Weak Governments and Trade Agreements*

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Abstract

The recent theoretical literature on the determinants of trade agreements has stressed the importance of political gains, such as credibility, as a rationale for trade agreements. The empirical literature, however, has lagged behind in the estimation of the economic gains or losses associated with these politically motivated trade agreements. This paper fills that gap by providing estimates of the economic impact of politically and economically motivated trade agreements. We find that credibility gains play a role in increasing the probability of two countries signing an agreement. Moreover, agreements with a stronger political motivation are more trade creating than agreements that are signed for pure market access / economic reasons.
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"*Economists have always been aware that the determinants of trade policy are deep down political.*"Dani Rodrik, Handbook of International Economics, vol.3

1 Introduction

The standard theory of trade agreements (TAs) explains their existence as a way of solving terms-of-trade externalities among large countries (Bagwell and Staiger, 1999). By giving each other reciprocal concessions, countries can internalize terms-of-trade externalities and achieve a more efficient outcome. Thus, even if economists recognize that trade policy at the national level is mainly explained by politics as the above quote from Rodrik (1995) suggests, standard trade theory mainly focused on the internalization of terms-of-trade externalities.

This gap has started been filled recently as the literature provided new rationales for TAs where internal politics played an important. A seminal contribution is by Maggi and Rodriguez-Clare (1998) who explain how governments that face time-inconsistency problems in their interactions with domestic lobbies could use the external enforcement provided by TAs to achieve a better outcome. Their idea is simple. In a world where capital is immobile across sectors in the short-run, the government gets compensated by lobbies in the domestic political game for the static distortion induced by trade protection (the consumption and the mobile factor-induced production inefficiencies), but not for the capital allocation inefficiencies associated with over-investment in the protected sector. If these allocation inefficiencies are large relative to the potential static gains from the political game for the government, TAs can be used as an external enforcement to credibly commit to trade reform and avoid the long-run misallocation of resources.

Maggi and Rodriguez-Clare (1998) argue that incentives to pre-commit through TAs will be stronger the smaller is the government's weight in the bargaining game with domestic lobbies. Indeed, if governments can extract most of the lobbying rent from the bargaining game, then there will be little over-investment by producers as they get a small share of the lobbying rent. They also show that pre-commitment will be used by governments which are neither too sensitive nor too unaffected by domestic lobbying. In the former case they

would rather extract the lobbying rents, while in the second they do not really need external enforcement.

Mitra (2002) shows that the Maggi and Rodriguez-Clare (1998) result does not depend on capital mobility, but is much more general. Any model where there is a resource cost incurred prior to lobbying through actions taken in the expectation of successful lobbying in the next stage will lead to this result. Mitra (2002) obtains similar results to the ones in Maggi and Rodriguez-Clare (1998) in a model with perfect capital mobility, but where there are fixed costs associated with lobby formation.

More recently Limão and Tovar (2009) explain why commitment to a tariff-bound in TAs[1] can be justified if contributions have a diminishing marginal utility for the government.[2] The reason is again simple. A higher tariff may yield a higher joint surplus in the bargaining game between the government and domestic lobbies. But in the presence of diminishing marginal utility from contributions for the government, this higher tariff that results in higher contributions may actually reduce the share of the government in the total pie. A tariff bound can credibly improve the government's bargaining position and compensate for the fall in the joint surplus. The diminishing marginal utility from lobby contributions to the government could be justified for example by the long-run misallocation of capital in the setup of Maggi and Rodriguez-Clare (1998).

Maggi and Rodriguez-Clare (2007) found that tariff ceilings will actually be preferred to exact tariff commitments because the former allow for the lobbying game to continue, and therefore for the government to collect contributions after the TA is signed. This in turn reduces the net return to capital in the "wrong" sector which mitigates the overinvestment problem.[3]

In this paper we provide empirical evidence regarding the importance of credibility considerations when signing TAs based on the theoretical predictions of Maggi and Rodriguez-Clare (1998, 2007) and Limão and Tovar (2009). We then explore the potential heterogeneity of

[1]This is easily linked to WTO's multilateral negotiations, but as we will argue later, it also encompasses bilateral TAs even when what's negotiated involves internal free trade.

[2]See also Drazen and Limão (2008) for a similar result in a more general context.

[3]This is done in a model which allows for both commitment-motivated TAs and terms of trade externalities.

the impact on trade flows of credibility-motivated TAs, i.e., are agreements signed for credibility reasons more or less trade-creating? Theoretically one could expect both results. On the one hand credibility may increase (and the long run misallocation reduced) only in the presence of sufficiently trade-creating TAs, and therefore this will be the type of agreements that governments willing to increase their credibility will sign. On the other-hand, too much trade creation may limit the extent to which governments can extract rents from lobbies in the lobbying game as in Limão and Tovar (2009) or Maggi and Rodriguez-Clare (2007), where tariff bounds are preferred by governments to exact tariff commitments.

Results suggest that credibility considerations are an important determinant of preferential TAs. Credibility-driven TAs tend to be signed by governments with low bargaining power vis-à-vis domestic lobbies, and there is a u-shaped relationship between a government's sensitivity to domestic lobbies and the probability of signing a TA. This u-shaped relationship is particularly present when governments sign TAs with larger countries, which can be partly explained by the necessity to have self-enforcing TA agreements in the presence of time-inconsistency. We also find that credibility-motivated TAs tend to lead to more trade creation.

The rest of this article is organized as follows. Section 2 provides a theoretical framework to examine credibility motives for TAs and their impact on trade flows. Section 3 describes the econometric strategy and section 4 discusses the empirical results. Section 5 provides some concluding remarks.

2 Credibility-Driven Trade Agreements

In this section we review the empirical predictions in Maggi and Rodriguez-Clare (1988) regarding the determinants of credibility-motivated TAs.

Assume a 2-sector 2-factor small open economy that cannot influence world prices. On the demand side, assume for simplicity that utility is linear and additive in the numéraire good so as to eliminate any income or substitution effects for the manufacturing good on which we will be focusing. On the supply side, assume that the numéraire sector produces using

capital and land which are both in fixed supply (and both normalized to 1) using a constant returns to scale technology. The returns to capital in the numéraire sector are subject to diminishing returns, which implies that the marginal productivity of capital in the numéraire sector increases with the amount of capital allocated to the manufacturing sector (s_k^m). The manufacturing sector produces using capital only with a one-to-one technology. Thus, the marginal productivity of capital in the numéraire sector is given by the domestic price of the manufactured good.

Capital is sector-specific in the short-run, but not in the long-run. We assume that only owners of capital in the manufacturing sector get politically organized to lobby the government for trade protection.[4] They offer the government political contributions in exchange for higher levels of protection. They have mass zero and therefore their share of domestic consumption or lump-sum redistributed tariff revenue is zero. Their objective function is simply given by the returns to capital in the manufacturing sector net of the contributions (per unit of capital, c) they offer the government: $L = (p - c)s_k^m$.

The government's objective function is a weighted sum of social welfare and lobby contributions where social welfare enters with a weight equal to a, i.e., $V = (1 - a)C + aW$. Thus, the larger is a the less sensitive is the government to lobbies' contributions and the more it cares about social welfare when making trade policy decisions.

The timing of the game is as follows. In the first stage, depending on expected returns to capital in the two sectors, owners of capital decide in which sector to invest. In the second stage the government and the manufacturing lobby engage in Nash-bargaining over trade policy, in which government bargaining power is given by σ and lobby bargaining power by $1 - \sigma$.

In such a setup there will be over-investment in the manufacturing sector in the first stage if capital owners expect the government to be sensitive to lobby contributions ($a < 1$) in the second stage, and their share of the lobbying game to be sufficiently large (σ not too large). Indeed in such a case they will allocate a larger share of capital to the manufacturing sector

[4]Note that we do not allow owners of capital to get organized, and therefore only "short-run" lobbies are part of the political game.

than under free trade, and this will create a production distortion for which the government will not get compensated in the second stage. The only compensation the government will get in the second stage is the one associated with the protection-induced consumption distortion. This uncompensated distortion may create incentives for the government to try to pre-commit to free trade in the first stage even if this implies forgoing the lobby's contributions in the second stage. This will certainly be the case if the bargaining weight of the government is zero ($\sigma = 0$) which implies that the lobby's contributions will only just compensate for the consumption distortion, and leave the government worse-off than if it had pre-committed to free trade in the first stage.

On the other hand, if the government enjoys a sufficiently large share of the joint surplus, then this may compensate for the long-run production distortion and the government will prefer not to commit to free trade and benefit from the large lobby contributions. Actually, if $\sigma = 1$, then there is no over-investment as all of the joint surplus will be captured by the government, and owners of capital in the manufacturing sector will be left indifferent between their lobbying game returns and the free trade returns ($c = p - p^*$ and therefore $L = p^* s_k^m$). Thus, there are no incentives for owners of capital to invest in the manufacturing sector beyond the level observed at free trade prices.

The first empirical prediction from this model has to do with the relationship between the weight the government grants to social welfare in its objective function, and the value for the government of using a TA as a commitment device, i.e., $G = V^* - V = aW^* - (1-a)C - aW = a(W^* - W) - (1-a)C$. Take the derivative of G with respect to a:

$$G_a = \frac{\partial G}{\partial a} = (W^* - W) - a\frac{\partial W}{\partial a} + C - (1-a)\frac{\partial C}{\partial a} \tag{1}$$

To describe $G(a)$ we proceed in two steps. First, we evaluate G_a at $a = 1$, to obtain $G_a < 0$. To see this note that if $a = 1$ the last term on the right-hand-side of (1) drops out. Also $C = 0$ as the government only cares about social welfare and therefore there is no point in lobbying. This also implies that the welfare level in the lobbying game will be identical to the welfare level under free-trade, i.e., $(W^* - W)$. This implies that when the government already puts

a very high weight on social welfare, an increase in a will make commitment through a TA less valuable and therefore less likely. The intuition is simple: if the government already cares a lot (exclusively) about social welfare, then there is no need to use TAs as a commitment device.

Second, we evaluate G_a at $a = 0$, to obtain $G_a > 0$ at least for low values of σ. To see this note that if $a = 0$ the right-hand-side in (1) becomes: $(W^* - W) + C - \partial C/\partial a$. The first two terms are positive, and the last term is negative as contributions will increase with a. However, the increase in contributions will be sufficiently small if the bargaining weight of the government in the lobbying game is sufficiently small. Indeed, the increase in contributions will be sufficiently small if σ is small. This implies that $G_a > 0$ when the government puts a very low weight on social welfare and it has a relatively low bargaining weight an increase in a will make commitment through a TA more valuable and therefore more likely. Thus putting these two results on G_a together we have that when σ is small there is an inverted u-shaped relationship between a and the gains from using a TA as a commitment device.

First prediction: Trade agreements are more likely to be used as a commitment device in countries with intermediate values of a when governments are weak.

EXPLORE NON-LINEARITIES WHEN GOVERNMENTS ARE STRONG....

We have assumed so far that TAs are perfectly enforceable, but they may not be so. Governments may be tempted to deviate from their commitments in a previously signed TA if the short-run political gains offered by lobbies outweigh the gains associated with respecting the agreement. In other words, for the TA to be enforceable there need to be high costs of exit. The damage to the international reputation of the country will be one example. Other countries will be reluctant to sign agreements with governments which have not respected their TA obligations in the past. Another is the potential response of the trading partner which will punish the deviation by its partner by withdrawing market access concessions. In this case, lobby contributions may compensate for the short-run inefficiencies associated with higher levels of protection, but will not be sufficiently large to compensate for the losses suffered by the partner's trade policy response. These losses will tend to be larger the larger

is the size of the partner's market relative to the home market.

Second prediction: Trade agreements are more likely to be used as commitment devices when countries sign agreements with relatively large partners. This increases the enforceability of the agreement: TAs with large counterparts offer substantial market access gains and therefore reduce the incentives to deviate from what was originally agreed.

EXPAND USING CLASSIC SELF-ENFORCEMENT SETUP...

We finally turn to the impact of credibility-driven TAs on trade flows: are they likely to lead to more or less trade creation? Or put otherwise, are countries seeking to use TAs as a commitment device more likely to sign agreements with partners that will lead to more trade creation? So far we have assumed that the small country was committing to free trade through the TA. In this case the TA will definitely be trade-creating. But other types of TAs that are less trade-creating or even trade-diverting are possible.

In order to illustrate this assume that there are two potential partners with which the domestic government could sign a TA: if signed with partner A then the agreement is fully trade-creating and will lead to the same level of investment in the manufacturing sector as under free trade. If the agreement is signed with partner B there will be some trade-diversion and therefore some over-investment in the manufacturing sector.

The trade-off for the domestic government is then quite simple. The TA with partner A will result in the socially optimal level of investment in the manufacturing sector, but there will be no contributions from lobbies left, as there will be nothing to bargain over. The TA with partner B, on the other hand, will allow for over-investment in the manufacturing sector, although not as large as under no commitment. Thus the long-run misallocation of resources for which the government is not compensated will be smaller than under no commitment, but larger than if the TA is signed with country A. On the other hand, the agreement with B will allow the government to receive contributions in the second stage making it more attractive than the agreement with A. In other words a less trade-creating agreement will reduce the size of the pie, but may increase the government's share of this pie and therefore may be more attractive than a pure trade-creating agreement where a government's lobbying rents

are forgone. Thus, it seems that whether credibility-driven TAs are more or less trade creating is an empirical question.

3 Empirical framework

We proceed in two steps. We first estimate the first two predictions of the previous section regarding the determinants of credibility- driven TAs and build a measure of credibility motives behind the signing of each agreement. In the second step we test the third prediction and whether the impact of TAs on imports varies depending on importance of credibility motives.

3.1 Testing the credibility motivation

We investigate whether, controlling for market access reasons and the political affinity between two countries, credibility motivations influence the probability of those countries signing an agreement.

Building on the specification used by Baier and Bergstrand (2004 and 2007) or Egger et al. (2009) to explain trade agreements we add the credibility determinants suggested in the first two predictions above. The basic reduced-form equation to be estimated is then:

$$\begin{aligned} \mathrm{TA}_{ijt} &= \beta_0 + \beta_1\, a_{it} + \beta_2\, a_{it}^2 + \beta_3(1-\sigma_{it}) * a_{it} + \\ &\quad \beta_4(1-\sigma_{it}) * a_{it}^2 + \beta_5(1-\sigma_{it}) + \beta_6 \mathrm{RS}_{ijt} + \beta_7 \mathrm{RS}_{ijt} * (1-\sigma_{it}) * a_{it} \\ &\quad + \beta_8 \mathrm{RS}_{ijt} * (1-\sigma_{it}) * a_{it}^2 + \beta_9 \mathrm{MS}_{jt} + \beta_{10} \mathrm{DMS}_{ijt} + \beta_{11} \mathrm{AI}_{ijt} + \beta_{ij} + e_{ijt} \qquad (2) \end{aligned}$$

where TA_{ijt} is a binary variable indicating whether countries i and j have a trade agreement at time t; β's are parameters to be estimated and β_{ij} are country-pair fixed effects to control for anything that is country-pair specific such as distance, colonial links, a common border, differences in Capital-Labor ratios and in real GDPs (in 1960) as in Baier and Bergstrand (2004) etc; a_{it} is the weight the government of country i grants to domestic aggregate welfare

at time t, and $1-\sigma$ is a measure of this government's relative weakness in the bargaining game with lobbies at time t. Below we describe how these two determinants of credibility-driven TAs are measured. Note that a enters in a quadratic form and is interacted with $1-\sigma$ as suggested by the first prediction; moreover, a (a^2) and $1-\sigma$ are interacted with RS which captures the relative size of j's market with respect to i's market (following the second prediction). MS is the market size of country j at time t as in Meyer (2003),[5] DMS is the absolute value of the difference in market size between countries i and j at time t and AI is the Affinity Index between the two countries at time t, as in Baier and Bergstrand (2007); e is the error term.

Because our dependent variable is binary, we use a conditional ML estimation appropriate for the panel logit model with country-pair fixed effects.[6]

The first prediction implies $\beta_3 > 0$ and $\beta_4 < 0$ and the second prediction implies $\beta_7 > 0$ and $\beta_8 < 0$. In the next section we describe how we measure a government's welfare-mindedness (a) and bargaining strength/weakness (σ).

3.1.1 Measuring Government's welfare mindedness

Governments' welfare mindedness (a) is estimated using the methodology presented in Gawande et al (2009) based on the Grossman-Helpman "Protection for Sale" (1994) setting. In this model, the existing level of tariffs in a country is the result of government - which values both its population's welfare and the contribution it receives from import-competing domestic producers - and lobbies maximizing their own objective functions. The first order condition associated with the government's maximization in the second stage of the Nash game can be written as follows:[7]:

$$\frac{t_{its}}{1+t_{its}} = \frac{1-a_{it}}{a_{it}} \frac{y_{its}}{m_{its}\varepsilon_{is}} \tag{3}$$

[5] We also use GDP as a robustness check.

[6] Fixed effects estimation is possible for the panel logit model, but not for other binary panel models such as probit due to the incidental parameters problem (Cameron and Trivedi, 2005).The bias if we were to use probit estimation will be relatively important when t is small relative to ij, which is the case here as t is around 10 and ij around 10,000. This is not the case in other setups such as Egger et al (2009).

[7] We assume that all s sectors which are import-competing are politically organized.

where t_{its} is the MFN tariff in country i at time t in sector s, y is domestic production, m are imports, and ε is the absolute value of the import demand elasticity. The country and time-varying parameter a_{it} can be estimated using the cross-sector variation of equation (3). Many of the right-hand-side variables suffer from endogeneity bias of measurement error (elasticities are estimates provided in Kee, Nicita and Olarreaga (2009)). One solution is to rewrite (3) as

$$\frac{t_{its}}{1+t_{its}}\frac{\varepsilon_{is}m_{its}}{y_{its}} = \frac{1-a_{it}}{a_{it}} = \theta_{it} \tag{4}$$

We use a stochastic version of this equation to estimate $\theta_{it} = (1-a_{it})/a_{it}$: we calculate the LHS of equation (4) and regress it on country-pair dummies. Using this estimate we then retrieve a which varies by country and year; it is given by $a_{it} = 1/(1+\theta_{it})$.Our estimates of a vary between 0 and 1, and reflect the importance a government attributes to aggregate welfare relative to the contributions it receives from domestic groups. The higher is a, the higher is the government's welfare mindedness.

The estimates of a are displayed in Table A1 of the Appendix. The lowest a's belong to Ethiopia, Bolivia, Bangladesh, Sri Lanka and Cameroon. In general, richer countries and large middle-income countries have higher a, such as Singapore, Japan and Italy. Countries with lower a are also among the most corrupt: the Spearman rank correlation between our estimates of a and the 2005 Corruption Perception Index from Transparency International is 0.52.

Equation (4) shows that the estimates of a not only depend on the level of tariffs, but also on the import-penetration ratio (m/y) and import demand elasticities, their covariance with tariffs and with each other. As Gawande et al (2009) note the incidence of tariffs in industries with high import demand elasticities reveals the willingness of governments to trade aggregate welfare for contributions (low a). The incidence of tariffs in industries with high import-penetration ratios reveals the same, since distorting prices in those sectors creates large deadweight losses. As such, it is not surprising that the correlation between the estimates of a and average tariff is relatively low (-0.32).

Table 1 indicates how our estimates of a_{it} correlate with different measures of corruption

such as the Corruption Perception Index, the number of parking violations by diplomats (from Fisman and Miguel, 2007), the corruption Index of the World Bank Governance Indicators database (Kauffman, Kraay and Mastruzzi, 2009), and average tariffs and GDP per capita. All coefficients have the expected signs: corrupt countries are associated with lower a, as well as countries with higher average tariffs. Richer countries have higher a.

3.1.2 Measuring government's bargaining weight

In order to estimate the government's bargaining weight σ, define the contribution that the lobby offers the government in the second-stage of the game to obtain a certain level of protection. Under Nash bargaining the contribution is a weighted sum of the welfare loss incurred by the government and the lobby's willingness to pay for protection:

$$C = (1-\sigma)\left[\frac{a}{1-a}\left(W^* - W\right)\right] + \sigma\left[\left(p - p^*\right)y\right] \tag{5}$$

The first term in square brackets is the value of the welfare loss associated with a given level of protection for the government relative to a dollar of contribution, and the second term is the value for the lobby of obtaining a given level of protection. If the government's bargaining weight is close to 1, then the government will get all the rents away from the lobbies. On the other hand if the government is weak ($\sigma = 0$), then it will only be left indifferent with respect to its level of welfare under free-trade.

Taking the derivative of (5) with respect to tariffs, recalling that the level of production is fixed in this second stage by assumption, and then using the first order condition of the government's maximization problem[8] we obtain:[9]

$$\frac{\Omega}{2-\Omega} = \sigma \qquad \text{where} \quad \Omega = \frac{a}{1-a}\frac{t}{1+t}\frac{m}{y}\varepsilon \tag{6}$$

We then estimate σ using a stochastic version of (6) for each country and year. Table

[8] If the government's FOC is satisfied then $\partial C/\partial t = -a/(1-a) * dW/dt$, where $dW/dt = -\varepsilon m t/(1+t)$.

[9] The welfare loss is linearly approximated by the Harberger triangle, i.e., $W^* - W = 1/2 * \Delta m * t = 1/2 * m * \varepsilon * t/(1+t)$.

A2 of the Appendix presents the average estimates of $1-\sigma$ (government's weakness/lobby's strength) by country, with an overall mean of .86. This relatively large bargaining weight for lobbies vis à vis governments' is in accordance with the assumption of the Grossman and Helpman (1994) model, where lobbies are assumed to capture all the rents from the lobbying game.

The 5 countries with the strongest governments are Bangladesh, Trinidad-Tobago, Venezuela, India and Thailand. Interestingly, there is a positive correlation of 0.41 between government's weight and the Corruption Perception Index (from Transparency International): with the exception of Denmark, the 25 strongest governments are among the most corrupt according to the CPI. The presence of strong lobbies seems to decrease government's willingness to participate in the bargaining game since its share of the rents will be relatively small.

We examine how our estimates correlate with a number of political variables from the World Bank's Political Institutions Database (Beck et al. 2001, 2008) and results are presented in Table 2. As expected, the government's bargaining weight σ correlates negatively with a dummy that indicates whether there is a constitutional limit on the number of years the executive can serve before new elections must be called (*Finite Term*), and with the margin of opposition in Congress i.e the fraction of seats held by the opposition (but significant only at the 11% level). As expected, it correlates positively with the Government Herfindahl Index (the sum of the squared seat shares of all parties in the government).

3.1.3 How important are credibility motivations?

Using the estimates from the conditional ML of (2) we can then predict the likelihood of observing a trade agreement between two partners at time t:

$$P_{ijt} = \frac{\exp^{\mathbf{x}'\beta}}{\sum_l \exp^{\mathbf{x}'\beta}} \tag{7}$$

where l represents a country-pair and the denominator is therefore a constant within a country-pair. The probability modeled by *clogit* is not the unconditional probability $P(Y = 1|X)$, but the probability of a positive outcome conditional on one positive outcome in the

country-pair group. As such, the underlying model has a different intercept for each group.

To differentiate between credibility and market-access driven TAs, we calculate the predicted probability of a positive outcome considering only explanatory variables associated with the credibility argument (the triple interactions of a , $(1-\sigma)$ and the relative size of country j with respect to i), which we call P^c henceforth:

$$P_{ijt}^{c} = \frac{\exp^{\mathbf{x^{c}}'\beta}}{\sum_{l} \exp^{\mathbf{x^{c}}'\beta}} \tag{8}$$

We will then be able to estimate the average probability that a country signs a credibility agreements depending on the type of agreement (South-South, South-North, North-North and North-South).

3.2 Do credibility-driven TAs affect trade differently?

To disentangle whether there is heterogeneity in the way credibility-motivated trade agreements affect imports we turn to the workhorse of the trade literature: the gravity equation. In order to control for the same variables as in the most recent work on the impact of TAs on bilateral trade flows, we introduce country-pair specific fixed effects. This controls for bilateral distance, colonial linkages, a common border or any other geographical or time-invariant institutional determinant of bilateral flows (see Carrere, 2006 or Baier and Bergstrand, 2007 or 2009).

We also use alternative gravity specifications. In a second specification we use time*exporter specific effects, and year fixed effect to control for general equilibrium effects such as those affecting trade flows through exporter-country price indices (see Baier and Bergstrand, 2007 or Egger et al., 2009).[10] We also estimate a more traditional gravity specification controlling for distance, common language and remoteness as in Carrere (2006). Finally, we calculate the importer and exporter price indices/multilateral resistance terms à la Anderson e van Wincoop (2003) and include it in the estimated gravity equations. More formally, the following

[10]Note that time*importer effects are not included since our variable of interest - P_{ijt}^{c} , interacted with the RTA dummy - depends on importer's characteristics.

specifications were estimated:

$$\begin{aligned}
\ln(m_{ijt}) &= \alpha_0 + \alpha_1 \mathrm{TA}_{ijt} + \alpha_2 \mathrm{TA}_{ijt} * \ P^c_{ijt} + \alpha_3 \ P^c_{ijt} + \alpha_4 \mathrm{lnGDP}_{it} + \alpha_5 \mathrm{lnGDP}_{jt} \\
&\quad + \alpha_{ij} + \alpha_t + u_{ijt} \qquad (9) \\
\ln(m_{ijt}) &= \alpha_0 + \alpha_1 \mathrm{TA}_{ijt} + \alpha_2 \mathrm{TA}_{ijt} * \ P^c_{ijt} + \alpha_3 \ P^c_{ijt} + \alpha_{ij} + \alpha_4 \mathrm{lnGDP}_{it} + \alpha_{jt} + u_{ijt} \qquad (10) \\
\ln(m_{ijt}) &= \alpha_0 + \alpha_1 \mathrm{TA}_{ijt} + \alpha_2 \mathrm{TA}_{ijt} * \ P^c_{ijt} + \alpha_3 \ P^c_{ijt} + \alpha_4 \mathrm{lnGDP}_{it} + \alpha_5 \mathrm{lnGDP}_{jt} \\
&\quad + \alpha_6 \text{Common Language} + \alpha_7 \text{Log Inverse Distance} + \alpha_8 \text{Remoteness} + u_{ijt} \qquad (11) \\
\ln(m_{ijt}) &= \alpha_0 + \alpha_1 \mathrm{TA}_{ijt} + \alpha_2 \mathrm{TA}_{ijt} * \ P^c_{ijt} + \alpha_3 \ P^c_{ijt} + \alpha_4 \mathrm{lnGDP}_{it} + \alpha_5 \mathrm{lnGDP}_{jt} \\
&\quad + \alpha_{ij} + \alpha_6 P_{it} + \alpha_7 P_{jt} + u_{ijt} \qquad (12) \\
& \qquad (13)
\end{aligned}$$

where the αs are parameters to be estimated, m_{ijt} are country $i's$ imports from country j at time t, TA_{ijt} is a dummy indicating whether countries i and j have a trade agreement at time t, α_{ij} are country-pair dummies, α_t are time dummies, α_{jt} are exporter-year specific effects, P_{it} is the price index in the importer country i, P_{jt} is the price index in the exporter country j, and u_{ijt} is an error term.

The sign of α_2 determines whether credibility-driven trade agreements are more or less trade-creating. If $\alpha_2 > 0$ then credibility-driven trade agreements are more trade-creating, and if $\alpha_2 < 0$, then credibility-driven trade agreements are less trade-creating.

An important problem with the estimation of (9) or (10) that is emphasized in the work of Baier and Bergstrand (2007 and 2009) and Egger et al. (2009) are the ones of omitted variable and selection bias. Indeed, there may be many unobserved characteristics that are correlated with the decision to form a TA and this will lead to omitted variable bias in our estimates. Moreover, the decision to form a TA may depend on the outcome based on unobserved characteristics for the econometrician but known by governments signing these trade agreements. In this case we will also have selection bias. To correct for this we could use Heckman's (1997) procedure for the estimation of treatment effects which are subject to selection and omitted variable bias. We do not follow this method since the selection and

main equation contain the same variables. Indeed, when there is no exclusion restriction in the selection model OLS tends to perform better than the Heckman selection model.

We estimate those specifications using OLS and Poisson pseudo-maximum likelihood (PPML) where the later take the presence of zeros in the bilateral trade data into account, following the recent empirical literature on the estimation of gravity models (Santos Silva and Tenreyro, 2006).

To address the issue of endogeneity of the RTA variable, we use the three-step estimator in Baier and Bergstrand (2007). In the first stage we estimate the predicted probabilities using the estimates reported in Table 3 . In the second stage we run a linear regression of the TA variable on a constant, the predicted probabilities, and all the variables used in the TA and gravity regressions. The third stage involves the estimation of the gravity equation substituting the predicted values from the second-stage regression for TA. According to Wooldridge (2002) this three stage IV estimator is consistent and asymptotically efficient.

4 Results

Table 3 presents the results of the effect of credibility motivations on the formation of TAs between two countries. More specifically, we test the two predictions from the extended Maggi-Rodriguez Clare model of section 2.

The first prediction - trade agreements are more likely to be used as a commitment device in countries with intermediate values of a when governments are weak - are confirmed by our estimates of β_3 and β_4, which are both statistically significant. The second prediction is also confirmed: the signs of the coefficients for the interactions $\text{RS}_{ijt} * (1 - \sigma_{it}) * a_{it}$ and $\text{RS}_{ijt} * (1 - \sigma_{it}) * a_{it}^2$ confirm the expected inverted u-shaped relationship between a government's sensitivity to its domestic lobby and the probability of signing a TA. Thus, a trade agreement is more likely to be used as a commitment device when countries sign agreements with relatively larger partners.

In column 3 of Table 3 we correct our estimates of a and $sigma$ for the fact that themselves

have been estimated. Indeed, they are a_{it} and σ_{it} are *generated regressor*. To minimize the measurement error bias in the estimation of equation 2, we apply the error correction suggested by Fuller (1987) and Gawande (1997). Given that a_{it} is estimated with a measurement error equal to u_{it} and standard error σ_{uit}; the corrected a_{it} (or $\widetilde{a_{it}}$) is then:[11]

$$\widetilde{a_{it}} = \overline{a} + \frac{\sigma_a^2 - \overline{\sigma_u^2}}{\sigma_{uit}^2}(a_{it} - \overline{a}) \tag{14}$$

where $\overline{a}$ and σ_a^2 are the sample mean and variance of a, respectively. It can readily be seen from the formula that a_{it} is measured without error ($\widetilde{a_{it}}$=a_{it}) whenever the variance of the measurement error of one observation is equal to the difference between the sample variance of a_{it} and the mean variance of u_{it} (i.e when the fraction above = 1). If the denominator is large, $\widetilde{a_{it}}$ is approximated by the sample mean of a ($\overline{a}$); and if the sample variance of a_{it} is large relative to the measurement error (the numerator), $\widetilde{a_{it}}$ is approximated by the estimated a_{it}. Results of the estimation of equation (2) using $\widetilde{a_{it}}$ and $\widetilde{\sigma_{it}}$ do not change significantly, as can be seen in column 3 of Table 3.

Table 4 provides OLS estimates showing again that the inverted u-shape relationship is obtained using a linear probability model as well.

SHOW TURNING POINT USING CONDITIONAL LOGIT (AROUND A=0.8). PLOT IT IN 3-D .

How does the probability that an agreement gets signed for credibility reasons vary by region? Using equation (8) we estimated P_{ijt}^c for different types of agreements. Results are reported in Table 5. South-North agreements have a higher P^c on average than all other type of agreements (24%), followed by South-South agreements (23%), North-South (16%) and North-North agreements (14%). Developing countries are more likely to sign trade agreements for credibility reasons.

Table 6 to examine the impact of credibility-driven TAs on the trade flow between pairs of countries. In both gravity specifications (with country-pair and time fixed effects; and exporter-year and country-pair fixed effects), the coefficient of interest is insignificant (on the

[11] A similar correction is undertaken for σ_{it} in column 3 of Table 3.

interaction TA*P^c), suggesting no particular effect of credibility-driven TAs on trade flows between the pair of countries. Nevertheless, once we account for the presence of zeros in the trade matrix and estimate the gravity equation with Poisson ML in Table 7, we find that credibility-drive TAs are trade creating.

4.1 To do list

- calculate the multilateral resistance terms Pi and Pj (van Wincoop's)
- Mayer type estimates to control for multilateral resistance
- 3SLS estimates
- test of essential heterogeneity and Local Instrumental Variable estimates to control for the potential endogeneity of P^c_{ijt}

5 Concluding remarks

We provided empirical evidence regarding the importance of credibility considerations when signing TAs based on the theoretical predictions of Maggi and Rodriguez-Clare (1998). Results suggest that credibility-driven TAs tend to be signed by governments with low bargaining power vis-à-vis domestic lobbies, and that there is a u-shape relationship between government's sensitivity to domestic lobby and the probability of signing a TA. We also found that credibility motivated TAs tend to lead to more trade creation. Credibility considerations tend to be a stronger determinant of TA when these are signed by developing countries regardless of whether the partner is a develop or a developing country (as long as the partner is relatively larger).

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Data Appendix

We use the Preferential Trade Agreements Database from the Peterson Institute for International Economics and the World Trade Institute (WTI), constructed using the notifications of the date the agreements entered into force. The database contains 570 agreements in the period 1948 - 2007; of these, 329 agreements were still in force in 2007. A total of 1319 country-pair trade deals are registered up to 2000, but just 1134 are still in force or signed for later implementation. That means that around 11% of the pairs of countries are covered by some sort of trade agreement in the year 2000. Among these agreements, 65% are classified as pure Free Trade Agreements (FTAs), and the others are partial scope agreements, currency unions and others. For our analysis we will use all types of registered agreements. We limit the period of investigation to 1988-2000 due to the availability of data - the Trade, Production and Protection dataset (Nicita and Olarreaga, 2006) - used to construct a and σ (government's welfare-mindedness and bargaining weight vis à vis lobbies, respectively). We have 6026 country-pairs in the final sample (where a and σ are not missing values for at least 1 year).

Data on the Real Market Potential of countries, which we use to proxy for market size, is from Mayer (2007). The Affinity of Nations Index (1946-2002) that measures the interest similarity between pairs of countries based on the votes in the United Nations General Assembly is from Gartzke (2006). All politically-related data (the margin of majority of the government in Congress, the Herfindhal measure of concentration of Government parties in Congress, whether a country has a Finite Term for its government etc) come from the World Bank database of Political Institutions (Beck, Keefer and Clarke, 2001). The Corruption Perception Index is from Transparency International, the Corruption Index from the Worldwide Governance Indicators Database (Kauffman, Kraay and Mastruzzi, 2009) and the parking violations by diplomats from Fismel e Miguel (2007). Bilateral import data is from the United Nations Commodity Trade Statistics Database - COMTRADE (SITC classification revision 1), and data on GDP and GDP per capita from the World Development Indicators (WDI). Table 3 of the Appendix contains summary of statistics for all variables used.

Table 1: Government's Welfare Mindedness a_{it}

	(I)	(II)	(III)	(IV)	(V)	(VI)
CPI 2005	0.00894***					0.0422***
	(0.000879)					(0.00728)
Diplomatic violations		-0.000644**				0.00171***
		(0.000307)				(0.000324)
Corruption WB			0.155***			-0.584***
			(0.0153)			(0.0760)
Average tariff				-0.00182***		-0.00180***
				(0.000371)		(0.000389)
Log of GDP per capita					0.0875**	0.0623*
					(0.0343)	(0.0337)
Constant	0.467***	0.896***	0.644***	0.993***	0.0173	-0.768***
	(0.0400)	(0.0398)	(0.0314)	(0.0343)	(0.341)	(0.111)
Observations	290	279	290	290	287	279
R-squared	0.939	0.938	0.939	0.945	0.940	0.945

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

All regressions are estimated using OLS with country and year fixed effects.

Table 2: Government's bargaining weight σ

	(I)	(II)	(III)	(IV)	(V)
Finite Term	0.123				0.109
	(0.198)				(0.209)
Herfindahl Government		0.261**			0.271**
		(0.105)			(0.113)
Margin of Opposition			0.0309		-0.0986
			(0.154)		(0.168)
Log of GDP per capita				0.196	0.284
				(0.217)	(0.279)
Constant	0.0262	-0.277	0.103	-1.956	-1.575
	(0.255)	(0.283)	(0.260)	(2.162)	(1.440)
Observations	260	260	281	287	251
R-squared	0.296	0.317	0.292	0.296	0.319

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

OLS regressions include country and year fixed effects

Table 3: The effect of credibility on TA formation, 1988-2000

TA=1 or 0	(I)	(II)	(III) Gawande/Fuller correction of M.E
Welfare mindedness (a)	85.12***	-426.7**	-716.62
	(25.24)	(200.4)	(460.54)
Welfare mindedness-squared (a^2)	-56.30***	228.5**	377.75
	(15.37)	(115.7)	(257.74)
Government's weakness ($1-\sigma$)		-331.5***	-396.49*
		(111.9)	(224.36)
a*$(1-\sigma)$		734.8***	820.83
		(254.8)	(500.9)
a^2*$(1-\sigma)$		-406.8***	-426.12
		(144.7)	(279.18)
Relative size (j/i)(RS)		263.4***	688.16**
		(97.88)	(648.20)
a*$(1-\sigma)$*RS		773.4***	1720.11**
		(243.0)	(316.2)
a^2*$(1-\sigma)$*RS		-433.7***	-964.86**
		(135.7)	(357.16)
a*RS		-600.5***	-1550.18**
		(218.8)	(608.06)
a^2*RS		340.0***	869.99**
		(122.3)	(335.96)
$(1-\sigma)$*RS		-343.9***	-764.92**
		(108.7)	(293.93)
Market size of partner (MS_j)	3.41e-05***	4.55e-05**	.000036**
	(1.24e-05)	(1.83e-05)	(.000016)
Abs. value of size difference (DMS)	286.2**	325.3**	386.87***
	(139.0)	(152.7)	(154.29)
UN Affinity Index (AI)	1.902*	2.510**	3.966***
	(1.083)	(1.121)	(1.076)
Observations	936	936	936

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

All regressions are estimated using a ML conditional logit which controls for time-invariant country-pair specific unobservables. (a) and $(1-\sigma)$ vary between 0-1.

Table 4: The effect of credibility on TA formation, 1988-2000 (OLS estiamtes

	(I)	(II)
Welfare mindedness (a)	15.91***	-10.49
	(5.133)	(23.88)
Welfare mindedness-squared (a^2)	-10.30***	3.761
	(3.092)	(14.09)
Government's weakness ($1-\sigma$)		-18.94*
		(11.36)
a*($1-\sigma$)		41.37
		(26.98)
a^2*($1-\sigma$)		-22.67
		(15.87)
Relative size (j/i)(RS)		19.90**
		(7.907)
a*($1-\sigma$)*RS		52.95***
		(20.07)
a^2*($1-\sigma$)*RS		-30.43**
		(11.81)
a*RS		-47.46**
		(18.73)
a^2*RS		27.72**
		(11.02)
($1-\sigma$)*RS		-22.92***
		(8.459)
Market size of partner (MS_j)	2.70e-09**	1.69e-09
	(1.23e-09)	(1.22e-09)
Abs. value of size difference (DMS)	0.0760***	0.0721***
	(0.0271)	(0.0263)
UN Affinity Index (AI)	0.217	0.521***
	(0.184)	(0.192)
Constant	-6.789***	5.587
Observations	936	936
R-squared	0.057	0.133
Number of country-pairs	138	138

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

All regressions include with country-pair fixed effects.

Table 5: Summary Statistics of P^c by type of agreement

North-North TAs							
obs	mean	sd	max	min	p25	p50	p75
2264	.1422	.3448	1	0	0	0	2.09e-14
South-South TAs							
obs	mean	sd	max	min	p25	p50	p75
9592	.2328	.4211	1	0	0	0	.0021
North-South TAs							
obs	mean	sd	max	min	p25	p50	p75
6236	.1622	.3658	.9856	.0	0	0	3.76e-32
South-North TAs							
obs	mean	sd	max	min	p25	p50	p75
1905	.2382	.4118	1	0	0	0	.0174
All agreements							
obs	mean	sd	max	min	p25	p50	p75
19997	.2011	.3978	1	0	0	0	1.78e-10

Table 6: The impact of credibility-driven TAs on imports

	(I)	(II)	(III)	(IV)
Log of Imports				
Log of GDP (i)	1.247***	1.245***	1.279***	0.861***
	(0.125)	(0.125)	(0.125)	(0.0219)
Log of GDP (j)	1.1999***	1.2018***		1.2173***
	(0.191)	(0.118)		(0.016)
TA	0.309***	0.307***	0.284***	0.303***
	(0.0822)	(0.0826)	(0.0880)	(0.0705)
P^c		-0.00638	-0.0270	-0.0391
		(0.0251)	(0.0270)	(0.0255)
TA*P^c		0.0124	0.0281	0.0644
		(0.0642)	(0.0658)	(0.0620)
Common Language				0.670***
				(0.0913)
Log Inverse of Distance				1.194***
				(0.0557)
Remoteness				-0.00716
				(0.0133)
Constant	-51.88***	-51.89***	-24.01***	-32.88***
	(4.233)	(4.235)	(3.168)	(0.828)
Observations	17920	17920	17920	15049
R-squared	0.089	0.089	0.941	
Number of country-pairs	3724	3724		2936

Bootstrapped Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
OLS regressions in columns I and II have country-pair and year fixed effects.
OLS regression in column III has exporter-year and country-pair fixed effects,
and column IV has year fixed effects.

Table 7: The impact of credibility-driven TAs on imports (Poisson estimates)

	(I)	(II)	(III)
Imports			
Log of GDP (i)	1.175***	1.130***	1.120***
	(0.000173)	(0.000177)	(0.000179)
Log of GDP (j)	1.095***	1.126***	1.111***
	(0.000138)	(0.000140)	(0.0001429)
TA	0.226***	0.218***	0.2136***
	(0.000163)	(0.000164)	(0.0001643)
P^c		-0.0472***	-0.0498***
		(3.72e-05)	(0.0000379)
TA*P^c		0.0433***	04603***
		(5.17e-05)	(0.0000522)
Common Language			0.2919***
			(0.0928991)
Log Inverse of Distance			1.292***
			(0.0579)
Remoteness			-0.0776**
			(0.0128525)
Constant			-33.57**
			(0.4989)
Observations	18716	18716	16026
Number of country-pairs	3256	3256	3030

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Poisson ML regressions in columns I and II have country-pair and year fixed effects.

Poisson ML regression in column III has year fixed effects.

Appendix

Table A1: Estimates of Government's welfare mindedness a

Country	a	St.Dev	Dev.from overall mean
Singapore	.9917	.	.1304
Japan	.9878	.0017	.1265
Italy	.9819	.0051	.1206
Brazil	.9799	.0044	.1186
Romania	.9785	.	.1173
Spain	.9750	.0028	.1138
South Korea	.9741	.0051	.1128
USA	.9737	.0021	.1125
Turkey	.9721	.0032	.1108
Taiwan	.97	.0049	.1087
Germany	.9676	.0072	.1063
France	.9674	.0048	.1061
United Kingdom	.9664	.0026	.1052
Argentina	.9634	.0049	.1022
China	.9617	.0132	.1004
Finland	.9581	.0011	.0969
Australia	.953	.0056	.0917
Poland	.9503	.0087	.0891
Colombia	.9454	.016	.0841
Denmark	.9415	.0057	.0803
South Africa	.9307	.0443	.0695
Latvia	.9304	.0094	.0692
Hungary	.9284	.0288	.0672
Greece	.9184	.0125	.0572
Nepal	.9146	.	.0534
Malaysia	.9087	.0231	.0474
Chile	.9047	.0047	.0435
India	.9010	.0302	.0398
Sweden	.9008	.	.0396
Venezuela	.8994	.0627	.0381
Ireland	.8949	.0043	.0337
Peru	.8845	.	.0232
Uruguay	.8833	.0507	.0220
Guatemala	.8817	.0173	.0204
Philippines	.8755	.0105	.0142
Norway	.8750	.0198	.0137
Indonesia	.8750	.0430	.0137
Netherlands	.8733	.0107	.0121
Costa Rica	.8423	.0428	-.0189
Egypt	.8077	.0267	-.0536
Kenya	.7875	.0477	-.0737
Ecuador	.7640	.044	-.0972
Mexico	.7572	.0588	-.1041
Malawi	.7437	.0092	-.1176
Morocco	.723	.0897	-.1383
Thailand	.723	.0950	-.1383
Trinidad - Tobago	.7056	.0120	-.1557
Cameroon	.6985	.09	-.1627
Sri Lanka	.6200	.0332	-.2413
Bangladesh	.4731	.	-.3882
Bolivia	.3863	.1053	-.4749
Ethiopia	.2137	.	-.6476

Table A2: Estimates of Government's bargaining weakness $(1-\sigma)$

Country	$(1-\sigma)$	St.Dev	Dev. from overall mean
Bangladesh	0	.	-.8621
Trinidad Tobago	.4785	.6768	-.3835
Venezuela	.562	.59	-.3
India	.5804	1.195	-.2816
Thailand	.6686	.1784	-.1934
Denmark	.7119	.6498	-.1502
Malawi	.7166	.5559	-.1455
South Korea	.7404	.4157	-.1217
Morocco	.7453	.1593	-.1168
Poland	.749	.5957	-.1131
Nepal	.764	.	-.0981
Brazil	.7877	.2353	-.0744
Philippines	.8238	.5618	-.0383
Hungary	.8320	.1762	-.03
Malaysia	.8333	.5964	-.0287
Ecuador	.8333	.3844	-.0287
Uruguay	.8408	.3234	-.0213
Romania	.8522	.	-.0099
Indonesia	.8581	.4336	-.004
Mexico	.8647	.2658	.0026
Ireland	.8732	.0575	.0111
Colombia	.8841	.2032	.022
Latvia	.8865	.1186	.0244
Sri Lanka	.9007	1.018	.0386
Egypt	.9077	1.926	.0456
Argentina	.9164	.1792	.0543
Spain	.9167	.1686	.0546
Greece	.9188	1.047	.0567
Finland	.9349	.0694	.0729
South Africa	.9376	2.272	.0755
China	.9509	1.422	.0888
United Kingdom	.9579	.3656	.0958
Cameroon	.9597	.2665	.0976
Costa Rica	.961	.1545	.0989
Peru	.963	.	.1009
Turkey	.9634	.1714	.1014
Norway	.9673	.1052	.1052
Japan	.9691	.0345	.1071
Taiwan	.97	.1283	.108
USA	.9726	.0447	.1106
Kenya	.9783	.1151	.1162
Guatemala	.9789	.0756	.1168
Chile	.9806	1.276	.1186
Netherlands	.9809	.0134	.1188
Germany	.9814	.1113	.1193
Italy	.9867	.2520	.1246
Bolivia	.9871	.0418	.125
France	1	.0157	.1379
Australia	1	.2288	.1379
Singapore	1	.	.1379
Ethiopia	1	.	.1379
Sweden	1	.	.1379

Table A3: Summary Statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
RTA	0.121	0.326	0	1	69161
FTA	0.065	0.247	0	1	69161
Government's welfare mindedness a	0.89	0.128	0.214	0.994	290
a after ME correction	.95	.642	-.342	12.44	290
Government's bargaining weakness $(1-\sigma)$	0.878	0.237	0	1	290
$(1-\sigma)$ after ME correction	0.881	0.233	0	1	290
Market size of partner (MS_j), in US 000	29127.933	159366.781	263.446	2262526.25	68961
Relative size (j/i)(RS)	-0.701	2.288	-8.517	8.227	68961
Abs. value of size difference (DMS)	9.011	2.066	-1.527	14.631	68961
UN Affinity Index (AI)	0.693	0.229	-0.468	1	46343
Imports	294982.671	2792603.118	0	231032976.557	177786
Log of Imports	8.271	3.864	-6.908	19.258	106300
Log of GDP(i)	25.505	1.701	20.855	29.915	69161
Log of GDP(j)	23.855	2.192	18.921	29.915	69161