

A GTAP Model Extension for Specific Tariff

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Introduction

In the standard GTAP model (Hertel, 1997), all import tariffs are treated as ad valorem, i.e., as fractions of prices. In real world, however, the tariff structure is rather complicated, with the prevalent presence of non-ad valorem instruments such as Tariff-Rate-Quotas (TRQs) and specific tariffs. While there have been GTAP model-based applications that deal with TRQs (Elbehri and Pearson, 2005), specific tariffs have not been modeled in this framework so far.

Our objective is to develop a GTAP extension that has additional features to capture the specific tariff effects and illustrate its usefulness with an application. The data sources for this model, apart from GTAP 8 Data Base (Narayanan, McDougall and Aguiar, 2012), is the MacMAP tariff dataset constructed by ITC and CEPIL. Guimbard, Jean and Mimouni (2012) outline the methodology used to compute Ad Valorem Equivalents (AVEs) of specific tariff from the raw data on specific tariff. We employ this data to compute the revenue from specific tariff.

Prevalence of Specific Tariffs

Specific tariffs have been levied by both developed and developing countries across the world, mainly on food and agricultural commodities. From the GTAP Data Base, in terms of Ad Valorem Equivalent (AVE), we can infer that specific tariffs are most prevalent in sectors such as beverages and tobacco, dairy products, sugar, vegetables, fruits and various other crops. Countries that have high AVEs of specific tariffs include most of the European countries, Japan, Taiwan, USA, Russia and other former Soviet Union members, as well as some developing countries such as Malaysia, Sri Lanka, Thailand and Zimbabwe.

Table 1 illustrates the incidence of specific tariffs in a few commodity groups imported by US. These are largely source-generic and vary across the commodities within each group. Given the dominance of specific tariffs in beverages and tobacco, we break it down into sub-groups of commodities in order to look at the variations in terms of specific tariffs as well as the AVE. Raw tobacco faces high specific tariffs, while tobacco products face even higher specific tariffs, possibly explaining the lower value of imports in these products. Dairy products also face high specific tariffs in AVE terms. Although the specific tariff is low in AVE terms for wheat, that has been possibly sufficient to restrict the imports to less than half a billion US\$.

Table 1: Incidence of specific tariffs: Illustration of US data

Commodities	Specific Tariffs ¹	Average Unit Price in USA ²	Implied AVE (%)	Imports ³ Bn US\$
Wheat	0.0065-0.033 US\$/KG	0.18-0.27 US\$/KG	2.41-18.33	0.55
Tobacco (raw)	0.239-6.45 US\$/KG	3.66-4.37 US\$/KG	5.47-176.23	0.39
Tobacco products	6.45-9.92 US\$/KG	0.93-1.15 US\$/KG	560.87-1066.67	0.10
Lime Juice	0.011-0.11 US\$/Liter	About 10 US\$/Liter	0.11-1.10	<0.01
Alcoholic Beverages	0.042-\$1.76 US\$/Kg; 1.78-2.35 US\$/Proof Liters	-Wide Range-		5.48
Dairy Products	0.154-1.399 US\$/KG	0.29-0.46 US\$/KG	33.48-482.41	2.38

GTAP 8 Data Base (Narayanan, Aguiar and McDougall, 2012) has data on specific and ad valorem tariff revenue, based on the protection data from ITC/CEPII MacMAP dataset (Guimbard, Jean and Mimouni, 2012). We employ this dataset in this paper.

In terms of the share of specific tariff revenue in total import tariff revenue, there are five countries that have over 25%: Singapore (100%), Norway (56%), Georgia (36%), Switzerland (31%) and Australia (28%); Japan, Malta, Malaysia, Zimbabwe, Israel and Romania have over 10%, while Indonesia, Sri Lanka, Mauritius, Pakistan, and many countries from the former Soviet Union have between 5 and 10% of their tariff revenue from specific tariffs; most EU member countries as well as USA have this share in between 3 and 10%. On the other hand, in terms of the share of specific tariffs faced by exporters in their total tariff expenditure paid, there are over 20 countries facing values higher than 10%. Latin American and African countries dominate this list.

Table 2 summarises the prevalence of specific tariffs across ten major food and agricultural sectors in the world. For other agricultural/food sectors, specific tariffs are negligible (less than 100 million US\$ in terms of revenue). While the non-EU members in Europe appear to be the major imposers of specific tariff, Russia, Ukraine, Armenia and Malaysia also impose high specific tariffs in a few sectors. From exporters' point of view, developing countries such as China, Brazil, Georgia, Turkey, Malawi and the rest of South America and Caribbean face high specific tariffs in most agricultural sectors. Apart from the sectors shown in table 2, many manufacturing sectors such as motor vehicles, wearing apparel, chemicals, rubbers, plastics, leather and wood products also face specific tariffs across the world.

¹ This data was extracted from HS6-level information on tariffs retrieved from the website http://dataweb.usitc.gov/scripts/tariff_current.asp

² Compiled from various data files available from USDA's National Agricultural Statistics, retrieved from the website <http://usda01.library.cornell.edu/usda/current/AgriPric/AgriPric-01-31-2013.pdf>

³ All of this data, except wheat and dairy products (from GTAP version 8.1 Data Base, for the year 2007) was retrieved from the website <http://dataweb.usitc.gov/scripts/prepro.asp> in February 2013.

Literature suggests that specific tariffs are targeted against the developing countries (Chowdhury, 2011). We find mixed trend in this exploratory look: developed countries such as France and Germany too face relatively high specific tariffs in sectors such as wheat, while developing countries such as Malaysia impose high specific tariffs. Among the exporters facing the highest AVE of specific tariff, we find many developing countries.

Other food products, beverages and tobacco, are the products for which the global trade is higher than 100 million US\$ among the listed ones in table 2. The global average AVE, calculated as the ratio of the global specific tariff revenue to total global trade flows, is highest for sugar, followed by wheat, non-cattle meat and beverages and tobacco.

Table 2: Agricultural and food commodities facing specific tariffs across the world

Commodities	Spe. Tar. Revenue (US\$ Mn)	Max. AVE of Spe. Tar. (%) bilateral & simple avg. AVE by Importers (I) & Exporters (E)			Global Avg. AVE of Spe. Tar. (%)	Global Trade Flows (US\$ Mn)
		Bilateral	Avg. (I)	Avg. (E)		
Beverages and Tobacco	2430	746 (ARM on XCB)	47(MYS)	10(CHN)	2.42	100,219
Sugar	1697	179 (UKR on XEC)	13(RUS)	12(BRA)	8.99	18,879
Meat (other than cattle)	1415	478 (XEF on BRA)	22(XEF)	5(BRA)	2.49	56,926
Other Food Products	1164	383 (NOR on GEO)	15(NOR)	3(GEO)	0.43	272,027
Wheat	857	150 (NOR on XNF)	19(NOR)	2(FRA)	2.87	29,822
Vegetable Oil	562	111 (CHE on MYS)	18(CHE)	2(TUR)	0.86	65,385
Vegatable and Fruits	500	94 (UKR on CAN)	18(XEF)	1(CHN)	0.56	89,208
Milk Products	372	176 (CHE on CAN)	17(XEF)	7(XSM)	0.61	60,885
Other Crops	318	995 (MYS on RUS)	56(MYS)	8 (MWI)	0.60	53,281
Cattle Meat	106	192 (XEF on NAM)	20 (XEF)	3 (XCB)	0.29	36,939

The Model

Let us denote the commodities, exporters and importers by the index variables i , r and s . In the standard GTAP model, the changes in tariff-inclusive price $pms(i,r,s)$ depend on those in CIF prices $pcif(i,r,s)$ and ad valorem tariff $tms(i,r,s)$. We introduce a new variable $spec(i,r,s)$, which captures the percentage change in specific tariff (in US\$/unit). To add this variable to the price linkage equation determining $pms(i,r,s)$, we compute weights on both the specific and advalorem tariff changes, based on the initial values of both types of tariff revenue and trade flows. This is explained in equation (1).

The major change in the behavior of the model is in the case where no tariffs change, but the market prices change, triggered by a supply/technological shock. In the standard model, the

tariff-inclusive prices change to the extent that market prices change. However, in our extension, the changes in tariff-inclusive prices also depend on the initial size of specific tariff revenue and imports, even when none of the tariffs change. We find that the additional terms in the price linkage equation, due to the introduction of specific tariff, act in a direction opposite to movement of pre-tariff prices. In other words, there is a price-stabilizing effect captured in our model extension that captures specific tariffs explicitly.

$$pms(i,r,s)=tm(i,s)+SHRADV(i,r,s)*tms(i,r,s)+SHRSPE(i,r,s)*specadv(i,r,s)+pcif(i,r,s)-(1)$$

where,

SHRADV(i,r,s) is the ratio of value of imports of commodity *i* from regions *r* to *s* including the ad valorem tariff revenue (*VITS(i,r,s)*) to the value of imports in domestic market prices

SHRSPE(i,r,s) is the ratio of specific tariff revenue from the imports of commodity *i* from regions *r* to *s* (*SPECR(i,r,s)*) including the ad valorem tariff revenue to the value of imports in domestic market prices

specadv(i,r,s) is the percentage changes in the AVE of specific tariff; this variable is solved within the model as the difference between *spec(i,r,s)* and *pcif(i,r,s)*

The equation determining the contribution of tariff revenue to regional income (equation 2) is also modified to include this new variable on specific tariff:

$$100.0 * INCOME(r) * del_taxrimp(r) + TIM(r) * y(r) = sum(i,TRAD_COMM, sum(s,REG, VITS(i,s,r) * [tm(i,r) + tms(i,s,r)] + SPECR(i,s,r)*specadv(i,s,r) + MTAX(i,s,r) * [pcif(i,s,r) + qxs(i,s,r)])) - (2)$$

where,

del_taxrimp(r) is the change in the ratio of total import tariff revenue to income in region *r*.

TIM(r) is the total import tax payments in region *r*

INCOME(r) is the total income of region *r*

MTAX(i,r,s) is the ad valorem tariff revenue corresponding to imports of commodity *I* from region *r* to region *s*.

SPECR(i,r,s) is the specific tariff revenue corresponding to imports of commodity *I* from region *r* to region *s*.

VITS(i,r,s) is the value of imports of commodity *i* from regions *r* to *s* including the ad valorem tariff revenue