# Free trade agreements and market power*

Preliminary and incomplete

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**Abstract**

This paper studies the outcomes of negotiations of free trade agreements (FTAs). We link to which staging category a product belongs to, to the market power a country has for that product. In doing so, we provide empirical evidence on the practical importance of the terms-of-trade framework as an explanation for the presence of trade agreements. While the terms-of-trade hypothesis is more than a century old, evidence to support or reject the theoretical arguments has long been non-existing. This paper is the first paper to test the augmented terms-of-trade hypothesis in relation to bilateral trade agreements. Using detailed data on 15 recently concluded FTAs, we find a strong link between market power and the probability of a product to be exempted from liberalization. Products with higher market power also tend to have longer phase-outs periods, i. e. they are liberalized slower over time. Moreover, including political economy considerations, such as lobbying and concern for the FTA partner, also results in findings that are consistent with the theory. Our results are robust to using different measures of market power.

**Keywords: terms of trade, optimal tariff theory, bilateral tariff negotiation outcomes, free trade agreements**

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## 1 Introduction

Why do countries conclude trade agreements? To answer this question, economists tend to rely on the terms-of-trade theory of trade agreements. This theory states that governments acting unilaterally will tend to overuse tariffs and other trade restrictions to the extent that they are able to shift the cost of protecting a domestic industry onto foreign producers. This cost-shifting is made possible through movements in foreign exporter prices or terms of trade, and the extent of the cost-shifting is directly related to how much market power a country has for a given good. We define market power as the inverse elasticity of foreign export supply of that country. Countries with high market power are typically considered "large" and will want to set a positive optimal tariff, as the distortion caused by the tariff will be compensated by an improvement of the terms of trade. While maximizing the domestic governments objective function, this unilateral policy is inefficient from an international point of view as it imposes a negative externality on the trading partners. The purpose of a trade agreement is then to undo this policy inefficiency and improve the welfare of each government.

The terms-of-trade theory can easily be generalized to more realistic settings. The literature has augmented the terms-of-trade hypothesis with a range of political economy considerations. Grossman and Helpman (1995a and 1995b) for example, show how lobbying affects the relationship between the optimal tariff and market power. The optimal tariff is no longer only determined by the market power of a country for a particular good, but now also depends on the presence (or absence) of lobbies and their preferences.

Even though the terms-of-trade hypothesis is more than a century old, evidence to support or reject the theoretical arguments has long been non-existing. This has changed during the last decade, and evidence supporting the validity and usefulness of the theory is mounting. Broda, Limão and Weinstein (2008) present convincing evidence on the positive relationship between market power and tariffs in a non-cooperative setting. They do this by examining the tariff schedules of 15 non-WTO countries, and US trade restrictions not covered by the WTO. Moreover, Bagwell and Staiger (2011) consider changes in the tariff schedules of countries who have recently acceded to the WTO, while Bown (2004) and Bown and Crowley (2013) study the relation between market power and WTO disputes and antidumping duties, respectively. Finally, Ludema and Mayda (2013) are the first to explore the link between market power and domestic and foreign political economy considerations. They investigate the choice of MFN tariffs by existing WTO members and control for some political economy variables. All produce findings consistent with the (augmented) terms-of-trade hypothesis, and hence support the validity of the terms-of-trade hypothesis in explaining the purpose of the multilateral trading system.

However, the (augmented) terms-of-trade hypothesis does not only explain the existence of multilateral trade agreements, it also explains the presence of bilateral trade agreements (EIAs). Though, up to date, and to the best of our knowledge, there is no convincing empirical evidence on the validity of this argument. Two studies try to test the hypotheses derived from the Grossman and Helpman (1995b) model, namely Damuri (2012) and Gawande et al (2005). However, neither of both accounts appropriately for market power[1], thereby introducing severe

[1]While Damuri (2012) ignores the concept of market power completely, Gawande et al. (2005) do include

omitted variable bias in their results.

This paper wants to change that. We contribute to the literature by testing the terms-of-trade hypothesis augmented with political economy considerations in relation to free trade agreements.

To do so, we cannot simply use the negotiated tariff as a dependent variable, as the purpose of free trade agreements is to abolish tariffs between countries. Therefore, we exploit the argument developed in Grossman and Helpman (1995b) that governments exclude products from free trade agreements to create the best opportunity for exporting interests to overcome opposition to the FTA from import-competing producers. Alternatively, governments can also impose quotas or obtain (longer) phase-out periods for products so that industries have time to adjust. These measures provide excellent alternatives to using tariffs as a dependent variable.

We use detailed data on 15 recently concluded FTAs between countries in Asia, North America, Central and South America, Europe and Oceania. To ensure enough variation in our data, we include small as well as large countries in our dataset, as well as developed and developing countries. To measure market power, we use the method outlined in Broda, Limão and Weinstein (2008). We start by estimating the impact of market power on the probability of a product to be exempted from liberalization in free trade agreements, on the one hand, and the speed of liberalization of a product, on the other hand. After that, we include political economy considerations in our estimations.

Our findings provide support for the augmented terms-of-trade hypothesis. We find that products with higher market power are exempted more often from liberalization and have a slower liberalization path. Our results are robust to using different measures of market power. Moreover, including political economy considerations does not change our results.

This paper is structured as follows. Section 2 discusses the theory on optimal tariffs and market power in more detail. Section 3 and section 4 respectively discuss the method and data used. Results are presented in 5 and section 6 concludes.

## 2 The optimal tariff argument

The basic theory underlying the optimal tariff argument can be traced back all the way to the early 1800s, when British economists heatedly debated the (potential) repeal of the Corn Laws and other tariffs. While classical economists had been stressing the benefits of tariff reductions and freer international trade for decades, controversy arose on the impact of a unilateral tariff reduction on British general welfare. At that time, international trade theory was sophisticated enough to recognize that tariffs could increase national income for a country that could influence its terms of trade. While the classical economists were united about the significance of improved resource allocation, they were divided about the importance of the terms of trade effect. Consequently, economists such as Robert Torrens and John Stuart Mill expressed caution about, or even outright opposition to, a purely unilateral reduction of the Corn Laws and other tariffs. Others, such as Nassau Senior and John Ramsay McCulloch, denied that tariff liberalization

it in their econometric model to test the Grossman and Helpman (1995b) hypothesis. However, due to lack of estimates of the export supply elasticity at the time, they assume the inverse elasticity of foreign export supply to be equal to 1.

needed to be reciprocated and either ignored terms of trade considerations or thought they would be minor compared to the benefits from improved resource allocation (Irwin, 1988).

In this section we provide the basic intuition behind the terms-of-trade theory, and then generalize the theory to more realistic settings. We do this by augmenting the theory with political economy considerations and allowing for the possibility to conclude trade agreements. Section 2.1 derives the optimal tariff for each country when governments maximize national income with their unilateral tariff choices. Section 2.2 generalizes this optimal tariff relationship to also include cases where the government's objective is not social welfare maximization. Finally, section 2.3 allows for the conclusion of trade agreements.

## 2.1 Unilateral and non-cooperative optimal tariffs

We focus on a country $i$ that takes as given the policies of the remaining n $\geqslant 1$ countries (Broda, Limão and Weinstein, 2008). Suppose each individual in country $i$ has a utility defined over a numeraire good, $c_0$, and a vector of non-numeraire goods $u(\mathbf{c})$:

$$U = c_0^h + \sum_p u_p(c_p^h) \tag{1}$$

Here we consider the simple case where $u(\mathbf{c})$ is separable. Each individual $h$ with incomes $I^h$ chooses expenditure on each good $c_p$ to maximize (1), subject to $c_0^h + \sum_p p_p c_p^h \leq I^h$, where $p_p$ is the domestic price for $c_p$. Given this utility, the demand for each good $p$ is simply a function of its own price, i.e., $c_p = c_p(p_p)$. Social welfare is then the sum of the individual indirect utilities, which includes income and consumer surplus:

$$W = \sum_h \left[ I^h + \sum_p \kappa_p(p_p) \right] \equiv \sum_h \left[ I^h + \sum_p \Big( u_p(c_p(p_p)) - p_p c_p(p_p) \Big) \right] \tag{2}$$

To determine income, we employ the standard assumption in the leading endogenous trade policy models, e.g. Grossman and Helpman (1994, 1995a). First, the numeraire is freely traded and produced using only labor according to a constant returns production. So, the equilibrium wage is determined by the marginal product in this sector, which we normalize to one. Second, the non-numeraire goods are produced under constant returns to scale using labor and one factor specific to the goods.This means that each specific factor earns a quasi-rent that is increasing in the good‘s price, $\pi_p(p_p)$. Finally, tariff revenues for each good, $r_p(p_p)$, are redistributed uniformly to all individuals. All individuals own a unit of labor and a fraction of them also own up to one unit of specific capital. If we normalize the population to be one and recall the wage is also unity, we can rewrite social welfare as

$$W = 1 + \sum_p [\pi_p(p_p) + r_p(p_p) + \kappa_p(p_p)] \tag{3}$$

The world price for each traded good $g \in G_m$ is determined by the market clearing conditions

$$m_p((1+\tau_p)p_p^*) = m_p^*(p_p^*) \quad \forall p \in G_m, \tag{4}$$

where $m_p$ represents home's import demand written as a function of the domestic price, $p_g = (1+\tau_p)p_p^*)$, and $m_p^*$ is the rest of the world's export supply. From this we obtain prices as functions of the trade policy, i.e., $p_p(\tau_p)$, $p_p^*(\tau_p^*)$.

A government choosing the tariff to maximize (3) will set it according to the following first order conditions:

$$\tau_p p_p^* \frac{dm_p}{d\tau_p} - m_p \frac{dp_p^*}{d\tau_p} = 0 \quad \forall p \in G_m. \tag{5}$$

With the first term representing the domestic distortion caused by the negative impact of tariffs on import levels. The second term represents the terms-of-trade effect. If the country has no market power in trade, i.e., if the export supply elasticity is infinite, then $dp_p^*/d\tau_p = 0$, and the optimal tariff is zero[2] . Otherwise, the optimal tariff is positive and can be shown to equal the inverse export supply elasticity:

$$\tau_p^{opt} = \omega_p \equiv \left[\left(\frac{dm_p^*}{dp_p^*}\right)\left(\frac{p_p^*}{m_p^*}\right)\right]^{-1}. \tag{6}$$

## 2.2 Unilateral optimal tariffs and political economy considerations

The positive relationship between tariffs and market power can be generalized to more realistic settings. The relationship holds *even* when governments are not immune for political pressures and governments accept contributions from lobby groups instead of acting as benevolent servants of the public interest. Even though the terms-of-trade argument is often associated with a welfare-maximizing government, the (partial) positive relationship between tariffs and market power holds also when the government places no weight on social welfare at all.

When we allow for political economy considerations, the government objective function now becomes $aW_p + \lambda_p \pi_p$, with the last term representing lobbying contributions from organized lobbies representing importing firms. Grossman and Helpman (1995a) show that the non-cooperative tariff the government chooses in this case is

$$\tau_p^{GH} = \omega_p + \lambda_p \frac{z_p}{\sigma_p}, \tag{7}$$

with $\lambda_p = \frac{I_p - \alpha}{a+\alpha}$, $I_p$ 1 if a sector is politically organized, $a$ the weight the government places on aggregate social welfare relative to contributions, $\alpha$ the fraction of the population that owns the specific input used to produce product $p$ and $z_p$ the inverse import penetration ratio, i.e. domestic sales of good $p$ divided by total imports of good $p$. The tariff for an organized group is increasing in the inverse import penetration ration, because a given tariff generates larger benefits for a factors owner if it applies to more units sold. The tariff depends negatively on the import demand elasticity because the tariff's distortion is increasing in $\sigma_p$ once we account for the terms-of-trade effect.

[2]The popular version of this argument is that small countries cannot influence their terms of trade, while big countries can. Both are sides to the same coin, as market power is correlated with the size of a country, i.e. larger countries will on average have higher market power than smaller countries. However, note that market power is product-specific, while country size is not. There is a lot of variation in market power across goods for a given country. This explains why Broda, Limão and Weinstein (2008) find that even small countries can have considerable market power. This is especially true for differentiated goods.

### 2.3 Trade agreements and optimal tariffs

When we allow for free trade agreements, the objective function of the domestic government changes as follows

$$aW_p + \lambda_p \pi_p + \psi_p \pi_p^{EXP} + \phi_p \pi_p^{FTA} \tag{8}$$

with $\psi_p$ the political clout of exporting firms, $\pi_p^{EXP}$ own export profits, $\phi_p$ the governments concern about the interests of its FTA partner, and $\pi_p^{FTA}$ export profits of the FTA partner. We allow $\lambda_p$ to be different from $\psi_p$. These weights can represent lobbying efforts as in Grossman and Helpman (1995a, 1995b), but they are also consistent with other political economy models such as the median-voter framework or labor union lobbying (see for example Baldwin (1987) and Helpman (1997)). The last term represents the bargaining power the FTA partner has to assure its exporters of preferential access to country $i$'s market.

Ludema and Mayda (2013) show that in this case, the negotiated tariff equation becomes

$$\tau_p^N = \frac{\omega_p(1 - \sum \psi_p s_p) + \frac{\lambda_p}{\sigma_p} z_p - \frac{1-\phi_p}{\sigma_p} s_p}{1 - \frac{\lambda_p}{\sigma_p} z_p + \frac{1-\phi_p}{\sigma_p} s_p} \tag{9}$$

with $s_p$ the import share of the partner country, i.e. imports from the partner country of good $p$ divided by total imports of good $p$. The negotiated tariff is increasing in $\frac{\lambda_p}{\sigma_p} z_p$, which captures the political influence of import-competing firms. It is decreasing in $\sum \psi_p s_p$, which measures the political influence of exporting firms. Exporting firms have two reasons to prefer low domestic tariffs. First of all, to the extent that firms import their inputs from abroad, domestic import tariffs will equal a higher cost structure for the exporting firm. Second, domestic protection will induce partner countries to also protect their industries, hence lowering market access of the domestic exporters. The influence of FTA partners, $\frac{1-\phi_p}{\sigma_p} s_p$, is ambiguous in sign. If the concern for the FTA partner is small, i.e. $\phi_p < 1$, then the negotiated tariff is decreasing in the FTA share of imports. While if it is large, i.e. $\phi_p > 1$, it is increasing.

## 3 Methodology

In order to test the terms-of-trade hypothesis for free trade agreements, we cannot simply use the negotiated tariff as a dependent variable, as studies examining the terms-of-trade hypothesis in the context of the WTO do. This because the purpose of free trade agreements is to abolish tariffs between countries, and our dependent variable would hence consist of a zero matrix. We therefore shift our focus from tariffs on all products, to products getting special treatment in FTAs.

In one of their seminal works, Grossman and Helpman (1995b) developed a theoretical framework that identifies the conditions for which an FTA between two countries can be politically viable. Crucial in their analysis, is the stance of industries towards the FTA. In their model, industries that are expected to lose (gain) from the potential FTA, will try to lobby the government of their country to oppose (support) the FTA. The degree to which they are successful, depends a.o. on whether they are politically organized, their political weight, what the stance is of other lobbies and how much the government cares about lobbies. They show that, for an FTA to be viable, the amount of industries in each country respectively that stands to gain from the agreement needs to be sufficiently "balanced", as this creates the best opportunity for exporting interests to overcome opposition to the FTA from import-competing producers. If not, industries that stand to lose a lot from the FTA will be able to successfully lobby their governments stance on the FTA.

Staging categories can be used to shift this balance. By allowing countries to exclude certain products, impose quotas or have (long) phase-out periods that give industries time to adjust, governments can capture the support of some potential losers, while at the same time winning the favor of exporters who would benefit from the agreement. This is exactly what we see in real world trade agreements. Trade agreements are not simply absent or present between a country pair. Most trade agreements do not foresee in complete free trade between the partners once the agreement comes into force. Rather, trade agreements typically consist of pages and pages of appendices[3], describing the liberalization path for each product or tariff line. This liberalization path consists of a tariff base rate (fixed or ad valorem or both) from which the liberalization will take place, and the staging category (in trade agreements with the European Union, there are typically between 10 and 25 different staging categories) determining the exact number of months and subsequent percentage tariff reduction. Not all products however get liberalized completely, and hence these appendices typically also contain clauses on quotas, entry price systems, exceptions, etc. for certain goods. Policy makers thus have a lot of options to tailor a trade agreement to their exact needs and wishes.

We will exploit this to evaluate the validity of the augmented terms-of-trade hypothesis when it comes to explaining trade agreements. We will first look at the relationship between market power and product exclusions, on the one hand, and the length of the phase-out periods, on the other hand, and then include political economy considerations.

### 3.1 Construction of the dependent variables

From the appendices of the trade agreements, we can easily construct a couple of variables capturing the level of protection a product will get: (1) an indicator variable indicating if a product is excluded from complete liberalization (2) an indicator variable indicating if a product was already completely duty-free (3) an indicator variable indicating if a product is liberalized immediately (4) an indicator variable indicating if a product is phased-in (5) a continuous variable indicating the speed of preferential liberalization, measured by the number of months to achieve zero tariffs (6) a continuous variables indicating the customs duties for a product during the liberalization period. Variables (1) to (5) are constant over time, while variable (6) is time dependent.

In certain agreements, goods are not liberalized along a linear path (in equal stages) but are kept at or close to their base rate for a longer time. Here, the liberalization is kept limited in the first years after the agreement entered into force. This reflects a higher political sensitivity than a liberalization in equal stages. In order to take this into account, we build on Adriaensen

[3]The tariff elimination schedule of the EU-South Korea FTA, for example, is a whopping 1050 pages long. This does not include additional appendices on extra procedures, rules or exceptions.

and Kerremans (2013) and construct a variable to measure the liberalization path of a product.

$$Libpath = \frac{1}{t_{max}} \sum_{t=0} \frac{\tau_t}{\tau_0} \tag{10}$$

with $t_{max}$ the maximum liberalization time across agreements (in months), $\tau_t$ the tariff at time $t$ and $\tau_0$ the baserate. *Libpath* has a range between 0 and 1. At its lower bound, products are liberalized immediately, while at the upper bound the product is excluded from liberalization. For two categories with an equally long phase-out period, we can expect a higher score on *libpath* in case backloading is involved.

As trade agreement data only shares the same classification until the 6-digit level, we need to aggregate them up. This will allow us to compare data across agreements, and match the trade agreement data with data on trade flows. To do so, we convert variables (1)-(4) from indicator variables to the proportion of tariff lines within an HS6-code having certain characteristics[4] (i.e. instead of an indicator variable indicating whether or not a product is excluded from liberalization, we now obtain a variable indicating the proportion of excluded tariff lines for each HS6-code). For variable (5), (6), and *libpath* we can take simple averages. For variable (5), this of course leads to numbers of months that does no longer correspond exactly to any staging category.

### 3.2 Estimating market power

Measuring importer market power is conceptually very straightforward: it is equal to the inverse elasticity of export supply. However, estimating importer market power has proven to be slightly more difficult. According to Broda, Limão and Weinstein (2008), this is the key reason why the impact of market power on tariffs has not been examined before. Most estimates of trade elasticities simply assume that countries face an infinitely elastic supply of exports and therefore estimate only import demand elasticities.

It is only since the seminal contribution of Broda, Limão and Weinstein (2008) that a methodology is available to estimate (the inverse) export supply elasticity on the product-level for a multitude of countries. Earlier attempts were made by Irwin (1988) estimating the export supply and import demand elasticity at the aggregate level for the UK, Feenstra (1994) reporting both elasticities for eight specific products for the US, Broda and Weinstein (2006) estimating import demand elasticities for a range of imports for the US but not export supply elasticities and Romalis (2007) estimating both elasticities at the aggregate level for the US.

Broda, Limão and Weinstein (2008) estimate the import demand elasticity ($\sigma_{ip}$) and inverse export supply elasticity ($\omega_{ip}$) using a system of import and export equations. The system can be derived in a setting where any imported product is valued according to a CES utility function and supply is perfectly competitive. They derive the following optimal demand of country $i$ for a given variety $v$ of a product $p$ and the residual export supply country $i$ faces for that variety:

$$\Delta^{k_i p} \ln s_{ipvt} = -(\sigma_{ip} - 1)\Delta^{k_{ip}} \ln p_{ipvt} + \varepsilon^{k_{ip}}_{ipvt}, \tag{11}$$

[4] Another option would have been to calculate for each variable the mode by HS6-code and assign that value to the HS6-code. The number of tariff lines, however, does not indicate how important a tariff line is in value of trade, hence introducing bias to the data.

$$\Delta^{k_i p} \ln p_{ipvt} = \frac{\omega_{ip}}{1+\omega_{ip}} \Delta^{k_{ip}} \ln s_{ipvt} + \delta_{ipvt}^{k_{ip}} \tag{12}$$

with $p_{ipt}$ the domestic price of variety $v$ of product $p$ imported by country $i$ in year $t$, $s_{ipvt}$ the share of variety $v$ of product $p$ in country $i$, $\varepsilon_{ipvt}$ demand shocks and $\delta_{ipvt}$ supply shocks. Both equations are differenced with respect to time $t$ and a benchmark variety of the same product $p$ imported by $i$, denoted $k_{ip}$.

Assuming that both elasticities are constant over varieties and the defined time period, and that demand and supply shocks relative to the benchmark variety $k_{ip}$ are uncorrelated, i.e. $E_t(\varepsilon_{ipvt}\delta_{ipvt}) = 0$, equations (11) and (12) yield the following solution:

$$Y_{ipv} = \theta_{ip1} X_{1,ipv} + \theta_{ip2} X_{2,ipv} + u_{ipv}, \tag{13}$$

where $\theta_{ip1} = \frac{\omega_{ip}}{(1+\omega_{ip})(\sigma_{ip}-1)}$, $\theta_{ip2} = \frac{\omega_{ip}(\sigma_{ip}-2)-1}{(1+\omega_{ip})(\sigma_{ip}-1)}$, $u_{ipvt} = \frac{\varepsilon_{ipvt}^{k_{ip}} \delta_{ipvt}^{k_{ip}}}{\sigma_{ip}-1}$, $Y_{ipvt} = (\Delta^{k_{ip}} \ln p_{ipvt})^2$, $X_{1,ipvt} = (\Delta^{k_{ip}} \ln s_{ipvt})^2$, and $X_{2,ipvt} = (\Delta^{k_{ip}} \ln p_{ipvt} \Delta^{k_{ip}} \ln s_{ipvt})$.

Feenstra (1994) shows that a consistent estimator of $\theta_{1,ip}$ and $\theta_{2,ip}$ can be obtained by averaging (13) over time:

$$\overline{Y}_{ipv} = \theta_{ip1} \overline{X}_{1,ipv} + \theta_{ip2} \overline{X}_{2,ipv} + \overline{u}_{ipv}, \tag{14}$$

with the bars denoting time averages. Note that the double differencing is also useful in controlling for other factors that could otherwise induce a correlation of the error terms. In order to identify $\sigma_{ip}$ and $\omega_{ip}$, three varieties or more are needed per importer-good pair. While data on prices and shares of a single variety can pin down a relationship between $\sigma_{ip}$ and $\omega_{ip}$, they are insufficient to determine the exact value of these elasticities. Given that the true $\sigma_{ip}$ and $\omega_{ip}$ are assumed constant across varieties of the same good, Feenstra (1994) shows that the true underlying elasticities are exactly identified when there are three varieties per $ip$ pair that are sufficiently different in their second moments.

Our estimation strategy is as follows. We start by estimating equation (14) for each importer-good pair to obtain $\hat{\theta}_{1,ip}$ and $\hat{\theta}_{2,ip}$. We then calculate $\hat{\sigma}_{ip}$ and $\hat{\omega}_{ip}$ using our estimates for $\hat{\theta}_{1,ip}$ and $\hat{\theta}_{2,ip}$ and check that the elasticities are economically feasible, i.e. $\sigma_{ip} > 1$ and $\omega_{ip} > 0$. When we obtain more than one estimate of $\sigma_{ip}$ or $\omega_{ip}$ that is economically feasible, we take the average of both values.

We use unit values and import values as indications of $p_{ipt}$ and $s_{ipvt}$, respectively. As the trade agreements in our sample enter into force at different times, we calculate separate measures of market power for each trade agreement using the five years of trade data prior to entry into force[5]. The definitions of a good and a variety are dictated by data availability. The more disaggregated the choice of good, the fewer varieties per good there are, and hence the more imprecise the estimates (potentially) are. The more aggregated the choice of the good, the

[5]Take for example the FTAs between the EU and Mexico and the EU and Korea. The former entered into force in 2000, while the latter only entered into force 11 years later. When we estimate elasticities for the EU, we therefore use trade data from 1994 to 1999 for the EU-Mexico agreement, and 2005 to 2010 for the EU-Korea FTA. Not only is this method more precise, it also helps us avoid endogeneity issues because of reverse causality.

less informative the estimated elasticities will be. Given that the rest of our dataset contains information on the HS6-level, we follow Broda, Limão and Weinstein (2008) in defining a good as a HS4 category, and a variety as a HS6 category.

### 3.3 Estimation strategy

Taking the first-order Taylor approximation of equation (9), we obtain the following tariff equation:

$$\tau_p^N = \omega_p(1 - \sum \psi_p s_p) + \frac{\lambda_p}{\sigma_p} z_p - 1 - \phi_p \frac{s_p}{\sigma_p} \tag{15}$$

Replacing the optimal tariff with either the proportion of excluded tariff lines per HS6 product or the liberalization path of the product, we can write the general econometric model we will estimate as follows:

$$depvar_{ipv} = \beta_1 f(\omega_{ip}) + \mathbf{Z}_{is} + \mathbf{Z}_i + \mathbf{Z}_{iv} + \varepsilon_{ipv} \tag{16}$$

with $\mathbf{Z}_{is}$ a vector of political economy variables, $\mathbf{Z}_i$ country characteristics, $\mathbf{Z}_{iv}$ product characteristics and $\varepsilon_{ipv}$ the error term. Although the theory predicts a linear relationship between market power and tariffs, we follow Broda, Limão and Weinstein (2008) by estimating different functional forms, as there are theoretical and economical reasons to expect the true effect to diminish at higher levels of market power.

We start by evaluating the relationship between market power and our dependent variables. To do this in a parsimonuous way, we abstract of any political economy variables, and instead include fixed effects. This has the advantage of allowing us to use a maximum number of observations. We estimate our model using country fixed effects, country and sector fixed effects, and country-sector fixed effects. As our measure of market power, we use the coefficients we have estimated using the method outlined in the previous section. In order to account for the (potential) diminishing impact of market power, we also include the square of market power in one regression. To address the skewness of market power, we also estimate the regression using a semi-log specification, i.e. $f(\omega) = \ln(\omega)$. Finally, to account for the outliers of our elasticity estimates, we create a dummy variable equal to 1 if the inverse export elasticity estimate is in the top two thirds of all products' estimates within the same country and use that in our estimation.

In a second stage, we include political economy variables. As political pressure is unobserved, we have to be creative with the use of proxy variables. First, we follow Ludema and Mayda (2013) and attempt to capture domestic political pressure by using a sector dummy for $\lambda_{ip}$ and $\phi_{ip}$. We interact the former with $\frac{z_{ip}}{\sigma_{ip}}$ and the latter with $s_p$. We measure the inverse penetration ratio as value-added minus exports divided by total imports. Secondly, we use tariffs as a proxy for $\lambda_{ip}$ and $\phi_{ip}$, as did Damuri (2012). High MFN tariffs for a product could indicate that firms were successful in lobbying the government for protection. We can therefore assume that industries that were successful at obtaining protection for a good, will want to maintain protection on this good. In both specifications, we include the interaction of the FTA share of imports with the inverse import demand elasticity as a measure of the last term of equation 16.

# 4 Data

This paper uses two main datasets. Our database contains very detailed information on 15 recent trade agreements (see table 6 in the appendix for a list of all trade agreements included). Our sample includes free trade agreements between countries in Asia, North America, Central and South America, Europe and Oceania. We did not include any FTA with an African country in our sample, as data availability for estimating market power is poor. To ensure enough variation across agreements, we included FTAs with large countries (such as the US, EU and China) as well as smaller countries (Panama and Peru), and developed as well as less-developed countries. We included FTAs between two small countries as well as FTAs between a large and a small country. We also included FTAs between developed-developing country pairs, as well as developed-developed and developing-developing country pairs.

We constructed our database at the HS6-level. This is the most detailed level for which we can compare both sides of each agreement, as the tariff lines for a more detailed level are constructed using each country's own custom codes (such as the 8-digit Common Nomenclature (CN) for the EU or the 10-digit Harmonised Tariff Schedule of Korea (HSK)). Moreover, on this level, it is possible to match all trade agreement data with matching international trade statistics.

Data on the negotiated tariff liberalization schedules come straight from the trade agreements themselves, and have been coded by Adriaensen and Kerremans (2013). Their paper describes the coding process and their dataset in more detail. While in principal the coding of these agreements is rather straightforward, in practice it is not. Some tariff lines have special clauses or missing values, while for other products there is positive trade between the two countries, but there is no corresponding tariff line.

We encountered 6 coding possibilities: (1) both baserate and staging category are given (2) both baserate and staging category are given, however the staging category includes a clause that prohibits the complete liberalization of the product such as entry price systems, tariff quota, etc. (3) the baserate is zero at the start of the agreement and hence no staging category is necessary (4) it is explicitly stated that the product is excluded from liberalization (5) either the baserate or staging category is missing or (6) the tariff line is not included in the appendix.

In this paper, we classify all products in category (2) as excluded (this in contrast to Damuri (2012) for example, who decide to only code tariff lines as excluded from liberalization if the quota for the good in question is less than 50% of its bilateral imports). Moreover, the coding of categories (1) and (3) is very straightforward. However, the coding of categories (5) and (6) is difficult as the meaning of and the motivation for the missing data is not clear.

Data on trade flows comes from COMTRADE. Our dataset includes yearly detailed HS6-level trade flows for the period 1995-2014.

# 5 Results

This section presents our main results. Section 5.1 focuses on market power, while 5.2 discusses political economy considerations.

Table 1: Proportion of tariff lines by staging category.

(a) Non-agricultural products

| Agreement | Reporter | | | | Partner | | | |
|---|---|---|---|---|---|---|---|---|
| | A | I | P | E | A | I | P | E |
| Australia-Chile | 41.8% | 47.5% | 10.6% | 0.0% | 0.7% | 96.0% | 3.3% | 0.0% |
| Chile-Panama | 99.7% | 0.0% | 0.0% | 0.3% | 32.7% | 32.4% | 34.9% | 0.0% |
| EU-Chile | 71.3% | 17.1% | 11.5% | 0.0% | 0.5% | 93.1% | 5.8% | 0.6% |
| EU-Korea | 27.9% | 69.5% | 2.6% | 0.0% | 17.9% | 72.1% | 9.6% | 0.4% |
| EU-Mexico | 56.7% | 11.4% | 31.7% | 0.3% | 14.9% | 27.7% | 56.6% | 0.8% |
| EU-Peru | 27.8% | 71.8% | 0.1% | 0.3% | 56.3% | 24.5% | 19.2% | 0.1% |
| Peru-Canada | 49.3% | 30.3% | 20.3% | 0.1% | 57.6% | 42.1% | 0.3% | 0.0% |
| Peru-China | 55.9% | 4.8% | 29.8% | 9.5% | 8.7% | 58.7% | 27.6% | 5.1% |
| Peru-Mexico | 1.7% | 84.5% | 13.5% | 0.3% | 18.6% | 68.7% | 12.1% | 0.5% |
| Peru-Panama | 56.2% | 22.0% | 21.6% | 0.2% | 33.2% | 24.7% | 41.7% | 0.4% |
| US-Australia | 7.6% | 70.7% | 21.5% | 0.2% | 0.0% | 72.8% | 27.2% | 0.0% |
| US-Chile | 1.0% | 95.2% | 3.8% | 0.0% | 0.3% | 93.1% | 6.7% | 0.0% |
| US-Colombia | 0.8% | 98.8% | 0.3% | 0.0% | 0.2% | 75.4% | 24.4% | 0.0% |
| US-Korea | 2.8% | 76.6% | 20.6% | 0.0% | 0.0% | 87.9% | 12.1% | 0.0% |
| US-Peru | 0.8% | 98.8% | 0.4% | 0.0% | 0.0% | 81.4% | 18.5% | 0.0% |

(b) Agricultural products

| Agreement | Reporter | | | | Partner | | | |
|---|---|---|---|---|---|---|---|---|
| | A | I | P | E | A | I | P | E |
| Australia-Chile | 74.9% | 24.9% | 0.3% | 0.0% | 0.0% | 95.2% | 4.4% | 0.4% |
| Chile-Panama | 99.3% | 0.0% | 0.0% | 0.7% | 14.4% | 47.1% | 21.2% | 17.3% |
| EU-Chile | 22.2% | 7.1% | 45.7% | 24.9% | 0.0% | 86.0% | 11.4% | 2.6% |
| EU-Korea | 13.9% | 68.9% | 14.8% | 2.4% | 2.7% | 28.2% | 65.0% | 4.0% |
| EU-Mexico | 12.6% | 7.4% | 42.2% | 37.8% | 9.7% | 35.2% | 25.5% | 29.6% |
| EU-Peru | 15.4% | 63.9% | 3.0% | 17.7% | 16.2% | 36.7% | 34.1% | 13.0% |
| Peru-Canada | 12.7% | 43.9% | 33.5% | 9.9% | 42.4% | 49.2% | 0.5% | 7.9% |
| Peru-China | 16.6% | 56.3% | 27.1% | 0.0% | 8.0% | 20.2% | 64.2% | 7.6% |
| Peru-Mexico | 5.5% | 29.1% | 43.2% | 22.2% | 10.5% | 24.3% | 44.8% | 20.4% |
| Peru-Panama | 38.8% | 28.7% | 19.8% | 12.8% | 17.7% | 35.0% | 28.9% | 18.4% |
| US-Australia | 1.0% | 48.0% | 24.4% | 26.6% | 0.0% | 100.0% | 0.0% | 0.0% |
| US-Chile | 2.1% | 79.1% | 18.8% | 0.0% | 0.0% | 73.4% | 26.6% | 0.0% |
| US-Colombia | 0.0% | 94.7% | 5.3% | 0.0% | 4.4% | 74.5% | 21.1% | 0.0% |
| US-Korea | 1.5% | 44.3% | 54.2% | 0.0% | 0.0% | 28.1% | 71.0% | 1.0% |
| US-Peru | 0.8% | 90.9% | 4.1% | 4.2% | 0.0% | 50.5% | 49.5% | 0.0% |

With A already duty-free, I immediate, P phased-in and E exception.

### 5.1 Market power

Results using the percentage of excluded tariff lines per product as a dependent variable are presented in table 2, while results using the liberalization path of products are presented in table 3. The first set of regressions (columns (1)-(6)) is estimated using ordinary least squared, while the remainder of the regressions are estimated using a probit regression. The first two sets include all products, while the last set of regressions only uses non-agricultural products. Estimations including country fixed effects, country and sector fixed effects or country-sector fixed effects yield very similar results.

Table 2: Market power and product exclusions in free trade agreements.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OLS - All products | | | | | | Probit - All products | | | | | | Probit - Non-agricultural products only | | | | | |
| $\omega$ | -0.0000** | | | -0.0000*** | | | -0.0138** | | | -0.0138** | | | -0.0067 | | | 0.0150 | | |
| | (0.000) | | | (0.000) | | | (0.006) | | | (0.006) | | | (0.006) | | | (0.017) | | |
| High $\omega$ | | 0.0048** | | | | | | 0.1581*** | | | | | | 0.3263*** | | | | |
| | | (0.002) | | | | | | (0.048) | | | | | | (0.084) | | | | |
| Ln($\omega$) | | | -0.0013** | | | | | | -0.0120 | | | | | | 0.0181 | | | |
| | | | (0.001) | | | | | | (0.015) | | | | | | | (0.022) | | |
| $\omega^2$ | | | | 0.0000*** | | | | | | 0.0000** | | | | | | -0.0005* | | |
| | | | | (0.000) | | | | | | (0.000) | | | | | | (0.000) | | |
| $\omega$' | | | | | 0.0031 | | | | | | 0.1903** | | | | | | 0.3626*** | |
| | | | | | (0.004) | | | | | | (0.076) | | | | | | (0.120) | |
| $\omega'^2$ | | | | | -0.0013 | | | | | | -0.0586*** | | | | | | -0.1235*** | |
| | | | | | (0.001) | | | | | | (0.021) | | | | | | (0.033) | |
| Ln($\omega$') | | | | | | 0.0006 | | | | | | 0.0406* | | | | | | 0.0339 |
| | | | | | | (0.001) | | | | | | (0.022) | | | | | | (0.030) |
| Observations | 20,039 | 20,039 | 20,039 | 20,039 | 18,014 | 18,014 | 16,669 | 16,669 | 16,669 | 16,669 | 14,996 | 14,996 | 8,805 | 8,805 | 8,805 | 8,805 | 7,796 | 7,796 |

Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.10. Dependent variable: percentage of excluded tariff lines by HS6-product. Only tariff lines that were not already duty-free are considered. ' denotes variables without outliers (top 10 percentile by country). All estimations include country and sector fixed effects. Estimations with country fixed effects only, or country-sector fixed effects yield very similar results. Results can be retrieved upon request. Sectors are defined as chapters of the Harmonised System.

Table 3: Market power and the liberalization path of products in free trade agreements.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OLS - All products | | | | | | Probit - All products | | | | | | Probit - Non-agricultural products only | | | | | |
| $\omega$ | -0.0000*** | | | -0.0000*** | | | -0.0005 | | | -0.0006 | | | -0.0003 | | | -0.0004 | | |
| | (0.000) | | | (0.000) | | | (0.000) | | | (0.000) | | | (0.000) | | | (0.000) | | |
| High $\omega$ | | 0.0056** | | | | | | | 0.0430** | | | | | | 0.0511** | | | |
| | | (0.002) | | | | | | | (0.021) | | | | | | (0.023) | | | |
| Ln($\omega$) | | | -0.0021*** | | | | | | | -0.0197*** | | | | | | -0.0135* | | |
| | | | (0.001) | | | | | | | (0.007) | | | | | | (0.008) | | |
| $\omega^2$ | | | | 0.0000*** | | | | | | 0.0000 | | | | | | 0.0000 | | |
| | | | | (0.000) | | | | | | (0.000) | | | | | | (0.000) | | |
| $\omega$' | | | | | | 0.0018 | | | | | | -0.0002 | | | | | | 0.0012 |
| | | | | | | (0.003) | | | | | | (0.033) | | | | | | (0.037) |
| $\omega'^2$ | | | | | | -0.0006 | | | | | | 0.0028 | | | | | | 0.0042 |
| | | | | | | (0.001) | | | | | | (0.009) | | | | | | (0.010) |
| Ln($\omega'$) | | | | | 0.0009 | | | | | | 0.0092 | | | | | | 0.0117 | |
| | | | | | (0.001) | | | | | | (0.010) | | | | | | (0.011) | |
| Observations | 24,214 | 24,214 | 24,214 | 24,214 | 21,643 | 21,643 | 24,214 | 24,214 | 24,214 | 24,214 | 21,643 | 21,643 | 20,191 | 20,191 | 20,191 | 20,191 | 17,872 | 17,872 |

Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.10. Dependent variable: liberalization path of products (see text for definition). Only tariff lines that were not already duty-free are considered. All estimations include country and sector fixed effects. Estimations with country fixed effects only, or country-sector fixed effects yield very similar results. Results can be retrieved upon request. Sectors are defined as HS chapters.

Looking at estimations of a linear relationship between market power and product exclusion, there seems to be a negative correlation between both. This when using OLS as well as a probit estimation. This is at odds with the theory. Including the square of market power in the estimation, does not change this when including all products in the estimation. However, the coefficient for $\omega$ turns positive (though not statistically significant) when excluding agricultural products.

The negative coefficients are probably due to outliers in the elasticity estimates. When we use a dummy for products with high market power, the results are positive and statistically significant across all three sets of estimations. Excluding outliers[6], we confirm these findings. Now the coefficient for $\omega$ is positive (though not statistically significant across all specifications). Including $\omega^2$ in the estimation, we find that the coefficient for the square term is negative, i.e. the impact of market power on the probability of a product of being exempted from liberalization is indeed diminishing in market power.

We find a similar story for the liberalization path of a product, even though the link with market power is slightly weaker. Products for which a country has a higher market power tend to be liberalized slower, this either by allowing for longer phase-out periods of the product, or by backloading the tariff reductions.

### 5.1.1 Robustness check

Our estimates for market power contain lots of missing values. Our baseline results are therefore estimated using only part of our trade agreement data. Even though we do not have any reason to believe that the missing values will induce a systemic bias in our results, we do perform some robustness checks including our full sample. Broda, Limão and Weinstein (2008) show that log GDP, the Rauch index[7] and the importing country's share of world imports by product are determinants of the inverse export supply elasticity. We use these measures as proxy variables for market power in our specifications.

Table 4: Robustness check.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Exclusions | | | Liberalization path | | |
| $\text{Ln}(\text{GDP}_i)$ | 0.0236*** | | | -0.0568*** | | |
| | (0.008) | | | (0.003) | | |
| Differentiated | | -0.1542*** | | | 0.1728*** | |
| | | (0.030) | | | (0.012) | |
| Import share | | | 0.2421*** | | | 0.0308 |
| | | | (0.078) | | | (0.049) |
| Observations | 82,426 | 73,651 | 76,660 | 107,320 | 102,225 | 100,204 |

Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.10. The dependent variables are either the percentage of excluded tariff lines by HS6-product or the liberalization path of a product. All estimations use a probit estimator and include sector fixed effects. Sectors are defined as chapters of the Harmonised System.

Results are presented in table 4. The first set of estimations (column (1)-(3)) uses product

[6] We define outliers as values that are higher than the 90th percentile for each country.

[7] Data on GDP is coming from World Development Indicators, while data on the Rauch classification of goods comes from Rauch (1999). We use the conservative Rauch classification, and construct a dummy taking value 1 if a good is differentiated.

exclusions as a dependent variable, while the second set uses liberalization path. Both sets are estimated using a probit estimation.

Overall, the results seem to suggest that there is no systematic bias produced by missing values of our elasticity estimates and support the terms-of-trade hypothesis. We find a positive relationship between product exclusions and GDP and import share, respectively. However, the coefficient for differentiated goods is negative and statistically significant. For liberalization path, we find a negative coefficient for the log of GDP, and a positive coefficients for differentiated goods. Both coefficients are statistically significant. Import share is positive, but small and not statistically significant.

### 5.2 Political economy

Results are presented in table 5. The first set of estimations uses the percentage of excluded tariff lines per product as a dependent variable, while the second set uses the liberalization path of a product, and finally, the third set uses the phase-out period of a product (number of months before the product is completely liberalized). The first two sets are estimated using a probit estimation, while the last set is estimated using a tobit regression with truncation point zero. All estimations include country and sector fixed effects.

We find that the positive relationship between market power and product exclusions is robust to including political economy considerations. All specifications have positive signs for the market power coefficient, and negative signs for the squared market power term. The probability of excluding a product from liberalization in a trade agreement is higher the more market power a country has for a given good, but the relationship is not linear, rather it is diminishing in market power.

Looking at the impact of market power on the liberalization path of a product, we no longer find the expected positive relationship. Rather, when we include policy considerations into the estimation, we find a negative relationship between market power and the liberalization path of a product, i.e. a higher inverse export supply elasticity for a given good is associated with a higher degree of liberalization for that good. This is probably due to longer phase-out periods for goods with higher market power. Looking at the last set of estimations, we find a strong negative relationship between market power and the number of months before a good is completely liberalized. Goods that have higher market power tend to have shorter phase-out periods when we include political economy variables.

Finally, we include variables to control for reciprocity in trade agreements. Van den Hove (2013) notes that EU negotiations with Peru and other countries in Central and South America have been based on reciprocity of trade concessions and conditions for goods and services. We distinguish two types of reciprocity: broad and narrow. We define narrow reciprocity as all partners of a trade agreement obtaining similar trade concessions on the same goods (i.e. if one country excludes a product from liberalization, the partner country will also get a similar concession for that product). Broad reciprocity involves the exchange of concessions for one good for concessions on another good or more general concessions, such as labor and environmental provisions. To measure the impact of broad reciprocity, we include the number of WTO+ and WTOX provisions in the trade agreement as a variable in the estimations. To measure narrow

Table 5: Free trade agreements, market power and political economy considerations.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | | | | Exlusions - probit | | | | |
| $\omega$' | 0.4418* | 0.5299** | 0.3583 | 0.4274 | 1.2290*** | 1.2290*** | 1.6634*** | 1.6634*** |
| | (0.231) | (0.241) | (0.273) | (0.276) | (0.367) | (0.367) | (0.422) | (0.422) |
| $\omega'^2$ | -0.1440* | -0.1692** | -0.0847 | -0.0995 | -0.2904*** | -0.2904*** | -0.3924*** | -0.3924*** |
| | (0.077) | (0.082) | (0.077) | (0.077) | (0.102) | (0.102) | (0.113) | (0.113) |
| $IS/\sigma$ | 5.4317*** | 229.4672** | 26.6414 | -92.1095 | 72.0487 | 72.0487 | -102.8417 | -102.8417 |
| | (1.402) | (101.772) | (28.192) | (74.192) | (131.069) | (131.069) | (194.139) | (194.139) |
| $\tau * z/\sigma$ | | | 0.0000 | 0.0000 | | | | |
| | | | (0.000) | (0.000) | | | | |
| $\tau * IS$ | | | | 0.9006*** | | | | |
| | | | | (0.335) | | | | |
| WTO+ and WTOX | | | | | -0.1914*** | | -0.0782* | |
| | | | | | (0.040) | | (0.043) | |
| WTOX | | | | | | -0.3191*** | | -0.1304* |
| | | | | | | (0.067) | | (0.072) |
| Partner | | | | | | | 1.6091*** | 1.6091*** |
| | | | | | | | (0.314) | (0.314) |
| | | | | Liberalization path - probit | | | | |
| $\omega$' | 0.0009 | 0.0099 | -0.0556 | -0.0362 | -0.2575*** | -0.2572*** | -0.2360*** | -0.2363*** |
| | (0.054) | (0.055) | (0.069) | (0.069) | (0.081) | (0.081) | (0.082) | (0.082) |
| $\omega'^2$ | 0.0096 | 0.0072 | 0.0355** | 0.0314* | 0.0840*** | 0.0839*** | 0.0695*** | 0.0697*** |
| | (0.015) | (0.015) | (0.018) | (0.018) | (0.023) | (0.023) | (0.023) | (0.023) |
| $IS/\sigma$ | -10.3438** | -3.1329 | 2.2744 | -50.6003** | 35.6052 | 33.5957 | 32.6644 | 31.3199 |
| | (4.872) | (16.471) | (5.213) | (19.762) | (35.683) | (35.429) | (38.535) | (38.361) |
| $\tau * z/\sigma$ | | | -0.0000 | -0.0000 | | | | |
| | | | (0.000) | (0.000) | | | | |
| $\tau * IS$ | | | | 0.6694** | | | | |
| | | | | (0.300) | | | | |
| WTO+ and WTOX | | | | | -0.0834*** | | -0.0565*** | |
| | | | | | (0.011) | | (0.012) | |
| WTOX | | | | | | -0.1511*** | | -0.1024*** |
| | | | | | | (0.019) | | (0.020) |
| Partner | | | | | | | 1.3591*** | 1.3495*** |
| | | | | | | | (0.183) | (0.184) |
| | | | | Phase-out period - tobit | | | | |
| $\omega$' | -1.6009 | -1.3306*** | -13.3338** | -12.7963** | -10.3599*** | -10.3599*** | -4.7254*** | -4.7254*** |
| | (3.742) | (0.432) | (6.495) | (6.501) | (0.609) | (0.605) | (0.755) | (0.754) |
| $\omega'^2$ | 0.9114 | 0.8596*** | 4.6310*** | 4.5056*** | 4.0206*** | 4.0206*** | 0.8723*** | 0.8723*** |
| | (0.971) | (0.097) | (1.578) | (1.580) | (0.141) | (0.141) | (0.174) | (0.175) |
| $IS/\sigma$ | -812.5445** | -536.6757*** | 186.3349 | -1242.4398 | 2177.5651*** | 2177.5651*** | 5710.4075*** | 5710.4075*** |
| | (369.043) | (96.684) | (392.803) | (1151.142) | (32.189) | (32.081) | (388.984) | (387.475) |
| $\tau * z/\sigma$ | | | -0.0000 | -0.0000 | | | | |
| | | | (0.000) | (0.000) | | | | |
| $\tau * IS$ | | | | 13.6726* | | | | |
| | | | | (7.997) | | | | |
| WTO+ and WTOX | | | | | -10.5476*** | | -4.7188*** | |
| | | | | | (0.063) | | (0.073) | |
| WTOX | | | | | | -17.5794*** | | -7.8647*** |
| | | | | | | (0.312) | | (0.349) |
| Partner | | | | | | | 0.6498*** | 0.6498*** |
| | | | | | | | (0.011) | (0.010) |
| $FE_i$ | yes | yes | yes | yes | yes | yes | yes | yes |
| $FE_s$ | yes | yes | yes | yes | yes | yes | yes | yes |
| $FE_s * z/\sigma$ | yes | yes | no | no | yes | yes | yes | yes |
| $FE_s * IS$ | no | yes | no | no | yes | yes | yes | yes |
| Observations set 1 | 4,047 | 4,047 | 2,266 | 2,266 | 1,659 | 1,659 | 1,256 | 1,256 |
| Observations set 2 | 8,995 | 8,995 | 5,933 | 5,933 | 5,399 | 5,399 | 5,019 | 5,019 |
| Observations set 3 | 7,119 | 7,119 | 4,702 | 4,702 | 4,042 | 4,042 | 2,904 | 2,904 |

Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.10. Only tariff lines that were not already duty-free are considered. Sectors are defined as chapters of the Harmonised System. Constant is ommitted to save space.

reciprocity, we include for each product the trade regime of that product for the partner country. So in our first set of regressions, we include the percentage of excluded tariff lines per product for the partner country, while in our second set we include the liberalization path of the partner country for a given product, and in the third set the phase-out period of the partner country's good.

Columns (5) and (6) present evidence on broad reciprocity, while columns (7) and (8) present some indications on narrow reciprocity. We find a negative and statistically significant relationship between the number of WTO+ and/or WTOX provisions and our three dependent variables. Hence, the more WTO+ and/or WTOX provisions are included in a free trade agreement, the lower the probability a product is excluded from liberalization, the higher the probability of backloading and the shorter its phase-out period. This rejects the broad reciprocity hypothesis. Countries do not seem to obtain more WTO+ and/or WTOX provisions when allowing for less liberal tariff conditions. Rather, countries that are already willing to go further when it comes to opening up trade in terms of free trade of goods, seem to also be more open to including more WTO+ and WTOX provisions. This in contrast to narrow reciprocity. The coefficient for *partner* is positive and statistically significant for all three sets of estimations. Products that are excluded for one country of an FTA, therefore have a higher probability of also being excluded for the partner country. Products that have a longer phase-out period in one country also tend to have a longer phase-out period in the partner country.

## 6 Conclusion

Even though the terms-of-trade hypothesis is more than a century old, evidence to support or reject the theoretical arguments has long been non-existing. This paper is the first paper to test the augmented terms-of-trade hypothesis in relation to bilateral trade agreements.

Our analysis proceeds in two stages. We start by evaluating the main prediction of the simple terms-of-trade theory, and then augment it with political economy considerations. We find strong support for the augmented terms-of-trade theory in explaining bilateral tariff negotiation outcomes. Using detailed data on 15 recently concluded FTAs, we find a strong link between market power and the probability of a product to be exempted from liberalization. Products with higher market power also tend to have longer phase-outs periods, i. e. they are liberalized slower over time. Moreover, including political economy considerations, such as lobbying and concern for the FTA partner, also results in findings that are consistent with the theory. Our results are robust to using different measures of market power and political economy variables.

While economists often assume that most countries are "small", i.e. they do not have market power, our results show that this is not the case. Even small countries have considerable market power for certain products, and manage to exclude these products from liberalization in free trade agreements.

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# 8 Appendix

Table 6: Free trade agreements included in dataset.

| **Agreement** | **Signature** | **Entry into force** |
|---|---|---|
| EU-Mexico FTA | 8 December 1997 | 1 July 2000 |
| EU-Chile FTA | 18 November 2002 | 1 February 2003 |
| EU-Korea FTA | 15 October 2009 | 1 July 2011 |
| EU-Peru FTA | 26 June 2012 | 1 March 2013 |
| US-Korea FTA | 30 June 2007 | 15 March 2012 |
| US-Chile FTA | 6 June 2003 | 1 January 2004 |
| US-Peru FTA | 12 April 2006 | 1 February 2009 |
| US-Australia FTA | 18 May 2004 | 1 January 2005 |
| US-Colombia FTA | 22 November 2006 | 15 May 2012 |
| Panama-Chile FTA | 27 June 2006 | 7 March 2008 |
| Panama-Peru FTA | 25 May 2011 | 1 May 2012 |
| Australia-Chile FTA | 30 July 2008 | 6 March 2009 |
| Mexico-Peru FTA | 6 April 2011 | 1 February 2012 |
| Canada-Peru FTA | 29 May 2008 | 1 August 2009 |
| Peru-China FTA | 28 April 2009 | 1 March 2010 |