

Do Deep Trade Agreements Boost Vertical FDI?

Alberto Osnago, Nadia Rocha, and Michele Ruta

An increasing number of preferential trade agreements (PTAs) and the rise of offshore production are distinctive features of the modern world economy. Exploiting the WTO database on the content of deep trade agreements, we build on the existing literature to investigate whether deep trade agreements between countries are related to vertical foreign direct investment (FDI). Specifically, we show that deeper trade agreements increase vertical FDI measured with a proxy constructed in Osnago, Rocha and Ruta (2015) with data on foreign firm ownership and subsidiaries' revenues available in the ORBIS database. JEL codes: F13, F23

How are preferential trade agreements (PTAs) and global value chains (GVCs) related? Two recent features of the world economy brought this question to the forefront of trade research and of the trade policy debate. First, during the recent decades, technological innovation in communication and transportation enabled the unbundling of stages of production processes across time and space leading to an increase in offshoring. Second, starting at the end of the 1990s, more and more countries signed bilateral and regional PTAs.

The answer to this broad question can actually be less straightforward than one could think. Both offshoring and trade agreements present two distinct features. Offshoring can be done in two modes: outside or within the boundaries of the firm. When firms outsource the production of some stages outside their boundaries, that is, when firms engage in foreign outsourcing, they generate arm's length trade. On the contrary, when firms offshore within their boundaries through (vertical) foreign direct investment (FDI) they generate within-firms trade.

Similarly, PTAs can be classified into two types. Traditional PTAs usually involve reciprocal market access exchanges involving tariff cuts and the reduction of other border measures. On the other hand, modern day PTAs often contain provisions that cover a wide array of non-tariff measures, both at the border and behind-the-border. The literature refers to these new trade agreements as "deep"

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to distinguish them from traditional PTAs that focus only on market access commitments—sometimes referred to as “shallow” agreements.

In this paper we briefly illustrate available data on PTAs and the existing literature that studies the relationship between the depth of PTAs and offshoring. We then provide novel results that show how deep PTAs are associated to the mode of offshoring. The empirical evidence that we collect in this paper shows that deeper PTAs are related to more vertical FDI.

WHAT ARE DEEP PTAs AND WHAT IS THEIR CONTENT?

PTAs are usually thought of as reciprocal market access exchanges involving tariff cuts and the reduction of other border measures. With preferential tariffs approaching the zero lower bound, the coverage of PTAs in terms of policy areas has widened over time as documented by [WTO \(2011\)](#).

Modern day trade agreements increasingly contain provisions that cover a wide array of non-tariff measures, both at the border and behind-the-border. For example, several PTAs include provisions regulating technical barriers to trade (TBT), sanitary and phytosanitary (SPS) measures, rules on investment, intellectual property rights (IPR) protection, provisions on anti-corruption, competition policy, labor standards, and so forth.

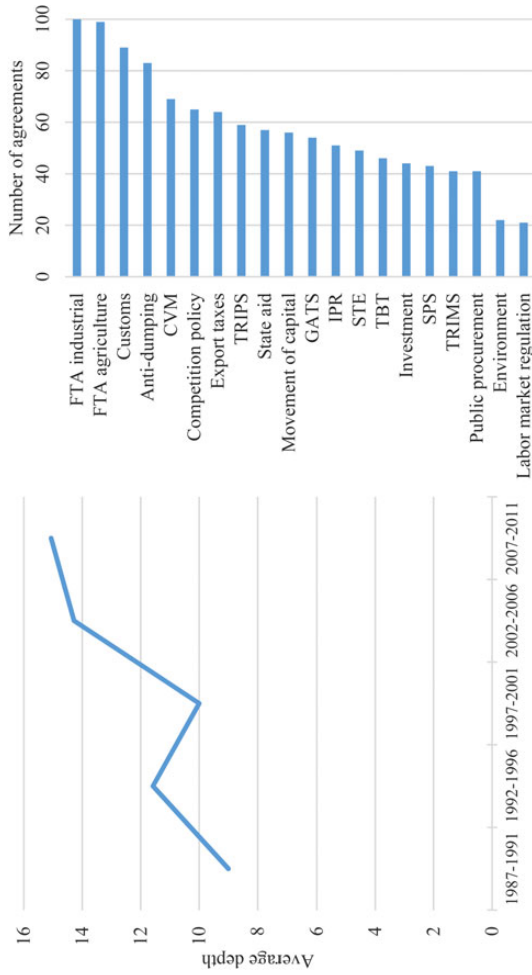
In this paper we rely on the dataset on the content of preferential trade agreements constructed by the WTO. Following [Horn et al \(2010\)](#), the WTO mapped a total of 52 disciplines across 100 PTAs signed between 1958 and 2011.

The left panel of figure 1 shows that PTAs became deeper over time. Agreements signed between 1987 and 1991 included on average nine provisions whereas agreements signed between 2007 and 2011 included on average 15 provisions. The right panel of figure 1 lists the 20 most common provisions included in the set of agreements mapped by the WTO. As expected, all agreements include reductions in tariffs on manufacturing goods. At the same time, more than 50 percent of agreements include deeper provisions such as anti-dumping and countervailing measures (CVM), rules on competition, movement of capitals and intellectual property rights (TRIPS and IPR). Moreover, TBT, investment disciplines and SPS measures are often included in PTAs. Exploiting the WTO data set, we construct different measures of depth of PTAs based on the content of each agreement. The left panel of figure 1 reports the evolution over time of the average depth of PTAs, measured as the average number of provisions included in PTAs.

DEEP PTAs AND VERTICAL FDI

The recent wave of PTAs and the surge in offshoring have brought to the forefront of trade research and of the trade policy debate the question of how trade agreements relate to the international organization of production (see, e.g., [Lawrence \(1996\)](#), [Baldwin \(2011\)](#), [WTO \(2011\)](#), and [Antras and Staiger](#)

FIGURE 1. Evolution of Depth over Time and most Common Provisions, 1987–2011



Source: Authors' calculations based on the WTO dataset on the content of PTAs.

(2012)). The key insight of the theoretical literature is that the “depth” of trade agreements is associated with the international fragmentation of production.

Econometric studies are scarce but they suggest that there is a positive relationship between production networks trade and deep integration. [Orefice and Rocha \(2014\)](#) investigate empirically the dual relationship between deep PTAs and trade in parts and components. They find that signing deep trade agreements increases trade in parts and components. At the same time higher levels of trade in production networks increases the likelihood of signing deeper agreements.

In this paper we move the focus on the relationship between deep PTAs and offshoring within the boundaries of the firm, that is, vertical FDI. The key question is whether the depth of trade agreements between two countries is correlated with more vertical FDI.

Empirical Strategy

We estimate the following linear equation:

$$\log(FDI_{ijkt}) = \beta_1 DEPTH_{ijt} + \beta_2 INSTITUTIONS_{jt} + \beta_3 \log(Tariff)_{ijkt} + \beta_4 BIT_{ijt} + \gamma_1 X_{jt} + \gamma_2 X_{ij} + \delta_{ikt} + \varepsilon_{ijkt} \quad (1)$$

where k is the parent’s sector, t is time, i and j are country indexes (i for the “origin” country and j for the “destination” country). The dependent variable FDI_{ijkt} is a measure of the intensive margin of vertical FDI. In order to quantify vertical FDI flows we apply an innovative methodology proposed by [Alfaro and Charlton \(2009\)](#), used also by [Lanz and Miroudot \(2011\)](#). Using firm level data obtained from the ORBIS dataset, we determine the ownership relationship among a very large number of firms. We then proxy vertical FDI from country i to country j in sector k at time t as the aggregate value of the revenues of all subsidiaries owned by firms in country i producing inputs for sector k in country j .¹

The main variable of interest that captures the depth of the agreements is $DEPTH_{ijt}$. In the empirical analysis, $DEPTH_{ijt}$ can take one of four forms: a dummy equal to one if there is a PTA; the number of provisions included in the PTA; or the log of one of two indexes ($\log(\text{Top } 5)$ and $\log(\text{Top } 10)$) constructed using a principal component analysis as in [Orefice and Rocha \(2014\)](#).

The control variable $INSTITUTIONS_{jt}$ is rule of law in the country that receives FDI. $Tariff_{ijkt}$ represents the level of tariffs imposed by the origin country i on product k . This variable helps us to separate the impact of our PTA variable that goes beyond simple tariff liberalization. BIT_{ijt} is a dichotomous variable capturing the existence of a bilateral investment treaty between i and j at time t .

1. See [Osnago et al. \(2015\)](#) for details on the identification of vertical FDI and the construction of the variable.

X_{jt} is a vector of controls for characteristics of the destination country that vary over time. It includes GDP, GDP per capita and destination country remoteness. It also includes the average depth of the agreements signed by the host country with third countries in order to capture the overlapping nature of PTA networks. We also control for country-pair characteristics by including a standard set of gravity variables X_{ij} such as geographical distance, contiguity, common language, and colonial relationship.² We finally include sector-country-time fixed effects δ_{ikt} in order to control for potential omitted variables bias.

Key Findings

We show that deeper PTAs are associated to more vertical FDI originating from Germany, Japan, and the United States.³ The first four columns in table 1 report the coefficients of equation 1 estimated using OLS. Focusing only on the number of provisions for ease of interpretation, column 2 shows that the inclusion of one additional provision in the agreement is associated with an increase in vertical FDI of 1.7 percent.

The relationship between vertical FDI and deep PTAs can go in both directions. Deep PTAs may stimulate the creation of GVCs by facilitating trade of intermediate goods and FDI flows between potential members of a production network. On the other hand, firms involved in intense vertical FDI may lobby for deeper trade agreements in order to secure and increase the profitability of their investments in partner countries.

In order to deal with potential endogeneity issues we also use an instrumental variable approach. We instrument PTA depth between country i and country j with the weighted average depth of all the agreements signed by i and j with third countries.⁴ The rationale of this instrument comes from the domino theory of PTAs first introduced by Baldwin and Jaimovich (2010): the higher the level of integration between a country j and its partners, the higher the probability that country i will sign a PTA of similar depth with j to avoid trade diversion effects.⁵

The instrumental variable estimations are reported in columns 5 to 8 of table 1. The coefficients of all our measures of depth remain positive and significant suggesting that deeper integration is an important factor driving the make-or-buy decision of firms. One additional provision increases the value of FDI by almost 5 percent.

2. Rule of law comes from the Worldwide Governance Indicator database, tariffs from TRAINS, BIT from UNCTAD, GDPs from the World Bank World Development Indicators and the gravity variables from CEPII.

3. We restrict our analysis to these countries since they represent the regional hubs of production networks. Our sample is also restricted to the years 2003, 2007, and 2011 for practical reasons.

4. This type of instrumental variable approach has already been used in the literature (see, e.g., [Orefice and Rocha 2014](#)).

5. A similar argument has been provided by [Chen and Joshi \(2010\)](#).

TABLE 1. Vertical FDI and Deep Integration

	FDI (log of revenues in 1000\$)							
	OLS				IV			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PTA	0.643*** (0.220)				0.910*** (0.269)			
N. of Provisions		0.0169** (0.007)				0.0492*** (0.009)		
log(Top 5)			0.601* (0.323)				2.190*** (0.440)	
log(Top 10)				0.538** (0.234)				1.459*** (0.282)
Avg depth of PTAs by j	0.037** (0.015)	0.035** (0.016)	0.042*** (0.016)	0.041*** (0.016)	0.040*** (0.013)	0.028** (0.014)	0.043*** (0.014)	0.044*** (0.014)
Rule of Law	0.364*** (0.135)	0.344** (0.133)	0.342** (0.134)	0.351*** (0.135)	0.389*** (0.124)	0.409*** (0.128)	0.418*** (0.127)	0.419*** (0.127)
Tariff (log)	0.042 (0.195)	-0.198 (0.179)	-0.123 (0.181)	-0.096 (0.181)	0.107 (0.177)	-0.256* (0.152)	-0.001 (0.159)	0.027 (0.159)
BIT	0.075 (0.149)	0.026 (0.151)	0.012 (0.151)	0.028 (0.153)	0.121 (0.138)	0.167 (0.143)	0.155 (0.145)	0.155 (0.144)
Observations	4,816	4,692	4,692	4,692	4,816	4,692	4,692	4,692
R-squared	0.350	0.346	0.345	0.346	0.348	0.340	0.336	0.340
δ_{ikt} FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*** $p < .01$, ** $p < .05$, * $p < .1$.

Country-industry-year fixed effects refer to the country of the parent firm. All regressions control for distance, contiguity, colony relationship, common language, a dummy for China, GDP, GDP per capita, average integration and remoteness of the country of the subsidiary. Robust standard errors in parentheses clustered at the 6-digits NAICS.

CONCLUSIONS

A better grasp of the relationship between PTAs and offshoring is important in a world where countries sign more and more trade agreements and firms increasingly seek to engage in international production networks. In this paper, we provide novel evidence that the depth of PTAs is also related to the mode of offshoring. In particular, our findings indicate that signing deeper agreements can increase the flows of vertical FDI between countries.

In a related paper (Osnago et al. 2015), we take a step forward and examine how the content of PTAs, that is, the type of provisions included, is related to firms' choice between foreign outsourcing and vertical FDI. We find evidence that the positive link between the depth of PTAs and vertical FDI is driven by the provisions that improve the contractibility of inputs provided by foreign suppliers, such as regulatory provisions.

While more work is needed, this line of research is contributing to our understanding of how policymakers can design trade agreements to support firms' integration into global value chains.

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