Economics Bulletin

Volume 31, Issue 4

Trigger Points of the Special Safeguard Mechanism

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Abstract

Current negotiations of the WTO's Doha Development Agenda include proposals for an agricultural special safeguard policy. The Special Safeguard Mechanism (SSM) under consideration would allow developing countries to invoke additional duties if import quantities rise above or import prices fall below specific trigger levels. We show that a global excess supply shock for a given agricultural commodity is ambiguous in terms of triggering a quantity- or price-based SSM. Using wheat and maize trade data, we show that a global excess supply shock may trigger a Q-SSM for one country and a P-SSM for another. We also provide threshold levels for the magnitude of shocks that would cause the P-SSM or Q-SSM to bind for various countries.

The views and opinions presented in this article represent those of the authors and not those of the United States Department of Agriculture or the Economic Research Service.

Citation: Peyton M Ferrier and Amanda M Leister, (2011) "Trigger Points of the Special Safeguard Mechanism", *Economics Bulletin*, Vol. 31 No. 4 pp. 3211-3220.

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Submitted: September 30, 2011. **Published:** November 23, 2011.

1. Introduction

Negotiations in the WTO under the Doha Development Agenda came to a standstill in July 2008. One of the key points of contention surrounds the potential inclusion of the Special Safeguard Mechanism (SSM), which would allow developing countries to invoke an additional duty on agricultural commodity imports when prices fall below a specified price trigger (P-SSM) or net imports rise above a specified quantity trigger (Q-SSM).

Determining which SSM policy lever would be triggered in response to a shock is important because the measures have different effects in their implementation and potential for trade distortion (Martin and Ivanic 2011, Grant and Meilke 2009, Hertel, Martin, and Leister 2010). For example, the P-SSM applies duties on a shipment-by-shipment basis, and is more likely to be applied to low-value imports from developing countries than to high-value imports from developed ones (Finger 2009). Alternatively, the Q-SSM applies duties uniformly on all subsequent shipments once the quantity trigger is breached.

We use an equilibrium displacement (ED) model (Davis and Espinoza 1998, Brester, Marsh, and Atwood 2004) to show whether the Q-SSM or P-SSM binds in response to a shock that increases global excess supply. We provide equivalency levels to show domestic price changes that correspond to import quantity increases that trigger the Q-SSM, as well as import quantity increases that correspond to decreases in domestic prices that trigger the P-SSM for each region. Finally, we show threshold values for global quantity shocks that would trigger the Q-SSM in the case where the P-SSM constraint does not bind.

2. Model

Assume countries trade a commodity in a perfectly competitive environment with zero transactions costs. Let *i* index the trading region and Q_i^S and Q_i^D be each region's quantity supplied and demanded. Let a positive value of σ_i from an exporting country represent the effect of either an unfavorable supply shock (i.e. a crop failure) or a positive demand shock (i.e. an increasing price of substitute goods). In equilibrium, net exports ($NE_i(P)$) from region *i* are:

$$NE_i(P) = Q_i^S(P) - Q_i^D(P) - \sigma_i \qquad (1)$$

By identity, net imports ($NI_i(P)$) equal the negative value of net exports ($NE_i(P)$). For simplicity, assume that region 1 is a net importer ($NI_1(P) > 0$).

The net supply of imports to region 1 is the sum of the net exports from all other regions of the world, shown as:

$$NE_{I\to 1}(P) = \sum_{i\neq 1} NE_i(P) = \sum_{i\neq 1}\left(Q_i^S(P) - Q_i^D(P) - \sigma_i\right) \quad (2)$$

After excluding region 1, Equation (2) represents global excess supply which is necessarily increasing in price. In equilibrium, net import demand for country 1 is:

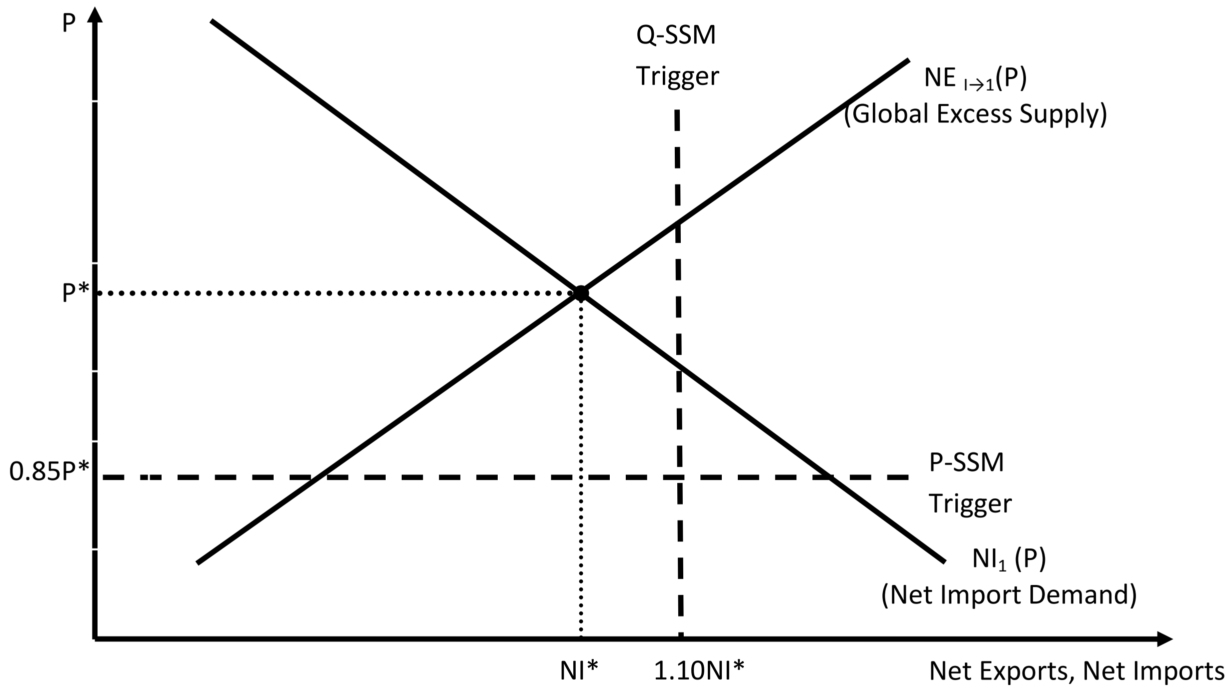
$$NI_1(P) = Q_1^D(P) - Q_1^S(P) + \sigma_1 \quad (3)$$

In equilibrium,

$$NI_1(P) = NE_{I\to 1}(P) \quad (4)$$

The global excess supply curve and the domestic excess demand curve in region 1 are depicted in Figure 1:

Figure 1 – Q-SSM and P-SSM Triggers in an Importing Region



In Figure 1, the equilibrium of price and net imports are P* and NI*. The dashed vertical line at 1.1NI* denotes the Q-SSM trigger. Shifts to excess global supply or net import demand that increase the equilibrium net imports above the Q-SSM trigger would allow developing countries to enact the Q-SSM. Similarly, the horizontal line at .85P* denotes the P-SSM trigger. Similar shifts to global excess supply that decrease the equilibrium price below the trigger would allow developing countries to invoke the P-SSM.

For domestic shocks (σ_1), it is unambiguous whether the P-SSM or Q-SSM would be triggered. If σ_1 is positive and large, the domestic excess demand curve shifts right and triggers the Q-SSM. Conversely, if σ_1 is negative and large, the domestic excess demand curve shifts left and triggers the P-SSM. Moreover, a negative global supply shock $(\sum_{i\neq 1}\sigma_i < 0)$ will shift the global excess supply curve left and triggers neither the Q-SSM nor P-SSM. Only a positive global supply shock that shifts global excess supply to the right (simultaneously decreasing P and increasing NI) would trigger the SSM. Without more knowledge of supply and demand responsiveness, it is unclear whether the Q-SSM or P-SSM will be triggered first.

The magnitude of the change in quantity (of net imports) or price from a global supply shock is found by tracing its effects after the market adjusts to remain in equilibrium, which is found by taking the total derivative of import demand (equation 3). Define ε_i^D and ε_i^S as the elasticities of supply and γ_i as the share of supply that a country consumes $\left(Q_i^D/Q_i^S\right)$. The marginal effect of a change in net import demand is:

$$\Delta NI_1 = (\varepsilon_1^D\gamma_1 - \varepsilon_1^S)Q_1^S\left(\frac{\Delta P}{P}\right) + \Delta\sigma_1 \tag{5}$$

Similarly, the marginal effect of a shock to the global excess supply function is found using the total derivative of import supply (equation 2):

$$\Delta NE_{I\rightarrow 1} = \sum_{i\neq 1}\left(\left(\varepsilon_i^S - \gamma_i\varepsilon_i^D\right)Q_i^S\frac{\Delta P}{P} - \Delta\sigma_i\right) \tag{6}$$

Setting equations (5) and (6) equal, the equilibrium percentage change in price from an exogenous shock to global excess supply is:

$$(\varepsilon_1^D\gamma_1 - \varepsilon_1^S)Q_1^S\left(\frac{\Delta P}{P}\right) + \Delta\sigma_1 = \sum_{i\neq 1}\left(\left(\varepsilon_i^S - \gamma_i\varepsilon_i^D\right)s_i^S\left(\frac{\Delta P}{P}\right) - \Delta\sigma_i\right) \tag{7}$$

Let a country's production be represented as their share of global production (s_i), or $Q_i^S = s_j\sum_j Q_j^S$ and let σ_1 equal 0. Equation (7) can then be re-written as:

$$\frac{\Delta P}{P} = A\left(\frac{\sum_{i\neq 1}\Delta\sigma_i}{\sum_i Q_i^S}\right) \leq 0 \tag{8}$$

where A is $\left(\sum_{i=1}\left(\varepsilon_i^S - \gamma_i\varepsilon_i^D\right)s_i^S\right)^{-1}$. Equation (8) relates the shocks to excess global supply to the change in price.

The effect on country 1's net imports from a change in the world price is found by dividing both sides of (5) by the import relationship in (3). The result is:

$$\frac{\Delta NI_1}{NI_1} = \frac{(\varepsilon_1^D \gamma_1 - \varepsilon_1^S)}{\gamma_1 - 1}\left(\frac{\Delta P}{P}\right) = B\left(\frac{\Delta P}{P}\right) \qquad (9)$$

where B equals $(\varepsilon_1^D \gamma_1 - \varepsilon_1^S)/(\gamma_1 - 1)$. From Equation (9), the effect of a global shock on domestic imports is:

$$\frac{\Delta NI_1}{NI_1} = AB\left(\frac{\sum_{i \neq 1} \Delta\sigma_i}{\sum_i Q_i^S}\right) \qquad (10)$$

While γ_1 exceeds 1 for all importing countries, it may be very close to one for countries that import small shares relative to total domestic production. The comparative static analysis of (8) and (10) suggests that small changes in price cause large percentage changes in import volumes and are more likely to trigger the Q-SSM rather than the P-SSM. Conversely, trade-dependent countries that produce little of a given commodity are less responsive to price changes (in terms of consumption) and are more likely to trigger the P-SSM rather than the Q-SSM. Simulations can be used to show whether a given global shock would cause either the P-SSM or the Q-SSM to bind in specific cases.

3. Simulation Results

Using data on elasticities from the Food and Agricultural Policy Research Institute[1] (FAPRI) in tandem with production and trade data from the United Nations Food and Agriculture Organization[2] (FAO), we examine which countries may trigger the P-SSM or Q-SMM for comparable global excess supply shocks. We consider the markets for wheat and maize (Table I and Table II, respectively). Both tables include the raw data for production and trade for developing, net importing countries, while information on developed net importing and net exporting countries is included in the appendix. Tables 1 and 2 provide simulation results for (1) the effect of a positive 10% shock to global excess supply on net imports; (2) the magnitude of the global excess supply shock that would increase imports by 10% to trigger the Q-SSM; (3) the percentage change in imports associated with the production shock that would trigger the Q-SSM; and (4) the magnitude of the production shock that would trigger the P-SSM, regardless of whether the Q-SSM is triggered. Column (3) is highlighted for countries where the P-SSM would be triggered rather than the Q-SSM. Column (4) is highlighted for the opposite case, where the Q-SSM is triggered rather than the P-SSM.

[1] This data is found at www.fapri.org/tools/elasticity.aspx. When necessary, we combine countries to conform to FAPRI's more aggregated groups. We assume the supply elasticities for wheat in South Korea and Asia and for maize in Israel, Japan, South Korea and Algeria is 0.2.

[2] This data is found at http://faostat.fao.org. Production and trade levels are averages from 2006 to 2008.

For wheat, Column (1) suggests that a 10% increase in global supply would trigger the Q-SSM for all countries except Egypt and South Korea (which does not designate itself as a developed country for purposes of agricultural trade rules within the WTO). Column (2) shows the threshold for a global production shock that would trigger the Q-SSM. China, India and Pakistan, which are notable for their small import shares of total consumption (γ_i near one), exceed the quantity trigger if the global production shock exceeds one percent. With the exception of the Africa/Middle East region, Columns (3) and (4) generally show that countries with larger import shares of consumption are more likely to trigger the P-SSM rather than the Q-SSM for a given shock to the global excess supply of a given commodity.

For maize, Column (1) initially indicates that a 10% shock to global production would trigger the Q-SSM in all developing import regions, aside from the Middle East, Malaysia, South Korea and Algeria. In addition, Column (2) shows that a global shock of only 6.4% percent is need to trigger the Q-SSM in the aforementioned countries. Columns (3) and (4) again show that countries with large import shares of consumption are more likely to trigger the P-SSM rather than the Q-SSM.

4. Conclusion

Even if global, rather than domestic, production shocks cause the Special Safeguard Mechanism to be enacted, the economic implications of the SSM policy differ, depending on whether the P-SSM or Q-SSM is invoked. We show that countries with small import shares of consumption are more likely to trigger the Q-SSM rather than the P-SSM for similar shocks, providing examples from the wheat and maize markets. Moreover, relatively small percentage changes in global production can cause either trigger to bind. In addition to other concerns regarding the economic implications of the SSM, policy makers may wish to consider the appropriateness of the trigger levels as they are currently specified.

Table I. Data and Simulation Results – Wheat

Developing Region	ε_i^D	ε_i^S	s_i	γ_i	B	(1) Effect of 10% Q Shock on %ΔNI	(2) %ΔQ that causes %ΔNI to equal 10%	(3) %ΔP assoc'd with ΔNI to equal 10%
China	-0.07	0.09	17.4 %	100.1%	-123.3	3225%	0.03%	-0.08%
India	-0.32	0.29	11.8 %	103.9%	-15.99	418.2%	0.24%	-0.63%
Pakistan	-0.11	0.23	3.5%	103.5%	-9.86	258.0%	0.39%	-1.01%
Iran	-0.16	0.08	2.0%	114.5%	-1.82	47.5%	2.10%	-5.50%
Asia, Other	-0.26	0.20	1.0%	159.5%	-1.03	27.0%	3.70%	-9.68%
Brazil	-0.27	0.43	0.7%	241.0%	-0.77	20.0%	4.99%	-13.05%
Mexico	-0.16	0.24	0.6%	167.9%	-0.75	19.6%	5.11%	-13.35%
Morocco	-0.23	0.17	0.6%	182.1%	-0.72	18.7%	5.33%	-13.95%
Tunisia	-0.32	0.15	0.2%	230.3%	-0.68	17.8%	5.62%	-14.69%
Africa/Mid. East	-0.16	0.09	6.3%	153.2%	-0.63	16.5%	6.07%	-15.88%
Latin America	-0.28	0.21	0.5%	282.3%	-0.55	14.4%	6.97%	-18.22%
Algeria	-0.35	0.18	0.3%	373.5%	-0.54	14.2%	7.03%	-18.39%
Egypt	-0.07	0.09	1.2%	184.8%	-0.26	6.8%	14.79%	-38.67%
South Korea	-0.08	0.20	0.0%	40002%	-0.08	2.1%	47.38%	-123.91%

Data: FAPRI (2011), FAO (2011) where production and import data come from 2006-08 data sets

A = -2.62, Total Production = 1,898,900,537 Tons

Table II. Data and Simulation Results -Maize

Developing Region	ε_i^D	ε_i^S	s_i	γ_i	B	Effect of 10% Q Shock on %ΔNI	%ΔQ that causes %ΔNI to equal 10%	%ΔP assoc'd ΔNI to equal
Pakistan	-0.39	0.28	0.44%	100.3%	-223.5	5447.4%	0.018%	-0.04%
China	-0.14	0.13	20.3%	101.2%	-22.6	549.7%	0.182%	-0.44%
Asia, Other	-0.19	0.14	1.77%	102.0%	-16.7	407.8%	0.245%	-0.60%
South Africa	-0.25	0.28	1.15%	102.2%	-23.8	580.4%	0.172%	-0.42%
E. Europe, Other	-0.1	0.07	0.33%	104.1%	-4.3	104.0%	0.962%	-2.34%
Africa, Other	-0.1	0.07	4.37%	106.0%	-2.9	71.7%	1.395%	-3.40%
Indonesia	-0.19	0.28	1.77%	106.1%	-7.9	191.5%	0.522%	-1.27%
Former Sov. Union	-0.08	0.09	0.40%	109.0%	-2.0	47.7%	2.095%	-5.10%
Vietnam	-0.22	0.08	0.55%	112.9%	-2.5	61.9%	1.615%	-3.94%
Mexico	-0.12	0.22	3.00%	134.7%	-1.1	26.8%	3.732%	-9.10%
Egypt	-0.36	0.25	0.83%	163.7%	-1.3	32.1%	3.115%	-7.59%
Latin America, Other	-0.2	0.1	2.04%	167.3%	-0.6	15.7%	6.351%	-15.48%
Middle East, Other	-0.13	0.09	0.91%	235.5%	-0.3	7.1%	14.033%	-34.20%
Malaysia	-0.19	0.23	0.01%	5638%	-0.2	4.8%	20.767%	-50.61%
South Korea	-0.38	0.2	0.01%	11002%	-0.4	9.4%	10.649%	-25.95%
Algeria	-0.22	0.2	0.00%	128457%	-0.2	5.4%	18.613%	-45.39%

Data: FAPRI (2011), FAO (2011) where production and import data come from 2006-08 data sets

A = -2.44, Total Production = 2,322,365,546 Tons

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6. Appendix

Table A1. Data and Simulation Results – Wheat and Maize for Exporters and Developed Countries

Country/Group	ε_i^D	ε_i^S	s_i	γ_i	B	Effect of 10% Q Shock on %ΔNI	%ΔQ that causes %ΔNI to equal 10%	%ΔP assoc'd with ΔNI to equal 10%
Developed Net Importers – Wheat								
Japan	-0.19	0.16	0.1%	723.7%	-0.25	6.4%	15.54%	-40.63%
Net Exporters – Wheat								
Australia	-0.26	0.33	2.4%	17.2%	0.45	-11.8%	-8.45%	22.10%
Canada	-0.22	0.39	3.9%	30.0%	0.65	-17.0%	-5.87%	15.35%
Argentina	-0.39	0.41	2.1%	29.1%	0.74	-19.3%	-5.18%	13.54%
USA	-0.22	0.39	9.1%	54.0%	1.11	-29.0%	-3.45%	9.03%
Former USSR	-0.05	0.09	4.1%	87.3%	1.05	-27.5%	-3.64%	9.51%
Russia	-0.15	0.19	8.3%	78.6%	1.44	-37.6%	-2.66%	6.95%
Ukraine	-0.36	0.21	2.8%	74.9%	1.91	-50.1%	-2.00%	5.22%
Eastern Europe	-0.08	0.07	2.5%	94.7%	2.77	-72.4%	-1.38%	3.61%
EU-New Mem.	-0.34	0.29	2.0%	88.5%	5.16	-134.9%	-0.74%	1.94%
EU-Orig. 15	-0.26	0.12	16.4%	97.8%	16.95	-443.3%	-0.23%	0.59%
Developed Net Importers –Maize								
Russia	-0.37	0.31	0.60%	103.2%	-21.8	530.8%	0.188%	-0.46%
Canada	-0.25	0.18	1.34%	117.9%	-2.7	64.7%	1.546%	-3.77%
EU- Orig. 15	-0.44	0.08	4.84%	123.9%	-2.6	63.7%	1.570%	-3.83%
Israel	-0.33	0.2	0.01%	1231%	-0.4	9.2%	10.888%	-26.54%
Japan	-0.21	0.2	0.00%	10746495%	-0.2	5.1%	19.539%	-47.62%
Net Exporters –Maize								
Australia	-0.3	0.23	0.14%	99.7%	176.6	-4304%	-0.023%	0.06%
Thailand	-0.21	0.15	0.51%	94.4%	6.2	-151%	-0.661%	1.61%
Brazil	-0.11	0.42	6.62%	88.0%	4.3	-104.7%	-0.955%	2.33%
India	-0.22	0.21	2.32%	87.2%	3.1	-76.5%	-1.308%	3.19%
EU New Mem.	-0.25	0.26	3.19%	83.4%	2.8	-68.6%	-1.457%	3.55%
United States	-0.25	0.18	39.0%	81.5%	2.1	-50.4%	-1.983%	4.83%
Ukraine	-0.51	0.28	1.09%	79.3%	3.3	-80.7%	-1.239%	3.02%
Argentina	-0.37	0.7	2.51%	30.0%	1.2	-28.2%	-3.543%	8.63%