Online appendix

Formulas for Failure? Were the Doha Tariff Formulas too Ambitious for Success?

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This technical note summarizes the computation methodology used in “Formulas for Failure? Were the Doha Tariff Formulas too Ambitious for Success?” to generate Tables 6 and 7 related to the assessment of the welfare, market access and political costs of alternative tariff formulae. This note is organized in two sections: section 1 describes the data used in the computation; section 2 explains the computation approach.

# Data and scenarios

In this work, we use the tariff scenarios defined in Laborde and Martin (2011)[[1]](#footnote-1) and the underlying database on bound and applied tariffs and trade at the HS6 level. The 2008 Doha modalities are implemented as described in section 2 and table 2, computing their effects on bound, then MFN applied and finally bilateral applied tariffs when relevant. In this paper, two additional scenarios (*Proportional cut equivalent to C1* and *Proportional cut equivalent to D1*) are developed where an equivalent proportional cut on bound tariffs is computed at the country level to generate the same trade-weighted average reduction in the applied rate as in scenarios C1 and D1. Since we deal with a non-linear problem (applied bilateral rates are the minimum of the initial rates and the post-formula bound tariffs which in our case are endogenous to the proportional cut parameter we aim to compute), we solve it using numerical simulations in GAMS. Importantly, due to heterogeneity in binding overhang and preferential margins, the trade-weighted average reductions in applied rates will be different.

# Implementation

Results in tables 6 and 7 are computed by implementing Equation 1:

**(1)

Assuming that import demand behavior can be represented using a CES function with an elasticity of substitution of 2[[2]](#footnote-2) the different terms of this equation can be identified and calibrated easily using actual trade and tariff information. In doing this, z(**p**,u) is replaced by a CES expenditure function over the numeraire domestic good and the imported goods which are, using the Armington assumption, differentiated from the domestic good. The only challenge is calibrating the first term . By considering linear political preferences, and assuming that the initial equilibrium reflects a domestic political-economy equilibrium, we can identify the political weight vector, in the product dimension, defined in Equation 2:

**h** = - (**p – p\*)'zpp** (2)

The right hand side of (2) is the product of the observed tariff vector and the matrix of first derivatives of the vector of import demands calibrated using the CES function. The h value is treated as a parameter in the analysis. Final results are computed by calculating the change in three components of Equation 1 as the tariff rate, *t*, changes. By choosing as units the quantity of each good that can be bought at world prices for $1, we are able to simplify the formulas by dropping the p\* variable. The three effects we distinguish are:

* **Political cost:** 
* **Economic welfare *W*:** =$^{Y}/\_{P}$
* **Import volume *M*:** 

$M=\sum\_{iϵHS6}^{}1×m\_{i}\_{} $with $m\_{i}=a\_{i}×^{Y}/\_{P}×\left(\frac{P}{\left(1+t\_{i}\right)}\right)^{σ}$

*Where i* indicates the product, *I* the set of all products including the numeraire, *HS6* the set of all traded products, *t* the *ad valorem equivalent* of the applied tariff at the hs6,  the specific political weight of the product, *P* the CES true price index, *Y* national income defined as $\overbar{Y}+\sum\_{iϵHS6}^{}t×m\_{i}$ and $a\_{i}$ the CES share parameter, $m\_{i}$ import volume of product *i*

Finally, we compute the differences between the scenario values and the initial values to measure changes (e.g. increases in imports, political costs or economic welfare) and then the ratios between the different terms (they share the same money metric) to obtain tables 6 and 7.

1. Laborde, D. and Martin, W. (2011), ‘Agricultural Market Access’ in Martin, W. and Mattoo, A*. eds. Unfinished Business? The WTO's Doha Agenda.* Center for Economic Policy Research and World Bank, London and Washington DC. <http://go.worldbank.org/L8904MG5A0> [↑](#footnote-ref-1)
2. Sensitivity analysis was performed by exploring the range from 1.5 to 4 for this parameter, reflecting the broad range seen in the literature. The results in tables 6 and 7 are not altered qualitatively. [↑](#footnote-ref-2)