324**	-0.149*	-0.306**	-0.564**	-0.202**	-0.319**	-0.278*
		(0.131)	(0.077)	(0.136)	(0.174)	(0.086)	(0.121)	(0.145)
Matrix X Elements								
INTERD	+	1.042**	1.563**	1.490**	1.128**	1.591**	1.465**	1.559**
		(0.156)	(0.116)	(0.194)	(0.245)	(0.172)	(0.157)	(0.182)
NATURAL	+	0.685**	0.705**	0.761**	0.852**	0.973**	0.745**	0.744**
		(0.049)	(0.033)	(0.061)	(0.078)	(0.054)	(0.049)	(0.054)
DCONT	+	0.914**	0.252**	0.144	-0.239*	0.064	0.133*	0.055
		(0.083)	(0.046)	(0.092)	(0.127)	(0.082)	(0.076)	(0.085)
REMOTE	+	1.728**	-0.379**	1.319**	0.286	1.935**	0.788**	1.760**
		(0.284)	(0.154)	(0.340)	(0.215)	(0.300)	(0.269)	(0.309)
GDPSUM	+	-0.027	0.597**	1.327**	0.241**	1.376**	1.058**	1.280**
		(0.138)	(0.087)	(0.202)	(0.055)	(0.148)	(0.143)	(0.155)
GDPSIM	+	-0.389**	0.366**	-0.158	0.346**	0.422**	0.543**	0.338*
		(0.192)	(0.101)	(0.218)	(0.067)	(0.171)	(0.171)	(0.179)
DKL	+	0.451*	0.414**	0.604*	-0.162	0.077	0.186	0.172
		(0.259)	(0.143)	(0.316)	(0.212)	(0.259)	(0.258)	(0.269)
SDKL	-	-0.387**	-0.418**	-0.598**	-0.040	-0.359**	-0.478**	-0.367**
		(0.119)	(0.053)	(0.145)	(0.101)	(0.114)	(0.114)	(0.117)
DROWKL	-	0.921**	1.092**	0.510*	-0.321**	1.419**	1.182**	1.175**
		(0.213)	(0.139)	(0.308)	(0.127)	(0.236)	(0.228)	(0.246)
CU-FTA decision (latent)								
GEO	+	0.056**	0.032**	0.074**	0.090**	0.068**	0.062**	0.066**
		(0.011)	(0.007)	(0.024)	(0.020)	(0.020)	(0.022)	(0.020)
GEO*INEQ	-	-0.001**	-0.001**	-0.001**	-0.002**	-0.001**	-0.001**	-0.001**
		(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
IMB								-0.126
								(0.282)
[GEO]+33.52*[INEQ*GEO]=0		11.46	1.57	11.69	12.83	9.02	10.53	9.98
(p-value)		(0.001)	(0.210)	(0.001)	(0.0003)	(0.003)	(0.001)	(0.002)
Number of obs.		24,684	24,291	20,154	4,165	27,851	24,700	24782
Number of obs. PTAs		834	1565	530	205	587	584	584
LR test of independent equations		109.20**	287.32**	129.79**	33.50**	132.20**	137.91	86.14**
Year Fixed Effects		Yes	Yes	Yes	No	Yes	Yes	Yes

Probit models with sample selection. Standard errors for estimated coefficients are shown in parentheses. "**" and "*" denotes significance at 5 and 10 level respectively.

Appendix - Table A: Definition of Control Variables[a]

Matrix X	
Natural (+)	$\log(1/\text{distance}_{ab})$
DCONT (+)	equals one if countries in a country-pair are located in the same continent and zero otherwise
REMOTE (+)	$0.5\{\log[\sum_{k\neq b}\text{distance}_{ak}/(n_t-1)]+\log[\sum_{k\neq a}\text{distance}_{bk}/(n_t-1)]\}$
GDPSUM (+)	$\log(\text{GDP}_{at}+\text{GDP}_{bt})$
GDPSIM (+)	$\log(1\text{-}(\text{GDP}_{at}/(\text{GDP}_{at}+\text{GDP}_{bt}))^2-(\text{GDP}_{bt}/(\text{GDP}_{at}+\text{GDP}_{bt}))^2)$
DKL (+)	$\lvert\log(\text{GDPPC}_{at})-\log(\text{GDPPC}_{bt})\rvert$
SDKL (-)	$\lvert\log(\text{GDPPC}_{at})-\log(\text{GDPPC}_{bt})\rvert^2$
DROWKL (-)	$0.5\{\lvert\log[\sum_{k\neq a}\text{GDPPC}_{kt}/(n_t-1)]-\log(\text{GDPPC}_{at})\rvert+\lvert\log[\sum_{k\neq b}\text{GDPPC}_{kt}/(n_t-1)]-\log(\text{GDPPC}_{bt})\rvert\}$
INTERD (+)	average PTA membership of third countries as in Egger and Larch (2008)
Other Control Variables	
CROSS (-)	$\frac{1}{2}\left[\frac{FDI_{abt}}{GDP_{at}}+\frac{FDI_{bat}}{GDP_{bt}}\right]$

[a] Sign in parentheses indicates the predicted effect of a variable on the likelihood of PTA formation. In the case of the variable CROSS, it indicates the expected effect of that variable on the likelihhod that an FTA rather than a CU emerges in equilibrium. Moreover, GDP_{at} represents country a's gross domestic product in year t, GDPPC_{at} represents country a's GDP per capita in year t, and FDI_{abt} represents the inward stock of FDI received by country a originating in country b at time t. REMOTE corresponds to the country-pair simple average of the natural logarithm of the average of the distance between each country in a country-pair and its trade partners; DROWKL corresponds to the simple average of the absolute value of the difference between the log of the per-capita income of a country in a country-pair and the log of the average per-capita income of its trade partners.