Trade Policy Uncertainty and the WTO[1]

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Abstract

The literature on trade policy uncertainty has stressed that the risk of a trade policy reversal may have a direct effect on trade and growth, which goes beyond the effect of applied tariff levels. Indeed, for a given level of applied tariffs, higher trade policy uncertainty may work as an additional fixed cost to entry a new market, which reduces market access, and in turn slows down investments and growth.
Little is known about the determinants of trade policy uncertainty. To fill this gap, in this paper we first construct a time series of bound tariffs (the ceiling levels of the tariffs at which countries committed under the WTO) and provide descriptive statistics of the countries' degree of freedom in setting their tariffs. Then, using a dataset of MFN applied tariffs and bound rates at the HS 6-digit level covering the period 1996-2011, we estimate an empirical model of MFN tariff variations that, based on Bagwell and Staiger (1990)'s model of varying cooperative tariffs, also accounts for countries' commitments under the WTO. We show that the size of the "water" (the gap between applied and bound tariff rate) is an important determinant of trade policy uncertainty.

1. Introduction

In their recent book, Findley and O'Rourke claim that "globalisation is fragile and easily reversible". Indeed, the recent economic crisis has highlighted that the risk that tariff liberalization may step back exists. The latest WTO monitoring reports and several reports of the Global Trade Alert recorded signals of increasing protectionism in reaction to the recent economic crisis.

Against this background, a novelty of the recent trade literature is the focus on trade policy uncertainty. Several new papers stress that not only the level of fixed and variables trade costs matter for trade, but also the degree of uncertainty of trade costs in the destination market. Exporters value the risk associated with possible trade policy changes in the destination market when to export and

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delay exports to risky destinations (Freund and Pierola 2010a, b; Handley and Limao 2011; Handley 2011; Sala *et al.* 2010). In addition, Limao and Maggi (2012) explore the role of trade policy uncertainty as a motive for trade agreements. This adds to the theory of trade agreement an additional motive beyond the terms-of-trade and the commitment arguments (Bagwell and Steiger 1999; Maggi and Rodriguez-Clare 1998).

The relevance of trade costs uncertainty on trade has been argued to be a factor in explaining patterns of trade in several papers. For instance, Freund and Rocha (2011), Freund and Pierola (2010a, b) and Crozet *et al.* (2008) underlined the role of countries' *institutional* uncertainty in determining exports.

However, direct empirical evidence on the impact of trade policy uncertainty of the destination market on trade is at an initial stage. Focusing on Australia's imports in 2004 and 2006, Handley (2011) studies the effects of trade policy uncertainty on trade. Handley and Limao (2011) focus on Portugal entry into the EU, concluding that the country's accession reduces exporters' risk of tariff reversal to the MFN applied rates.

Handley and Limao (2011) and Handley (2011) used a measure of the policy space as a proxy for trade policy uncertainty. In particular, the first study used the gap between MFN applied and preferential rate, while the second used the gap between the bound rate and the applied MFN rate. The rationale is that trade commitments reduce the margin of manoeuvre that countries have in increasing their tariffs. For example, under the WTO, countries can freely increase their applied MFN tariffs to the bound rate. Above the bound rate, however, tariffs can only be increased under specified circumstances.

It is clear that the available policy space is a factor affecting the risk of a policy reversal. However, this is likely not to be the only one. Economic theory of time varying tariffs under uncertainty suggests that also other factors affect the variability of trade policy. Bagwell and Steiger (1990) , for instance, showed that changes in import values, as well as the value of import demand and export supply elasticities influence a country's tariffs. Political economy models (Grossman and Helpman 1995) also stress the importance of specific industry characteristics as determinants of a country's level of protection.

Our paper examines the determinants of trade policy changes. Using a sample of over 150 countries over the period 1996-2011, we study changes in MFN cooperative-tariff over time as a function of the variables identified in Bagwell and Steiger (1990) [2]. In addition, we account for the fact that changes in cooperative tariffs are subject to binding commitments for WTO member countries. WTO commitment schedules define for each country and at the national tariff line level the maximum level of the tariff. This ceiling rate is the bound duty rate. Countries are free to change their applied tariff

[2] This approach has been previously adopted by Bown and Crowley (2012) for the US antidumping measures. These are exceptional measures. They are non-MFN and, in the case of anti-dumping, firm specific.

insofar as they stay below the bound rate. MFN tariffs can be raised above such ceiling using safeguards provisions, but these measures can only be applied only under specific circumstance (for a review, see WTO 2009). The database on MFN tariff rates includes safeguards.[3] Antidumping and Countervailing Duties (CVDs) are excluded because they do not apply on an MFN basis.

In order to appropriately account for a country's policy space, we build a new database on current binding status and binding rate at the HS 6 digit sector-level. The WTO's Consolidated Tariff Schedules (CTS) database only provides data on present binding status and binding rates. Historical data on bindings are not collected. In this paper, we use information on the commitments' implementation period, base status and base rates at the HS 6 digit level to build the historical evolution of binding commitments.

To our knowledge, this is the first paper that studies the determinants of MFN tariff changes for a large number of countries over a long period of time. Estevadeordal *et al.* (2008) studied the relationship between changes in MFN and changes in preferential tariffs for a sample of 10 Latin America countries. Existing studies on the looking at the determinants of trade policy changes mainly focused on specific non-MFN trade measures, such as antidumping (Bown and Crowley 2012). MFN tariffs are cooperative, by definition, because that is the set of measures to which countries have committed through the agreement under *all* circumstances.

The rest of the paper is organised as follows: Section 2 explains how we constructed the new variable on historical binding commitments, and provides some descriptive statistics on the patterns of tariff commitments, available policy space and actual utilization of this margin of manoeuvre by countries and over time. Section 3 details the methodology and results of the econometric estimation and Section 4 concludes.

[3] We will single out safeguards in a later version of the paper.

2. Commitments and policy space

2.1 Building a series of historical binding commitments

There is no series of the evolution of the commitments schedules of WTO members available. The CTS database reflects commitment schedules as of November 2011. In order to build this historical series, we combine available information in the CTS database on final and base bound rate, implementation period and the base status as follows.

Typically, under the WTO, when countries commit to bind a certain tariff line, they agree to reduce this tariff below a certain maximum rate (the *final bound rate*). This commitment may be enforced on the date of the ratification of the agreement (this is the case of immediate implementation) or on a later data within a certain period of time (generally called, the implementation period). During this period, the maxim level of the tariff has to be reduced from the *base rate* to the final bound rate by a certain date. The CTS contains information on the date starting from which the maximum ceiling rate has to be reduced and the date by which the final bound has to be in place.

In order to build the evolution of the bound rate over time, we followed this general rule: we assumed that the binding rate is equal to the base rate for the years before the beginning of the implementation period and equal to the final bound in the years following the end of the implementation period. This assumption is supported by the practice that during the Uruguay Round the base rate was set equal to the existing bound MFN rates if the line was previously bound, if not differently negotiated (see "WTO Schedule of Concessions and Renegotiations of Concession, Module 4"). However, for those products for which countries have renegotiated commitments (such as ITA and PHARMA products, Annex 5 agriculture, renegotiations and unilateral commitments), this assumption may not be correct as the base rate for the new commitments may not always coincide with bound rate at the time. The total of observations falling in this case is however small, just approximately mere 20,300 observations of which 30% is represented by ITA products.

During the implementation period, typically, the binding is reduced gradually by the same amount (percentage points) each year from the base rate to the final bound rate. This assumption is supported by the general rule stated in paragraph 2 of the Marrakech Protocol to the GATT 1994 “The tariff reductions agreed upon by each Member shall be implemented in five equal rate reductions, except as may be otherwise specified in a Member's schedule. The first such reduction shall be made effective on 1 January of entry into force of the WTO Agreement, each successive reduction shall be made effective on 1 January of each of the following years, and the final rate shall become effective no later than the date four years after the date of entry into force of the WTO Agreement, except as maybe otherwise specified in that Member's schedule”.

For example, for tariff line 030233, Brazil had an implementation period going from 1995 to 1999, with a base rate of .55 and a final bound rate of .35. In this case, we assume that in 1995 the bound rate was reduced to .51, in 1996 to .47, in 1997 to .43 and so on, until reaching the 1999 final bound rate of .35.

2.2 Descriptive statistics on countries degree of freedom in setting higher tariffs based on our sample

The sample we use for the analysis in this paper covers 158 countries over the period 1996-2011. Of these, 44 countries are either non WTO countries (like Samoa) or countries that have acceded WTO (23 countries) in this time interval. The coverage is limited by the availability of MFN tariff information across countries and over time.

Table 1: Policy space over time

	Percentage of bound lines		Average bound rate		Average water	
	2011	% change 2011-1996	2011	% change 2011-1996	2011	% change 2011-1996
	(1)	(2)	(3)	(4)	(5)	(6)
World	76.6	1.4	33.9	-8.2	23.9	-20.4
High income	89.4	0.2	20.7	-10.1	12.5	-13.9
Middle income	82.5	2.1	34.9	-9.5	26.3	-26.2
Low income	49.0	0.0	49.5	-2.4	32.2	43.3
NAMA	73.3	1.5	29.5	-8.8	20.7	-22.7
Agriculture	98.9	0.9	55.9	-6.4	41.3	-13.6

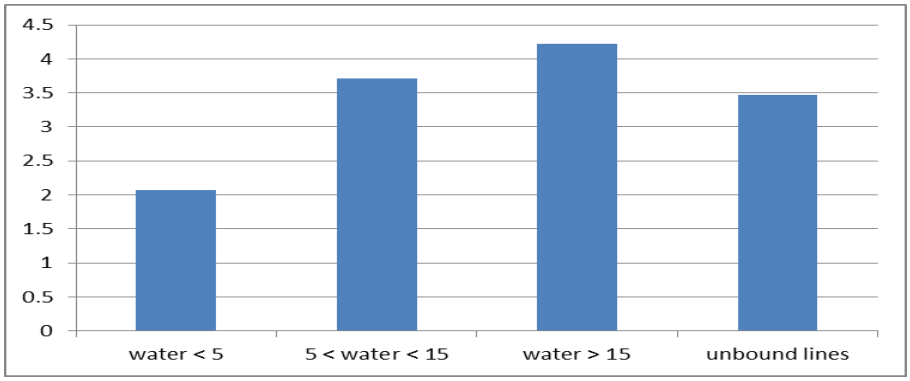
Note: Estimates for the sample of countries for which we have information on tariffs over the two period 1996 and 2011, based on ad-valorem lines only.

Table 2: Rate of utilization of the policy space

	Tariff increases		Average tariff increase	
	(number of lines)	(% of lines)	(level)	(percentage)
World	204,011	3.5	5.6	67.5
High income	18,593	1.3	5.6	84.7
Middle income	159,750	4.5	5.0	57.6
Low income	25,668	2.9	9.9	121.5
NAMA	175,797	3.4	5.1	62.8
Agriculture	28,214	3.8	9.1	95.0

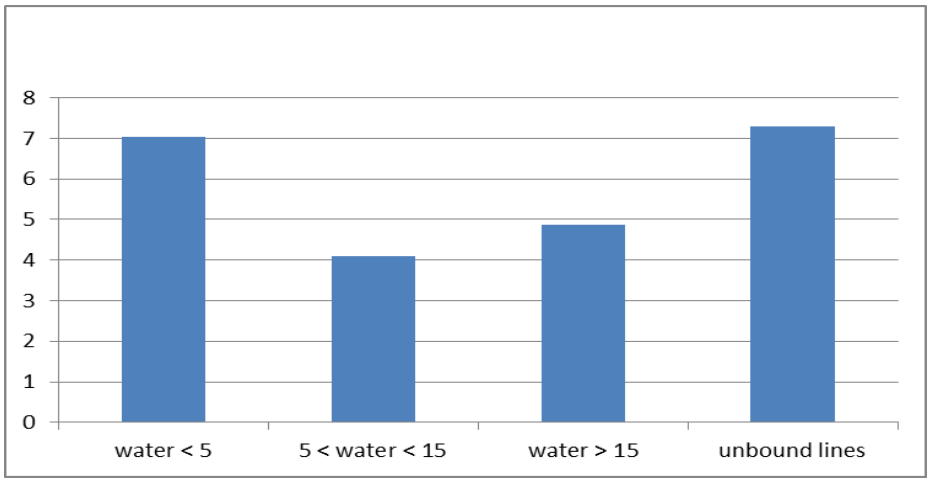
Note: Statistics for the sample of countries for which we have information on tariffs over the two period 1996 and 2011, based on ad-valorem lines only.

Figure 1: Number of tariff increases, by level of water (percentage of tariff lines)



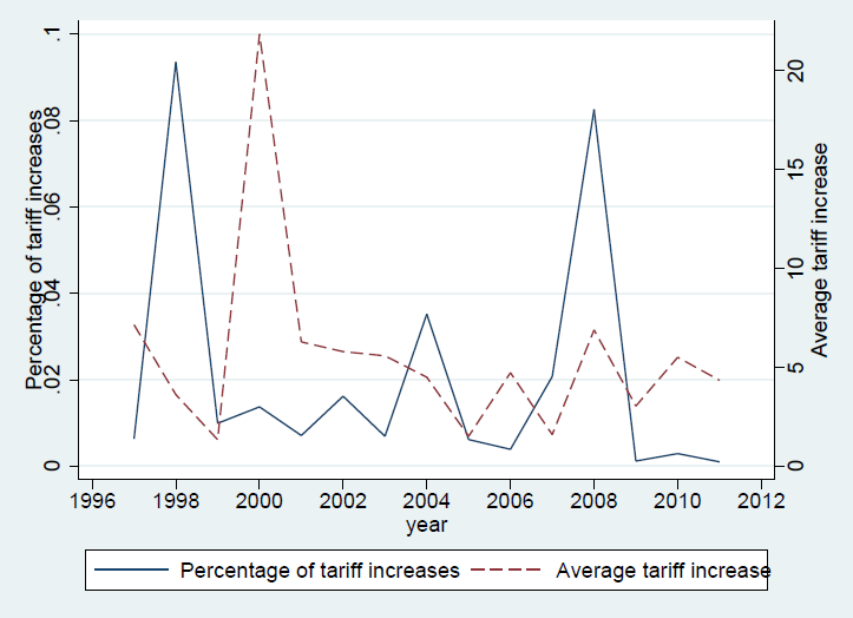
Note: Statistics for the sample of countries for which we have information on tariffs over the two period 1996 and 2011, based on ad-valorem lines only

Figure 2: Average tariff increase, by level of water



Note: Statistics for the sample of countries for which we have information on tariffs over the two period 1996 and 2011, based on ad-valorem lines only

Figure 3: Number of tariff increases (in per cent, left scale) and average tariff increases (right scale), 1997-2011



Note: The graph only includes those country-sector pairs for which we have observation on the tariff change for the whole sample period (1997 – 2011), considering ad valorem tariffs only.

3. The determinants of trade policy uncertainty

3.1 The empirical model

In this section, we estimate the probability of a change in tariffs, considering three possible outcomes for tariffs: decrease, no change, increase. Our dependent variable takes values -1, 0, and 1 in the three cases, respectively, and we obtain the predicted probabilities using ordered logit estimation models. To choose the determinants of tariff changes, we follow Bown and Crowley (2012), who tests empirically the model of Bagwell and Steiger (1990). According to this model, the likelihood of tariff increases is higher when imports increase. Hence, changes in imports are included among the dependent variables. Moreover, for a given increase in imports, the tariff change will depend on the export supply and import demand elasticities: in particular, import changes will impact tariffs only in relatively inelastic sectors. Therefore, the model includes among the regressors the inverse of the sum of export and import demand elasticities, both in isolation and interacted with the lagged import growth. Finally, the coefficient of variation of imports is included, since more variable imports flow would decrease the likelihood of a tariff change.

We augment the specification of Bown and Crowley (2012), by considering also the role of lines' bound status and level of water in determining tariff changes. Following the analysis of Estevadeordal

et al. (2008), we also include indicators for membership in Preferential Trade Agreements (PTA) and Customs Union (CU). The study above estimates the impact of changes in preferential tariffs on changes in MFN tariffs, distinguishing between Free Trade Areas (FTAs) and CUs. It finds that reductions in preferential tariffs induce a decline in MFN tariffs in the case of FTAs, but not in the case of CUs.

Formally, our estimated equation is the following:

$$y_{cit} = \beta_0 + \beta_1 M_{cit-1} + \beta_2 \frac{1}{\mu_{ci}^x + \mu_{ci}^m} + \beta_3 M_{cit-1} \frac{1}{\mu_{ci}^x + \mu_{ci}^m} + \beta_4 \sigma_{ci}^m +$$

$$+\beta_5 W_{cit-1} + \beta_6 PTA_{ct-1} + \beta_7 CU_{ct-1} + \beta_8 GDP_{ct} + \beta_9 g\_GDP_{ct-1} + \varepsilon_{cit} ,$$

Where subscripts *c*, *i* and *t* indicate the country, sector and year, respectively. y_{cit} is equal to -1, 0, or 1 in the cases of tariff reduction, no tariff change, and tariff increase, respectively. M_{cit-1} indicates the lagged growth of imports, while μ_{ci}^x and μ_{ci}^m are the export supply and import demand elasticities, and σ_{ci}^m is the coefficient of variation of import growth. W_{cit-1} indicates the water in the tariff, and PTA_{ct-1} and CU_{ct-1} are dummy variables which are equal to one when the country is member of a PTA or a CU, respectively. GDP and g_GDP indicate the GDP level and growth rate.

3.2 Data on import values and import tariffs, elasticities and membership in trade agreements

Data on MFN applied rates are from the WTO's Integrated Data Base (IDB) and UNCTAD's Trade Analysis and Information System (TRAINS). We used TRAINS as primary source and IDB to fill the gaps.[4] Only *ad valorem* tariffs are used in the analysis, with data covering the years 1996-2011.[5] Observations are disaggregated at the HS 6-digit sectoral-level. Original data are collected in different 6-digit HS classifications. In particular, data are in HS 1992, 1996, 2002, 2007, depending on the year and the country. Tariff data have all been converted to the HS 1996 nomenclature, using concordance tables.[6]

[4] The distribution of the tariff variable which uses IDB as primary source is almost identical.

[5] The European Union (EU) is included in the dataset as a single aggregate. Data on the EU refer to EU-15 from 1996 to 2004, to EU-25 from 2004 to 2006, and to EU-27 from 2007 onwards. For those countries that acceded the EU in 2004 (Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia) or 2007 (Bulgaria and Romania), data cover the period from 1996 to the year before EU accession.

[6] Simple averages have been used when the same HS 1996 code corresponded to two or more HS codes in the other classifications. In the opposite case (two HS1996 corresponding to one HS 2002, say), the same MFN has been used for all tariff lines at the HS 1996.

The source of import data is Eurostat for the European Union, and UN COMTRADE for the other countries. Eurostat data we also converted to the HS 1996 nomenclature, while COMTRADE data are already in HS 1996. Data on GDP are from the World Bank Development indicators.
Export supply and import demand elasticities data come from (Christian Broda *et al.* 2008), at the HS-4 digit level. These data have been converted to the 6 digit HS 1996 nomenclature.

3.3 Econometric results

Table 3 below shows the estimated coefficients of the ordered probit model. A positive (negative) and significant coefficient indicates that the variable significantly increases (decreases) the probability of our dependent variable being in the third category, corresponding to a tariff increase. Our results show that the likelihood of a tariff increase raises with the size of the "water" (the gap between applied and bound tariff rate), which is therefore an important determinant of trade policy uncertainty.

4. Conclusions

Relying on the theoretical model of stochastic cooperative tariff of Bagwell and Steiger (1990), this paper shows that a reduction in the bound rate has a significant effect on trade policy uncertainty.
New trade literature has stressed the importance of trade policy uncertainty as an additional trade cost and show that higher uncertainty significantly reduce trade. Our further work on this topic will look at the impact on trade of trade policy uncertainty using a direct measure of uncertainty.

Table 3: The determinants of trade policy uncertainty (Ologit estimated coefficients)

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7) No change in nomenclature	(8) No imputed elasticities
$Water_{t-1}$		0.006***	0.006***	0.005***	0.009***	0.009***	0.001***	0.023***
		[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]
PTA_{ct-1}			0.114***	-0.008	0.319***	0.776***	0.186***	1.251***
			[0.005]	[0.006]	[0.008]	[0.011]	[0.009]	[0.017]
Cu_{ct-1}				0.248***	0.615***	1.504***	0.270***	0.624***
				[0.003]	[0.019]	[0.024]	[0.004]	[0.017]
Import $growth_{t-1}$	0.000***	0.000***	0.000***	0.000**	0.000**	-0.000***	0.000***	0.000
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Ln $(1/(\mu^{x}_{ci}+\mu^{m}_{ci})$	-0.000	0.009***	0.008***	0.010***	0.000	-0.002*	0.036***	0.052***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.006]
Ln [(Import $growth_{t-1}$)*$(1/(\mu^{x}_{ci}+\mu^{m}_{ci})$]	0.003	0.004	0.003	-0.001	0.008**	0.025***	-0.039***	0.071***
	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.004]	[0.005]	[0.013]
Coeff. Variation of import $growth_{ci}$	0.000	0.000	0.000	0.000	0.000	0.000	-0.000	-0.000***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
$=\ln(GDP)_{ct}$	-0.127***	-0.105***	-0.105***	-0.091***	0.526***	0.519***	-0.093***	-0.025***
	[0.001]	[0.001]	[0.001]	[0.001]	[0.013]	[0.011]	[0.001]	[0.003]
GDP $growth_{t-1}$	1.433***	1.396***	1.379***	1.405***	0.086***	0.066***	1.737***	4.241***
	[0.011]	[0.011]	[0.011]	[0.012]	[0.018]	[0.017]	[0.016]	[0.066]
cut1	-4.994***	-4.356***	-4.254***	-3.939***	10.746***	10.822***	-4.179***	-0.712***
	[0.015]	[0.017]	[0.018]	[0.018]	[0.289]	[0.239]	[0.024]	[0.086]
cut2	0.424***	1.057***	1.159***	1.486***	16.776***	17.253***	1.811***	5.008***
	[0.015]	[0.017]	[0.018]	[0.018]	[0.290]	[0.240]	[0.024]	[0.089]
Cntry, Sector, Year	NO	NO	NO	NO	YES	NO	NO	NO
Cntry*period	NO	NO	NO	NO	NO	YES	NO	NO
Observations	4,249,583	4,164,094	4,164,094	4,164,094	4,164,094	4,164,094	2,782,023	238,585
r2_p	0.0147	0.0167	0.0168	0.0183	0.113	0.201	0.0169	0.0961
ll	-2.144e+06	-2.109e+06	-2.109e+06	-2.106e+06	-1.903e+06	-1.713e+06	-1.173e+06	-120722

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

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