Chapter 12

FOOD CRISIS AND EXPORT TAXATION: THE COST OF NONCOOPERATIVE TRADE POLICIES

Antoine Bouët and David Laborde

Export restrictions are trade measures that are permanently adopted by countries throughout the world.[1] Piermartini (2004) noted that approximately one-third of World Trade Organization (WTO) members impose export duties. Examples are export taxes implemented by Indonesia on palm oil, by Madagascar on vanilla, coffee, pepper, and cloves, by Pakistan on raw cotton, by the Philippines on copra and coconut oil, by Indonesia on palm oil, and by the European Union on wheat (Bouët and Laborde 2010; OECD 2010). What are the effects of such policy measures? And why do governments restrict exports in times of food crisis?

As the section "The Economics of Export Taxation in the Context of a Food Crisis" shows, economic analysis provides several rational justifications for using these restrictions—in particular, in terms of changes in international terms of trade and the impact on domestic prices of final and intermediate goods and public receipts. Moreover, it appears that countries have a relatively large degree of freedom in the implementation of such taxes, as the WTO does not prohibit export taxes and other forms of export restrictions. More precisely, as stated by Crosby (2008, 3), "general WTO rules do not discipline Members' application of export taxes," but "they can agree—and several recently acceded countries, including China, have agreed—to legally binding commitments in this regard." In addition, the Uruguay Round Agreement on Agriculture (AoA) stipulates that when implementing a new export restriction, a WTO member must (1) consider the implications of these policies on food security in importing countries, (2) give notice to the Committee on Agriculture, and (3) consult with WTO members that have an interest in the country's export policies. This agreement does not, however, impose

1 This chapter was originally published as an article in the *Review of World Economics* (Bouët and Laborde 2012). The authors would like to thank the participants of a workshop organized at OECD on October 30, 2009, and of a seminar organized at IFPRI-MTID in Washington, DC, on April 10, 2010, and in particular Jeonghoi Kim, David Tarr, Franck van Tongeren, and Maximo Torero for useful comments on an earlier version. Two anonymous reviewers have also been very helpful.

any penalty on countries that ignore the rules. Finally, this form of trade policy does not receive a great deal of attention from the public or the academic establishment.

This chapter provides a theoretical and empirical background that contributes to a better understanding of export taxes in the context of food crises. The 2006–2008 food crisis has shown that governments may be tempted by these policies at a time when their use is not regulated by international cooperation. As we show, these instruments may amplify the surge in world agricultural commodities prices—in particular when they are combined with a reduction of import tariffs by large net food-importing countries. This amplification effect is the result of a noncooperative game between large net food-importing countries and large net food-exporting countries; small net food-importing countries do not have the capacity for reaction and are hurt by this game equilibrium. We illustrate this process through a Computable General Equilibrium (CGE) model that quantifies these mechanisms. This modeling exercise clearly shows that when world food prices spike, both the implementation of new export restrictions and the reduction of import tariffs on agricultural commodities feed augmentation of world prices and harm small net food-importing countries. Such outcomes represent a clear lack of international coordination; we argue that international institutions should promote more cooperation in this area.

The next section provides an analytical framework that can help better explain these trade policies. In particular, in the section "A General Equilibrium Analysis," we develop a theoretical model under general equilibrium that (1) describes what the consequences are of adopting import taxes in large and small net-food importing countries and export taxes in large and small net food-exporting countries and (2) derives optimal policies when the objective of a government is to maximize the country's real income. In the section "An Illustration of the Adoption of Export Taxes on Agricultural Commodities and Their Effects Using the MIRAGE Model of the World Economy," we use the MIRAGE model to illustrate the potential impact of world price shocks and how countries may react using either increased export taxes and/or reduced import taxes, emphasizing the effects of noncooperative trade policies in this context.[2] In this modeling exercise, the objective of the government is to keep domestic prices constant in the case of an external

2 The MIRAGE model was initially developed at the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) in Paris. Full description of the model is available in Bchir et al. (2002) and Decreux and Valin (2007).

shock that implies a surge in world food prices. The rationale of this behavior is explained at the beginning of the next section. A final section concludes.

The Economics of Export Taxation in the Context of a Food Crisis: A General Equilibrium Analysis

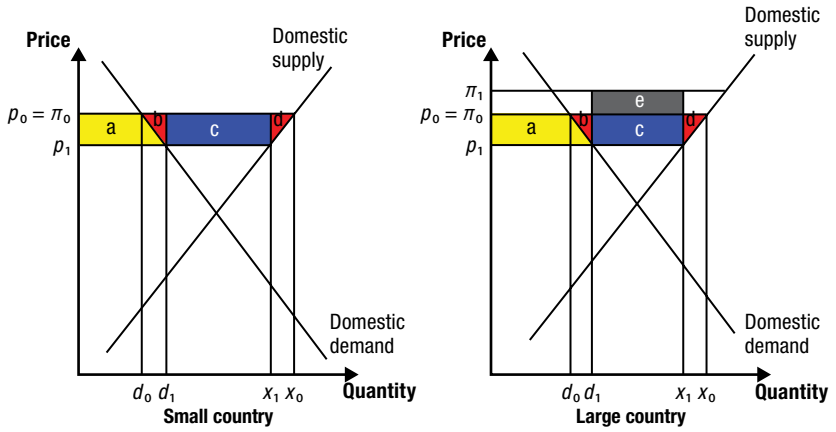
The objective of this section is to provide a more complete theoretical framework to explain the effects of export taxation in a general equilibrium. It might be helpful to present a list of the purported objectives of export taxation as stated officially by various governments. This list can be then compared to the actual impact of export restrictions as revealed by economic analysis. Kim (2010) provides a list that was revealed by WTO members during their Trade Policy Review. It includes: (1) noneconomic reasons related to security issues, such as chemical weapons and nuclear nonproliferation, (2) noneconomic reasons related to life, public health, safety, and environmental issues (for example, transboundary movement of hazardous waste), (3) economic reasons in accordance with international or bilateral agreements (for example, international commodities agreements on sugar, coffee, and petroleum), and (4) maintenance of an adequate supply of essential products or promotion of downstream industries. The economic analysis of export taxation provides other economic reasons.

We develop a general model of international trade between four countries (two large and two small). The purpose of this exercise is to understand that, as far as a food crisis is concerned, there is a distinction to be made between (1) large food-exporting countries that can increase the world price of the commodity they export while decreasing the domestic price of this commodity, (2) large food-importing countries that can also have an impact on world prices and accept a deterioration in their terms of trade in order to decrease the domestic price of an agricultural commodity, (3) small net food-importing countries that cannot affect world prices and are harmed by the policies of large countries, and (4) small net food-exporting countries that cannot affect world prices and benefit from the policies of large countries. The entire process is a "trade game" with strategic interdependence on import tariffs and export taxes.

A Partial Equilibrium Analysis

The partial equilibrium framework provides several insights (Figure 12.1). Consider first the case of a small country (left graph on Figure 12.1) imposing an export tax t (defined in specific terms). The initial domestic price is p_0,

FIGURE 12.1 A partial equilibrium analysis of an export tax



Source: Authors' investigation.

while the initial world price is π_0. At these initial prices, domestic demand is d_0 and is less than domestic supply, x_0, the difference being exported on the world market. As these exports are now taxed, at the initial prices, domestic producers prefer offering their supply on the local market (untaxed) rather than on the world market (taxed). On the domestic market, the supply is increased, reducing the domestic price until $p_1 + t = \pi_0$, while the world price is, by definition, unchanged (small country). At this level of prices, domestic producers are indifferent between selling their products on local markets and exporting them.

Domestic consumers benefit from this policy, as they consume more ($d_1 > d_0$) at a lower price ($p_1 < p_0$); their gain is here measured by area a. Domestic producers are hurt by this policy, as they produce and sell less ($x_1 < x_0$) at a lower price ($p_1 < p_0$); their loss is here measured by (a + b + c + d). Finally, the export tax increases public revenues (area c). Clearly, policy makers should not implement such a policy if it is assumed that one dollar of consumers' surplus has the same value as one dollar of producers' surplus and one dollar of public revenue. Nevertheless, if policy makers have a food security objective that implies a decrease in domestic prices, export taxes may be justified in the sense that they augment domestic consumption and reduce the local consumer price. They increase the surplus of food consumers. In such a case, a consumption subsidy is a first-order instrument (meaning it is more efficient), but it may have a cost for the government: if we assume that the government

has difficulties raising taxes on other products and/or sources of income (for example, a tax on firm profits), an export tax may be preferred to a consumption subsidy.[3] Both arguments explain why one dollar of increase in consumers' surplus or in public revenue is more important for the government than one dollar of loss in terms of producers' surplus.

The case of a large country (see right graph on Figure 12.1) differs in the sense that the world price is affected by the export tax. The reason is that a large country is assumed to export a significant share of world exports, such that if these exports are reduced, world exports would be significantly reduced and the world price would increase. Consumers' and producers' surpluses are identically affected, but public revenues are augmented as the world price is raised up to π_1; the post-tax level of exports is still the difference between x_1 and d_1, but the unit tax is now $\pi_1 - p_1$. This is all the more important, as the implementation of this policy can lead to an augmentation of domestic welfare if the area denoted by e is larger than the sum of the areas (b + d). While b + d represents welfare losses coming from these new distortions, e represents an improvement in national terms of trade. Final exports $(x_1 - d_1)$ are sold at π_1 and not π_0, with the difference $(\pi_1 - \pi_0)$ representing a gain in terms of trade for each unit exported.

Simultaneously, the same political elements are still in play, as domestic consumers and the public budget are favored and domestic producers are hurt by this decision. Therefore economic analysis provides several justifications for the implementation of export taxes.

1. **Terms of trade**. This is perhaps the most important justification. By restricting its exports, a country that supplies a significant share of a particular commodity in the world market can raise the world price of that commodity. This implies an improvement in that country's terms of trade. The reasoning behind this argument is very similar to the optimum tariff argument (Bickerdike 1906; Johnson 1953), which states that by implementing a tariff on its imports, a "large" country can significantly decrease the demand for a commodity that it imports; this therefore leads to a decrease in the commodity's world price.

3 It has also been argued that export taxes on commodities (cocoa, oil) have been administrated in a very convoluted way in several developing countries (for example, Côte d'Ivoire) and have fostered corruption, as this resource is less monitored than other taxes paid by local customers/constituencies.

2. **Food security and final consumption price.** By creating a wedge between the world price and the domestic price, a government can lower the latter by reorienting domestic supply toward the domestic market. Piermartini (2004) provides an example in which the Indonesian government imposed export taxes on palm oil products, including crude and palm cooking oil, in 1994 because it considered cooking oil an "essential" commodity. This rationale was often used by governments during the food crisis of 2006–2008 to justify the implementation of export taxes and other forms of export restrictions.

3. **Intermediate consumption price.** Export taxes on primary commodities (especially unprocessed ones) work as an indirect subsidy to higher-value-added manufacturing or processing industries by lowering the domestic price of inputs compared with those inputs' world—nondistorted—price. While the previous justification addresses the use of export taxes to lower prices for final consumption, this one is concerned with decreasing prices for intermediate consumption. This justification follows a reasoning similar to the theory of effective protection and is noted by Corden (1971), who considers that an export tax on an exportable input protects the using industry. For example, in 1988, Pakistan imposed an export tax on raw cotton in order to stimulate the development of the yarn cotton industry. This kind of degressive export tax structure (greater than zero for the raw commodity; zero or close to zero for the processed good) also exists in China (for steel products, metal ore sand, and ferro-alloys) and Indonesia and Malaysia (for palm oil/biodiesel and cooking oil; see Amiruddin 2003).

4. **Public receipts.** Export taxes provide revenues for developing countries that have limited capacity for domestic taxation. This is a lesser argument because in order to raise a given amount of revenue, the imposition of lump-sum taxes is the best policy (Ramsey 1927; Diamond 1975). Deardorff and Rajaraman (2005) demonstrate that for a country exporting a (primary) product under monopsony's power, the best available policy may be to tax exports so as to extract some of the profits of the monopsonist; doing so worsens the distortion but increases domestic public receipts to the detriment of monopsony's rents.

5. **Income redistribution.** Like import tariffs, export taxes are measures that imply redistribution of income to the detriment of the domestic

producers taxed and to the benefit of domestic consumers and public revenues.

6. **Stabilization of domestic prices.** In order to stabilize domestic prices for export producers, some developing countries use variable tax rates. Piermartini (2004) provides the example of Papua New Guinea, which established an export tax/subsidy rate for cocoa, coffee, copra, and palm oil equal to one-half the difference between the reference price—calculated as the average of the world price in the previous 10 years—and the actual price for the year.

It is worth noting that in the long run, consequences could be different because, as noticed by Mitra and Josling (2009, 11), "producers in the rest of the world will increase their supply in response to higher prices. As a result of increased supply the price adjusts downward from the short-run level, but still remains above the pre-restriction level." Therefore it is quite possible that export restrictions could be beneficial in the short run while having negative consequences in the long run due to adjustments in the terms of trade. Evidently the partial equilibrium approach does not provide a rigorous and consistent framework, as it does not account for income effects and all interdependent links that exist in the world economy. A general equilibrium analysis is required.

A General Equilibrium Analysis

We consider a model of international trade between four countries: two are large (1 and 2), meaning that they are price makers on the world market, and two are small (3 and 4), meaning that they are price takers. These countries produce and trade two commodities, an agricultural commodity (A) and an industrial commodity (I). Countries 1 and 4 have a comparative advantage in A: they export the agricultural good and import the industrial one. In contrast, countries 2 and 3 have a comparative advantage in I: they export the industrial good and they import the agricultural good. Country i's welfare function is denoted as U_i, and the local demand of country i for good k is D_i^k, $\forall i = 1, 2, 3, 4$; $\forall k = A, I$. Let X_i^k, $\forall i = 1, 2, 3, 4$ and $\forall k = A, I$, the production of good k in country i. The variable π^k is the nominal world price of good k, and p_i^k is the nominal local price of good k in country i. The variable π is the relative price of good A on the world market in terms of industrial goods, p_i is the relative price of good A within country i. Variable y_i indicates the real income in country i, and Y_i is the nominal income in country i.

Let us assume the following:

1. Technology is accounted for by "well-behaved" production functions.
2. Competition is perfect in each country in both product and factor markets.
3. Welfare depends only on local consumption of both goods:

$$U_i = U_i(D_i^A, D_i^I) \text{ with: } \frac{\partial U_i}{\partial D_i^k} > 0, \forall i, \forall k. \quad (1)$$

4. Governments select either an import tariff/subsidy or an export tax/subsidy on good A in order to maximize the national welfare function.[4]
5. Trade is balanced in each country:

$$X_i^I - D_i^I = \pi \,.\, (D_i^A - X_i^A) \quad (2)$$

Both sides are positive for $i = 2$ and 3 and negative for $i = 1$ and 4.

6. There is no transportation cost.
7. The tariff/export tax revenue is redistributed totally to local agents without losses.

We first analytically derive the effects of an import tariff in countries 2 and 3 and of an export tax in countries 1 and 4. We then determine the optimal policy for each country.

AN IMPORT TARIFF IN THE LARGE FOOD-IMPORTING COUNTRY

Let us first consider the traditional case of the impact of an import tariff on demand. In the case of 2, t_2 is a tariff on agricultural imports. The demand for imports is:

$$M_2^A = D_2^A(p_2, y_2) - X_2^A(X_2^I(p_2)). \quad (3)$$

Total differentiation brings:

$$dM_2^A = \frac{\partial D_2^A}{\partial p_2}(p_2, y_2)dp_2 + \frac{\partial D_2^A}{\partial y_2}(p_2, y_2)dy_2 - \frac{dX_2^A}{dX_2^I}\frac{dX_2^I}{dp_2}d\mathrm{p}_2. \quad (4)$$

We have:

$\sigma^c{}_2 = -\frac{p_2}{M_2^A}\frac{\partial D_2^A}{\partial p_2}(p_2, y_2)$ is the compensated relative price elasticity of demand for agricultural imports in country 2; $m_2 = p_2\frac{\partial D_2^A}{\partial y_2}(p_2, y_2)$; m_2 is the marginal

4 The main reason is that we are interested in what happens to demand for the agricultural good. There are some equivalence theorems that show that in a two countries/two goods model, the imposition of an export tax is equivalent to an import tax (Lerner 1936). We could also consider that import tariffs on the industrial good are bound at 0.

propensity to spend on agricultural goods in country 2; $e_2 = -\frac{p_2}{E_2^I}\frac{dX_2^I}{dp_2}$; e_2 is related to a relative price elasticity of supply for industrial products in country 2.

Let us find an expression of dy_2. If $V_2 = V_2\,(p_2, Y_2)$ is the maximum utility that can be attained by 2 when the domestic price is p_2 and nominal income is Y_2, Roy's theorem gives:

$$D_2^A = -\frac{\frac{\partial V_2(p_2,Y_2)}{\partial p_2}}{\frac{\partial V_2(p_2,Y_2)}{\partial Y_2}} = -\frac{V_{2p_2}}{V_{2Y_2}} \tag{5}$$

Therefore:

$$dy_2 = \frac{dV_2}{V_{2Y_2}} = dY_2 - D_2^A . dp_2 = dX_2^I + p_2 . dX_2^A + X_2^A . dp_2 + d(\pi t_2 M_2^A) - D_2^A . dp_2.$$

Since perfect competition ensures that the economy is located on the production frontier: $dX_2^I + p_2 . dX_2^A = 0$, we have

$$dy_2 = -M_2^A . dp_2 + M_2^A\, d(p_2 - \pi) + \pi t_2\, dM_2^A = -M_2^A . d\pi + \pi t_2\, dM_2^A \tag{6}$$

Equation (6) states that in this international trade model, a country's real income is affected either by a change in world prices ($d\pi < 0$ means that the world price for the agricultural good decreases; this is the good that country 2 imports) or a variation in quantities traded (real income increases when trade increases, other things being equal).

Integrating equation (6) and the previous definitions inside (4)[5], we obtain:

$$\frac{dM_2^A}{M_2^A} = \left\{-\sigma^c{}_2 \cdot \frac{dp_2}{p_2} - \frac{m_2}{1+t_2}\frac{d\pi}{\pi} - \frac{e_2}{1+t_2}\frac{dp_2}{p_2}\right\}/d_2 \tag{7}$$

where:

$$d_2 = 1 - [m_2 t_2 / (1 + t_2)].$$

RESULT 1. IN THE LARGE FOOD-IMPORTING COUNTRY, WHEN IMPOSING A TARIFF, FOUR MECHANISMS ARE AT PLAY.

1. A substitution effect on domestic consumption: under constant real income, a tariff increase leads to a domestic agricultural price increase, which reduces domestic consumption of the agricultural good in favor of other goods.

2. A substitution effect on domestic production: under constant real income, a tariff increase leads to a domestic agricultural price increase,

5 In particular to obtain equation (7), remember that: $p_2 = \pi(1+t_2)$ and $E_2^I = \pi M_2^A$.

which expands domestic production of the agricultural good to the detriment of other goods.

3. The imposition of a tariff on the country's imports of the agricultural good reduces the world price of this good, which implies that terms of trade are improved for this country.

4. A multiplier effect: an increase in real income increases demand for imports, which in turn increases tariff receipts, which increases real income, and so on. Starting from free trade (that is, a situation in which no tariff is imposed) ($t_2 = 0$), this effect is nil.

AN EXPORT TAX IN THE LARGE FOOD-EXPORTING COUNTRY

We turn now to the case of country 1, which may consider the implementation of a tax t_1 on its agricultural exports. Its supply of agricultural exports is:

$$E_1^A = X_1^A\left(X_1^I(p_1)\right) - D_1^A(p_1, y_1) \tag{8}$$

Total differentiation brings:

$$dE_1^A = \frac{dX_1^A}{dX_1^I}\frac{dX_1^I}{dp_1}dp_1 - \frac{\partial D_1^A}{\partial p_1}(p_1, y_1)dp_1 - \frac{\partial D_1^A}{\partial y_1}(p_1, y_1)dy_1 \tag{9}$$

$\sigma_1^c = -\frac{p_1}{E_1^A}\frac{\partial^c D_1^A}{\partial p_1}(p_1, y_1)$ is the compensated relative price elasticity of supply of agricultural exports in 2, $m_1 = p_1\frac{\partial D_2^A}{\partial y_2}(p_1, y_1)$ is the marginal propensity to demand agricultural goods in 1, and $e_1 = -\frac{p_1}{M_1^I}\frac{\partial X_1^I}{\partial p_1}$ is the relative price elasticity of the supply of industrial goods in 1. Let us find an expression of dy_1. As for $i = 2$, $V_1 = V_1(p_1, Y_1)$ is country 1's indirect utility and Roy's theorem is:

$$D_1^A = -\frac{\frac{\partial V_1(p_1, Y_1)}{\partial p_1}}{\frac{\partial V_1(p_1, Y_1)}{\partial Y_1}} = -V_{1p_1}/V_{1Y_1} \tag{10}$$

Therefore:

$$dy_1 = \frac{dV_1}{V_{1Y_1}} = dY_1 - D_1^A.dp_1 = dX_1^I + p_1.dX_1^A + X_1^A.dp_1 + d(p_1t_1E_1^A) - D_1^A.dp_1$$

$p_1t_1E_1^A$ is country 1's public revenue from taxation of exports ($\pi = p_1(1 + t_1)$). Following similar manipulations, we obtain:

$$dy_1 = E_1^A.d\pi + p_1t_1dE_1^A \tag{11}$$

Equation (11) is important because it states that country 1's real income is affected either by a change in world prices (terms of trade effect; $d\pi > 0$ means that the agricultural good's world price increases; this is the good that country 1 exports) or a variation in quantities traded (real income increases when trade increases, other things being equal). The terms-of-trade effect is proportional to the amount of country 1's agricultural exports. Integrating equation (11) and the previous definitions inside (9), we obtain:

$$\frac{dE_1^A}{E_1^A} = \left\{\sigma^c{}_1 . \frac{dp_1}{p_1} - m_1(1+t_1)\frac{d\pi}{\pi} + (1+t_1).e_1\frac{dp_1}{p_1}\right\}/d_1 \qquad (12)$$

where:

$$d_1 = 1 + m_1 t_1 .$$

RESULT 2. IN THE LARGE FOOD-EXPORTING COUNTRY, WHEN IMPOSING A TAX ON ITS AGRICULTURAL EXPORTS, FOUR MECHANISMS ARE AT PLAY.

1. A substitution effect on domestic consumption: under constant real income, a tax on agricultural exports leads to a domestic agricultural consumer price decrease, which in turn augments the domestic consumption of the agricultural good ("food security effect").
2. A substitution effect on domestic production: under constant real income, a tax on agricultural exports leads to a domestic agricultural producer price decrease, which decreases domestic production of the agricultural good ("antifarmer effect").
3. As this is a large country, the imposition of a tax on exports of an agricultural good increases the world price of that good, which implies that the country's terms of trade are improved.
4. A divisor effect: an increase in real income increases demand for the agricultural commodity, which decreases export supply of the agricultural commodity, which in turn reduces export tax receipts, which decreases real income. Starting from free trade (t = 0), this effect is nil.

TARIFFS AND TAXES IN SMALL COUNTRIES

As far as country 3 is concerned, the problem is similar to country 2 in that it has a comparative disadvantage in the production of the agricultural good; country 3 imports this good. The only difference is that it is a small country, so that a change in its real income is expressed as:

$$dy_3 = \pi t_3 dM_3^A \qquad (13)$$

Concerning country 4, the problem is similar to country 1 in that it has a comparative advantage in the production of the agricultural good; country 4 exports this good. The only difference is that it is a small country, so that a change in its real income is expressed as:

$$dy_4 = p_4 t_4 dE_4^A \tag{14}$$

For small countries, the higher the level of trade, the higher the real income. Concerning country 3, welfare is maximized with $\pi = p_3$; that is, domestic price equal to world price $t_3 = 0$, as $p_3 = \pi(1+t_3)$. The same policy conclusion applies for country 4: $t_4 = 0$ is the optimal policy, and any other policy does not maximize real income.

A TRADE WAR OF IMPORT TARIFFS AND EXPORT TAXES

If country 3 implements a tariff on its agricultural imports, it decreases its traded imports and its real income is negatively affected. Country 3's reaction function is:

$$t_3 = 0 \tag{15}$$

Similarly, country 4's reaction function is:

$$t_4 = 0 \tag{16}$$

As far as country 2 is concerned, its program consists of selecting a production structure and a world price that maximize real income:

$$Max_{X_2^I,\pi} U_2 = U_2(D_2^A; D_2^I) = U_2(X_2^A + M_2^A; X_2^I - E_2^I)$$

Under:

$$E_2^I(\pi) = \pi M_2^A \tag{17}$$

$$X_2^I = -p_2 X_2^A + constant \tag{18}$$

$$p_2 = \pi(1 + t_2) \tag{19}$$

Equation (17) defines trade balance, (18) defines production frontier, and (19) defines the relation between world and domestic prices. This program can be rewritten as:

$$Max_{X_2^I,\pi} U_2 = U_2\left(-\frac{X_2^I}{p_2} + \frac{E_2^I(\pi)}{\pi}; X_2^I - E_2^I(\pi)\right) \tag{20}$$

Solving (20) yields country 2's reaction function:

$$t_2 = \frac{1}{\sigma_2^* - 1} \tag{21}$$

where $\sigma_2^* = \frac{\pi}{E_2^I} \frac{\partial E_2^I}{\partial \pi} > 0$ is the reciprocal demand elasticity facing 2. It is a general equilibrium elasticity that measures how much the rest of the world is willing to trade agricultural goods against country 2's industrial goods. In this elasticity, substitution effects (on both the consumption and production side), real income effects, and multiplier effects are embedded.[6]

As far as country 1 is concerned, the same approach gives:

$$Max_{X_1^A,\pi}\ U_1 = U_1\ (D_1^A; D_1^I) = U_1\ (X_1^A - E_1^A; X_1^I + M_1^I) \tag{22}$$

Under:

$$M_1^I = \pi E_1^A(\pi) \tag{23}$$

$$X_1^I = -p_1 X_1^A + constant \tag{24}$$

$$\pi = p_1(1 + t_1) \tag{25}$$

This can be rewritten as:

$$Max_{X_1^A,\pi} U_1 = U_1(X_1^A - E_1^A(\pi);\ -p_1 X_1^A + \pi E_1^A(\pi)) \tag{26}$$

Solving (26) yields country 1's reaction function:

$$t_1 = \frac{1}{\sigma_1^* - 1} \tag{27}$$

where $\sigma_1^* = \frac{\pi}{E_1^A} \frac{\partial E_1^A}{\partial \pi} > 0$ is the reciprocal demand elasticity facing country 1. Under the conditions that countries 1 and 2 are large countries, these elasticities are greater than unity, and optimal taxes (on imports for country 2 and on exports for country 1) are strictly positive.[7]

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6 We can easily derive a relation between the reciprocal demand elasticity and the parameters s_2^C, e_2, m_2, and d_2 defined previously.

7 The design of optimal export taxes requires the estimation of consumption, production, and trade elasticities. Broda, Limao, and Weinstein (2006) find evidence that non-WTO members have market power and implement relatively high tariffs compared to WTO members. Warr (2001) concludes that available econometric estimates for the world demand elasticity of rice facing Thailand imply optimal export taxes ranging from 25 percent to 100 percent. This assessment may lead to false interpretations; Bautista (1996) gives an example in which the Philippine government implemented an export tax on copra and coconut oil based on the principle that the country represented a large share of the world market for these products and faced a "negative elasticity" in world export demand. In fact, this evaluation did not take into account substitutability with other vegetable oils and the Philippines' consequent low share of the world market. Moreover, demand and supply elasticities may change over time; consequently a country may gain in the short run while losing in the longer run.

RESULT 3. UNDER THESE ASSUMPTIONS, FOUR CONCLUSIONS MAY BE DERIVED FROM THE "IMPORT TARIFF-EXPORT TAX" GAME.

1. Each time either the large food-importing country or the large food-exporting country increases its tax, this move has a double effect. The first is the terms-of-trade effect, which consists of an improvement in the terms of trade for the country that implements the tax increase and a deterioration in the terms of trade for the other large country. The second effect is a traded volume effect, which consists of a decrease in traded volume for the country that implements the policy and its partners. A change in the small country's trade policy does not have an impact on its terms of trade and affects only traded volume.
2. Concerning large countries (1 and 2), as any policy change in this context has these two effects, at a given stage a country may decide to decrease its tax and accept a deterioration in its terms of trade while benefiting from an increase in trade volumes.
3. If the government's objective is to maximize real income, the Nash equilibrium is the intersection of reaction functions (15), (16), (21), and (27). This Nash equilibrium implies a loss of real income for country 3, a gain of real income for country 4, and a reduction in world real income. At equilibrium, a large country may also benefit from augmented real income as compared to free trade.
4. If the objective of a government is to decrease the domestic price of the agricultural good, the policy to be implemented is a decrease in the import tax in the large food-importing country and an increase in the export tax in the large food-exporting country. Both policies will have the effect of increasing the world price of the agricultural good and therefore hurting country 3, while increasing country 4's real income.

Point (i) comes from the expression of the changes in real income as stated by equations (6), (11), (13), and (14). Point (ii) is implied by the fact that moving from free trade to autarky, other things being equal, will bring about an initial increase in a large country's real income followed by a decrease; as a consequence, it is possible that, due to excessive taxation of trade flows, trade may be too small and a country may try to increase it by reducing the distortion that the tax caused. As far as Point (iii) is concerned, from the two effects under play, one being positive and one negative, the improvement in

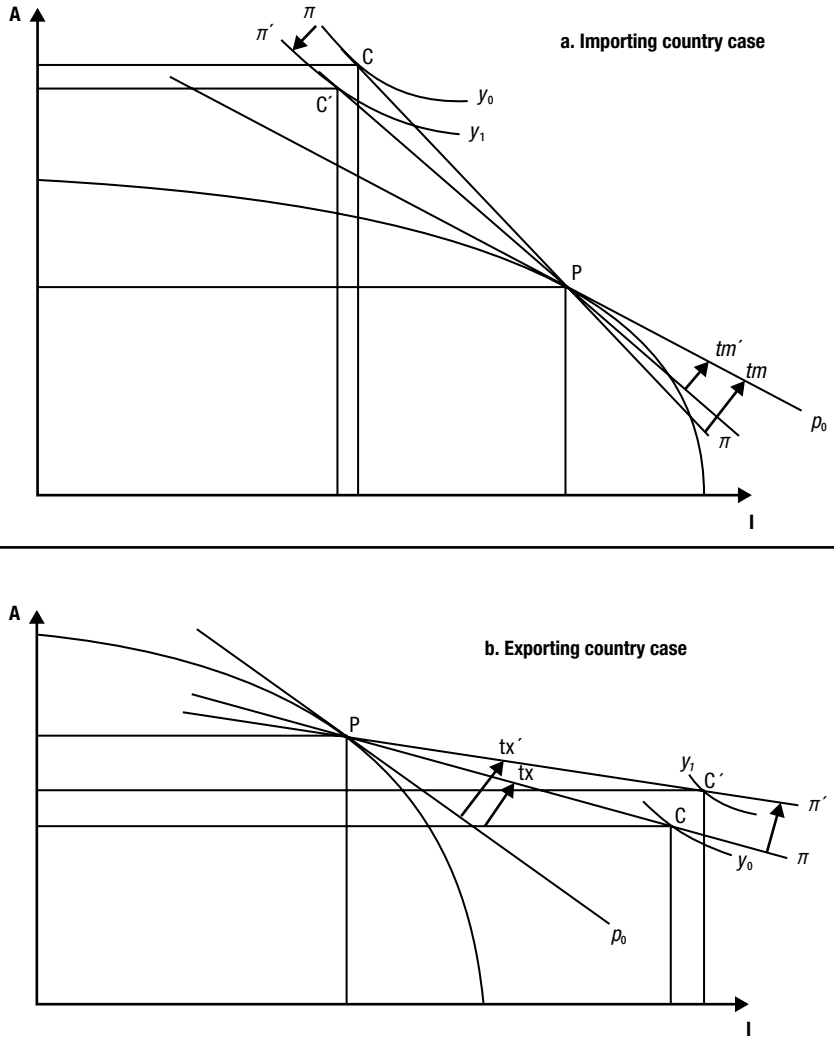
the terms of trade for one large country means deterioration for the other, while the reduction of trade is negative for both large countries; at Nash equilibrium involving a positive export tax in country 1 and a positive import tax in country 2, trade volumes are reduced. Therefore, either both large countries are worse off than under free trade or one is better off and the other is worse. Concerning Point (iv) an increase of the world price for the agricultural good deteriorates country 3's (small net food-importing country) terms of trade while improving country 4's (small net food-exporting country) terms of trade. If these countries do not tax either imports or exports, they maximize the quantities they trade. Consequently, country 3's real income is reduced while country 4's real income is augmented as compared to the initial situation of world free trade.

We thus see the possibility that governments may engage in a trade war for food security purposes, through which they respond to increases in world agricultural prices by increasing export taxes in agriculture-exporting countries and decreasing import taxes in agriculture-importing countries. This is illustrated in Figure 12.2a.

Figure 12.2a illustrates the case of an agriculture-importing country (A is the agricultural good and is located on the vertical axis) whose aim is to maintain the domestic agricultural price at p_0. Initially, the world price is at π, which leads this country to impose a tariff of tm on agricultural imports, such that $\pi . (1 + tm) = p_0$ (this accounts for the impact of tm on π). If an increase in the agricultural world price occurs, from π to π', this country must reduce its import tariff to tm', such that $\pi' . (1 + tm') = p_0$. It must be noted that the agriculture-importing country's real income is decreased from y_0 to y_1.

Figure 12.2b depicts the case of an agriculture-exporting country that also aims to maintain the domestic agricultural price at p_0. Initially, the world price is at π which leads this country to impose a tax of tx on agricultural exports, such that $p_0 (1 + tx) = \pi$ (this accounts for the impact of tx on π). If an increase in the world agricultural price occurs, from π to π', this country must augment its export tax up to tx', such that $\pi'/(1 + tx') = p_0$. While its two trading partners are hurt by this price shock and subsequent policy reaction, it is worth noting that the agriculture-exporting country's real income is increased from y_0 to y_1. Let us note also that with the imposition of this import tariff, the country does not maximize the international value of its production; if it were maximized, the international price lines (π or π') would be tangential to the production-possibility frontier and domestic production would adjust to a change in international prices.

FIGURE 12.2 A general equilibrium analysis of import and export taxes



Source: Authors' investigation.

As stated previously, the WTO does not really limit the use of export restrictions, especially export taxes; however, WTO members are committed to "bind" import duties. Consequently, WTO members are authorized to increase export taxes and reduce import duties. As we have shown, this is exactly the sequence of policy options that large countries may implement in

the case of upward food price spikes when their aim is to maintain domestic food prices at a maximum level. This clearly entails a lack of international coordination that can harm trading partners—in particular small net food-importing countries. The only option available for small net food-importing countries in this scenario is to decrease import tariffs or implement import subsidies, which has a cost in terms of public revenues and does not have any impact on terms of trade.

Finally, it must be emphasized that if under free trade, a country (either 1 or 2 in our example) has an interest in implementing an export tax or an import tariff because such a policy will increase its real income (or decrease domestic agricultural prices), this does not mean that at the end of the process (when all countries have implemented their respective policies) each country is better off than it would be under free trade. In particular, each country's real income could be reduced as compared to free trade; this is the classical "prisoner's dilemma." Nonetheless, a country can win from a trade war in the sense that its real income can be greater than it was initially (Johnson 1953).

An Illustration of the Adoption of Export Taxes on Agricultural Commodities and Their Effects Using the MIRAGE Model of the World Economy

This section uses the MIRAGE model of the world economy to assess the economic consequences of various trade policies. These simulations rely on low supply and demand elasticities.[8] They are compatible with a short-run situation. We simulate a demand shock that implies a 10 percent increase of the world price of wheat as well as various trade policies implemented to react to this shock and maintain domestic food security. We use short-term elasticities to generate the price increase; our objective is to understand the mechanisms that take place in the short run and explain the adoption of policies that preserve food security at home but generate negative consequences for trading partners.

In this modeling exercise, all countries are pursuing domestic price stability. The rationale for this objective is that governments are now striving to prevent a significant increase in the prices of necessary goods (food) for

8 The model is also based on low Armington elasticities (these are GTAP elasticities, see Hertel et al. 2007) as compared to other models like LINKAGE from the World Bank. A sensitivity analysis has been undertaken in order to conduct the same analysis with higher elasticities. These results are given in footnote 13.

low-income households. Policy makers have recently increased statements about the need to decrease food price volatility.[9] Recent economic studies show that the implications of upward food price spikes are substantial, not only in terms of short-term household welfare but also in terms of nutrition and loss of capital (long-term perspective; see Headey and Fan 2010; Hoddinott et al. 2008).

It remains to explain why policy makers choose to use trade policy instruments to pursue their objective. This may be a second-rank policy compared to cash transfers to low-income households or consumption subsidies. However, both these policy options are costly in terms of public revenues, while export taxes or restrictions are not and may even increase public receipts. Moreover, cash transfers may be difficult and take a long time to implement. Consumption subsidies (or de-taxations) are also costly in terms of public receipts and support all households, not only low-income households. Finally, we have to account for the differentiation of local and foreign goods: when a shock comes from world markets, governments may think that they have to change the prices of internationally traded goods without affecting the prices of domestically produced goods.

The Model

The MIRAGE model is a multinational, multisector Computable General Equilibrium (CGE) model (Bchir et al. 2002; Decreux and Valin 2007). We use the MIRAGE model under its static version, with a perfect competition hypothesis and without modeling foreign direct investment. We use perfect competition instead of imperfect competition because the latter framework necessitates supplementary data (number of firms, markup, and magnitude of scale economies) for calibration purposes that are difficult to gather for many regions. Moreover, we focus on agriculture, which is usually characterized by strong competition. The use of the static version is also justified by the fact that we are not interested in the dynamics of reform.

The first source of data is GTAP7 (see Narayanan and Walmsley 2008 for full documentation), which provides world macroeconomic accounts and trade flows for the year 2004. The market access data come from the MAcMapHS6 version 2.1 database (Boumellassa, Laborde, and Mitaritonna 2009), which measures protection in 2004 and includes all regional

9 See the statements made during G20 Seoul meetings in November 2010 (Kim 2010).

agreements and trade preferences existing to this date.[10] The geographic decomposition is a key element of the methodological design of the study. On the basis of the GTAP7 database, we select countries that are net wheat exporters and net wheat importers.[11] In the Appendix, Table 12.A1 presents the geographic and sectoral decomposition. The sectoral decomposition focuses on agriculture and identifies 25 sectors, 13 of which are agricultural.

We design and study scenarios in order to evaluate the impact of trade policies (implemented through either a variation of import duties or a variation of export taxes) on world prices and national real incomes. We suppose that these trade policies are aimed at keeping the domestic price of an agricultural commodity constant when the world price of that commodity suffers a shock. In other words, these are clearly food security policies. Our objective is to understand the international implications of these policies for world prices and national real income—in particular for small countries.

We implement six scenarios (Table 12.1). The first is called "Base" and represents a demand shock in the wheat sector. We assume that the demand from oil-exporting countries increases, such that the world price of wheat is augmented by about 10 percent. Similar results could be driven by alternative assumptions, such as an increased demand for wheat for biofuel (ethanol production in Europe) or increased demand from large Asian countries (such as India and China). We have chosen to locate the demand increase in oil-exporting countries due to the diversity of their suppliers and our desire not to blur the results for other important importing regions.

We then endogenize export taxes in net wheat exporters, such that the real domestic price of wheat remains constant (scenario ET). The next scenario is an endogenization of import taxes (scenario IT) under the same objective in net wheat importing countries. As scenario IT implies the adoption of import subsidies, we implement another scenario in which the decision to decrease import taxes is limited by 0 (free trade); this scenario is called IT0. Finally, we study two scenarios that cumulate two political situations described earlier:

10 This does not represent an evaluation of the analysis conducted in subsections 2.2 to 2.5 since we do not assess the consequences of the implementation of increased export taxes and reduced import duties starting from free trade. The objective of this section is to evaluate the economic consequences of trade policies (either through increased export taxes or reduced import taxes designed to keep domestic prices constant) on countries' real income, since we think that these policies have been adopted during the food crisis. In that sense, we add new distortions to a world trading system with initial distortions. We could study how close initial policies are to their optimal level, but it would represent a new object of research.

11 In the GTAP7 database (base year 2004), the EU27 position on wheat is atypical with a balanced position. Therefore we do not treat the European Union as a net exporter (or a net importer).

TABLE 12.1 Six scenarios

Scenario	Description
Base	Base demand shock.
ET	Implementation of export taxes in countries that are net wheat exporters, such that the real domestic price of wheat is constant.
IT	Implementation of import taxes (or import subsidies) in countries that are net wheat importers, such that the real domestic price of wheat is constant.
IT0	Implementation of import taxes (import subsidies are forbidden) in countries that are net wheat importers such that the real domestic price of wheat is constant; the domestic price is not constant if the strategic rigidity (no import subsidies) is binding.
ETIT	Implementation of IT import taxes in countries that are net wheat importers and of export taxes in countries that are net wheat exporters, such that the real domestic price of wheat is constant.
ETIT0	Implementation of IT0 import taxes in countries that are net wheat importers and of export taxes in countries that are net wheat exporters, such that the real domestic price of wheat is constant (import subsidies are forbidden).

Source: Authors' investigation.

(1) import taxes are fixed at the level of scenario IT and export taxes are endogenous, such that the real domestic price of wheat remains constant (scenario ETIT), and (2) import taxes are fixed at the level of scenario IT0—no import subsidy—and export taxes are endogenous, such that the real domestic price of wheat remains constant (scenario ETIT0).[12] In scenarios ET, IT, IT0, ETIT, and ETIT0, each of the exporting or importing countries applies their new trade tax simultaneously.

Results

Table 12.2 presents the import taxes required by net wheat importers to keep the domestic price of wheat constant.[13] Variations of import tariffs are substantial—in particular in the Middle East and North Africa and the "rest of

12 In a scenario in which export and import taxes are both endogenous, countries enter a spiral of never-ending escalation of export taxes and import subsidies because on the importing countries' side, the governments have no fiscal constraints and can finance the subsidies using a lump-sum transfer from households.

13 A sensitivity analysis has been carried out. It focuses on the ET scenario under which wheat-exporting countries impose an export tax in order to maintain domestic price constant. Two options are considered: either Armington elasticities are doubled, or supply elasticities are doubled. Results are not much modified. Evolution of world prices and countries' real incomes are very close to our central scenario. Export taxes that governments have to implement in order to keep domestic price constant are slightly different, but only differ from taxes in the central scenario by 0.6 to 4.6 points. The maximum difference occurs in the case of the Russian Federation's export tax (24.9 percent in the central scenario) when Armington elasticities are doubled. Detailed results of this sensitivity analysis may be requested from the authors.

TABLE 12.2 Additional import taxes

Country or region	Import taxes (%)
Rest of Asia	–20
China	–30
Thailand	–28
Viet Nam	–13
Bangladesh	–19
Pakistan	–29
Rest of South Asia	–19
Mexico	–27
Rest of Europe	–32
Rest of Latin America	–30
Brazil	–25
Rest of Commonwealth of Independent States	–30
Middle East and North Africa	–42
Egypt	–26
West Africa	–21
East Africa	–24
Southern Africa	–19
South Africa	–28

Source: Authors' calculation.

Europe" region. For instance, Egypt and Thailand may be obliged to implement an import subsidy in order to keep the domestic price of wheat constant.

Table 12.3 presents the augmentations of export taxes needed to keep the domestic price of wheat constant in net exporting countries under three scenarios. When only export taxes are implemented in net wheat exporters, the changes in export taxes are systematically less than 6 percent, while they are always higher than 45 percent when import taxes are also implemented in net wheat importers. This illustrates the interdependence of trade policies and how a process of retaliation and counterretaliation may worsen the whole process of policy decision making. If no import subsidies are implemented (column ETIT0), which may be a more realistic scenario, the changes in export taxes (from 19 percent to 50 percent) may be much less important but may remain substantial—in particular as compared to the scenario ET.

TABLE 12.3 Additional export taxes

Country	ET (%)	ETIT (%)	ETIT0 (%)
Australia	16	47	19
India	19	46	21
Canada	18	52	25
United States	20	52	27
Argentina	19	50	25
Russian Federation	25	57	37
Ukraine	20	50	50

Source: Authors' calculations.

Table 12.4 indicates how world prices on traded quantities of agricultural goods may be affected in various scenarios. Almost all agricultural prices may be positively affected by various shocks due to substitution effects on the demand and supply sides; however, according to this modeling exercise, wheat is by far the commodity that is most exposed to world price shocks. While the world price of wheat may increase by 10.8 percent due to the demand shock, it may increase by 16.8 percent when net wheat exporters react by increasing export taxes. Therefore this policy reaction is typically a beggar-thy-neighbor decision, as it is a rational decision from the single-country point of view but it amplifies the negative global aspects of the initial shock. The effects may be even larger when net importing countries implement reductions in import tariffs (27.3 percent). When no import subsidies are implemented, the impact of import taxes on world prices (12.6 percent) is much more comparable to the impact of export taxes. Finally, the combination of increased export taxes in net wheat exporters and reduced import taxes in net wheat importers may cause a dramatic increase in this commodity's world price (41.1 percent when import subsidies are implemented; 20.6 percent when they are not), as the disconnection between domestic and world prices is fueled by these border distortions.

Figure 12.3 indicates how the national real income of a few countries is affected by these various policy shocks. In the previous section, it was expected that net wheat exporters' welfare would be positively affected by the initial shock and their subsequent policy response (increased export taxes), while net wheat importers' welfare would be negatively affected. That is clearly confirmed by this modeling exercise. Argentina's welfare may significantly increase under all shocks, in particular under one that combines endogenous export taxes and import tariffs with allowed import subsidies (scenario ETIT); its

TABLE 12.4 World prices (percentage of change compared to reference situation)

Sector	Base	ET (%)	IT (%)	IT0 (%)	ETIT (%)	ETIT0 (%)
Wheat	10.84	16.76	27.31	12.62	41.10	20.58
Dairy products	0.04	0.05	0.00	0.02	0.03	0.04
Livestock	0.19	0.21	0.18	0.13	0.24	0.17
Meat	0.07	0.08	0.06	0.06	0.07	0.07
Oilseeds	0.09	0.06	0.09	0.08	0.05	0.04
Other crops	0.16	0.17	0.18	0.12	0.18	0.13
Other food	0.04	0.08	−0.04	0.00	0.04	0.04
Paddy and processed rice	0.21	0.13	0.32	0.20	0.10	0.11
Plant fiber	0.13	0.11	0.14	0.10	0.13	0.09
Sugar	0.14	0.12	0.20	0.12	0.16	0.10
Vegetable and fruits	0.20	0.21	0.25	0.14	0.27	0.14
Vegetable oil	0.01	0.01	−0.01	0.00	0.00	0.00

Source: Authors' calculations.

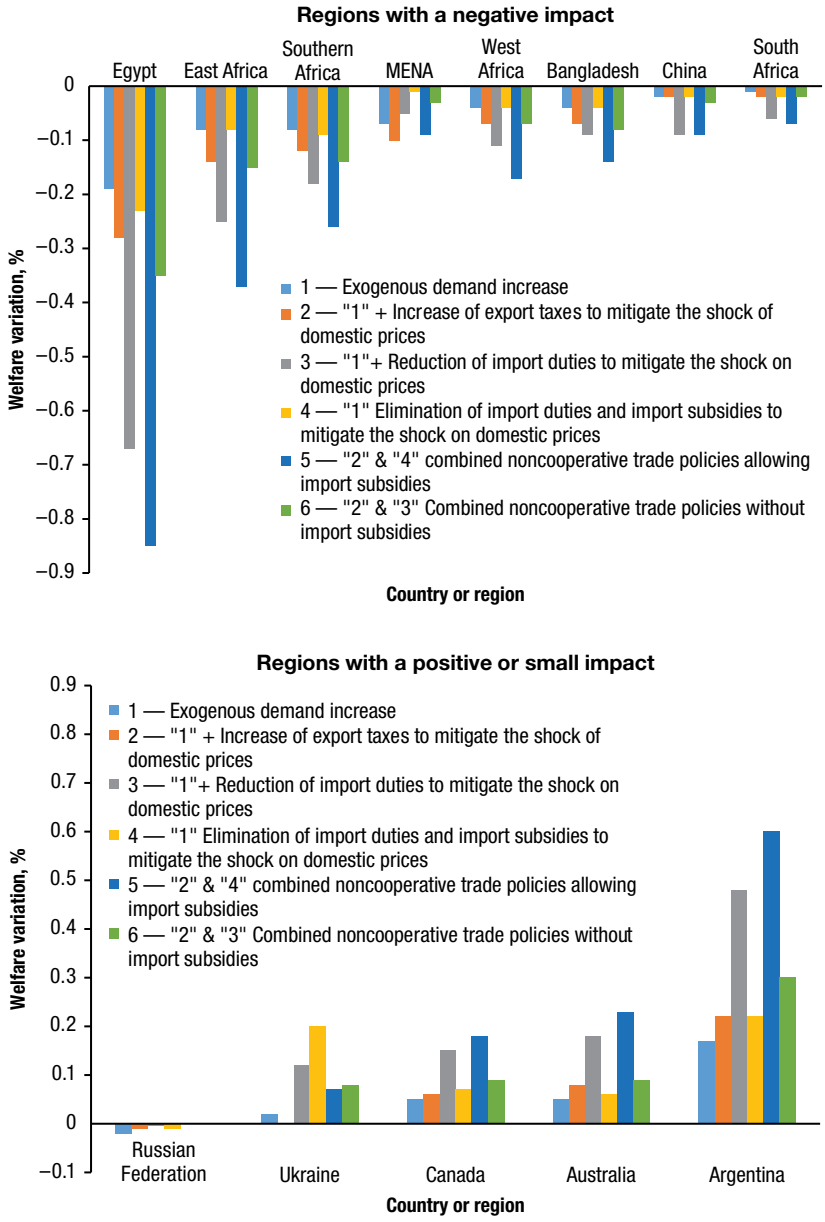
real income may be increased by 0.6 percent. Australia (+0.23 percent under ETIT), Canada (+0.18 percent), and Ukraine (+0.07 percent) are other beneficiaries. On the other side, net wheat importers may be significantly harmed by these shocks in terms of real income: −0.85 percent in the case of Egypt under the ETIT scenario and −0.37 percent for eastern Africa.

These results rely on low supply and demand elasticities that are compatible with a short-run situation. In reality, these parameters can change over time; for instance, if agents expect that price changes will remain, both producers and consumers will change their behaviors. In case of a price augmentation, producers, including new producers, will invest more (in technology, irrigation, and so on), and world supply elasticity will increase in the long run.[14] Consumers will shift their demand to other products and/or new suppliers (increase in demand elasticity for wheat and in the Armington elasticities) and counteract initial real income benefits.

The case of Argentina also reveals how increased export taxes on a primary commodity can be used to encourage high-value processed sectors to buy this primary commodity as an intermediate good. When the demand shock augments the world price of wheat by about 10 percent, the Argentinean production of wheat may increase by 4.5 percent (in volume) while production of the "other food" sector, which includes milling industries and other flour-related

14 As explained previously, we used the static version of the MIRAGE model.

FIGURE 12.3 Welfare impact of various scenarios (percentage of change compared to reference situation)



Source: Authors' calculation.

Note: MENA = Midde East and North Africa. For each country or region the columns represent successively the following scenarios: 1 - Base; 2 - ET; 3 - IT; 4 – ITO; 5 – ETIT; 6 – ETITO.

products, may be reduced by 0.6 percent. Under the ET scenario, in which governments of net wheat exporting countries increase their export taxes as a reaction to this world price shock, the production volumes of wheat and "other food" sectors are constant. An increased export tax on a primary commodity is clearly a way to promote the production of sectors using this commodity as an intermediate good.

Conclusion

This chapter provides an economic analysis of the use of export taxes and illustrates why these policies have been so popular during the food crisis. Several elements can justify the implementation of such trade practices: (1) export taxes can raise the world price of exports and therefore improve terms of trade; (2) export taxes can reduce the domestic price of the taxed commodity and benefit final consumers of this commodity (this may be an important policy issue when food security is at stake); (3) export taxes can reduce the domestic price of the taxed commodity and benefit intermediate consumption of this commodity (which is important when it is a primary commodity and expansion of the manufacturing sector that purchases it is at stake); (4) export taxes increase public revenue, which is beneficial in a country where domestic fiscal receipts are small; and (5) export taxes provide a means of redistributing income from domestic producers to domestic consumers and the public sector.

As a consequence, export taxes are attractive trade policy instruments. However, this chapter draws attention to one key element of the implementation of export taxes: these are typically beggar-thy-neighbor policies that deteriorate the terms of trade and real incomes of some trading partners. This often leads to retaliation by partners whose terms of trade have been negatively affected by initial export taxes. We show that these trading partners can react by either reducing import tariffs or augmenting export taxes, depending on their status as either net importers or exporters of the commodity. The 2006–2008 food crisis clearly illustrates this point about retaliation and counterretaliation in response to either reduced import duties or augmented export taxes. Evidence of such government reactions during the 2006–2008 food crisis have been largely documented in terms of increased export taxes and adoption of export restrictions (such as export bans), as well as in terms of a reduction of import duties and government-to-government panic purchases (Polovinkin 2010; Headey 2010; Headey and Fan 2010). In that sense, our predictions in terms of tariffs and export duties changes were supported by reality.

Several policy conclusions are worth noting. First, this process implies the implementation of a noncooperative policy equilibrium that lessens world welfare; as a consequence, this calls for international cooperation. Second, although large countries can implement beggar-thy-neighbor policies that increase national welfare at the expense of trading partners, small countries do not have this option; changes in their own policies neither improve their own welfare nor harm their partners' situation. Finally, there is a key asymmetry between net exporters and net importers of an agricultural commodity during a food crisis, as net exporters can benefit from increases in world prices while net importers are hurt and have no capacity to retaliate efficiently.

Another topic of interest is to analyze government responses to a downward price spike; for example, Martin and Anderson (2010, 2) state that "intensified import restrictions and export subsidies played a significant role in downward price spikes in 1986." Obviously there are some similarities between upward versus downward price spikes and their implications on economic agents and government responses. First, governments can react to downward price spikes in international markets by either increasing import duties (in net food importing countries) or reducing export taxes (in net food exporting countries) in order to increase domestic prices; both reactions lead to reduced world demand by the first group of countries and increased world supply by the second one, with both reactions feeding into the downward price spikes. Second, this could magnify the harm done to small net food-exporting countries. This is another example of a lack of international coordination in the trade policy area.

But there are also some strong differences between these economic phenomena. First, increasing import duties may not be an option, as many countries impose import duties equal to bound duties (no binding overhang). Second, export taxes are implemented more frequently in developing countries and also serve as an important source of public revenue.[15] Therefore, reducing export taxes is a more difficult policy option than increasing export taxes. Simultaneously reducing export taxes in a large net food-exporting developing country contributes to deteriorating terms of trade and increasing the price of input for domestic manufacturers. Third, in the case of upward price spikes, the rationale for intervention is obviously to protect low-income consumers, while reducing export taxes in the case of downward price spikes is aimed at supporting domestic producers. This is a completely different political

15 Kim (2010) states that among WTO members imposing export duties, 21 are least developed countries, 40 are middle-income countries, and only 4 are rich countries.

context. Moreover, in the case of low world food prices, policy alternatives may be easier to implement, such as public storage (it is always possible to buy crops for public storage when prices are low, while selling crops in the case of high food prices may not be feasible if public storage is zero) or cash transfers (it may be more difficult to give cash transfers to many low-income consumers in developing countries when prices are high than to give cash transfers to a limited number of farmers when prices are low).

Today, the European Union, the United States, and Mexico have already filed a case at the WTO on China's export restrictions on raw materials. In 2008, China raised export taxes on some metal resource products, such as parts of steel products, metal ore sand, and ferro-alloys. From this article we may understand that the objective of this policy was to reorient the supply of these goods on the domestic market in order to decrease the price of intermediate goods for domestic manufacturing sectors. Under these conditions, it is understandable that the European Union has proposed to discipline such practices.[16] Although this proposal has been well received by countries such as Canada, the United States, Switzerland, and the Republic of Korea, it has been highly criticized by some developing countries such as Argentina (which also confirms what was expected from our analytical framework), Brazil, Cuba, India, Indonesia, Malaysia, Pakistan, and Venezuela, with Argentina leading the opposition. The reasons advanced by this group of countries is that "export taxes are a right and a legitimate tool for developing countries; they help increase fiscal revenue and stabilize prices; there is no legal basis for a negotiation; there is no explicit mandate for a change in WTO rules on this issue" (Raja 2006). It is worth noting that the European Union makes a distinction between trade-distorting taxes and "legitimate" export taxes such as those applied in the context of balance-of-payments imbalances. The European Union proposes a full prohibition of trade-distorting export taxes. The European Union and the United States frequently implement bans of export taxes when they negotiate bilateral agreements.

Under the Doha Development Agenda, the European Union has been very active in demanding substantive commitments by all WTO members to eliminate or reduce export taxes. This chapter shows that export taxes and import tariffs exhibit strong similarities and can even be equivalent in terms of their impact on domestic and foreign welfare. Taking commitments on export taxes into the WTO context may be justified, as these commitments exist in the domain of import tariffs. Moreover, another justification for this is the

16 The European Union's proposal is available on the WTO website (WTO 2006).

consideration of small net food-importing countries that can be harmed in the event of a food crisis and by the escalation of export taxes throughout the world and that do not have many policy instruments with which to address this kind of issue. Export taxes and export restrictions could clearly become a new and major bone of contention between high-income countries and agri-food-exporting middle-income countries in trade negotiations.

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Appendix

TABLE 12.A1 Geographic and sectoral decomposition

Country/region	MIRAGE label
Australia	Paddy and processed rice
Rest of Asia	Wheat
China	Other grains
Thailand	Vegetable and fruits
Viet Nam	Oilseeds
Bangladesh	Sugar
India	Plant fiber
Pakistan	Other crops
Rest of South Asia	Livestock
Canada	Other natural resources
United States	Other food
Mexico	Fossil fuels
Rest of Europe	Meat
Argentina	Vegetable oil
Rest of LAC (Latin America and Caribbean)	Dairy products
Brazil	Textile
EU27 (European Union)	Wearing and apparel
Rest of CIS (Commonwealth of Independent States)	Leather
Russian Federation	Other manufacturing products
Ukraine	Chemical products
MENA (Middle East and North Africa)	Motor vehicles and transport equipment
Egypt	Capital goods
West Africa	Services
East Africa	Construction
Southern Africa	Transportation
South Africa	

Source: Authors' investigation.