

16.F

ATC Export Tax Equivalents

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16.F.1 Introduction

Under the Agreement on Textiles and Clothing (ATC), certain industrialized countries impose quotas on imports of textiles and clothing from many less developed economies. In the GTAP Data Base, we represent these barriers to trade by reporting their money value. We calculate the money value of the tax by multiplying the value of trade derived from the trade data base (chapter 15) by an *ad valorem* tax equivalent rate. Hence we need estimates of the export tax equivalent of the quota. The next section examines the magnitude of quota wedges, and their evolution since the end of the Uruguay Round.

16.F.2 Quantitative Assessment of ATC Quota Margins

We next turn to an estimation of the price effects of the ATC quotas. Our data are for the value of bilateral trade in textiles and in clothing between the high-income OECD countries as importers and 86 countries and regions as exporters.¹ We also have data on trade-weighted tariffs (adjusted for trade preferences as well as we can) for this set of importer-exporter pairings. Trade data are drawn from the GTAP 6 Data Base, while protection data come from a mix of WTO, UNCTAD, and CEPII data on tariffs, augmented to reflect U.S. preference schemes in the Western hemisphere.

Our approach is to first assume CES import demand. From the first order conditions, this implies the following as a functional determinant of imports of good x from country i and into country j .

¹ The regions are: Australia; New Zealand; Rest of Oceania; China; Hong Kong; Japan; Korea; Taiwan; Rest of East Asia; Indonesia; Malaysia; Philippines; Singapore; Thailand; Vietnam; Rest of Southeast Asia; Bangladesh; India; Sri Lanka; Rest of South Asia; Canada; United States; Mexico; Rest of North America; Colombia; Peru; Venezuela; Rest of Andean Pact; Argentina; Brazil; Chile; Uruguay; Rest of South America; Central America; Rest of Latin America; Rest of the Caribbean; Austria; Belgium; Denmark; Finland; France; Germany; United Kingdom; Greece; Ireland; Italy; Luxembourg; Netherlands; Portugal; Spain; Sweden; Switzerland; Rest of EFTA (basically Norway); Rest of Europe; Albania; Bulgaria; Croatia; Cyprus; Czech Republic; Hungary; Malta; Poland; Romania; Slovakia; Slovenia; Estonia; Latvia; Lithuania; Russian Federation; Rest of Former Soviet Union; Turkey; Rest of Middle East; Morocco; Rest of North Africa; Botswana; South Africa; Rest of South African Customs Union; Malawi; Mozambique; Tanzania; Zambia; Zimbabwe; Rest of SADC; Madagascar; Uganda; Rest of Sub Saharan Africa

$$x_{ij} = \left[\frac{\alpha_{ij}}{P_{ij}} \right]^\sigma P_j^{\sigma-1} E_j \quad (1)$$

In equation (1), P_{ij} is the price of x_{ij} while P_j is the CES price index, E_j is country j expenditure on all imports of x and σ is the elasticity of substitution. From equation (1), relative import demands can then be written as a function of relative prices and CES expenditure weights α . This is shown in equation (2).

$$\begin{aligned} \frac{x_{ij}}{x_{kj}} &= \left[\frac{\alpha_{ij}}{\alpha_{kj}} \right]^\sigma \left[\frac{P_{kj}}{P_{ij}} \right]^\sigma \\ &= \left[\frac{\alpha_{ij}}{\alpha_{kj}} \right]^\sigma \left[\frac{\tau_{kj} P_{kj}^*}{\tau_{ij} P_{ij}} \right]^\sigma \end{aligned} \quad (2)$$

In equation (2), the τ term is a composite of any factors driving a wedge between world prices P^* and internal prices P .

To arrive at our estimating equation, we take logs of equation (2), and add terms for tariffs $(1+t)$ and ATC quota price margins Ω in place of the generic trading cost term τ . This yields equation (3).

$$\ln(x_{ij}) - \ln(x_{kj}) = \sigma [\ln(\alpha_{ij}) - \ln(\alpha_{kj})] + \sigma [\ln(1+t_{kj}) - \ln(1+t_{ij})] + \sigma [\ln(\Omega_{kj}) - \ln(\Omega_{ij})] + \varepsilon_{ik,j} \quad (3)$$

where $\Omega \geq 1$

We estimate equation (3) using non-linear least squares, on the assumption that relative expenditure weights are comparable across OECD countries, once we control for trading costs. This involves minimizing equation (3), including the imposition of our lower bounds on the Ω terms and our assumption about the α terms, as shown in equation (4).

$$\begin{aligned} \min \sum_{j, j \neq i, k} \sum_h (\varepsilon_{h,j})^2 \\ \text{s.t.} \quad \{ \ln(x_{ij}) - \ln(x_{kj}) \} - \{ \sigma [\ln(\alpha_{ij}) - \ln(\alpha_{kj})] + \sigma [\ln(1+t_{kj}) - \ln(1+t_{ij})] + \sigma [\ln(\Omega_{kj}) - \ln(\Omega_{ij})] \} = \varepsilon_{ik,j} \\ \ln(\Omega_{ij}) \geq 0 \end{aligned} \quad (4)$$

In equation (4), the error terms are indexed over the set of possible exporter pairings ik . We have implemented the estimation problem in GAMS.

The regression results and the estimated values of the Ω coefficients are reported in Tables 16.F.1 and 16.F.2. ATC coefficients are only reported for countries where quotas are actually in place, and where such quotas are at least 50% filled across some product categories. *Hence we do not measure the impact of monitoring or similar regimes. We have estimated these values both with an unrestricted substitution elasticity (i.e. where we estimate the substitution*

elasticity σ in addition to the ATC coefficients and expenditure weights) and also with the additional restriction that the substitution elasticities equal the new set of GTAP trade elasticities (Hertel, Hummels, Ivanic and Keeney 2003). While we reject this restriction based on an F-test, these values are relevant for those working with the standard GTAP model and parameter set.

The ATC coefficients are converted to *ad valorem* equivalents in Table 16.F.3 and compared to country values for 1997 from Dimaranan and McDougall (2002). A further comparison is made to 1992 estimates on a regional basis, again using the Dimaranan and McDougall value, and also Francois, McDonald, and Nordstrom (1995) in Table 16.F.4. The clear pattern is one of general liberalization since the beginning of the ATC process, with a few notable exceptions. Most notable is China. Both the EU and the United States have estimated tax equivalent rates that are the same for clothing as at the start of the 1990s. In addition, the regime for textiles is even more restrictive for textiles than it was in the early 1990s. This implies that quota growth rates under the ATC have simply failed to keep up with the mix of supply and demand side growth since the liberalization process started. In addition, Vietnam, which was not a major player in world markets in 1992, now faces far greater restrictions from the United States. In part, this reflects changes in the U.S.-Vietnam relationship. In 1992, Vietnam was still subject to Smoot-Hawley (column 2) tariff rates. With the implementation of the U.S.-Vietnam agreement in 2001-2002, and subsequent action by the U.S. to limit textile and clothing trade, new quotas, in all likelihood offering the same rate of overall protection, have essentially replaced the old tariffs. Another notable increase is North American protection against textiles and clothing from Central Europe. Again, in 1992 these countries were emerging from the fog of communism, and were not major players on world markets. Examination of the quota and trade categories involved shows that the North American regimes are protecting domestic producers of wool fabrics, suits, and related items. This protection is quite high. Finally, several countries have been largely graduated toward a liberal trade regime. This includes many of the lower income Asian and African suppliers.

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Table 16.F.1 NLS Estimates of ATC Price Wedges for Textiles

GTAP Regions		Preferred, Unrestricted Model			Restricted Model		
		Estimated Sigma=4.3			Imposed Sigma=7.5		
		CAN	USA	EU15	CAN	USA	EU15
chn	China	1.332	1.508	1.883	1.166	1.262	1.402
hkg	Hong Kong	1.000	1.000	1.423	1.000	1.000	1.204
kor	South Korea	1.000	1.049	1.407	1.000	1.019	1.184
tw	Taiwan	1.000	1.000	1.000	1.000	1.000	1.000
xea	Rest of South East Asia	1.000	1.000	1.211	1.000	1.000	1.103
idn	Indonesia	1.224	1.290	1.437	1.130	1.150	1.216
mys	Malaysia	1.199	1.231	1.483	1.110	1.115	1.229
phl	Philippines	1.018	1.000	1.454	1.026	1.000	1.231
sgp	Singapore	1.000	1.000	1.000	1.000	1.000	1.000
tha	Thailand	1.133	1.080	1.400	1.071	1.042	1.187
vnm	Vietnam	1.000	1.485	0.000	1.000	1.260	1.000
bgd	Bangladesh	1.000	1.000		1.000	1.000	
ind	India	1.000	1.148	1.190	1.006	1.096	1.082
lka	Sri Lanka	1.000	1.000		1.000	1.000	
xsa	Rest of South Asia	1.028	1.070	1.382	1.014	1.037	1.211
col	Columbia		1.000			1.000	
per	Peru			1.000			1.000
arg	Argentina			1.000			1.000
bra	Brazil	1.000	1.000	1.000	1.000	1.000	1.000
ury	Uruguay	1.000	1.000		1.000	1.000	
xca	Rest of Central America	1.000	1.000		1.000	1.000	
xcb	Rest of Caribbean	1.000	1.000		1.000	1.000	
xfa	Rest of FTAA	1.000	1.000		1.000	1.000	
bgr	Bulgaria		1.033			1.002	
cze	Czech Republic	1.115	1.419		1.052	1.212	
hun	Hungary	1.511	1.538		1.251	1.257	
pol	Poland		1.471		1.000	1.234	
rom	Romania	1.137	1.179		1.064	1.079	
svk	Slovakia	1.595	1.809		1.301	1.387	
tur	Turkey	1.135	1.065		1.057	1.019	
xme	Rest of Middle East		1.000			1.000	
zaf	South Africa	1.000			1.000		
xsc	Rest of SACU	1.000			1.000		
xsd	Rest of SADC	1.123	1.000		1.066	1.000	
	Rest of Sub-Saharan						
xss	Africa		1.151			1.070	
		R-squared .781, Obs 66516			R-squared .780, Obs 66516		
		F 1466.178 (Pr>F, 0.000			F 1467.766		
		Note: F statistic for restriction on sigma is 267.973, (Pr>F, 0.00)					

Note: All estimates involve NLS estimates, based on pair-wise regressions of textile imports for 2001 into high income OECD countries. The set of ATC coefficients, in both regressions, is significant at the .001 level. The unrestricted model fits the data better, also at the .001 level. Restricted values are from Hertel, et al. (2004). Quotas are treated with a price effect only if some categories have at least 50% quota fill rates. Blank values indicate no regime, or monitoring only. A value of 1 indicates non-binding regime.

†Vietnam in 2000 had negotiated a trade treaty with the US. However, this was not approved until later 2001, and implemented in 2002. Hence, Vietnam is subject here to column 2 (non-MFN) tariffs, combined with other monitoring requirements and restrictions on investment and trade. The Vietnam estimates represent the impact of this treatment, vis-à-vis MFN tariffs.

Table 16.F.2 NLS Estimates of ATC Price Wedges for Clothing

GTAP Regions		Preferred -- Unrestricted Model, Estimated Sigma=5.1			Restricted Model, Imposed Sigma=7.4		
		CAN	USA	EU15	CAN	USA	EU15
chn	China	1.309	1.590	1.573	1.204	1.376	1.339
hkg	Hong Kong	1.000	1.000	1.130	1.000	1.000	1.078
kor	South Korea	1.000	1.000	1.363	1.000	1.000	1.214
tw	Taiwan	1.000	1.000	1.000	1.000	1.000	1.000
xea	Rest of South East Asia	1.000	1.000	1.093	1.000	1.000	1.056
idn	Indonesia	1.000	1.000	1.176	1.000	1.000	1.108
mys	Malaysia	1.000	1.000	1.192	1.000	1.000	1.116
Phl	Philippines	1.000	1.000	1.403	1.000	1.000	1.248
sgp	Singapore	1.000	1.000	1.000	1.000	1.000	1.000
tha	Thailand	1.006	1.022	1.265	1.010	1.019	1.162
vnm	Vietnam †	1.000	1.563	1.000	1.000	1.368	1.000
bgd	Bangladesh	1.000	1.000		1.000	1.000	
ind	India	1.000	1.096	1.117	1.000	1.072	1.072
lka	Sri Lanka	1.000	1.000		1.000	1.000	
xsa	Rest of South Asia	1.000	1.000	1.174	1.000	1.000	1.148
col	Columbia		1.000			1.000	
per	Peru			1.000			1.000
arg	Argentina			1.000			1.000
bra	Brazil	1.184	1.080	1.000	1.119	1.050	1.000
ury	Uruguay	1.000	1.009		1.000	1.007	
xca	Rest of Central America	1.000	1.000		1.000	1.000	
xcb	Rest of Caribbean	1.000			1.000	1.000	
xfa	Rest of FTAA	1.000	1.000		1.000	1.000	
bgr	Bulgaria		1.043			1.018	
cze	Czech Republic	1.046	1.378		1.019	1.234	
hun	Hungary	1.000	1.149		1.000	1.090	
pol	Poland		1.487			1.302	
rom	Romania	1.266	1.322		1.164	1.200	
svk	Slovakia	1.257	1.353		1.148	1.211	
tur	Turkey	1.000	1.024			1.011	
xme	Rest of Middle East		1.000			1.000	
zaf	South Africa	1.000					
xsc	Rest of SACU	1.000			1.000		
xsd	Rest of SADC	1.000	1.000		1.000	1.000	
xss	Rest of Sub-Saharan Africa		1.000			1.000	
		R-squared .738, Obs 66204, F 1170.288 (Pr>F, 0.000)			R-squared .737, Obs 66204, F 1171.196		

Note: F statistic for restriction on sigma is 270.794, (Pr>F, 0.00)

Note: all estimates involve NLS estimates, based on pair-wise regressions of clothing imports for 2001 into high income OECD countries. The set of ATC coefficients, in both regressions, is significant at the .001 level. The unrestricted model fits the data better, also at the .001 level. Restricted values are from Hertel, Hummels, Ivanic, and Keeney (2003). Quotas are treated with a price effect only if some categories have at least 50% quota fill rates. Blank values indicate no regime, or monitoring only. A value of 1 indicates non-binding regime.

†Vietnam in 2000 had negotiated a trade treaty with the U.S. However, this was not approved until later 2001, and implemented in 2002. Hence, Vietnam is subject here to column 2 (non-MFN) tariffs, combined with other monitoring requirements and restrictions on investment and trade. The Vietnam estimates represent the impact of this treatment, vis-à-vis MFN tariffs.

Table 16.F.3 Comparison of Country Estimates: 1997 and 2001
ATC Export Tax Equivalent Rate, fraction of *f.o.b.* value (world prices)

United States	Textiles		Clothing	
	1997	2001	1997	2001
China	20.0	20.8	33.0	27.3
Hong Kong	1.0	0.0	10.0	0.0
South Korea	2.4	1.9	1.9	0.0
Taiwan	2.2	0.0	7.5	0.0
Indonesia	8.1	13.0	7.8	0.0
Malaysia	8.1	10.3	7.8	0.0
Philippines	6.5	0.0	7.8	0.0
Singapore	0.0	0.0	0.6	0.0
Thailand	8.3	4.0	13.2	1.9
Vietnam †	6.9	20.6	7.1	26.9
India	9.8	8.8	34.2	6.7
Sri Lanka	15.3	0.0	8.1	0.0
Latin America	7.2	0.0	5.3	0.7
Central European Associates	6.9	16.3	5.0	15.0
Turkey	7.0	1.9	4.9	1.1

Table 16.F.3 Comparison of Country Estimates: 1997 and 2001
ATC Export Tax Equivalent Rate, fraction of *f.o.b.* value (world prices)

European Union	Textiles		Clothing	
	1997	2001	1997	2001
China	12.0	28.7	15.0	25.3
Hong Kong	1.0	16.9	10.0	7.2
South Korea	1.6	15.5	0.6	17.6
Taiwan	6.9	0.0	5.9	0.0
Indonesia	6.3	17.7	6.0	9.7
Malaysia	6.3	18.7	6.0	10.4
Philippines	5.7	18.7	6.0	19.9
Singapore	0.6	0.0	0.2	0.0
Thailand	6.4	15.8	7.8	14.0
Vietnam	7.5	0.0	7.2	0.0
India	12.0	7.6	15.2	6.7
Sri Lanka	5.5	0.0	6.4	0.0
Latin America	3.1	0.0	5.2	0.0
Central European Associates	0.0	0.0	0.0	0.0
Turkey	1.5	0.0	0.0	0.0

Source: 2001 estimates are from author's calculations, 1997 estimates are Francois and Spinanger (2002) as summarized in Dimaranan et al (2002). 2001 estimates are based on the restricted elasticity columns in Tables 3 and 4. †Vietnam in 2000 had negotiated a trade treaty with the U.S. However, this was not approved until later 2001, and implemented in 2002. Hence, Vietnam is subject here to column 2 (non-MFN) tariffs, combined with other monitoring requirements and restrictions on investment and trade. The Vietnam estimates represent the impact of this treatment, vis-à-vis mfn tariffs. Since the U.S. imposed quotas immediately after implementing the trade agreement, these also provide a rough approximation of current import quota price effects.

Table 16.F.4 Comparison of Regional Estimates: 1992, 1997 and 2001
ATC Export Tax Equivalent Rate, fraction of *f.o.b.* value (world prices)

United States	Textiles			Clothing		
	1992	1997	2001	1992	1997	2001
China	15.5	20.0	20.8	28.7	33.0	27.3
East Asia	8.5	4.8	5.5	19.8	7.1	3.2
South Asia	15.5	12.6	4.4	28.7	21.2	3.4
Latin America	8.6	7.2	0.0	16.8	5.3	0.7
Middle East/Africa	4.4	0.5	0.2	7.7	0.6	0
Eastern Europe	6	6.9	16.3	11.9	5.0	15.0
ROW	3.6	7.0	1.9	6.7	4.9	1.1

European Union	Textiles			Clothing		
	1992	1997	2001	1992	1997	2001
China	21.5	12.0	28.7	26.5	15.0	25.3
East Asia	11.5	4.7	11.5	19.9	5.5	8.8
South Asia	21.5	8.8	3.8	26.5	10.8	3.4
Latin America	12.4	3.1	0.0	15	5.2	0.0
Middle East/Africa	6.0	0.3	0.0	7.2	0.0	0.0
Eastern Europe	8.6	0.0	0.0	10.8	0.0	0.0
ROW	5.2	1.5	0.0	6.7	0.0	0.0

Source: 2001 estimates are from author's calculations, 1997 estimates are Francois and Spinanger (2002) as summarized in Dimaranan et al (2002), and 1992 estimates are from Chyc et al (1994) and USITC (1993) as summarized in Francois, McDonald and Nordstrom (1995). 2001 estimates are based on the restricted elasticity columns in Tables 3 and 4.