The Political Economy of Discrimination: Modelling the Spread of Preferential Trade Agreements

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Abstract

During the past 15 years, a wave of preferential trade agreements (PTAs) has swept the world. By late 2006, the WTO counts over 250 such agreements, with another 90 under negotiation. The growing body of research has identified a host of variables to explain the proliferation of PTAs, ranging from hegemonic decline, support for allies, stalled multilateral negotiations and competition over export markets, to PTAs as an insurance policy against trade disputes. Yet a crucial puzzle remains: what explains the regional variation in the formation of PTAs?

This paper presents a model of PTA formation that explicitly focuses on spatial dependencies. The findings suggest that countries worry about possible trade and investment diversion when their neighbours are signing PTAs, but less about the overall number of PTAs in the international system. In addition, the model confirms the findings of earlier studies even in a much larger sample ranging from 1960-2004.

Introduction

During the past 15 years, preferential trade agreements (PTAs), or trade agreements that liberalize commerce between members only, have proliferated rapidly. The WTO counted 40 new PTAs in 2004 alone. As the WTO negotiations in the Doha Round have stalled, many observer expect this trend to accelerate further. Only a handful of countries are not party to any preferential agreement; at the other extreme, countries like Mexico and Singapore have concluded several dozen PTAs. More than half of global commerce is conducted under the rules of a preferential agreement, the remainder being mostly trade between the major economic powers EU, USA, Japan and China.

While the proliferation of PTAs is clearly a global phenomenon, preferential trade agreements have not spread evenly across the world. Rather, the current wave originated in an expanding network of agreements linking EU neighbours to members, some to eventually join the integration association (the Europe Agreements), others to benefit from preferential market access for a variety of political and economic reasons (e.g. the Euro-Mediterranean Agreements). In the early 1990s, Latin American countries began to rapidly develop a dense network of PTAs, including some that crossed the North-South divide, such as NAFTA and the US-Chile FTA. Recently, the wave has reached the Asia Pacific, leading to a flurry of negotiating activity driven by ASEAN, Japanese, Chinese, and Korean initiatives.

What explains this conspicuous regional variation? Why did preferential trade agreements become *en vogue* for groups of countries in one geographic region, but only a decade later in another?

This paper argues that states sign PTAs because they compete regionally for exports markets and foreign direct investment. Countries are more likely to seek preferential trade agreements when their neighbours are doing so. Neighbouring countries will often produce similar goods and export these goods to the same foreign markets. Moreover, close countries are naturally more likely to trade more with each other. For these reasons, countries will be particularly concerned about the potential trade and investment diversion created by PTAs on their doorstep. Regionalism is indeed "regional,"

but because neighbours compete, not because they get along particularly well.

To test this argument, I conduct an empirical analysis of PTA formation that takes spatial dependencies into account. The model strongly supports the argument: Countries indeed sign PTAs when neighbouring countries conclude preferential agreements with other countries, suggesting that they react to possible or actual diversion of trade and investment within regions.

The model corroborates important prior findings that emphasize the function of PTAs as an insurance policy against trade disputes. However, even though the analysis in this paper operates at the inter-state level, it finds little support for explanations of regionalism based on transactions costs, as neoliberal arguments would suggest. Neither a general increase in the number of PTAs nor the growth of WTO membership *per se* appear to be causally related to the regional spread of preferential trade agreements. Hegemonic decline has no explanatory power once spatial dependence is accounted for.

The paper is organized as follows. Section 1 discusses current explanations of PTA formation in international political economy and international economics, and shows why these studies cannot account for regional variation. Section 2 outlines an alternative argument. Data and estimation framework are presented in section 3; the findings are discussed in section 4, followed by an outlook on future research avenues.

1 Current Knowledge

The stunning growth in the number of free trade agreements and customs unions has inspired political economists to offer a variety of explanations. These accounts can be classified as bottom-up, domestic politics models on the one hand, and as top-down, system-level models on the other. For these models, regional variation over time as observed today remains difficult to explain, especially when considering the recent burst of PTA activity in the Asia Pacific.

Domestic politics explanations have noted the role of economies of scale in motivating multinational firms to lobby for preferential trade agreements. Milner (1997) proposes that firms support PTAs because they can achieve greater economies of scale in an expanded market. In particular for small-country firms, preferential access to

a bigger market can move their production "down the cost curve." Importantly, companies that achieve greater economies of scale in a regional market will also be more competitive abroad.

Chase (2005) develops a highly nuanced version of this argument, hypothesizing that producers with unexploited economies of scale will at first try to preserve external barriers, but become more favourable to external liberalization once they are achieving increasing returns because of longer production runs: "external barriers in trading blocs merely provide 'breathing room' to prepare firms to compete more vigorously on a global scale" (37). Since firms varied greatly in the extent of unrealized economies of scale in relation to market size, countries should show varying degrees of support for regional trade agreements. Overall, the growing importance of economies of scale should support a trend towards more preferential trade agreements. In addition, firms can make efficiency gains through the offshore production in a PTA partner country with lower labour cost, or "regional production sharing" in Chase's work.

While Chase's model accounts well for the development of regional trade blocs, especially in the interwar years, and for certain aspects of NAFTA, it has less predictive value when looking at the Asia Pacific. Due to low levels of regional production sharing and relatively easy access to the North American market, he predicts that Japan and ASEAN are unlikely to seek preferential trade agreements with each other in the near future–a prognosis that has already been proven wrong by PTAs between Japan and Malaysia, Thailand and the Philippines either signed or close to conclusion. This is not to argue that economies of scale and regional production sharing are unimportant for PTA formation. They may, however, be more important for the *design* of PTAs and the political support governments can muster, rather than for the political decision to seek them in the first place. By contrast, regional competition over export markets may be sufficient causes in instances where production-sharing and unrealized economies of scale are not.

A further incentive to form a PTA, especially for developing countries that are undertaking a process of economic reform, is the use of an agreement in overcoming domestic resistance to such policies. External pressure and demands made by a negotiating partner may well coincide with government intentions to liberalize previously protected economic sectors. Pastor and Wise (1994) offer such an

account of Mexico's decision to overhaul its foreign trade policy to join NAFTA. Moreover, once on the path of liberalization, a trade agreement locks in commitments. Not only can governments tie the hands of their successors (Tornell and Esquivel 1995), but they also signal such commitments to potential investors and trading partners (Fernández and Portes 1998). These accounts have much purchase when explaining the choices by the first developing countries that sought PTAs in the 1990, in particular in the Americas. Many of the "followers," however, are not very reform-oriented—even notorious protectionists like Pakistan are by now signing PTAs.

The problem, it appears, is that domestic-level explanations can only explain regional variation in PTA formation by pointing to differences in the underlying causal variables; an unlikely scenario when one considers the spread of PTAs within different regions at different times. By contrast, systemic-level models have attempted to address this question directly.

Inter-state explanations focus on power, military alliances, and friction in global trade institutions as explanatory variables. Mansfield, Milner, and Rosendorff (2002) show that military allies are more likely to form trade agreements. No military alliance in the Asia Pacific region has so far been linked to a PTA, suggesting that additional factors are at work here.

Power lies at the heart of Grieco's (1997, 176) explanation of regional variations in regionalism. His "relative disparity shift" hypothesis states that when disparities within a region are changing to disfavour certain states, these will be less inclined to institutionalize their trade relations with neighbours. The sustained dominance of the US and Germany explains the success of preferential trade agreements in North America and Europe, while Brazil fulfills a similar role in South America. Yet again, the Asia Pacific case represents an anomaly. Two dominant powers, China and Japan, are actively pursuing preferential trade agreements, while relative capabilities are slowly shifting in favour of China. Meanwhile, smaller countries in the region are concluding PTAs with both major powers. Power disparities appear to have little explanatory value for current developments.

More recently, Mansfield and Reinhardt (2003) have offered a sophisticated explanation resting on "feedback effects" of the WTO that spur on preferential trade agreements. They argue that ex-

panding GATT/WTO membership, ongoing multilateral negotiations and, most importantly, involvement in trade disputes especially with negative outcomes motivate states to seek PTAs, a form of insurance policy against the loss of important markets. By explicitly integrating the relative importance of a particular trade partner for the decision to pursue PTAs, their model goes a long way towards a more complete explanation of current patterns of trade agreements. Since geographically proximate states are also likely to trade more, as shown in countless studies employing gravity models, a regional preference for PTAs is embedded in their argument, albeit only at the dyadic level: the farther two countries apart, the less likely they are to conclude an agreement. Competitive dynamics are partly incorporated through a variable that measures the number of PTAs signed by a partner country, reasoning that the more countries have preferential access to the partner's market, the more urgent it is to likewise sign an agreement.

On a systemic level, however, Mansfield and Reinhardt construct variables that measure the total number of GATT/WTO members and PTAs. The former implies that with the increasing membership, transaction costs and trade disputes are bound to multiply. The latter assumes that states care primarily about the growth of PTAs *in general,* but do not differentiate between the states that are pursuing such agreements. The present study submits that all PTAs are not created equal—whether a Pakistan-Morocco PTA matters as much to Chile as Mercosur is debatable.

Baldwin's (1996) "domino theory of regionalism" goes the furthest in postulating external effects of PTAs on non-members. He argues that trade diversion, or reduced exports from non-members to member because of trade discrimination, will create an incentive for excluded countries to join a PTA. Moreover, an agreement will divert foreign direct investment away from non-members into the PTA. This echoes earlier suggestions by Hirschman (1981, 271) and Haggard (1997) that such trade diversion may indeed be among the principal incentives to form PTAs by allowing policy-makers to create rents for their constituents. Grossman and Helpman (1995) show that the feasibility of a preferential trade agreement depends much on the extent to which such agreements are discriminatory. The more influence rent-seeking groups have vis-à-vis other societal actors, the more likely PTAs are to be concluded.

Although the domino theory appears to be an apt description of the progressive expansion of the EC/EU, only in very few instances have studies been able to demonstrate the key causal link of trade diversion. This may be partly a problem of theory, partly one of empirics.

First, trade diversion implies that consumers switch to intra-PTA producers. Yet this requires that intra- and extra-PTA goods are highly substitutable, or demand highly elastic. If demand is inelastic for goods from outside the PTA, then consumers in the member countries will reduce consumption of other goods rather than reduce imports.

Second, much of today's trade is in intermediate goods, or inputs like parts and components. Of this, a large share is intra-firm trade or trade with close suppliers, possibly linked through long-standing contractual relationships that are not easily severed. Especially multinational firms may therefore temporarily absorb the relatively higher costs of importing from outside a PTA. If a new regional agreement indeed raises barriers to the outside world in violation of GATT Art. 24 (for example, when Sweden joined the EU, it had to raise tariffs in many instances), then outside producers may lower prices and reduce margins to stay competitive.

Finally, tariff reduction between PTA partners and the application of rules of origin to imports from non-members are normally phased in over time spans of up to ten year, perhaps enough to let outsiders adjust. Trade and investment diversion may therefore simply be too difficult to measure. Even in the case of NAFTA's egregious rules of origin, negative effects on outsiders may not have materialized in reduced imports (Krueger 1999; Aussilloux and Pajot 2002).

None of these considerations, however, imply that the political economy arguments underpinning the domino model are wrong. While we may not be able to measure diversion of trade and investment directly, we will be able to observe the indirect political effects of PTAs on excluded countries. Even if no trade or investment diversion takes place, outsiders will face relatively higher costs compared to member state firms when selling goods to a consumer in a PTA. Regionalism may still "spread like wildfire" (Baldwin 1997, 878), but the domino theory does not offer any predictions of what form regional agreements will take. Here, I submit that the particular

spatial dimension of PTA formation has to be taken into account. The following section sketches such a model.

2 Regional Competition and Spatial Dependence

The impetus towards forming regionally concentrated PTAs, I argue, comes in several guises. While the fear of trade or investment diversion form a key link in all of them, the underlying economic variables differ, leading to a variety of possible outcomes. Countries can either join existing agreements or form alternative arrangements with other partners, each depending on whether exports or foreign direct investment are the primary concern.

First, states will be concerned with loss of competitiveness if there is a sudden outburst of PTA negotiations in their neighbourhood. The most immediate effect could be trade diversion as hypothesized by Baldwin. Since geographically close neighbours tend to trade far more than distant countries, in particular goods for which transport costs are decisive, trade discrimination by proximate states will usually involve important trade partners. As a result, governments may come under pressure by exporters to ensure market access, leading countries to join existing agreements.

This hypothesis may be most relevant for countries with relatively similar per-capita incomes and if a regional agreement is open to expansion. The most prominent example would be the progressive expansion of the EC, although not necessarily in terms of actually joining the association. EC neighbours enjoyed preferential access to the EU via the European Free Trade Association (EFTA) and later the EEA (European Economic Area), so these agreements could be seen as a reaction to the creation of the EC.

Alternatively, excluded countries may choose to form arrangements with other countries, in particular if an existing PTA is not open to new members. Also, countries might not want to join a particular PTA because of the degree of liberalization or integration it entails—again, the example of EFTA is instructive, originally created as an alternative for European countries that did not seek to join the EC—or because it might not go far enough, as in the case of Chile's decision not to join Mercosur, but to seek associate status. Moreover, if the political economy dynamics described by Chase (2003) indeed also drive PTAs other than NAFTA, then we would

expect preferential agreements to reflect the interests of multinational firms, who may or may not prefer their home country to join an existing PTA. In this case, countries might form a dense network of bilateral deals, but may later expand these into larger agreements as multinational firms seek to achieve even greater economies of scale.

Finally, governments may not primarily be concerned about export markets, but rather about the diversion of FDI to countries that have PTAs with their most important markets. In this scenario, competition between countries would take the form of a simple prisoner's dilemma—if others are signing PTAs, not having one becomes a disadvantage when trying to attract foreign investment. Such competition has been theorized by Ethier (1998).[1] Developing countries that seek agreements with important home countries of foreign direct investment would therefore be the initiators of the trend towards PTAs. Given the competitive dynamic, they would seek PTAs with more developed countries once their regional competitors are doing so.

While analytically separate, PTAs may in practice fall in more than one category, without any apparent solution to differentiate them empirically ex ante. For the present study, I propose a first cut explanation that remains agnostic about which of the three spatially dependence effects on PTA formation is occurring, but estimates the straightforward effect of geographic proximity.

3 Research Design, Data, and Estimation

To examine the arguments advanced earlier, I employ a dyad-year framework as commonly used in the study of interstate wars (see Oneal, Russett, and Berbaum 2003 for a recent contribution), but only rarely applied to PTA formation, most recently by Mansfield and Reinhardt (2003). The unit of analysis is pairs of countries (dyads) i and j between 1960 and 2004, the last year for which sufficient data is available. The dependent variable is measured as 1 if two countries have a PTA in a given year, 0 otherwise, expressed through the usual log of the odds of changing from 0 to 1. Although there are a variety of types of PTAs, I include all customs unions

[1] Elkins, Guzman, and Simmons (2006) present a similar model for bilateral investment treaties.

and free trade agreements according to GATT Art. 24, agreements falling under the "Enabling Clause", that is agreements between developing countries that allow for very gradual liberalization, as well as PTAs by non-GATT/WTO-members. I do not consider partial-scope agreements, since their number is very small and their legal status not easily ascertainable. I estimate undirected dyads, that is each possible country pair enters the sample once, analogous to the selection used in studies of the outbreak rather than the initiation of wars, with random assignment which country is i and j in particular observation. Note that there are no a priori "irrelevant" dyads. While in dyad-year studies, it makes sense to exclude unlikely pairs of adversaries like South Africa and Tonga, there are no empirical grounds to do so here. With recent PTAs signed by partners like Singapore and Switzerland, we should not rule out any seemingly unrealistic combinations.

I begin with a baseline model inspired by Baier and Bergstrand (2004), regarded as the current standard of empirical models of PTA formation in international economics, although in contrast to their cross-sectional specification, I choose a time-series cross-section framework.

Explanatory Variables

The base model uses six variables: GDP PER CAPITA of each country, absolute value of the DIFFERENCE IN GDP, BILATERAL TRADE in current US dollars, and DISTANCE in km, all taken in logged form to reduce heteroskedasticity.

GDP PER CAPITA is a proxy for general economic development and expected to be positively related to the propensity to form PTAs. As countries develop, they increase their taxation capacity, making them less reliant on tariffs to generate revenue. In particular for least-developed countries, tariff revenues are often crucial for government budgets, hindering moves towards liberalization in trade agreements. As alternative sources of revenue become available, countries are more likely to agree to liberalization, with tariff revenue a negligible component of budgets for developed countries. In addition, more developed countries are in a better position to compensate societal groups who face adjustment costs due to trade

liberalization, as argued by the "embedded liberalism" interpretation of post-World War II political economy (Ruggie 1982).

The (absolute) value of the DIFFERENCE OF GDP captures that economic benefits will be greatest the more similar countries are in GDP, following the Baier and Bergstrand (2004) result that welfare gains are theoretically greatest when PTA members are identical in size and as close as possible. Hence, DISTANCE implies that with growing transport costs, this incentive is reduced, to the point where forming a PTA becomes "unnatural" (Baier and Bergstrand 2004, 32). All variables related to national income are from the World Development Indicators. The distance is from a dataset created by Mayer and Zignago (2006), based on the great circle distance between the capitals of both countries, except for a small number of countries in which the capital is not identical with the biggest agglomeration of population (e.g. in Canada, the "centre" is Southern Ontario instead of Ottawa, or in Germany, the Ruhrgebiet near Essen instead of Berlin).

BILATERAL TRADE captures the simple notion that the more two countries trade, the greater the relative benefits from further liberalization. Abstracting from political economy considerations for the moment, they should also have a greater incentive to form a preferential trade agreement because of welfare gains. Data on bilateral trade is from the UN COMTRADE database. Since the database shows at times considerable discrepancies between the bilateral exports reported by two trading partners, I use the export data of the reporting country with the higher GDP per capita, reasoning that more developed countries will also keep better trade statistics than less developed countries. At either extreme (two rich countries or two poor countries), this is an uncertain guide to data quality, but rich country pairs tend to show only minimal discrepancies in the COMTRADE data, while pairs of very poor countries almost always register with a trade volume near zero.

Following standard practice in dyad-year frameworks, I use a logistic regression that includes includes natural cubic splines to account for the duration dependence of the dependent variable (Beck, Katz, and Tucker 1998). Since in my dataset, $T > 20$, the times-series cross-section approach is justified.

I estimate the equation

$$Y = \alpha X + \beta V + \gamma Z_{ij} + \delta W y_{t-1}$$

where X is a vector of attributes that affects country i's decisions, V is a vector of attributes affecting country j's decisions, Z_{ij} is a matrix for characteristics of the relationship between countries i and j, and Wy is a spatial weight matrix constructed from the number of preferential trade agreements in the sample. Spatial lags of a dependent variable fulfill a similar function as lagged dependent variables in models that account for serial correlation.[2] Instead of lagging the dependent variable in time, values on the dependent variable are brought into the regression based on a distance function. In this particular context, W is an $N \times N \times T$ matrix, where a matrix cell is computed as $\frac{i,k,t}{distance_{ik}} + \frac{j,k,t}{distance_{jk}}$, with $i, k, t = 1$ if country i is a dyad member in year t and k is in a PTA with any country other than i, and $j, k, t = 1$ if country j is a dyad member in year t. Concretely, this weight matrix simply expresses the hypothesis that the effect of other countries signing PTAs in the previous year is the greater, the closer these countries are. A positive coefficient would indicate that countries indeed are driven to seek preferential agreements if their neighbours are doing so.

In this setup, geographic proximity of countries that sign PTAs motivates other states to do so. A more complete framework would test the different hypotheses outlined above separately. At this stage, computational challenges prevent a more refined analysis: calculating a simple weight matrix of country distance for all dyads of 151 country sample takes approximately 16 hours on a fast personal computer. Time-varying "distances" such as relative GDP or trade links would multiply this by the number of periods.

Including a transformed dependent variable, whether as temporal or spatial lag, potentially induces endogeneity. The results are likely to overstate the effect of spatially dependent observations slightly, especially when the actual number of PTAs is still small. Unfortunately, there are hardly any modelling options that avoid this problem. To counteract this tendency, I specify the model as completely as possible given our current state of knowledge by including control variables that prior studies have shown to be significant.

[2] See Anselin (1988) for an introduction to spatial econometrics, and Elkins, Guzman, and Simmons (2006) for an estimation method similar to the one employed here.

Control Variables

I include two sets of control variables, one set for which data is available for the full sample size, the other drawn from Mansfield and Reinhardt (2003). The latter set reduces the sample size considerably (from $N = 123,746$ to $N = 50,653$), limiting our ability to make direct comparisons between the results. Nonetheless, given that the Mansfield/Reinhardt study is the most comprehensive study of PTA formation to date, their findings are highly pertinent to the analysis undertaken here.

First, states will likely form PTAs with their most important trade partners. I therefore include two variables for the TRADE DEPENDENCE, measured as the partner countries share in total exports for i and j respectively. Since both countries have to make a decision to sign an agreement, this variable enters the equation twice, once as i's trade dependence on j, and once as the reverse.

Second, past research has shown that allied countries are more likely to form PTAs. Trade creates a security externality, inducing states to trade more with allies than adversaries, which in turn promotes preferential trade agreements between allies (Gowa and Mansfield 1993; Mansfield and Milner 1999). I therefore include the variable ALLIANCE coded as 1 if two countries have a formal military alliance in that year, 0 otherwise, based on Correlates of War project data (Gibler and Sarkees 2004), with years after 2000 coded manually.

A related important variable for the likelihood of a state entering PTA is regime type. Mansfield, Milner, and Rosendorff (2002) show that democracies are much more likely to sign preferential trade agreements: The probability of a country pair forming a PTA is doubled if one of the two governments is democratic, and four times as great when both are chosen in competitive elections. Given that countries around Europe and in Latin America democratized earlier than elsewhere, this may account in part for the time lag between PTAs in there and in other regions, although in recent years, more and more non-democracies have begun to sign PTAs. I therefore include the variable DEMOCRACY for i and j, measured on a scale from -10 to +10, based on the Polity IV dataset (Marshall and Jaggers 2005).[3]

[3] Values for 2004 filled in by the author

Finally, I include the following variables from Mansfield and Reinhardt (2003) in separate estimations, since they reduce the sample size to GATT/WTO members and limit the time period to years up to 1998 only: NEW DISPUTE WITH THIRD PARTY, DISPUTE LOSS WITH THIRD PARTY, HEGEMONY, MULTILATERAL TRADE ROUND UNDER WAY, PTA DENSITY, PTA DENSITY SQUARED, NUMBER OF GATT/WTO MEMBERS. NEW DISPUTE WITH THIRD PARTY equals 1 if either party was involved in a GATT/WTO dispute in $t-1$. DISPUTE LOSS WITH THIRD PARTY is a measure to which extent a country did not meet its objectives in a trade dispute brought before the GATT/WTO if that dispute started in $t-3$.

MULTILATERAL TRADE ROUND UNDER WAY is 1 whenever the GATT/WTO members are currently engaged in multilateral negotiation "rounds." HEGEMONY is the US's share of world trade, capturing the classic argument that hegemonic decline may have spurred on the creation of preferential trade agreements. NUMBER OF GATT/WTO MEMBERS captures transaction cost arguments: the more states participate in international trade negotiations, the more complex the dynamics, the higher the transaction costs and possibly, the greater the incentive for states to seek alternatives, either because their objectives are not met in multilateral rounds, or because they deliberately form PTAs as alternatives to enhance their bargaining leverage. TRADE PARTNER PTA COVERAGE is the proportion of i's ten most important GATT/WTO trade partners, exclusive of j, which maintained a reciprocal PTA with j in $t-1$.

Importantly, Mansfield and Reinhardt construct the variables PTA DENSITY and PTA DENSITY SQUARED as the proportion of GATT/WTO dyads that belong to a PTA in $t-1$, reasoning that as more and more countries are signing preferential trade agreements, the cost of staying at the sidelines is increasing. Moreover, countries will have more institutional models to choose from. This variable is of relevance for this study insofar as it is difficult to know *ex ante* whether countries care about PTA formation in their neighbourhood or in the international system, or if both effects are cumulative. PTA DENSITY SQUARED tests whether the effect is diminishing, since with an increase in the number of PTAs, eventually few potential partner countries remain.

Table 1: Descriptive statistics

Variable	Mean	Std. Dev.	N
PTA	0.076	0.265	123746
GDP per capita i	8.15	1.457	
GDP per capita j	7.693	1.597	
Difference in GDP	25.162	2.038	
Distance	8.654	0.845	
Bilateral Trade	16.152	3.483	
Alliance	0.109	0.311	
Democracy i	4.27	6.971	
Democracy j	1.938	7.504	
Spatial Weigh Matrix W	2.422	1.907	
Trade dependence i on j	0.099	0.421	
Trade dependence j on i	0.088	0.467	
Multilateral trade round underway	0.506	0.5	
New dispute with third party	0.482	0.5	50653
Dispute loss with third party	0.317	0.465	
Hegemony	0.139	0.008	
PTA density	0.009	0.032	
PTA density squared	0.001	0.002	
Detrended number of members	1.696	7.241	
Trade partner PTA coverage i	0.195	0.284	
Trade partner PTA coverage j	0.224	0.293	

4 Results

Table 2 presents the estimation results. The base model excluding any purely political variables already has considerable explanatory power, although the pseudo-R^2 of .82 is no doubt inflated by the use of cubic splines.[4] All coefficients are significant at traditional levels and have the expected signs: GDP per capita and Bilateral Trade have positive signs, while Difference in GDP and Distance have negative coefficients. A useful test-of-fit is the Percent Reduction in Error statistics proposed by Hagle and Mitchell (1992). It compares the percentage of cases the independent variables predicted correctly to the percentage of cases that would have been correctly predicted if the researcher adopted a simplistic model that

[4]Likelihood-ratio tests of the joint significance of all splines yield $p < 0.001$, indicating that they should be included in the model.

only used the central tendency of the dependent variable to make predictions. For the base model, the reduction in error is 83.3%.[5]

Adding control variables (model "controls" in table 2) shows the expected results for ALLIANCE and DEMOCRACY, both significant and with positive signs. DEMOCRACY and GDP PER CAPITA are the only variables that exhibit moderate bivariate correlation ($r < .6$). Surprisingly, TRADE DEPENDENCE is barely significant at conventional levels, suggesting that the relative importance of a partner country by itself does not add strongly to the propensity to seek a PTA. Perhaps countries fear that a PTA would tie them even more strongly to an already important trade partner, a sentiment voiced in Canada and Mexico prior to the CUSFTA and NAFTA.

Model "Weight of PTA" introduces the spatial weight matrix of the dependent variable into the estimation. The coefficient is positive and significant, suggesting that countries are indeed more likely to sign PTAs when their neighbours are doing so—but not to necessarily join existing PTAs. Recall that the weight matrix W is constructed so that a matrix entry i, j is the number of PTAs j has signed divided by the distance from i to j, excluding a possible PTA between i and j themselves, and cumulated for both countries in a dyad. Hence, the estimation result points to concerns about the detrimental effects of PTAs on outsiders harboured by either or both excluded countries in a dyad.

Comparison With Other Results

Models "MTN round" and "M-R 2003" incorporate the control variables obtained by Mansfield and Reinhardt (2003). "MTN round" includes a control that is 1 when GATT/WTO members are currently engaged in multilateral negotiations. Note that in contrast to the above-mentioned study, I include this variable for the full sample. Although the sample includes many countries that are not MTN members, it is possible that multilateral activity also motivates non-members to sign preferential trade agreements, perhaps as alternative or while they are still negotiating accession to the WTO. An example of such a country would be Russia, as of 2006 still negotiating membership in the multilateral trade body, but party to

[5] Without any additional variables, the model already correctly predicts 98.9% of all cases. Politics is, alas, a mere residual.

Table 2: Estimation results

Dependent variable PTA	base model	controls	Weight of PTA	MTN round	M-R 2003	excl. EC	excl. EC & EFTA
GDP per capita country i	0.119 ***	0.076 **	0.137 ***	0.133 ***	-0.061	-0.033	-0.185 ***
	(0.024)	(0.028)	(0.029)	(0.029)	(0.088)	(0.033)	(0.037)
GDP per capita country j	0.160 ***	0.110 ***	0.136 ***	0.130 ***	-0.010	0.061 *	-0.110 **
	(0.021)	(0.024)	(0.024)	(0.024)	(0.067)	(0.028)	(0.032)
Difference in GDP	-0.207 ***	-0.214 ***	-0.216 ***	-0.217 ***	-0.242 ***	-0.157 ***	-0.077 **
	(0.017)	(0.018)	(0.018)	(0.018)	(0.044)	(0.021)	(0.023)
Distance	-1.182 ***	-1.113 ***	-1.073 ***	-1.079 ***	-1.669 ***	-1.048 ***	-0.960 ***
	(0.031)	(0.033)	(0.034)	(0.034)	(0.086)	(0.041)	(0.046)
Bilateral trade	0.429 ***	0.390 ***	0.352 ***	0.352 ***	0.352 ***	0.270 ***	0.248 ***
	(0.015)	(0.025)	(0.026)	(0.026)	(0.068)	(0.030)	(0.032)
Alliance		1.274 ***	1.404	1.437 ***	1.127 ***	1.751 ***	2.166 ***
		(0.076)	(0.077)	(0.078)	(0.146)	(0.094)	(0.107)
Democracy i		0.054 ***	0.046	0.046 ***	0.023	0.017 **	0.019 **
		(0.006)	(0.006)	(0.006)	(0.016)	(0.006)	(0.007)
Democracy j		0.026 ***	0.022	0.022 ***	0.033 **	0.044 ***	0.027 ***
		(0.004)	(0.004)	(0.004)	(0.013)	(0.005)	(0.006)
Spatial weight			0.266 ***	0.300 ***	0.345 ***	0.384 ***	0.524 ***
			(0.018)	(0.019)	(0.093)	(0.023)	(0.027)
MTN underway				0.482 ***	-1.482 ***	0.621 ***	0.863 ***
				(0.059)	(0.227)	(0.072)	(0.082)
Trade dependence i on j		0.283 *	0.470 **	0.493 **	0.128	0.466 ***	0.389 *
		(0.135)	(0.143)	(0.143)	(0.284)	(0.145)	(0.150)
Trade dependence j on i		-0.059	0.071	0.064	-0.298	0.544 ***	0.743 ***
		(0.130)	(0.141)	(0.139)	(0.424)	(0.183)	(0.198)
New dispute with 3rd party					1.336 ***		
					(0.169)		
New dispute between i and j					-1.746 **		
					(0.555)		
Dispute lost with 3rd party					-0.177		
					(0.170)		
Hegemony					-6.775		
					(12.544)		
PTA density					8.211		
					(8.824)		
PTA density squared					178.426		
					(121.937)		
Detrended members					-0.106 ***		
					(0.020)		
Trade partner PTA coverage i					0.838 **		
					(0.253)		
Trade partner PTA coverage j					0.953 ***		
					(0.262)		
Spline 1	0.030 ***	0.028 ***	0.029 ***	0.028 ***	0.085 ***	0.024 ***	0.023 ***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.006)	(0.001)	(0.001)
Spline 2	-0.028 ***	-0.026 ***	-0.027 ***	-0.026 ***	-0.084 ***	-0.022 ***	-0.021 ***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.006)	(0.001)	(0.001)
Spline 3	0.012 ***	0.011 ***	0.012 ***	0.011 ***	0.039 ***	0.009 ***	0.008 ***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.001)	(0.001)
Spline 4	-0.002 ***	-0.002 ***	-0.002 ***	-0.002 ***	-0.008 ***	-0.001 ***	-0.001 ***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
N	123746	123746	123746	123746	50653	93967	80006
Log-likelihood	-5857.515	-5629.426	-5516.860	-5482.495	-1167.237	-3603.538	-2981.355
Chi square	54769.545	55225.723	55450.855	55519.586	26728.129	25923.171	20736.986
Pseudo R-square	0.82	0.83	0.83	0.84	0.92	0.78	0.78

*** significant at p<0.001 ** significant at p<0.01 * significant at p<0.05

a considerable number of preferential trade agreements. Surprisingly, MTN UNDERWAY is positive and highly significant in the full sample, but not in the more restricted "M-R 2003" estimates. The other control variables have a the expected signs and are significant, except for PTA DENSITY and HEGEMONY. This suggests that once spatial dependency is accounted for, a simple increase in the number of PTAs in the international system does not induce countries to seek more preferential agreements. Furthermore, a hegemonic role as here defined seems to have little effect on PTA formation.

Robustness Checks

Given the sensitivity of the model to (admittedly severe) sample restrictions, it is imperative to conduct a number of robustness checks. Since the European Community/Union is the quintessential expanding *regional* trade agreement, it is useful to explore if the parameter estimates stay significant even when EC/EU members are excluded. For model "excl. EC," the sample is restricted to dyads in which neither country is an EC/EU member. The key results are the same, except that GDP PER CAPITA is not significant for both countries. Meanwhile, TRADE DEPENDENCE assumes statistical significance.

Finally, model "excl. EC & EFTA" limits the sample to dyads in which neither party is an EC/EU nor a member in the European Free Trade Association. Again, the substantive results are the same, with the base model variables returning to significance. Notably, TRADE DEPENDENCE remains significant. Although the results of these two restrictions are merely suggestive, a possible interpretation is that in general, dependence on the other state in the dyad for a major share of exports is highly relevant for the incentive to seek a PTA with the partner country. When it comes to joining the EU, however, it appears that considerations extraneous to the model are important—in other words, the EU is much more than a free trade area.[6]

As additional robustness checks, I re-estimated the model using various other techniques, including rare events logit, random effects logit, and Cox proportional regression. The results were substantively identical and are available upon request.

[6] As long lamented by UK Conservatives.

5 Outlook

This paper has argued that countries see PTAs as an instrument in a competition between neighbouring countries. States worry about potential or actual trade and investment diversion, increasing their propensity to sign PTAs when their neighbours are doing so. Yet this does not imply the expansion of preferential trade agreements, partly because they may not be open to additional members, but more importantly, because joining an existing PTA may not be the right recourse. Rather, countries will have to sign PTAs with key partners, the more PTAs these countries are themselves concluding.

I modelled the spatial dependence through the construction of a spatial weight matrix, hypothesizing that geographically close neighbours will exert a greater "pull" towards more PTAs. For several reasons, geographic proximity is likely to have such an effect, most importantly relative similarity in factor endowments and close trade relationships, making it an obvious candidate for a first test of spatial dependency. By explicitly modelling the spatial dimension, this study offers a solution to the puzzle of spatio-temporal variation in the spread of PTAs across the globe.

The results suggest that countries are not simply motivated by an overall increase in the number of preferential trade agreements in the international system. Earlier findings to this effect do not seem to hold once a spatial specification is introduced. Other important findings indicating that democracy, alliances, an increase in GATT/WTO membership, and trade disputes with third parties, in particular when they have negative outcomes, are corroborated by this study.

The first cut explanation offered here can be extended in several directions. On purely analytical grounds there is no requirement for "space" to literally mean geography. Countries might well be competing with countries that are similar in terms of their relative factor endowments, suggesting that space could be defined as, for example, differences in capital per worker ratio. There is some anecdotal evidence that trade policy decision-making has indeed been influenced by such considerations: Mexico has deliberately used parts of the NAFTA treaty to divert investment away from Asian countries with similar factor endowments, countries that would have been cheaper locations of production for some consumer electronics.

A further alternative specification would be to distance as dissimilarity in export profiles, as suggested by Elkins, Guzman, and Simmons (2006). Dyads that trade in relatively more similar goods would be considered relatively closer, and hence more likely to sign PTAs if "close" neighbours are doing so.

Scholars have so far mostly focused on either systemic explanations of PTA formation, or they have sought to explain the contribution of domestic factors to the likelihood to sign trade agreements. This study suggests that countries are reacting to each others policies within regions, letting PTAs spread unevenly, but persistently across the globe.

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