

Time to Build & Unanticipated Tariff Changes

S. Schreiber, 08/08/2019 version

This industry-specific partial equilibrium (PE) model of tariff changes applies to industries where products take time to build or grow. After goods are grown, producers of imports face an unexpected tariff shock and must either sell their product at a lower price, or store some goods to future periods to partially avoid the negative effects of a tariff. The model has three periods. In period 1, producers decide how much to produce for the period 2 market and begin growing their goods. In period 2, an unexpected tariff enters into force and producers decide how much of their grown product to sell in the market and how much to store to period 3, subject to a storage cost. Producers also decide how much to produce for the period 3 market and begin growing those goods. In period 3, producers sell their period 2 goods plus any stored goods.

This version of the model has THREE sources of supply: domestic production, imports subject to the tariff policy change, and non-subject imports. The model only considers the possibility of storing the subject imported good, not the other two sources of supply. The user inputs initial expenditures on the foreign and domestic products in the initial period, the initial and new tariff rate, elasticity parameters, time cost of money, and ad valorem storage costs. The user can modify data inputs in the simulation by changing the values in the ORANGE - shaded lines in the notebook below. The spreadsheet will update the estimated changes in economic outcomes that are reported in the GREEN - shaded cells once the user selects "Evaluate Notebook" under "Evaluation" in the Menu above.

This model is provided as a generic analytical tool, and the data and parameter values are fictional and illustrative. Actual data and parameter values should be supplied by the user based on the industry and market to which the model is applied. The model is the result of ongoing professional research of USITC staff and may be updated. The model is not meant to represent in any way the view of the U.S. International Trade Commission or any of its individual Commissioners. The model is posted to promote the active exchange of ideas between USITC staff and experts outside the USITC and to provide useful economic modeling tools to the public.

`In[]:= ClearAll [f] ;`

Parameter Inputs

Elasticity of Substitution

$ln[*]:=$ **sigma = 3;**

Total Price Elasticity of Demand for the Sector

$ln[*]:=$ **eta = -1;**

Supply Elasticity of Subject Imports

$ln[*]:=$ **es = 5;**

Supply Elasticity of Non-Subject Imports

$ln[*]:=$ **en = 5;**

Supply Elasticity of Domestic Shipments

$ln[*]:=$ **ed = 2;**

Initial Ad Valorem Tariff in Period 0

$ln[*]:=$ **t0 = 0;**

New Ad Valorem Tariff in Period 1

$ln[*]:=$ **t1 = 0.25;**

Initial Expenditures

$ln[*]:=$ **vdomestic = 50;**

$ln[*]:=$ **vsubject = 25;**

$ln[*]:=$ **vnonsubject = 25;**

Time Cost of Money

$ln[*]:=$ **ROR = 0.05;**

Ad Valorem Carrying (or Storage) Costs, Subject Imports

$ln[*]:=$ **cf = 0.05;**

Hidden Sections

Summary of Economic Effects

Fraction of subject imports stored from period 1 to period 2

$$In[*]= \text{ScenarioNN} * 0 + \text{ScenarioYN} * \frac{zsyn * 100}{qs1planned}$$

$$Out[*]= 18.0003$$

Effects in period 1 with storage, planned versus actual

Percent change in price of domestic shipments (planned versus actual)

$$In[*]= \text{ScenarioNN} * \frac{(pd1nn - pd0) 100}{pd0} + \text{ScenarioYN} * \frac{(pd1yn - pd0) 100}{pd0}$$

$$Out[*]= 3.19717$$

Percent change in producer price of subject imports (planned versus actual)

$$In[*]= \text{ScenarioNN} * \frac{(ps1nn - ps0) 100}{ps0} + \text{ScenarioYN} * \frac{(ps1yn - ps0) 100}{ps0}$$

$$Out[*]= -11.7963$$

Percent change in consumer price of subject imports (planned versus actual)

$$In[*]= \text{ScenarioNN} * \frac{(ps1nn (1 + t1) - ps0) 100}{ps0} + \text{ScenarioYN} * \frac{(ps2yn (1 + t1) - ps0) 100}{ps0}$$

$$Out[*]= 21.8604$$

Percent change in producer price of non-subject imports (planned versus actual)

$$In[*]= \text{ScenarioNN} * \frac{(pn1nn - pn0) 100}{pn0} + \text{ScenarioYN} * \frac{(pn1yn - pn0) 100}{pn0}$$

$$Out[*]= 3.19717$$

Percent change in quantity of domestic shipments (planned versus actual)

$$In[*]= \text{ScenarioNN} * \frac{(qd1nn - qd1planned) 100}{qd0} + \text{ScenarioYN} * \frac{(qd1yn - qd1planned) 100}{qd0}$$

$$Out[*]= 0$$

Percent change in quantity of subject imports (planned versus actual)

$$In[*]= \text{ScenarioNN} * \frac{(qs1nn - qs1planned) 100}{qs0} + \text{ScenarioYN} * \frac{(qs1yn - qs1planned) 100}{qs0}$$

$$Out[*]= -18.0003$$

Percent change in quantity of non-subject imports (planned versus actual)

$$In[*]:= \text{ScenarioNN} * \frac{(qn1nn - qn1planned) 100}{qn0} + \text{ScenarioYN} * \frac{(qn1yn - qn1planned) 100}{qn0}$$

Out[*]= 0

Effects in period 2 with storage

Percent change in price of domestic shipments

$$In[*]:= \text{ScenarioNN} * \frac{(pd2nn - pd1nn) 100}{pd1nn} + \text{ScenarioYN} * \frac{(pd2yn - pd1yn) 100}{pd1yn}$$

Out[*]= -3.43673

Percent change in producer price of subject imports

$$In[*]:= \text{ScenarioNN} * \frac{(ps2nn - ps1nn) 100}{ps1nn} + \text{ScenarioYN} * \frac{(ps2yn - ps1yn) 100}{ps1yn}$$

Out[*]= 10.5263

Percent change in producer price of non-subject imports

$$In[*]:= \text{ScenarioNN} * \frac{(pn2nn - pn1nn) 100}{pn1nn} + \text{ScenarioYN} * \frac{(pn2yn - pn1yn) 100}{pn1yn}$$

Out[*]= -3.30989

Percent change in quantity of domestic shipments

$$In[*]:= \text{ScenarioNN} * \frac{(qd2nn - qd1nn) 100}{qd1nn} + \text{ScenarioYN} * \frac{(qd2yn - qd1yn) 100}{qd1yn}$$

Out[*]= -0.697668

Percent change in quantity of subject imports

$$In[*]:= \text{ScenarioNN} * \frac{(qs2nn - qs1nn) 100}{qs1nn} + \text{ScenarioYN} * \frac{(qs2yn - qs1yn) 100}{qs1yn}$$

Out[*]= 29.3386

Percent change in quantity of non-subject imports

$$In[*]:= \text{ScenarioNN} * \frac{(qn2nn - qn1nn) 100}{qn1nn} + \text{ScenarioYN} * \frac{(qn2yn - qn1yn) 100}{qn1yn}$$

Out[*]= -1.08796