Global Trade Analysis Project
https://www.gtap.agecon.purdue.edu/

This paper is from the
GTAP Annual Conference on Global Economic Analysis
https://www.gtap.agecon.purdue.edu/events/conferences/default.asp

Construction of ITC Tariff Dataset: Methodology and Comparisons across Versions

Xavier Pichot (presenter), Mondher Mimouni, Badri Narayanan and Janine Pelikan

1. Introduction

The objective of this paper is to explain the methodology of constructing a global dataset of tariffs in a consistent way. We further compare various alternative methodologies, across different versions and also across the years, for the ITC MacMAP dataset for the years 2004, 2007 and 2011. This paper is organised as follows: section 2 of this paper summarizes the methodology, section 3 provides an overview of non-advalorem duties, section 4 compares the ad-valorem equivalent of these duties, section 5 compares the tariff data across different years.

2. Summary of the Methodology

The raw data on tariff exists at tariff-line level. AVEs (Ad Valorem Equivalents) of TRQs (Tariff Rate Quotas) and specific tariff are calculated at this level. Bilateral trade data is available for many but not for all of the tariff-lines and countries. Otherwise HS6-level Reference Group or world trade data is used to calculate the UV (Unit Values), which varies across reporters and tariff-lines, but not across partners. The reason for moving from tariff-line to HS6 level for UV is that harmonization across countries is difficult at tariff-line level. However, for the quota fill rates calculated in the TRQs, they always employ trade quantities at tariff-line level.

This is aggregated to HS6 (version HS2007) level. Ad valorem and AVEs of specific tariffs are aggregated using weights of number of tariff-lines. Such an aggregated ad valorem tariff does not incorporate the fact that TRQs are imposed. However, they do contain information on the out-of-quota tariff rates, both in terms of ad valorem and AVE. When an in quota tariff is implemented for a given tariff line, the effective AVE will be lower than the aggregate AVE calculated as above, since it will be a weighted average of these out-of-quota tariff rates as well as marginal tariff rates and in-quota tariff rates, which are both less than the former. When there is no TRQ, the total tariff is the same as the total ad valorem equivalent. AVEs are capped at 1000% because that could be due to problematic unit values, while ad valorem tariff data is used as is, since it is real data.

Mixed tariffs are complicated in many cases. For example, the rule could suggest the minimum AVE among two different ad valorem and three specific duty schemes. In such cases, the rules to determine the exact type of tariffs are implemented at tariff-line level and then added to the AVE part of the tariff, irrespective of whether the final tariff is ad valorem or specific. Compound tariffs may have multiple ad valorem and specific tariffs clubbed together. We explain in this paper the methodology involved in decomposing the final tariffs into ad valorem and specific components, for all types of tariffs.

Aggregation to GTAP sector level from HS6 is done using a 3-year average trade data, to avoid excessive zero trade flows, which under-estimate the tariffs. Various alternatives are available to estimate the UVs at the tariff-line level. We examine each of them and compare their results. We then explain the methodology involved in incorporating the ITC MACMAP tariff dataset into GTAP Data Base. Finally, we also present some comparisons between different years (2004, 2007 and 2011) of tariff dataset used in GTAP 9 Data Base.

3. Overview of the use of non Ad-valorem duties

In the ITC MacMap database for 2007, which contains MFN duties for 159 countries (EU27 as a single entity), we observe (from table 1) that 76 among them have Non Ad-Valorem duties. For Switzerland, 81.7% of its tariff lines have tariffs in Non Ad-Valorem. Thus, an essential component of the methodology to construct tariff dataset is the conversion from non-advalorem to advalorem equivalent components. This is described in the next section.

Table 1: Sensitive countries on calculation of AVEs: countries with more than 4% of Non Ad-Valorem duties.

	Number of lines	Number of lines with Non Ad Valorem duties	Share of Non Ad Valorem duties	Share of Non Ad Valorem duties from agricultural sector	Share of Non Ad Valorem duties from NAMA sector	Number of lines with mixed duties	Share of Non Ad Valorem which are mixed duties
Switzerland	8083	6602	81.7%	24.1%	75.9%	0	0.0%
Thailand	5930	1346	22.7%	29.9%	70.1%	1254	93.2%
Russian Federation	11081	1914	17.3%	56.3%	43.7%	1582	82.7%
Belarus	11077	1646	14.9%	49.5%	50.5%	1454	88.3%
Kazakhstan	11199	1282	11.4%	50.9%	49.1%	1043	81.4%
European union	14172	1444	10.2%	97.6%	2.4%	88	6.1%
Norway	6980	701	10.0%	99.3%	0.7%	0	0.0%
Turkmenistan	10492	1037	9.9%	95.2%	4.8%	876	84.5%
United States	11168	925	8.3%	74.7%	25.3%	0	0.0%
Ukraine	11252	866	7.7%	96.4%	3.6%	196	22.6%
Bosnia and Herzegowina	10594	768	7.2%	99.3%	0.7%	0	0.0%
Argentina	9803	679	6.9%	0.0%	100.0%	679	100.0%
Japan	8817	577	6.5%	48.0%	52.0%	314	54.4%
Zimbabwe	5889	379	6.4%	14.0%	86.0%	11	2.9%
India	11693	725	6.2%	0.3%	99.7%	723	99.7%
Israel	8016	494	6.2%	37.2%	62.8%	283	57.3%
Uzbekistan	10576	638	6.0%	55.6%	44.4%	638	100.0%
Croatia	10596	629	5.9%	100.0%	0.0%	479	76.2%
Mauritius	6239	369	5.9%	0.5%	99.5%	1	0.3%
Lebanon	5704	330	5.8%	25.8%	74.2%	316	95.8%
Fiji	5950	260	4.4%	22.7%	77.3%	178	68.5%
Iceland	8061	347	4.3%	100.0%	0.0%	0	0.0%
Canada	8277	323	3.9%	96.3%	3.7%	162	50.2%
Taipei	10922	349	3.2%	65.3%	34.7%	85	24.4%
Montenegro	9814	311	3.2%	99.0%	1.0%	0	0.0%

4. Comparisons of Methods to calculate AdValorem Equivalents of tariffs

In this part we compare two different methodologies: unit values (UV) calculated at tariff line level or unit values calculated at HS6 level.

Tariff lines (TL) level: unit values are computed using trade at national tariff lines level. Usually, if trade is not available or unit value cannot be calculated, value of the corresponding reference group is used when existing. If it is not the case then we go up to hs6 world value. For the following analysis we keep specific tariffs which have been calculated using unit values at TL level.

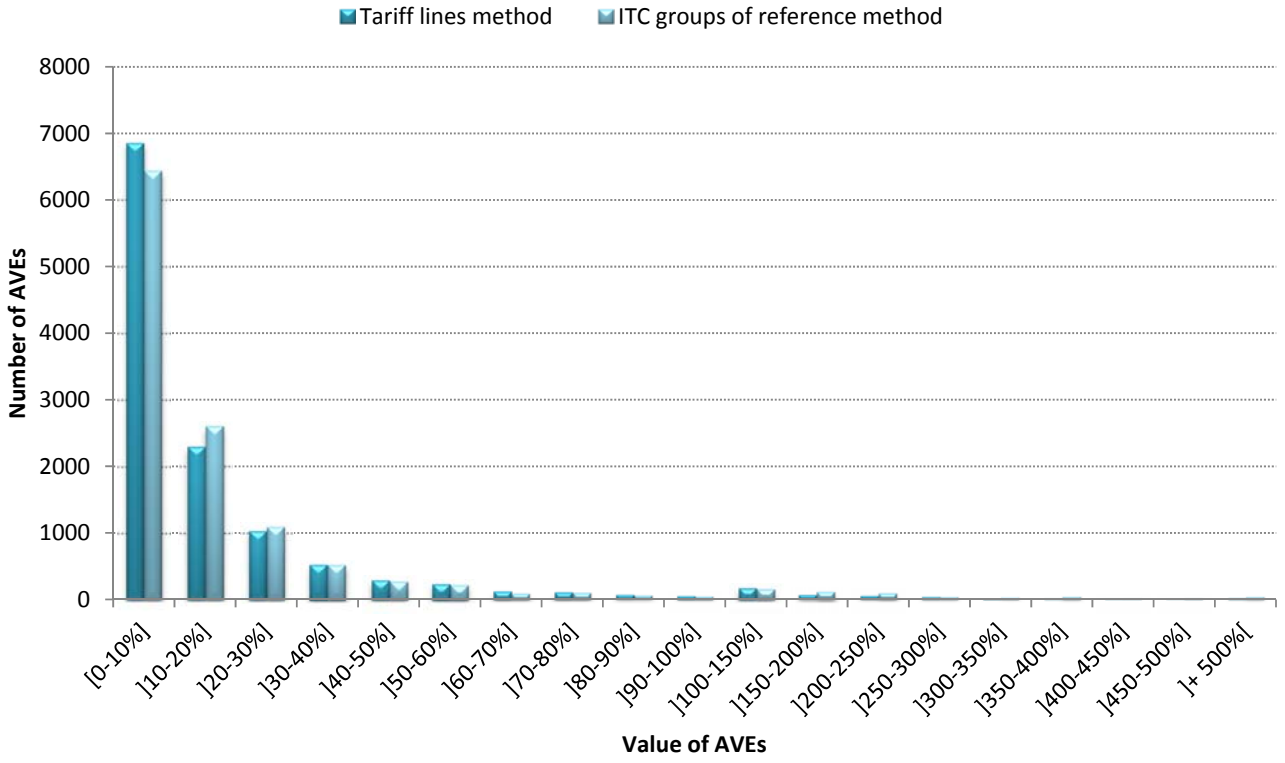
HS6 level - ITC groups of reference: countries are classified in 10 reference groups, and unit values are calculated at hs6 digits level for each group. It means that, for an hs6, two countries which belong to the same group have identical unit values. To calculate specific tariff (at tariff line level) we use the corresponding HS6 unit value.

In order to compare the two methods, we analyse AVEs calculated on 11975 national tariff lines (MFN duties) for a total of 51 countries. For all these codes we have AVEs calculated at tariff line level using tariff line UV and hs6 - ITC groups of reference UV.

Main countries in the sample:

Country	Number of comparable AVEs
Switzerland	5278
EU27	921
Russian Federation	903
Thailand	727
Belarus	625
United States	596
Kazakhstan	575
Argentina	417
Norway	371

Chart: Distribution of AVEs calculated with Tariff Lines method or ITC groups of reference



This chart shows the distribution of AVEs according to the methodology used. For example, using TL method, 57.3% of Non Ad Valorem tariffs (6856 tariffs) have an AVE between 0% and 10%, whereas this cluster represents 53.8% for ITC groups of reference method.

In order to see if the two methods give the same results, we undertake a dependent-sample t-test (namely a Student test). This test compares the difference in the means from two variables, while taking into account the fact that the scores are not independent. The null hypothesis (H0) is that the mean is equal to 0. Using SAS software, the t-statistic and its p-value for the null hypothesis are calculated. The p-value is the two-tailed probability using t distribution. It is the probability of observing a greater absolute value of t under the null hypothesis. If p-value is less than our pre-specified alpha level, usually 0.05, we will conclude that the difference is significantly from zero.

In this case, we compare AVEs calculated using two different methods, tariff lines method and ITC groups of reference method. This is a dependent group with paired observations. Results of the statistical test are shown below.

Annexe 1: SAS output of Student test

The TTEST Procedure

Difference: BCEAVgroup_i - BCEAV_lt

N	Mean	Std Dev	Std Err	Minimum	Maximum
11975	0.0439	0.5940	0.00543	-37.6886	15.0908

Mean	95% CL Mean		Std Dev	95% CL Std Dev	
0.0439	0.0333	0.0546	0.5940	0.5866	0.6017

DF	t Value	Pr > |t|
11974	8.09	<.0001

In the SAS output above, the t-value (8.09) is the ratio of the mean of the difference in means (0.0439) to the standard error of the difference (0.00543).

The corresponding p-value is lower than our pre-specified alpha level 0.05 (p-value<.0001). We conclude that the difference between the variables (AVEs calculated using tariff lines method and AVEs calculated using ITC groups of reference method) is statistically significantly different from 0.

In other words, the t test is significant and the means for AVEs tariff line and AVEs ITC groups are statistically significantly different from one another. We find similar differences between several other alternative methodologies.

5. Comparisons between different years and versions of GTAP Data Base

Table 1: Comparisons between 2007 and 2011 in the latest contribution from ITC (GTAP 9 Data Base):

S No	Comm	Src	Destin	Entropy	Initial, 2007	Initial, 2011	Adjusted 2007	Adjusted 2011
1	crp	SEN	EGY	693.157	6.5	1502.5	6.5	1502.5
2	gro	CHN	KOR	388.633	423.7	205.4	423.7	205.4
3	pfb	*	CHN	173.584	39.4	4.7	39.4	4.7
4	pcr	*	IRN	154.924	150	42.1	150	42.1
5	b_t	NLD	EGY	121.116	1026	69.1	1026	69.1
6	wht	*	JPN	113.071	78.7	23.1	78.7	23.1
7	sgr	*	GBR	86.68	48.2	3.3	48.2	3.3
8	b_t	USA	SAU	81.015	114.8	9.1	114.8	9.1
9	tex	*	VNM	80.018	28.2	9.6	28.2	9.6
10	mil	*	JPN	78.329	16.9	54.5	16.9	54.5
11	*	*	MAR	61.659	10.4	3.9	10.4	3.9
12	vol	ARG	IND	57.289	47.3	1.3	47.3	1.3
13	omt	*	JPN	54.6	27.7	42.8	27.7	42.8
14	p_c	SEN	FJI	52.092	18.4	91	18.4	91
15	omt	*	UKR	50.769	90	9.3	90	9.3
16	cmt	*	CHE	48	198.5	96.3	198.5	96.3
17	pcr	*	JPN	47.327	341.2	238.7	341.2	238.7
18	crp	SEN	MYS	42.897	30	10.4	30	10.4
19	oil	*	IND	42.764	5	0	5	0
20	omt	*	CHE	42.368	215.7	140.9	215.7	140.9
21	vol	LKA	IND	40.544	75.7	0.6	75.7	0.6
22	mvh	FRA	IRN	40.262	53.4	15.2	53.4	15.2
23	osd	CHN	JPN	36.227	1.1	94.1	1.1	94.1
24	b_t	POL	EGY	33.883	44.5	261.2	44.5	261.2
25	pcr	*	RUS	31.705	14	120.7	14	120.7
26	omf	MOZ	ZWE	29.343	796.4	37.4	796.4	37.4
27	sgr	*	RUS	29.296	45.1	20.5	45.1	20.5
28	omn	BEL	IND	26.328	0	10	0	10
29	gro	USA	TUR	24.156	126.3	28.1	126.3	28.1
30	*	ARE	IRN	23.73	25.4	15.7	24.5	15.7
31	mvh	*	AUS	23.12	23	17.7	23	17.7
32	mvh	*	VEN	22.021	20.8	12.5	20.8	12.5

Table 1, above, gives a picture of changes in global tariffs between 2007 and 2011. Largely, most of the tariffs have come down slightly from 2007 to 2011. Exceptions include chemicals/rubber/plastics and beverages/tobaco sectors in Egypt (rows 1 and 24), diary products and non-cattle meat in Japan (rows 10, 13) and processed rice in Russia (row 25). In many of these cases, the hike in total ad valorem equivalent tariff corresponds to the existence of TRQs in disaggregated sectors, wherein the trade quantities have been higher than the quotas in 2011, triggering the out-of-quota tariff rates.

Table 2, below, compares the tariff dataset included in GTAP 8.1 Data Base with that in GTAP 9 Data Base, pre-release 1, for the year 2007. A few observations emerge from this table. Firstly, Korea has ad valorem tariffs according to the ITC tariffs data, for sectors such as gro and osd (rows 1, 2, 7, 16, 25), but CEPII retained the TRQs that were included in the 2004 dataset; since trade quantities were low, the AVE of TRQs turned out to be low in the version contributed by CEPII for GTAP 8.1 Data Base. Secondly, the updated trade quantities in

the latest version, associated with TRQs, have resulted in the increase of AVE for several agricultural products imported by countries such as Switzerland (rows 4, 12, 29) and Canada (rows 11 and 26). Thirdly, for India, ITC has collected recent tariff dataset, which shows much lower tariffs than those in the previous versions (rows 3, 9, 13, 18, 32), except for the imports of vegetable oils from Sri Lanka (row 17). Finally, inclusion of used cars in Australian imports, facing specific tariffs, with lower unit values, has resulted in higher AVE of mvh therein (row 10). There have been some other changes, such as in the beverages and tobacco sector in the Egypt (rows 8, 23, 30) and Kazhakstan (rows 21, 31), which may be attributable to other changes in the source data.

Table 2: Comparisons between the tariffs contributed for GTAP 8.1 Data Base and GTAP 9 Data Base for the year 2007

S No	Comm	Src	Destin	Entropy	Initial, 8.1:2007	Initial, v5-2007	Adjusted 8.1:2007	Adjusted v5-2007
1	gro	*	KOR	6553.312	5.7	425.5	5.7	425.5
2	osd	*	KOR	1167.189	102.6	484.8	102.6	484.8
3	*	*	IND	454.309	14.5	7.7	14.5	7.7
4	omt	*	CHE	228.053	58.2	215.7	58.2	215.7
5	pfb	*	CHN	185.061	3.6	39.4	3.6	39.4
6	mvh	*	SYR	139.864	80.4	26.7	80.4	26.7
7	osd	IND	KOR	129.751	611.5	813.1	1953.9	813.1
8	b_t	*	EGY	118.695	154.1	375.8	154.1	375.8
9	coa	*	IND	108.01	32.5	5	24.5	5
10	mvh	*	AUS	93.385	12.4	23	12.4	23
11	omt	BRA	CAN	91.867	3.2	255.9	3.2	255.9
12	omt	BRA	CHE	88.051	6.2	496.2	112	496.2
13	wht	*	IND	72.38	100	26.4	89.1	26.4
14	mil	*	JPN	55.066	48.1	16.9	48.1	16.9
15	lea	*	JPN	51.568	10.9	24.1	10.9	24.1
16	v_f	THA	KOR	50.101	4.2	736.9	4.2	736.9
17	vol	LKA	IND	48.491	0	75.7	-5.3	75.7
18	vol	IDN	IND	46.682	99.6	63.9	88.8	63.9
19	cmt	NZL	*	45.456	10.3	28.5	10.3	28.5
20	*	RUS	BLR	42.776	7.3	0	7.3	0
21	b_t	RUS	KAZ	40.205	70.6	0	70.6	0
22	omt	USA	UKR	37.916	18.1	140.7	18.1	140.7
23	b_t	NLD	EGY	36.294	158.1	1026	383.2	1026
24	crp	SEN	MYS	35.803	12	30	12	30
25	osd	CHN	KOR	33.891	139.6	490.5	670.9	490.5
26	mil	CHE	CAN	29.293	0.8	245.7	0.8	245.7
27	pcr	*	JPN	28.063	429.4	341.2	429.4	341.2
28	gro	USA	MEX	27.143	17.5	0	17.5	0
29	cmt	BRA	CHE	25.967	152.8	348.8	152.8	348.8
30	crp	IRL	EGY	25.934	83.7	309.1	83.7	309.1
31	*	RUS	KAZ	25.562	8	0	6.7	0
32	omn	BEL	IND	22.126	15	0	9.1	0