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Coverage and enforceability of investment rules in PTAs: the role of global value chain trade and regulatory differences

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Abstract

Against the background of a changing landscape of trade and investment governance in the 21st century, characterised by the proliferation of deep preferential trade agreements (PTAs), this paper econometrically tests the importance of global value chain trade and regulatory differences in explaining the likelihood of a country pair to include an (enforceable) investment provision in the PTA. The spatial probit analysis, based on Bayesian Monte Carlo Markov Chain simulation, reveals that higher production network trade and strongly differing legal frameworks are indeed associated with a higher likelihood of including (enforceable) investment provisions. This is true even when controlling for interdependence between countries and conducting a variety of sensitivity checks, underscoring the importance of deep integration in the context of global value chains. However, when excluding EU countries from the sample, investment coverage and enforceability is rather driven by positive spatial interdependence between countries, raising the question whether the focus on global value chain trade and regulatory differences is something characteristic of EU trade policy making.

JEL : F13, F14, F15
Keywords: preferential trade agreement, investment, global value chain, production network trade, spatial probit, Bayesian econometrics

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1 Introduction

During the last decades, trade agreement formation has gained momentum. Both the sheer number of agreements as well as their large coverage of policy areas is unprecedented. One of these policy areas not traditionally covered in trade agreements is investment, which is ever more closely related to trade since the emergence and rising importance of global value chains (GVCs). This interconnectedness between trade and investment might also explain why both issues are increasingly dealt with under the roof of so-called preferential trade and investment agreements, rather than forming preferential trade agreements (PTAs) and bilateral investment treaties (BITs) separately.

The rationale behind forming deep agreements going beyond the traditional elimination of trade barriers into policy areas such as investment seems straightforward. First, production network trade needs to be underpinned by sound regulations in all policy areas that are related to the functioning of the associated value chain. Second, especially in developing countries that form part of these chains, deep agreements can complement weak domestic regulations by granting a certain degree of protection to foreign investors.[1] Moreover, the provisions may facilitate market access and ensure fair and equitable treatment. Indeed, recent empirical evidence confirms that deep agreements have a stronger effect on final and intermediate goods trade (see for example Kohl et al., 2013; UNCTAD, 2011; Noguera, 2012; Orefice and Rocha, 2013; Dür et al., 2014; Johnson and Noguera, 2014). Interestingly, it seems that PTAs covering investment have a stronger impact on foreign direct investment (FDI) than BITs (Lesher and Miroudot, 2007). Berger et al. (2013) also find a positive impact on FDI for market access provisions in PTAs, but not in the case of BITs. A possible explanation is that investors are attracted by the whole set of rules offered by deep PTAs that regulate not only investment but also other trade- and investment-related policies.

On the other hand, investment provisions come at a cost: the signing parties are less free in regulating foreign direct investment and supporting domestic companies, e.g. through industrial policy measures. Moreover, some agreements include a dispute settlement mechanism that allows foreign investors to sue the host countries before an international arbitration tribunal, circumventing national law, in order to defend their rights granted under the agreements. It is therefore quite controversial whether including an investment provision is beneficial and might well depend on the country-specific context. Many countries embrace the possibilities offered

[1] Note that the term deep agreements here refers to agreements both wide in coverage (regarding the number of policy areas regulated) and in depth (regarding the strength of commitments made).

through deep integration for participation in GVCs. Other countries, such as Indonesia, South Africa and a number of Latin American countries have just recently canceled their investment agreements, fearing the interference of foreign investors in national policy decisions (e.g. Stiglitz, 2013).

In sum, investment is considered a suitable example for the subsequent analysis, both thanks to its high value in promoting global value chain trade and to the recently hotly debated negative repercussions on the domestic policy autonomy of host states: there is much to gain and much to lose. This paper therefore aims at empirically identifying the factors that characterise countries that decide to include investment provisions in their PTAs - differentiating between mere coverage and enforceability. Using a spatial probit model based on Bayesian Monte Carlo Markov Chain (MCMC) simulation, this paper tests the importance of trade within global value chains and regulatory differences in explaining the probability of a country pair connected via a PTA to include an (enforceable) investment provision in the agreement, also taking into account possible interdependence between countries.

Anticipating the results, higher production network trade is associated with a higher likelihood of including investment provisions and designing them such that they are enforceable. Countries with strong differences in regulatory frameworks are also more likely to include investment provisions in their PTAs. In combination, this strongly supports the idea that deep integration and a sound, reliable business environment matter in the context of global value chains. Countries with differing political regimes are also more likely to include investment rules, but less likely to design them such that they are legally enforceable. On the one hand, this is surprising since only enforceable provisions grant legal protection to foreign investors. One the other hand, it might be more difficult for countries with larger differences in regimes to commit to binding agreements that are acceptable for both parties. While the results are robust to many sensitivity checks, they no longer hold when excluding the EU countries from the sample. Consequently, this could be a hint that the importance of global value chain trade and regulatory differences is something inherent to EU trade policy making. Leaving all EU countries aside, positive spatial interdependence is a much better variable in determining the likelihood of investment coverage. More precisely, countries seem to be influenced by their neighbours' policy decisions, rather than taking domestic conditions into account.

The paper is organised as follows. Section 2 briefly outlines the existing literature on the determinants of PTA and BIT formation in general, as well as the related literature on the depth and design of PTAs. Section 3 describes the data and variables used for the empirical analysis,

presents stylised facts and motivates the hypotheses. Section 4 presents the methodology, results, interpretation, and sensitivity checks of the empirical analysis. Section 5 concludes.

2 Related literature

This paper is related to the empirical literature on PTA and BIT formation. Baier and Bergstrand (2004) were the first to investigate the economic determinants of preferential trade agreement formation. Conducting a cross-section analysis for the year 1996, they find that the variables used to capture different aspects of trade costs in the standard gravity model of trade (in the following referred to as 'gravity variables') also explain very well why a country pair decides to conclude a PTA in the first place. In particular, countries are more likely to form a PTA when they are (i) closer together, (ii) more remote from the rest of the world, (iii) larger and more similar in economic size, and (iv) more different in relative factor endowments (compared to the partner and the rest of the world). Using only these economic determinants, they correctly predict 85% of the agreements existing in 1996. Since the seminal work of Baier and Bergstrand (2004), many researchers have amended and extended this analysis to provide further insights on the determinants of PTA formation. For example, subsequent research reveals the generally positive, statistical significant effect of other traditional 'gravity variables' such as common language, common legal origin, colonial relationship, contiguity etc. (see for example Bergstrand and Egger, 2013).

Another important contribution is the work of Bergstrand and Egger (2013) who compare the empirical determinants of BIT formation to the determinants of PTA formation, motivated by a theoretical model. Their results reveal an interesting difference between the two forms of international agreements. While they confirm the significant and positive effect of economic size, economic similarity and distance, the signs differ with respect to adjacency, common official language, political stability and expropriation risk. It therefore seems that the determinants of trade and investment agreements do not completely coincide. This alone encourages an investigation on investment chapters in PTAs.

Regarding trade agreements with a focus on a specific regulatory area, Shingal and Egger (2014) investigate the determinants of services trade agreements. They find that a services trade agreement is more likely for (i) countries less distant from each other and more remote from the rest of the world, (ii) large economies with relatively open and similar services regulations and (iii) countries with a common language. Overall, these results seem to suggest that agreements

covering trade in services are largely determined by similarities between countries.[2] In sum, the explanatory power of most 'gravity variables' such as economic size, economic similarity, distance and the dummies on common characteristics seems to hold across different specifications in the literature of PTA and BIT formation. Therefore, investigating the coverage and enforceability of investment provisions in PTAs, as done in this paper, will require taking them into account.

Empirical papers on the determinants of the depth and design of PTAs (rather than their formation) are smaller but growing in number, and provide interesting insights. Based on a newly constructed dataset on the design of PTAs, Dür et al. (2014) introduce an additive indicator describing the depth of a PTA on a scale from $1-7$, depending on whether seven major areas – tariff elimination, services trade, investment, standards, public procurement, competition and intellectual property rights – are covered in the agreement. They note a significant difference of PTAs in terms of their content and depth as well as a development towards deeper agreements in the last two decades. Similarly, Kohl et al. (2013) code 296 trade agreements based on the methodology of Horn et al. (2010) and investigate how the heterogeneity of PTAs affects international trade flows.

Damuri (2012) classifies the depth of PTAs into four categories. He finds a positive effect on the depth of an agreement when intermediate goods trade makes up a high share of the countries' total trade with the rest of the world (general effect), as well as for important trading partners (bilateral effect). Orefice and Rocha (2013) use principal component analysis to construct an indicator for PTA depth, based on the WTO database on the content of PTAs. They find a positive causal effect of trade within production networks on the depth of the trade agreement, although mainly driven by the Asian region. Moreover, the trade agreement is deeper if the country pair forms a North-South relationship. The authors interpret this finding as evidence for the need to fill the governance gap arising from the lack of appropriate institutions, rules and mechanisms for regulating trade within global value chains. The results regarding the importance of production network trade in explaining the depth of a PTA are in line with the findings presented in the World Trade Report 2011 (UNCTAD, 2011).

While these studies focus on only one dimension of PTA design, Baccini et al. (2012) present a theoretical and empirical analysis on the interdependence between the depth, scope and flexibility of an agreement. Based on political economy considerations, they argue that the relative importance of exporters and import-competitors in the economy determines whether lobbying for deep, broad and rigid agreements (or vice versa) is stronger. Their results mainly confirm

[2]Counter-intuitively, the variables common legal origin and common colonizer have a negative sign, although insignificant.

that intra-industry as well as intra-firm trade, by increasing the benefits from liberalisation, have a positive effect on these dimensions.

Also closely related to this paper is the empirical work on the interdependence in PTA or BIT formation and design. Using both panel and cross-section data, Egger and Larch (2008) find that PTA formation is interdependent: the probability of a country-pair entering a PTA is the larger, the more PTAs are already in existence. A larger distance dampens this effect. Similarly, Baldwin and Jaimovich (2012) find support for the 'domino theory of regionalism' as framed by Baldwin (1995), namely that PTAs are "contagious": the prior existence of trade agreements stimulates the conclusion of new ones. Moreover, they find significant effects for political variables such as political distance, democracy and communist transition. Furthermore, Baccini and Dür (2012) show that the proliferation of PTAs is driven by competition for market access, i.e. interdependence between countries' policy decisions. In a later paper, Baccini and Dür (2013) investigate how the preferential treatment of PTA member countries in terms of foreign direct investment is related to the formation of third country PTAs. They find that the fear of 'investment discrimination' – either through tariff differentials that matter in GVC trade or through investment provisions in PTAs – is a major determinant of the proliferation of further trade agreements. Moreover, they find this effect to be stronger for countries with high levels of intermediate goods trade, reflecting the importance of global value chains in the trade-investment nexus. Furthermore, the discrimination effect is stronger for PTAs covering investment, which suggests that the inclusion of investment provisions is a response to investment discrimination.

Similar effects are found for interdependence in BIT making. Elkins et al. (2006) identify competition for capital as a major determinant of the spread of BITs. Neumayer et al. (2014) also focus on spatial interdependence in international investment agreements, mainly BITs. They find that developing countries sign agreements with weak (strong) commitments when their competitors in terms of attracting foreign direct investment from capital exporting countries have also committed to weak (strong) investment rules. Both papers therefore find empirical evidence for "competitive diffusion"of investment rules. Allee and Peinhardt (2014) find this effect to be driven mainly by the preferences and power of the home states; neither the attempt of investment-seeking host states to credibly commit to binding rules ("hands tying"explanation) nor a "rational design"approach taking the conditions in both countries and potential cooperation problems into account are good explanations for the spread of treaty design. Baccini et al. (2014) also find that the design of PTAs is strongly determined by interdependence between countries, in particular by countries' relationships to the more powerful players on the

international scene, i.e. the EU and US.

Given the established importance in prior empirical research, this paper will take the interdependence between countries into account, but focus on the remaining gaps in the literature – namely on the role of global value chain trade and regulatory differences in designing preferential trade agreements with regard to investment rules. By doing so, the paper addresses the question whether these dyad-specific factors still matter once spatial interdependence is controlled for.

3 Stylised facts, data description and hypotheses

This section motivates the research question by presenting stylised facts, outlines the testable hypotheses and describes the data sources and the construction of the variables used for the subsequent analysis.

3.1 Stylised facts

The total number of PTAs signed has increased substantially during the last decades. Accordingly, PTAs with investment provisions have also become more numerous. Figure 1 aggregates PTAs into five periods with regard to their date of entry into force and depicts the percentage of PTAs in that period for which (enforceable) investment provisions are included. It becomes clear that there is a clear upward-trend since the 1990's: the share of agreements including investment chapters increased from 35% to 78%. The numbers are equally striking for enforceable investment provisions, where the percentage increased from only 18% to 50%. Nevertheless, still many of the provisions included are not enforceable.

Figure 2 sheds light on how the coverage and enforceability of investment provisions in PTAs varies with regard to the combination of country pairs. The left part of the figure reveals that an investment provision is more frequently included in agreements between North-North and North–South country pairs, 78% and 83%, respectively. In North–North agreements, the high frequency of investment provisions is likely to be an expression of incidences of deep regional integration, in particular in the case of the EU. In North–South agreements, the inclusion of investment provisions could be motivated by the aim of protecting foreign direct investments and closing the governance gap stemming from insufficient domestic frameworks. Only roughly half of the South–South country pairs include investment provisions, reflecting their preferences for forming shallow PTAs between each other (see also Bruhn, 2014).

Figure 1: Coverage and enforceability of investment provisions per period

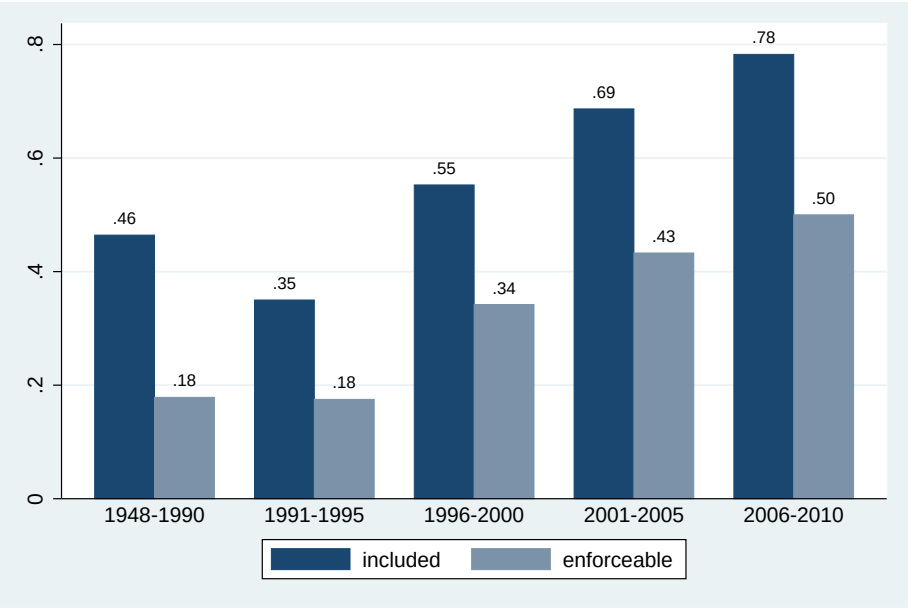
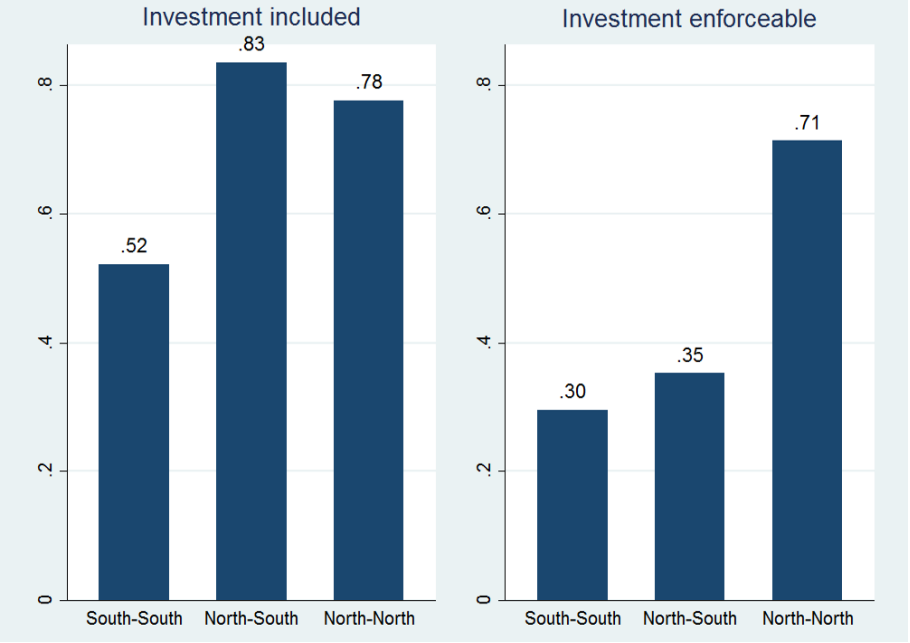


Figure 2: Coverage and enforceability of investment provisions by type of country pair



Interestingly, the picture looks quite different when taking into account the aspect of legal enforceability. While North-South country pairs are very likely to generally include investment provisions in their PTAs, only in 35% of the PTAs they are actually legally enforceable. This is quite surprising, given the widely stated argument that investment provisions may substitute for domestic regulatory insufficiency. Including enforceable provisions is also quite unlikely for South–South pairs (30%). In contrast, for North–North combinations, the lion's share of investment provisions included is also legally enforceable. Possibly, countries with a very different regulatory framework, presumably North-South pairs, find it harder to agree on common,

binding regulations in the investment area.

3.2 Testable hypotheses

Motivated by the literature, this paper will test two major hypotheses regarding the coverage and enforceability of investment provisions in PTAs.

Hypothesis 1. Higher importance of intermediate goods trade with the rest of the world, i.e. trade within global value chains, is associated with a higher likelihood of including an (enforceable) investment provision in the PTA.

The last decades have seen a tremendous increase in production fragmentation across regions and across the world. With this rising importance of regional and global value chains, which often involves the activity of multinational enterprises, it becomes clear that trade and investment are closely intertwined. Therefore, in order to manage multinational activities smoothly, a sound and reliable investment regime is required. Countries that are more involved in global production networks, proxied by a higher level of intermediate goods trade, are therefore expected to cover investment in their PTA with a higher likelihood.

Hypothesis 2. Countries that are more different in terms of regulatory frameworks and political regime are more likely to include an (enforceable) investment provision in the PTA.

The rationale behind this hypothesis is that countries may make use of international agreements to substitute for lacking regulations or bring existing, differing rules in line with each other. The need for doing so is the higher, the more pronounced the difference in existing frameworks. Note that the two hypotheses are closely related, as the importance of regulatory frameworks increases with foreign direct investment and the associated production network trade. Note also that in order for rules to be binding, investment provisions need to be enforceable. In theory, there should therefore not be a large difference in the outcome for coverage and enforceability of provisions. As can be seen in Figures 1 and 2, however, not all provisions that are included are enforceable, so some variation for the different dependent variables is likely to be observed.

Two more important factors are controlled for in the empirical analysis. First, PTA negotiations are surely influenced by political processes. For example, including an investment provision in a PTA may be more difficult when the opposition is strong. The model therefore includes a variable capturing the combined number of veto players in both countries. Presumably, the higher the number of veto players, the less likely it is that a deep PTA, i.e. one that includes (enforceable) investment provisions, is concluded. Moreover, the total number of (enforceable)

investment provisions that the country pair has included in PTAs until 2010 is added as an additional control for the countries' general propensity to address investment in PTAs.

As outlined in the literature review, the 'gravity variables' are found to be good predictors of PTA and BIT formation, which is why they are included as controls in the empirical analysis. However, once the decision on forming a trade agreement is made, these variables should have different or weaker effects on how the PTA is designed, i.e. whether an (enforceable) investment agreement is included or not. First, the sign of combined economic size is theoretically ambiguous. While countries with a larger GDP also have a higher propensity for FDI flows and global value chain trade, there might be an increased motivation for underpinning these flows with investment provisions. However, countries with a low GDP might also have a weaker domestic regulatory framework, increasing the need for investment regulation via international agreements. The variables on distance and contiguity are expected to play a minor role when it comes to the design of trade agreements. However, trade partners further away may be more difficult to monitor. Therefore, in contrast to the existing studies on PTA and BIT formation, a positive sign on the distance variable is predicted - namely that a larger distance between the two countries increases the likelihood of them including an investment provision in the PTA. Accordingly, the sign on the contiguity variable should be negative, given that direct neighbours are more easily monitored. If common official language and common legal origin matter, we would also expect a negative sign: both should build trust between the trading partners, potentially making a deep provision such as investment less necessary.

3.3 Data and descriptive statistics

Data on investment provisions in preferential trade agreements is obtained from the Kohl et al. (2013) dataset. Their coding covers 296 trade agreements and is based on the methodology introduced in Horn et al. (2010) which is also used for the construction of the WTO database on the content of PTAs. After adjusting the dataset to the availability of data on the explanatory variables, the remaining sample counts 102 trade agreements and 77 countries (see Appendix). The dependent variable *Investment_included* takes the value 1 if an investment provision is included in the respective agreement and 0 otherwise. In a second step, the dependent variable *Investment_enforceable* takes the value 1 if the investment provision is not only included but also legally enforceable. Legal enforceability is coded by evaluating the strength of legal language used (for details please refer to Horn et al., 2010). Some country pairs may be included twice in the data set; this happens in case the pair has entered into more than one agreement (e.g. in

Table 1: Descriptive statistics

VARIABLE	Obs	Mean	St.Dev.	Min	Max
Investment_included	519	0.7726	0.4195	0	1
Investment_enforceable	519	0.3854	0.4871	0	1
contig	519	0.1079	0.3106	0	1
comlang_off	519	0.3083	0.4622	0	1
distw in 1000km	519	4.4252	3.7474	0.1803	18.8845
col_hist	519	0.0308	0.1730	0	1
comleg	519	0.4489	0.4979	0	1
GDPsum	519	50.1456	2.3807	42.8804	56.1078
GDPdiff	519	1.5184	1.1255	0.0000	4.7123
ENDOWdiff	519	0.9662	0.8137	0.0021	4.0328
INTERMrow	519	1.1766	0.1088	0.8303	1.5428
LEGPROPdiff	519	2.0590	1.4268	0	6.1317
DEMOC1diff	519	7.4817	6.1348	0	19
CHECKSsum	519	6.3854	2.5343	2	21
PROPENSITinc	519	77.1908	33.4574	0	143
PROPENSITenf	519	42.9480	25.2224	0	91
BIT	519	0.4990	0.5005	0	1
EU	519	0.4721	0.4997	0	1
regional	519	0.3699	0.4833	0	1

a bilateral and a regional agreement). In order to control for already existing investment rules, the dummy BIT is included in a robustness check to capture whether the country pair has also signed a bilateral investment treaty. The data is taken from the UNCTAD IIA database.

In order to consider the role of global value chains for the formation of deep trade agreements, the variable *INTERMrow* is constructed. It captures the importance of intermediate goods trade relative to total trade for the country pair with regard to the rest of the world. It is constructed by summing the two countries' share of intermediate goods trade over total trade. The UN Comtrade Database and its classification into broad economic categories provides the data to compute these indicators on intermediate goods trade.[3] It is not clear whether including an investment chapter in the PTA with one partner significantly affects its production network trade with the rest of the world. However, in order to dampen the bias potentially caused by such simultaneity, the average value between 1995 and 2010 is used. Data (un)availability unfortunately does not allow being more conservative in this regard.

[3]Intermediate goods are the sum of broad economic categories 111 (Food and beverages, primary, mainly for industry), 121 (Food and beverages, processed, mainly for industry), 21 (Industrial supplies not elsewhere specified, primary), 22 (Industrial supplies, not elsewhere specified, processed), 31 (Fuels and lubricants, primary), 322 (Fuels and lubricants, processed (other than motor spirit)), 42 (Pars and accessories of capital goods (except transport equipment)), 53 (Parts and accessories of transport equipment).

The empirical analysis also includes a range of institutional and political variables. All are obtained from the Quality of Government (QoG) standard dataset by Teorell et al. (2013), which draws upon different sources. For the difference in the level of democracy, *DEMOC1diff*, the absolute difference of the countries' polity IV index (Center of Systemic Peace, Polity IV project) is used. The higher the value, the further apart are the countries' political regimes. In order to capture the difference in regulatory frameworks more closely (*LEGPROPdiff*), in particularly with regard to investment, the Fraser Institute's indicator on legal structure and security of property rights is used which ranges from 0 to 10 with an increasing degree of judicial independence, quality of legal framework, rule of law and protection of intellectual property rights (Gwartney et al., 2012). Both variables are lagged ten years to avoid simultaneity bias; to minimise the number of missing values, data up to five years prior to PTA enforcement are used if older data are not available. In addition, the combined number of veto players (*CHECKSsum*) in the two countries at the time of trade agreement enforcement is included, who could potentially oppose the enforcement in general or the inclusion of investment provisions more specifically. The data are also taken from the QoG dataset, originating in the Database on Political Institutions (Keefer and Stasavage, 2003). To control for the fact that some countries may always include investment, e.g. because they follow a model treaty and treaty design is path dependent (Kim and Manger, 2013), the variables *PROPENSITYinf* or *PROPENSITYenf* are included which count the total number of PTAs with (enforceable) investment provisions the countries have signed.

This paper also makes use of variables typically included when estimating gravity equations and identifying the determinants of PTA or BIT formation, i.e. common legal origin (*comleg*), common official language (*comlang_off*), contiguity (*contig*) and population-weighted distance (*distw*). These standard gravity variables are taken from the CEPII gravity dataset. Data on economic variables are obtained from the World Development Indicators. Following the literature, economic mass is measured by the sum of the natural logarithms of real GDP (*GDPsum*). The difference in economic size, *GDPdiff*, is defined as the absolute value of the difference between the logarithms of real GDP. In order to take potential endogeneity into account, GDP data ten years prior to the enforcement of the respective trade agreement are used. Even taking lengthy negotiation procedures into account, this time lag should minimise the risk that GDP figures are influenced by trade agreement formation, i.e. that they induce simultaneity bias. An additional economic variable is the difference in countries' relative endowment with labour and capital (*ENDOWdiff*). Following the convention of the literature (e.g. Egger and Larch, 2008), the absolute difference of real GDP per capita is used as a proxy.

Table 1 provides the descriptive statistics.

4 Empirical analysis

This section will introduce the methodology used to test the two major hypotheses, present and interpret the estimation results and do some sensitivity checks evaluating the robustness of the results.

4.1 Methodology

The empirical analysis is done by means of spatial probit estimation, using a Bayesian Monte Carlo Markov Chain (MCMC) simulation approach implemented in the statistical software R (see Wilhelm and de Matos, 2013, for a description of the package spatialprobit). The underlying model can be described as follows. As in the standard probit model, the dependent variable can take the values

$$y = \begin{cases} 1 & \text{an (enforceable) investment provision is included;} \\ 0 & \text{no (enforceable) investment provision is included.} \end{cases} \tag{1}$$

We assume, however, that the dependent variable is the outcome of the underlying latent variable model characterised by a spatial autoregressive process,

$$y^* = \rho W y^* + X\beta + \epsilon, \tag{2}$$

where y^* represents the difference in utility from including an (enforceable) investment provision in the PTA versus not doing so, Wy^* is the spatial lag, X represents the vector of exogenous explanatory variables, β the vector of the associated coefficients and ϵ the vector of homoskedastic disturbances. Note that we cannot observe the exact numerical value of y^*, i.e. the exact utility difference between covering and not covering investment. Instead, we observe only whether the provision is included/enforceable ($y = 1$) or not ($y = 0$). If the provision is included/enforceable, it is assumed that the countries' combined utility from doing so is positive. Note however, that no assumptions about the functional form of the combined utility or the bargaining power between the two countries are made.

Special attention should be given to the spatial lag Wy^* which captures the interdependence between observations. The rationale for including this spatial component is that policy decisions of one country may affect the decisions of another. This is particularly true in trade policy

making, where the literature has identified strong spillover/contagion effects (see Section 2). Note that if this assumption holds, then omitting the spatial lag, i.e. estimating a standard probit model, would lead to omitted variable bias.

W is a row-normalised spatial weighting matrix of dimension nxn which captures the degree of interdependence between observations. In this paper, it is assumed that countries are more likely to influence each others policy decisions when they are geographically close. Therefore, contiguity-based weights are used that can range from 0-4 (before normalisation). To give an example, the matrix entry for observation Indonesia-Singapore and observation Australia-Malaysia will receive a 2 (Indonesia and Malaysia are neighbouring countries, so are Singapore and Malaysia, but Indonesia-Australia and Singapore-Australia are not). Note that the spatial lag Wy^* in the equation (2) is endogenous. Franzese et al. (2010) highlight that estimation with an endogenous spatial lag, while taking into account interdependence, may unintentionally induce significant bias into the model. For estimation, the model is therefore transformed such that

$$(I - \rho W)y^* = X\beta + \epsilon \tag{3}$$

$$y^* = (I - \rho W)^{-1}X\beta + (I - \rho W)^{-1}\epsilon. \tag{4}$$

As in the standard probit model, the probability that a given observation includes an (enforceable) investment provision is given by a cumulative normal distribution. However, the spatial interdependence of the observations leads to non-spherical errors. More precisely, the variance-covariance matrix is given by $[(I - \rho W)^{'}(I - \rho W)]^{-1}$ in the spatial probit model rather than $\sigma^2 I$ in the standard probit model. This implies that we have to deal with an n-dimensional multivariate normal distribution which does not allow simple multiplication of the marginal distributions. Franzese et al. (2010) show that MCMC simulation is a suitable way to deal with these complications.[4]

Following the recommendations of the literature, this paper uses MCMC simulation to obtain Bayesian estimates for the parameters of interest. The procedure works as follows. First, the econometrician needs to determine the prior densities based on her belief about the distribution of parameters. In this paper, diffuse priors are used in order to put all the weight on the observed data in driving the results. The next step is to combine the prior density with the likelihood function from the data to obtain the joint posterior density of the parameters. As indicated above, in the case of a spatial probit, this joint posterior density is not available in

[4]The interested reader may refer to this source for the technical details and references to other suitable estimation strategies.

an analytically tractable, closed-form solution. However, the conditional densities for each of the unknown parameters are known, which allows Gibbs sampling to approximate the joint posterior distribution. For the parameter ρ, Metropolis-Hastings sampling is required, resulting in a Metropolis-Hastings-within-Gibbs-sampler. Based on the defined number of replications, the Bayesian MCMC estimator loops through this set-up until finally converging to the posterior means, which are reported in the tables below. Please also see Franzese et al. (2010) for a more formal and detailed description of this methodology.

4.2 Estimation results

Table 2 presents the results of the spatial probit model capturing the likelihood of a country pair including an investment provision (top of table), and including an enforceable one (bottom of table). The estimation is done for a sample of 519 observations, covering 77 countries and 102 PTAs (see Appendix for a list of countries and PTAs included). Period dummies are included to take trends over time into account. The Bayesian MCMC estimator is based on 10,500 draws of which the first 500 are discarded.

Coverage of investment: The results clearly indicate that having more intermediate goods trade with the rest of the world (INTERMrow) increases a country pairs' likelihood of including an investment provision in the PTA. This lends support to Hypothesis 1 that integration into global value chains, which is characterised by both trade and investment activities, requires 'deep' economic integration. As hypothesised, this deep integration with investment covered in PTAs is also more likely for countries with larger differences in legal frameworks and property rights protection (LEGPROPdiff). This relates to Hypothesis 2 that countries may need to fall back on international agreements when domestic regulations do not guarantee a sound business environment. The same is true for the difference in political regimes (DEMOC1diff) which is also positive and significant. Quite intuitively, having a high number of veto players (CHECKSsum) that can potentially oppose the coverage of investment in PTAs is significantly negatively related to this likelihood.

The coefficient on the spatial lag is negative and significant. This is a puzzle, as the literature suggests that there is positive interdependence between countries, explained by contagion and fear of discrimination. There is no clear intuition why this should not hold in the context of investment coverage in PTAs - which is what we observe. A potential explanation is that countries refrain from including investment provisions when they see that their neighbours make bad experiences with investment chapters in PTAs or BITs more generally, e.g. through investor-

state disputes. This is at odds with the empirical literature on BITs, however, which finds (i) that countries ignore the risks of investment agreements until they are affected themselves (Poulsen and Aisbett, 2013) and (ii) that stricter investment rules are contagious (Neumayer et al., 2014).

Enforceability of investment provisions: Do things change when looking only at those investment provisions that are legally enforceable? Participation in global value chains via intermediate goods trade (INTERMrow) still is a very good predictor of including an investment provision in the PTA - and ensuring it is enforceable. Enforceability is also more likely for countries with stronger differences in regulatory frameworks (LEGPROPdiff). This is in line with expectations that trade within global value chains needs a sound and reliable business environment that is not prone to possible adverse changes in domestic policy making. Interestingly, countries that differ strongly in terms of political regime (DEMOC1diff), even though they tend to include investment chapters, seem to be less successful in agreeing on enforceable provisions, as suggested by the negative and significant estimate. One possible interpretation is that for countries with different regimes agreeing on common binding rules is more difficult. The number of veto players, as before, is associated with a lower likelihood of including an enforceable investment provision. The coefficient on the spatial lag now has a positive sign, which is compatible with the expectations and the findings from the empirical literature. It is not significant in this benchmark model, however.

As a last note, the 'gravity variables' which are included as controls have little explanatory power with regard to coverage and enforceability of investment provisions in PTAs. Country pairs further away from each other and with a high combined GDP are less likely to include investment provisions. Countries that differ more strongly in relative factor endowments are more likely to cover investment. With regard to enforceable provisions, a common language seems to increase the likelihood while common colonial history decreases the likelihood. Overall, there is little significance associated with the variables and little resemblance with the strong findings of the literature on PTA and BIT formation. This suggests that the gravity variables are less important when it comes to explaining PTA design rather than formation. Strong explanatory power, however, has the countries' propensity to include (enforceable) investment in their PTAs (PROPENSITYinc and PROPENSITYenf). Accordingly, countries that have more PTAs signed which cover investment rules are more likely to do so with the next partner. This is quite intuitive, as many countries negotiate on the basis of a model treaty and follow a specific strategy in trade policy making.

Table 2: Estimation results

Dependent variable: Investment provision included

	Estimate	Std. Dev	t-value	Pr(>|z|)	Significance
(Intercept)	4.4204	2.4246	1.8231	0.0689	*
contig	0.1192	0.2717	0.4388	0.6610	
comlang	-0.0209	0.2667	-0.0783	0.9377	
distw	-0.1528	0.0312	-4.9003	0.0000	***
col_hist	-0.5748	0.5737	-1.0020	0.3168	
comleg	-0.2781	0.2545	-1.0925	0.2751	
GDPsum	-0.1505	0.0473	-3.1835	0.0015	***
GDPdiff	0.1707	0.0906	1.8844	0.0601	*
ENDOWdiff	-0.0199	0.1848	-0.1077	0.9143	
INTERMrow	**2.0813**	**0.8457**	**2.4610**	**0.0142**	**
LEGPROP	**0.3263**	**0.0794**	**4.1106**	**0.0000**	***
DEMOC1diff	**0.0355**	**0.0160**	**2.2125**	**0.0274**	**
CHECKSsum	**-0.0741**	**0.0330**	**-2.2473**	**0.0250**	**
PROPENSITYinc	0.0337	0.0042	8.0883	0.0000	***
W*y	**-0.2702**	**0.1085**	**-2.4890**	**0.0131**	**

Dependent variable: Investment provision included and enforceable

	Estimate	Std. Dev	t-value	Pr(>|z|)	Significance
(Intercept)	-7.3340	3.1068	-2.3606	0.0186	**
contig	0.2109	0.2984	0.7067	0.4801	
comlang	0.9652	0.2753	3.5055	0.0005	***
distw	0.0171	0.0299	0.5717	0.5678	
col_hist	-1.1402	0.5539	-2.0584	0.0401	**
comleg	-0.2309	0.1920	-1.2025	0.2297	
GDPsum	0.0423	0.0744	0.5685	0.5699	
GDPdiff	0.0124	0.0728	0.1703	0.8648	
ENDOWdiff	-0.2456	0.1482	-1.6568	0.0982	*
INTERMrow	**2.1584**	**0.7692**	**2.8059**	**0.0052**	***
LEGPROP	**0.2440**	**0.0666**	**3.6628**	**0.0003**	***
DEMOC1diff	**-0.0335**	**0.0153**	**-2.1850**	**0.0293**	**
CHECKSsum	**-0.0710**	**0.0368**	**-1.9280**	**0.0544**	*
PROPENSITYenf	0.0384	0.0079	4.8796	0.0000	***
W*y	**0.1109**	**0.5255**	**0.2110**	**0.8329**	

Significance levels: *** p<0.01, ** p<0.05, * p<0.1

The estimate gives the posterior mean after 10,500 draws with a burn-in period of 500 draws. Estimation is based on 519 observations and includes period dummies.

4.3 Robustness checks

One drawback of Bayesian simulation approaches is that one can never be absolutely sure that the estimator has (i) become independent of the starting values and (ii) converged (see e.g. Franzese et al., 2013, for a discussion). By using a relatively large number of 10,500 draws and dropping the first 500 draws from the sample ("burn-in period"'), the risk of non-convergence and dependence on initial values is reduced (although not completely ruled out, of course). In order to support this assumption, the Geweke-test is applied to the two benchmark models and the alternative models (see Table 3). The Geweke diagnostic reports the t-value associated with testing the null hypothesis that the mean in the first 10% and the last 50% of the Markov Chain are equal. Rejection is evidence for non-convergence. For both models, the test cannot reject the hypothesis that the means are equal. To further increase confidence about convergence, the model is also run with 33,000 draws, keeping only every third for calculation of the Bayesian estimate and discarding the first 1,000 draws completely from the sample. The results are almost identical to the ones reported for the benchmark model. Both procedures cannot identify any problems with non-convergence.

Irrespective of the estimation procedure, some other aspects are tested with regard to robustness of the results (see Table 3). First, a dummy variable indicating whether a country pair has a BIT in place is included. The intuition is straight forward: countries with a BIT in place might be more likely to include an investment chapter in their PTA (as a complement, e.g. extending rules to market access provisions) or less likely (since investment chapters may be a substitute for BITs). However, there is concern that the variable causes a bias stemming from reverse causality. For example, the EU encourages the termination of intra-EU BITs given their incompatibility with the single market. Therefore, the BIT variable is not included in the benchmark framework above, but tested here to see whether it significantly impacts the coefficient estimates of the variables of interest. The results indicate that having a BIT is significantly negatively associated with including an investment chapter in the PTA. Including the BIT variable does not weaken the explanatory power of the variables of interest, however. This holds both for the coverage and enforceability of investment provisions.

Another sensitivity check is applied by using an alternative weighting matrix. While the weighting is still based on contiguity, the weights are now restricted to be no higher than 1 (before normalisation), as opposed to 4 as explained in Section 3.3. The results are very robust to this change for both benchmark models.

Furthermore, one might argue that covering investment provisions in PTAs is mostly driven by

Table 3: Robustness checks

Dependent variable: Investment chapter included

	benchmark		33000 draws		BIT included		alternative W		no EU PTAs		no regional PTAs	
(Intercept)	4.4204	*	4.4098	*	2.6728		4.1907	*	1.3097		0.8914	
contig	0.1192		0.1256		0.0426		0.1244		0.2735		1.2828	
comlang	-0.0209		-0.0166		0.0279		-0.0045		-0.1169		1.2019	**
distw	-0.1528	***	-0.1532	***	-0.1638	***	-0.1496	***	-0.0604	*	-0.1266	***
col_hist	-0.5748		-0.5755		-0.5879		-0.5587		2.8917		-1.4621	**
comleg	-0.2781		-0.2892		-0.2522		-0.2966		0.0525		-0.0470	
GDPsum	-0.1505	***	-0.1493	***	-0.1213	**	-0.1453	***	-0.0665		-0.1224	
GDPdiff	0.1707	*	0.1688	*	0.1265		0.1652	*	0.2470	**	0.3251	**
ENDOWdiff	-0.0199		-0.0278		0.0848		-0.0384		0.3224		-0.3070	
INTERMrow	**2.0813**	**	**2.0532**	**	**2.4924**	***	**2.1184**	**	**0.6832**		**3.3832**	**
LEGPROP	**0.3263**	***	**0.3231**	***	**0.2960**	***	**0.3191**	***	**0.0823**		**0.3939**	***
DEMOC1diff	**0.0355**	**	**0.0351**	**	**0.0432**	**	**0.0344**	**	**0.0497**	**	**0.0257**	
CHECKSsum	**-0.0741**	**	**-0.0730**	**	**-0.0829**	**	**-0.0727**	**	**-0.0732**	*	**-0.1737**	***
PROPENSITYinc	0.0337	***	0.0335	***	0.0355	***	0.0324	***	0.0254	***	0.0252	***
BIT					-0.5615	***						
W*y	**-0.2702**	**	**-0.2712**	**	**-0.2529**	**	**-0.2662**	**	**0.7289**	***	**0.1973**	
Observations	519		519		519		519		274		327	
period dummies	yes		yes		yes		yes		yes		yes	
AIC	331.3236		331.2477		325.5645		331.8708		337.5073		170.1782	
Geweke	-0.9516		-0.9349		-0.5468		-0.9974		-0.8290		-0.0629	

Dependent variable: Investment chapter included and enforceable

	benchmark		33000 draws		BIT included		alternative W		no EU PTAs		no regional PTAs	
(Intercept)	-7.3340	**	-7.6619	**	-10.0708	***	-7.3529	**	-3.0517		-5.7159	*
contig	0.2109		0.2210		0.1572		0.2079		0.4696		0.7026	
comlang	0.9652	***	0.9908	***	1.0552	***	0.9636	***	-0.4971		1.0169	***
distw	0.0171		0.0202		0.0147		0.0147		-0.0405		0.0269	
col_hist	-1.1402	**	-1.1927	**	-1.2395	**	-1.1741	**	-34.0947		-1.2285	**
comleg	-0.2309		-0.2283		-0.1927		-0.2384		0.4948		-0.2577	
GDPsum	0.0423		0.0516		0.1030	*	0.0430		-0.0787		0.0533	
GDPdiff	0.0124		0.0086		-0.0264		0.0127		0.2216	**	0.1387	
ENDOWdiff	-0.2456	*	-0.2498	*	-0.2480	*	-0.2419	*	0.1116		-0.5578	***
INTERMrow	**2.1584**	***	**2.1250**	***	**2.2913**	***	**2.1133**	***	**-1.8272**		**3.0793**	***
LEGPROP	**0.2440**	***	**0.2410**	***	**0.2362**	***	**0.2459**	***	**0.1637**		**0.2472**	***
DEMOC1diff	**-0.0335**	**	**-0.0328**	**	**-0.0287**	*	**-0.0336**	**	**0.0359**	*	**-0.0558**	***
CHECKSsum	**-0.0710**	*	**-0.0692**	*	**-0.0930**	**	**-0.0711**	**	**-0.0267**		**-0.1251**	***
PROPENSITYenf	0.0384	***	0.0374	***	0.0383	***	0.0388	***	0.0467	***	0.0261	***
BIT					-0.4574	***						
W*y	**0.1109**		**0.1907**		**0.2488**		**0.1009**		**0.1236**		**0.4449**	*
Observations	519		519		519		519		274		327	
period dummies	yes		yes		yes		yes		yes		yes	
AIC	472.4861		475.8232		465.8276		472.2003		219.9186		297.8338	
Geweke	-0.5956		-0.55796		-0.4938		-0.6226		-1.7053		0.5467	

regional agreements. Therefore, the model is estimated only for bilateral agreements, where a PTA between a regional grouping and a third country is counted as bilateral, e.g. EU-Mexico. Again, the sign and significance of the variables of interest remains largely unchanged.

So far, the results are quite robust to changes to the model specification. However, there is one change to the model that alters the results significantly. Since EU countries are involved in roughly 50% of the observations (see Table 1 in Section 3.3), there is concern that the results are driven by EU trade policy making. Therefore, all observations involving the EU are dropped from the sample. Most notably, the spatial lag now has a significant and positive coefficent. This means that once ignoring EU countries, investment provisions do seem to be more likely for a country pair if their neighbours include them in their PTAs. This is what was expected from the literature. Moreover, the decision of including (enforceable) provisions does no longer seem to depend on regulatory differences or global value chain trade; both variables are insignificant at any conventional significance level. These results may be a hint that the importance of global value chain trade and regulatory differences for the design of PTAs is something inherent to EU trade policy making, whereas other countries are more prone to follow their direct neighbours' policy. However, this hypothesis would need to be backed by further analyses.

Given this striking result, a future version of this paper will try to increase the sample size so as to weaken the effect of EU observations and, as a further robustness check, will treat the EU as a single actor (rather than 28 countries that are likely to dominate the sample). The negative coefficient on the spatial lag is quite counter-intuitive; therefore, estimation with different weighting variables (e.g. bilateral trade or investment flows) will be considered. However, this may cause problems if the estimation procedure is not adapted, since the spatial weighting matrix is likely to be endogenous when it is based on economic variables (Qu and Lee, 2015).

5 Conclusion

Using spatial probit estimation in a Bayesian MCMC setting and thus taking interdependence between countries into account, this paper tests the role of global value chain trade and regulatory differences in explaining whether country pairs include (enforceable) investment provisions in their preferential trade agreements. It finds that higher production network trade is indeed associated with a higher likelihood of including enforceable investment provisions in the PTA. Countries with strong differences in political regime and regulatory frameworks are also more likely to include investment provisions; it seems, however, that countries that differ strongly in

political regime do not succeed in designing these provisions in an enforceable way. Overall, the results presented in this paper, robust to a variety of sensitivity checks, underscore the importance of deep integration in the context of global value chains. However, this result is largely driven by EU countries in the sample, raising the question whether the focus on economic and regulatory conditions is something characteristic of EU trade policy making. Leaving EU countries aside, including (enforceable) investment provisions is better explained by spatial interdependence. More precisely, countries are more likely to cover investment when their direct neighbours do so. Given the strong momentum of (deep) trade agreement formation, the paper delivers important insights into the determinants of PTA design, in particular in the context of global value chains.

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Appendix

List of countries: Algeria, Argentina, Australia, Austria, Bolivia, Brazil, Burundi, Cameroon, Canada, Central African Republic, Chile, China, Colombia, Costa Rica, Croatia, Cyprus, Czech Republic, Denmark, Ecuador, Egypt, El Salvador, Estonia, Finland, France, Germany, Greece, Guatemala, Honduras, Hungary, India, Indonesia, Ireland, Israel, Italy, Ivory Coast, Japan, Jordan, Latvia, Lithuania, Madagascar, Malawi, Malaysia, Mauritius, Mexico, Morocco, Netherlands, New Zealand, Nicaragua, Niger, Norway, Oman, Panama, Paraguay, Peru, Poland, Portugal, Republic of Congo, Romania, Singapore, Slovak Republic, Slovenia, South Korea, Spain, Sweden, Switzerland, Tanzania, Thailand, Togo, Trinidad & Tobago, Tunisia, Turkey, Uganda, United Kingdom, Uruguay, Venezuela, Zambia, Zimbabwe

List of PTAs: ASEAN-Australia-New Zealand 2010, ASEAN-China 2003, ASEAN-India 2010, ASEAN-Japan 2008, ASEAN-South Korea 2006, Andean Community (Cartanega) 1988, Andean-MERCOSUR 1998, Arab Maghreb Union (AMU) 1989, Asia Pacific Trade Agreement (APTA) 1976, Australia-Chile 2009, Australia-New Zealand (ANZCERTA) 1982, Australia-Singapore 2003, Australia-Thailand 2004, Bolivia-Chile 1993, CARICOM-Colombia 1995, CARICOM-Costa Rica 2004, CARICOM-Venezuela 1993, Canada-Chile 1996, Canada-Costa Rica 2001, Canada-Israel 1996, Canada-Peru 2009, Central America-Mexico 2001, Central American Common Market (CACM) 1990, Chile-China 2005, Chile-Colombia 2009, Chile-Costa Rica 1999, Chile-El Salvador 1999, Chile-India 2006, Chile-Japan 2007, Chile-Mexico 1998, Chile-Panama 2008, Chile-Peru 2006, Chile-South Korea 2003, Chile-Venezuela 1993, China-New Zealand 2008, China-Singapore 2009, Common Market for Eastern and Southern Africa (COMESA) 1994, Costa Rica-Mexico 1994, Croatia-Turkey 2002, EC-Algeria 1976, EC-CARIFORUM States EPA 2008, EC-Cameroon 2009, EC-Chile 2003,EC-Cote d'Ivoire 2009, EC-Croatia 2002, EC-Israel 2000, EC-Jordan 2002, EC-Mexico 2000, EC-Morocco 2000, EC-Tunisia 1998, EC-Turkey 1996, EFTA-Canada 2009, EFTA-Chile 2004, EFTA-Croatia 2002, EFTA-Egypt 2007, EFTA-Israel 1993, EFTA-Jordan 2002, EFTA-Mexico 2001, EFTA-Morocco 1999, EFTA-Singapore

2003, EFTA-South Korea 2006, EFTA-Tunisia 2005, EFTA-Turkey 1992, East African Community (EAC) 2000, Economic Community of Central African States (ECCAS) 1985, Economic Community of West African States (ECOWAS) 1993, Egypt-Jordan 1998, Egypt-Turkey 2005, El Salvador-Panama 2002, European Economic Area (EEA) 1994, Guatemala-Mexico 2000, Honduras-Mexico 2000, India-Singapore 2005, India-South Korea 2010, Indonesia-Japan 2008, Israel-Mexico 2000, Israel-Turkey 1996, Japan-Mexico 2004, Japan-Singapore 2002, Japan-Switzerland 2009, Japan-Thailand 2007, Jordan-Singapore 2004, Latin American Integration Association (LAIA) 1981, MERCOSUR-Bolivia 1997, MERCOSUR-Chile 2000, MERCOSUR-India 2009, Mercado Comun del Sur (MERCOSUR) 1991, Mexico-Nicaragua 1997, Mexico-Northern Triangle 2001, Morocco-Turkey 2004, New Zealand-Singapore 2000, New Zealand-Thailand 2005, North American Free Trade Agreement (NAFTA) 1994, Pan-Arab Free Trade Area (PAFTA) 1998, Panama-Singapore 2006, Peru-China 2010, Peru-Singapore 2009, Singapore-South Korea 2005, Southern African Development Community (SADC) 2000, Trans-Pacific Strategic Economic Partnership (TPSEP) 2006, Tunisia-Turkey 2004, West African Economic and Monetary Union (WAEMU) 1994