The economics of export taxation in a context of food crisis - A theoretical and CGE-approach contribution

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Abstract:

This paper aims at providing the rationales for the use of export taxes, in particular in the context of food crisis. Firstly we summarize the effects of export taxes using both partial and general equilibrium theoretical models. When large countries have an objective of constant food prices, in case of an increase in world agricultural prices, the optimal response is to decrease import tariffs in net-food importing countries while it is an increase in export tariffs in net-food exporting countries. The latter decision is welfare-improving while the former is welfare-reducing. Small countries are hurt by both decisions. Secondly we illustrate the costs of a lack of cooperation and regulation (binding process) of such a policy in time of crisis using a global computable general equilibrium model illustration, mimicking the mechanisms that have appeared during the recent food price surge. We conclude on the need for international regulation, in particular since small net-food importing countries may be substantially hurt by these 'beggar-thy-neigbor' policies that amplify the already negative impact of food crisis.

Keywords: export taxes, food crisis, optimum tariff, computable general equilibrium

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1. INTRODUCTION

The nature of the world trading system is deeply mercantilist. Consequently, policy decisions are usually aimed at increasing exports and/or decreasing imports and governments are used to implement import taxes and export subsidies. Export taxes and export restrictions, however, are policy instruments that appear much more difficult to understand than import tariffs.

Nevertheless export restrictions are a common practice. For instance, some developing countries implemented export taxes and export restrictions during the recent food crisis (2006-2008): Bangladesh, Brazil, Cambodia, China, Egypt, India, Madagascar, Nepal, Thailand, Vietnam on rice; Argentina, India, Kazakhstan, Nepal, Pakistan on India (see Table A.1 in annex).

Beyond crisis period, export restrictions are, in fact, trade measures that are permanently adopted by countries throughout the world. In 2004 Piermartini noted that approximately one third of WTO Members impose export duties. She gave the examples of export taxes implemented by Indonesia on palm oil, by Madagascar on vanilla, coffee, pepper and cloves, by Pakistan on raw cotton, by Philippines on copra and coconut oil, by Indonesia on palm oil, and by the European Union on wheat (see Table A.2 in annex).

Economic analysis provides several rational justifications of using these instruments:

(i) Terms of trade justification. This is perhaps the most important justification. By restricting its exports, a country which supplies a significant share of the world market in a commodity can raise its world price. This implies an improvement of its 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 decrease significantly the demand for a commodity that it imports; it therefore leads to a decrease of its

world price, which is again an improvement of terms of trade. Rodrik (1989) derives optimal tax structure, with taxes differentiated by domestic exporting firms and show that it depends on foreign demand elasticity and the size distribution of firms. Eaton and Grossman (1986) study the use of export taxes, but focus on profit-shifting argument, less on terms of trade argument.

(ii) Food security and final consumption price. By creating a wedge between the world price and the domestic price, government lowers the latter by reorienting domestic supply towards domestic market. Piermartini (2004) provides the example of the Indonesian Government imposing export taxes on palm oil products, including crude and palm cooking oil in 1994, as it considers cooking oil as an "essential" commodity. This rationale has often been used during the food crisis of 2006-2008 by governments to justify the implementation of export taxes and other forms of export restrictions.

(iii) Intermediate consumption price. Export taxes on primary commodities (especially unprocessed) work as an indirect subsidy to higher value-added manufacturing or processing industries by lowering domestic price of inputs compared to their world – non distorted – price (same mechanism than for *ii*). This justification follows a reasoning that is similar to the theory of effective protection and has been noticed by Corden himself (1971). For example, in Indonesia an export tax on lumber has implied a development of the domestic wood processing industry, which has been judged as excessive for environmental reasons since it contributed to the depletion of forests (World Bank, 1998). In 1988, Pakistan imposed an export tax on raw cotton, in order to stimulate the development of the yarn cotton industry. Export taxes on palm oil are imposed in Indonesia and Malaysia in order to supporting the development of downstream industry (biodiesel, and cooking oil; see Amiruddin, 2003).

(iv) Public receipts. Export taxes provide revenues to developing countries with limited capacity to rely on domestic taxation. This is a second-best argument as in order to raise a given amount of revenue, the imposition of lump-sum taxes is a first-best policy (Ramsey, 1927; Diamond, 1975).

(v) Income redistribution. Like import tariffs, export taxes are measures that imply redistribution of income at the detrimental of domestic producers of the commodity taxed and at the benefits of domestic consumers and public revenues.

(vi) 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 appears that countries have a relatively large freedom in the implementation of such taxes. The reason behind this is the fact that the World Trade Organization (WTO) does not prohibit export taxes and other forms of export restrictions. More precisely as stated by Crosby (2008), '*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, this form of trade policy does not receive a great attention from the public or the academic establishment.

This paper provides a theoretical and an empirical background contributing to a better understanding of export taxes in particular in the context of food crisis. Sections II and III provide an analytical framework that can help understand these trade policies better: while section II uses a partial equilibrium framework, section III uses a general equilibrium one and

study the case of countries with an objective of food security. In section IV we use the MIRAGE model in order 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 non cooperative trade policies in this context. Section V concludes.

2. THE ECONOMICS OF EXPORT TAXATION: A PARTIAL EQUILIBRIUM ANALYSIS

The objective of this section is to provide a simple theoretical framework that enables understanding the effects of export restrictions. Figure 1 depicts the impacts of an export restriction imposed by a small country (on the left side) and by a large country (on the right side). The difference between restrictions in a small and in a large country consists in the impact of a variation in net supply (exports) upon world prices. A change in a small country's exports does not lead to a variation of world prices as this country is supposed to be too small to have an influence on world markets. On the contrary, when a large country modifies its net supply (level of its exports) on the world markets, it is sufficiently large to exert an influence on world prices.

<Figure 1 included here>

2.1 The case of a small country

Consider first the case of a small country imposing an export tax t (defined in specific terms). Initial domestic price is p_0 while initial world price is π_0. At these initial prices domestic demand is d_0 and is less than domestic supply being x_0, the difference being exported on the world market. As these exports are taxed, at initial prices domestic producers prefer offering their supply on local market (untaxed) than on world markets (taxed). On the domestic market supply

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is increased reducing domestic price until $p_0 + t = \pi_0$, while world price is, by definition unchanged. At this level of prices domestic producers are indifferent between selling their products on local markets and exporting them.

Domestic consumers are benefiting from this policy as they consume more ($d_1 > d_0$) at a lower price ($p_1 < p_0$). Their surplus is increased by the yellow area denoted as 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 surplus is reduced by ($a+b+c+d$).

Finally, the export tax increases public revenues by the blue area, denoted c as post-tax level of exports are the difference between x_1 and d_1 and as the unit tax is ($\pi_0 - p_1$).

As a consequence, policymakers should not implement such a policy if we suppose that \$1 of consumers' surplus has the same value as \$1 of producers' surplus and \$1 of public revenue: indeed, a tax policy is detrimental to a small country as the loss of producers' surplus ($a+b+c+d$) is larger than the gain in consumers' surplus (a) and in public revenues (c). All these effects sum up in a loss of domestic welfare measured by red areas ($b+d$) which are equivalent to the Haberger triangles (deadweight losses) in the theory of protectionism.

This policy has distributional effects. For instance if policy makers have a food security objective which implies a decrease of domestic price, tax exports are efficient in the sense that they augment domestic consumption and reduce local consumer price. They increase the surplus of food consumers that may be overweighed in the government function in this case. A consumption subsidy will be a first order instrument (more efficient) but it will have a cost for the government. Similarly, if we assume that government has difficulties to raise taxes on other products and/or source of income (*e.g.* tax on firm profits), the shadow price of export tax will be

superior to one.[3] Both arguments explain why \$1 of increase in the surplus ($a+ c$) will be more important for the government than \$1 of inefficiency losses ($b+d$).

2.2 The case of a large country

The case of a large country differs in the sense that world price is affected by the export tax. The reason being that a large country is assumed to export a significant share of world exports such that if these exports are reduced, world exports are significantly reduced and world price is increased. Consumers' and producers' surpluses are identically affected, but public revenues are augmented by ($c+e$) as the world price is raised up to π_1: post-tax level of exports is still the difference between x_1 and d_1, but the unit tax is now (π_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 green area denoted by e is larger than the sum of the red areas ($b+d$). While ($b+d$) represent 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, the difference (π_1-π_0) representing a gain in terms of trade for each unit exported. Simultaneously the same political economy elements are still in play as domestic consumers and public budget is favored while domestic producers are hurt by this decision.

Finally, if we consider the case of an export tax on a primary commodity used as intermediate consumption in a manufactured good, it implies that the export tax decreases the domestic price of the intermediate good under the world price and increases the unit value added in the manufacturing sector. This kind of "degressive export tax structure" (greater than zero on raw commodity; zero or close to zero on processed good) exists in Pakistan (raw cotton), China (steel

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[3] It has also been argued than export tax on commodities (cocoa, oil) have been administrated in a very occult way in several developing countries (e.g. Cote d'Ivoire) and has fostered corruption, this resource being last monitored than other taxes paid by local customers/constituencies.

products, metal ore sand, and ferro-alloy), Indonesia and Malaysia (palm oil). It results in the expansion of production volume of the manufactured sector at the detrimental of the raw commodity in the country which implements it. As stated by Corden (1971), '*An export tax on an exportable input reduces its domestic price, and so raises the effective protection for the using industry, irrespective of whether the latter produces an exportable or an importable. Thus a country which exports raw cotton and imposes an export tax on it reduces the costs of its textile industry and hence protects the latter.*'

3. THE ECONOMICS OF EXPORT TAXATION IN A CONTEXT OF FOOD CRISIS: A GENERAL EQUILIBRIUM ANALYSIS

The objective of this section is to provide a more complete theoretical framework in order to understand the effects of export taxation in general equilibrium. We develop a general model of international trade between three countries, two large and one small. The purpose is to understand that as far as food crisis is concerned, there is a distinction to be made between (i) large food-exporting countries that can increase world prices of the commodity that they export while decreasing the domestic price of this commodity, (ii) large food-importing countries that can also have an impact on world prices and accept a deterioration of their terms of trade in order to decrease domestic price of agricultural commodity, (iii) and small countries that cannot affect world prices, but are hurt by "beggar-thy-neighbor" policies of large countries being either food-exporting or food-importing.

3.1 The Model

We consider a model of international trade between three countries: two are large (called ARG and EU) meaning that they are price-makers on the world market, the third one (called BGD)

being small meaning that it is a price-taker. They produce and trade two commodities, the agricultural one (A) and the industrial one (I). ARG has a comparative advantage in and exports the agricultural good while it imports the industrial one. On the other hand, EU and BGD have a comparative advantage in and export the industrial good while they import the agricultural good. A country's welfare function is denoted as U_i, local demand of country i for good k is D_i^k, $\forall i =$ ARG, BGD, EU; $\forall k = A, I$. Let us call: X_i^k, $\forall i =$ ARG, BGD, EU, $\forall k = A, I$, the production of good k in country i. π^k is the nominal world price of good k, $p^k{}_i$ is the nominal local price of good k in country i. π is the relative price of good A on world market in terms of industrial good, p_i within country i. y_i is the real income in country i, while Y_i is the nominal income in country i.

Let us assume that:

i)   Technology is given by "well-behaved" production functions,

ii)   Competition is perfect in each country on both product and factor markets,

iii)   Welfare only depends on local consumption of both goods:

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

iv)   Government selects either an import tariff/subsidy or an export tax/subsidy in order to maximize national welfare function,

v)   Trade is balanced in each country:

$$X_i^I - D_i^I = \pi.\left(D_i^A - X_i^A\right) \tag{2}$$

Both sides are positive for i=EU, BGD; negative for i=ARG.

vi)   There is no transportation cost,

vii)   The tariff/export tax revenue is redistributed to local consumers by an efficient mean.

We first derive analytically the effects of an import tariff in countries EU and BGD and of an export tax in country ARG. The reasons why we select these instruments will be apparent later on. We then determine the optimal policy for each country and conclude.

3.1 An import tariff in the large food-importing country

Let us first consider the traditional case for the impact of a tariff on import demand. In the case of EU, the demand for imports is:

$$M_{EU}^A = D_{EU}^A(p_{EU}, y_{EU}) - X_{EU}^A\left(X_{EU}^I(1/p_{EU})\right) \tag{3}$$

Total differentiation brings:

$$dM_{EU}^A = \frac{\partial D_{EU}^A}{\partial p_{EU}}(p_{EU}, y_{EU})dp_{EU} + \frac{\partial D_{EU}^A}{\partial Y_{EU}}(p_{EU}, y_{EU})dy_{EU} - (-1/p_{EU}{}^2)\frac{dX_{EU}^A}{dX_{EU}^I}\frac{dX_{EU}^I}{d(1/p_{EU})}dp_{EU}$$

$$\tag{4}$$

We call:

$\sigma^c{}_{EU} = -\frac{p_{EU}}{M_{EU}^A}\frac{\partial D_{EU}^A}{\partial p_{EU}}(p_{EU}, y_{EU})$; $\sigma^c{}_{EU}$ is the compensated relative price elasticity of demand for agricultural imports in EU; $m_{EU} = p_{EU}\frac{\partial D_{EU}^A}{\partial y_{EU}}(p_{EU}, y_{EU})$; m_{EU} is the marginal propensity to demand agricultural goods in EU;

$e_{EU} = \frac{1/p_{EU}}{E_{EU}^I}\frac{dX_{EU}^I}{d(1/p_{EU})}$; e_{EU} is relative price elasticity of supply for industrial exports in EU;

Let us find an expression of dy_{EU}. If $V_{EU} = V_{EU}(p_{EU}, Y_{EU})$ is maximum utility that can be attained by EU when domestic price is p_{EU} and nominal income is Y_{EU}, Roy's theorem gives:

$$D_{EU}^A = -\frac{\frac{\partial V_{EU}(p_{EU}, Y_{EU})}{\partial p_{EU}}}{\frac{\partial V_{EU}(p_{EU}, Y_{EU})}{\partial Y_{EU}}} = -\frac{V_{EU\,p_{EU}}}{V_{EU\,Y_{EU}}} \tag{5}$$

Therefore:

$$dy_{EU} = \frac{dV_{EU}}{V_{EU}}_{y_{EU}} = dY_{EU} - D_{EU}^{A}.dp_{EU}$$

$$= dX_{EU}^{I} + p_{EU}.dX_{EU}^{A} + X_{EU}^{A}.dp_{EU} + d(\pi t M_{EU}^{A}) - D_{EU}^{A}.dp_{EU}$$

Since perfect competition ensures that the economy is located on the production possibilities frontier: $dX_{EU}^{I} + p_{EU}.dX_{EU}^{A} = 0$, we have

$$dy_{EU} = -M_{EU}^{A}.dp_{EU} + M_{EU}^{A} d(p_{EU} - \pi) + \pi t dM_{EU}^{A} = -M_{EU}^{A}.d\pi + \pi t dM_{EU}^{A}$$

$$(6)$$

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 EU 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), we obtain:

$$\frac{dM_{EU}^{A}}{M_{EU}^{A}} = \left\{ -\sigma^{C}_{EU}.\frac{dp_{EU}}{p_{EU}} - \frac{m_{EU}}{1+t}\frac{d\pi}{\pi} - \frac{e_{EU}}{1+t}\frac{dp_{EU}}{p_{EU}} \right\}/d \tag{7}$$

Where $d = 1 - [mt/(1 + t)]$.

Result 1. *In the large food importing country, when imposing a tariff, four mechanisms are at play: (i) a substitution effect on domestic consumption; under constant real income a tariff increase leads to an agricultural domestic price increase, which reduces domestic consumption of the agricultural good in favor of other goods; (ii) a substitution effect on domestic production; under constant real income a tariff increase leads to an agricultural domestic price increase which expands domestic production of the agricultural good to the detriment of other goods ;*

(iii) the imposition of a tariff on this large country's imports of agricultural goods reduces the world price of this good which implies that terms of trade are improved for this country; (iv) 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 (t=0) this effect is nil.

3.2 An export tax in the large food-exporting country

We turn now to the case of country ARG. Its supply of agricultural exports is:

$$E^A_{ARG} = X^A_{ARG}\left(X^I_{ARG}\left(1/p_{ARG}\right)\right) - D^A_{ARG}\left(p_{ARG}, y_{ARG}\right) \tag{8}$$

Total differentiation brings:

$$dE^A_{ARG} = \left(-\frac{1}{p_{ARG}{}^2}\right)\frac{dX^A_{ARG}}{dX^I_{ARG}}\frac{dX^I_{ARG}}{d\left(\frac{1}{p_{ARG}}\right)}dp_{ARG} - \frac{\partial D^A_{ARG}}{\partial p_{ARG}}\left(p_{ARG}, y_{ARG}\right)dp_{ARG}$$

$$+ \frac{\partial D^A_{ARG}}{\partial y_{ARG}}\left(p_{ARG}, y_{ARG}\right)dy_{ARG} \tag{9}$$

$\sigma^c{}_{ARG} = -\frac{p_{ARG}}{E^A_{ARG}}\frac{\partial D^A_{ARG}}{\partial p_{ARG}}\left(p_{ARG}, y_{ARG}\right)$ is the compensated relative price elasticity of supply of agricultural exports in EU, $m_{ARG} = p_{ARG}\frac{\partial D^A_{ARG}}{\partial y_{ARG}}\left(p_{ARG}, y_{ARG}\right)$ is the marginal propensity to demand agricultural goods in ARG and $e_{ARG} = \frac{1/p_{ARG}}{E^I_{ARG}}\frac{dX^I_{ARG}}{d(1/p_{ARG})}$ is relative price elasticity of supply of industrial goods in ARG. Let us find an expression of dy_{ARG}. As for i=EU, $V_{ARG} = V_{ARG}\left(p_{ARG}, Y_{ARG}\right)$ is indirect utility and Roy's theorem is:

$$D^A_{ARG} = -\frac{\frac{\partial V_{ARG}\left(p_{ARG}, Y_{ARG}\right)}{\partial p_{ARG}}}{\frac{\partial V_{ARG}\left(p_{ARG}, Y_{ARG}\right)}{\partial Y_{ARG}}} = -\frac{V_{ARG\,p_{ARG}}}{V_{ARG\,Y_{ARG}}} \tag{10}$$

Therefore:

$$dy_{ARG} = \frac{dV_{ARG}}{V_{ARG\ Y_{ARG}}}$$

$$= dY_{ARG} - D^A_{ARG} \cdot dp_{ARG}$$

$$= dX^I_{ARG} + p_{ARG} \cdot dX^A_{ARG} + X^A_{ARG} \cdot dp_{ARG} + d(p_{ARG}\, t_{ARG}\, E^A_{ARG}) - D^A_{ARG} \cdot dp_{ARG}$$

Following similar manipulations we obtain:

$$dy_{ARG} = E^A_{ARG} \cdot d\pi + p_{ARG}\, t_{ARG}\, dE^A_{ARG} \qquad (11)$$

Equation (11) is important as it states that country ARG's real income is affected either by a change in world prices (terms of trade effect; $d\pi > 0$ means that agricultural good's world price increases; this is the good that ARG 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 ARG's agricultural exports. Integrating equation (11) and the previous definitions inside (9), we obtain:

$$\frac{dE^A_{ARG}}{E^A_{ARG}} = \left\{ \sigma^C_{\ ARG} \cdot \frac{dp_{ARG}}{p_{ARG}} + m_{ARG}\,(1 + t_{ARG})\frac{d\pi}{\pi} + p_{ARG} \cdot e_{ARG}\,\frac{dp_{ARG}}{p_{ARG}} \right\}\Big/ d_{ARG} \qquad (12)$$

Where: $d_{ARG} = 1 - m_{ARG}\, t_{ARG}$.

Result 2. *In the large food exporting country, when imposing a tariff on its agricultural exports, four mechanisms are at play: (i) a substitution effect on domestic consumption; under constant real income, a tariff on agricultural exports leads to an agricultural domestic consumer price decrease which in turn augments the domestic consumption of the agricultural good -'food security effect'-; (ii) a substitution effect on domestic production; under constant real income, a tariff on agricultural exports leads to an agricultural domestic producer price decrease which decreases domestic production of the agricultural good -'anti-farmers effect' -; (iii) the*

imposition of a tariff on exports of agricultural goods increases the world price of this good as this is a large country which implies that its terms of trade are improved; 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 (t=0) this effect is nil.

As far as BGD is concerned, the problem is similar to EU as it has a comparative disadvantage in the production of agricultural good and it imports it. The only difference is that it is a small country such that a change in its real income expresses as:

$$dy_{BGD} = \pi t_{BGD} \, dM^A_{BGD} \tag{13}$$

3.3 A trade war of import tariffs and export taxes

If BGD country implements a tariff on its agricultural imports, it decreases its traded imports and real income is negatively affected. BGD's optimal response is: $t_{BGD}=0$.

The definition of EU and ARG countries' optimal responses is easy. As far as EU is concerned, its program consists in selecting a production structure and a world price that maximizes real income:

$$\text{Max}_{X^I_{EU},\pi} \; U_{EU} = U_{EU}\left(D^A_{EU}; D^I_{EU}\right) = U_{EU}\left(X^A_{EU} + M^A_{EU}; X^I_{EU} - E^I_{EU}\right) \tag{14}$$

Under: $\qquad\qquad E^I_{EU}(\pi) = \pi M^A_{EU}$ \hfill (15)

$$X^I_{EU} = -p_{EU} X^A_{EU} + \text{constant} \tag{16}$$

$$p_{EU} = \pi(1 + t_{EU}) \tag{17}$$

This can be re-written as:

$$\text{Max}_{X^I_{EU},\pi} \; U_{EU} = U_{EU}\left(-\frac{X^I_{EU}}{p_{EU}} + \frac{E^I_{EU}(\pi)}{\pi}; X^I_{EU} - E^I_{EU}(\pi)\right) \tag{18}$$

Solving (18) yields:

$$t_{EU} = \frac{1}{\sigma^*_{EU} - 1} \qquad (19)$$

Where $\sigma^*_{EU} = \frac{\pi}{E^I_{EU}} \frac{\partial E^I_{EU}}{\partial \pi} > 0$ is the reciprocal demand elasticity facing EU. It is a general equilibrium elasticity measuring how much the rest of the world is willing to trade agricultural goods against European industrial goods. In this elasticity substitution effects (both on consumption and production sides), real income effects and multiplier effects are embedded.[4]

As far as ARG is concerned the same approach gives:

$$\text{Max}_{X^A_{ARG}, \pi} U_{ARG} = U_{ARG}\left(D^A_{ARG}; D^I_{ARG}\right) = U_{ARG}\left(X^A_{ARG} + M^A_{ARG}; X^I_{ARG} - E^I_{ARG}\right) \qquad (20)$$

Under: $\qquad M^I_{ARG} = \pi E^A_{ARG}(\pi) \qquad (21)$

$$X^I_{ARG} = -p_{ARG} X^A_{ARG} + \text{constant} \qquad (22)$$

$$\pi = p_{ARG}(1 + t_{ARG}) \qquad (23)$$

This can be re-written as:

$$\text{Max}_{X^A_{ARG}, \pi} U_{ARG} = U_{ARG}\left(X^A_{ARG} - E^A_{ARG}(\pi); -p_{ARG} X^A_{ARG} + \pi E^A_{ARG}(\pi)\right) \qquad (24)$$

Solving (18) yields:

$$t_{ARG} = \frac{1}{\sigma^*_{ARG} - 1} \qquad (25)$$

Where $\sigma^*_{ARG} = -\frac{\pi}{E^A_{ARG}} \frac{\partial E^A_{ARG}}{\partial \pi} > 0$ is the reciprocal demand elasticity facing country ARG.

Under the conditions that ARG and EU are large countries, these elasticities are greater than unity, and optimal taxes (on imports for EU, on exports for ARG) are strictly positive. We see that the design of optimal export taxes requires the estimation of consumption, production and

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[4] We can easily derive an expression of the reciprocal demand elasticity and the parameters σ^C_{EU}, e_{EU}, m_{EU} and d_{EU} defined previously.

trade elasticities. Broda, Limao, and Weinstein (2006) found evidence that non WTO members have market power and implement relatively high tariffs compared to WTO members. As far as export taxes are concerned Warr (2001) concludes that available econometric estimates for the world demand elasticity of rice facing Thailand imply optimal export taxes ranging from 25 to 100 per cent. This assessment may lead to false interpretation: Bautista (1996) gives the example of the Philippines government implementing an export tax on copra and coconut oil based on the principle that this country got a large share in the world market of these products and faced a "negative elasticity" in world export demand. In fact, this evaluation did not take into account the substitutability with other vegetable oil and the consecutive low share of Philippines in the world market: Philippines should have been treated as a "small country".

Result 3. *Under these assumptions: (i) 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 one is the terms of trade effect, which consists in an improvement of terms of trade for the country which implements the tax increase and in deterioration for its partner. The second one is a traded volume effect which consists in a decrease of traded volume for both the country which implements the policy and its partner. (ii) as any policy change in this context has these two effects, it is quite possible that at a stage a country decides to decrease its tax and accept a deterioration of its terms of trade while benefiting from an increase in trade volumes. (iii) if the objective of a government is to decrease domestic price of the agricultural good, the policy to be implemented is a decrease of the import tax in the large food importing country and an increase of the export tax in the large food exporting country, both policies having the effect of increasing the world price of the agricultural good, and therefore hurting the third country of which optimal*

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policy is always free trade, both in terms of welfare and of food security (low domestic price for agricultural goods).

Therefore, we see the possibility of governments engaged in a trade war for food security purposes, through which they respond to increases in agricultural world prices by increasing export taxes in agriculture-exporting country and decreasing import taxes in agriculture-importing country. This is illustrated on Figure 2.

<Figure 2 included here>

The top part of Figure 2 illustrates the case of agriculture-importing country (A is the agricultural good and is located on the vertical axis) which has an objective of agricultural domestic price constant at $p0$. 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 agricultural world price occurs, from π to π', this country has to reduce its import tariff to *tm'* such that $\pi'.(1+tm')=p0$. It has to be noted that agriculture-importing country's real income is decreased from y_0 to y_1.

The bottom of Figure 2 depicts the case of agriculture-exporting country which also has an objective of agricultural domestic price constant 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 $\pi.(1+tx)=p_0$ (this accounts for the impact of *tx* on π). If an increase in agricultural world price occurs, from π to π', this country has to augment its export tax up to *tx'* such that $\pi'.(1+tx')=p_0$. While its two trading partners are hurt by this world price shock and policy reaction, it is noteworthy that the agriculture-exporting country's real income is increased from y_0 to y_1.

The fact that the WTO law does not deal with the use of export taxes and bind import tariffs, is clearly a supportive factor of this sequence of policy options, which can hurt trade partners, in particular small countries. No option to retaliate is available for small countries that are hurt by these "*beggar-thy-neighbor*" policies (of course small net food-importing countries can decrease import tariffs or implement import subsidies with a cost in terms of public revenues). Finally, it has to be emphasized that if under free trade a country (either ARG or EU in our example) has an interest in implementing an export tax or an import tariff in the sense that this decision increases its real income (or decrease agricultural domestic price), it does not mean that at the end of the process each country is better off, as compared to free trade. In particular, each country's real income can 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 initially.

A final look at the impact on poverty is worthwhile. It is well-known (McCulloch *et al*, 2001) that trade policy operates on poverty through various channels, in particular through domestic consumption prices of traded goods, domestic activity and demand for unskilled labor, public revenues and transfers from governments to households, amongst others. Here, an export tax on agricultural commodities should reduce demand for (agricultural) unskilled labor while decreasing domestic consumption prices of food. The first effect is poverty-augmenting, while the second one is poverty-reducing. Warr (2001) undertakes a general analysis of export taxes in Thailand and shows that the factors earning effects (through demand for unskilled labor) are greater than expenditures effects (through domestic consumption price of rice). His conclusions on Philippines and coconut oil are similar (Warr, 2002).

4. AN ILLUSTRATION OF THE ADOPTION OF EXPORT TAXES ON AGRICULTURAL COMMODITIES AND THEIR EFFECTS THROUGH THE MIRAGE MODEL OF THE WORLD ECONOMY

This section uses the MIRAGE model of the world economy in order to assess economic consequences of various trade policies.

4.1 The Model

The MIRAGE model is a multinational, multi-sector CGE model (see Bchir, Decreux, Guerin and Jean, 2002; Decreux and Valin, 2007). In this section, the MIRAGE model is used 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, mark-up, and magnitude of scale economies) and for calibration purpose which 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 the reform, but only in the long term impact on world prices and various regions' macroeconomic variables.

The first source of data is GTAP7 (see Narayanan and Walmsley, 2008 for a full documentation), which provides world macroeconomic accounts and trade flows for the year 2004. The market access data comes from the MacMap-HS6 version 2.1 database (Boumelassa, Laborde and Mitaritonna, 2008), which measures protection in 2001 and includes all regional agreements and trade preferences existing to this date.

The geographic decomposition is a key element of the methodological design of the study. On the basis of the GTAP7 database, we select countries which are wheat net exporters and wheat net importers. Table 1 presents the geographic decomposition.

<Table 1 included here>

The sector decomposition focuses on agriculture and identifies 25 sectors, 13 of which are agricultural (see Table 2).

<Table 2 included here>

We implement six scenarios (Table 3). The first one 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%. Similar results could be driven by alternative assumptions such as an increase demand of wheat for biofuel mandate (ethanol production in Europe) or increase demand from large Asian countries (India, China). We have chosen to locate the demand increase in oil exporters countries due to the diversity of their suppliers and the desire not to blur the results for other important importing regions.

We then endogenize export taxes in net exporters of wheat 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 importing countries of wheat. As scenario IT implies the adoption of import subsidies, we implement another scenario where the decision of decreasing import taxes is limited by 0 (free trade): this scenario is called IT0. Finally, we study two scenarios which cumulate two political situations described earlier: 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 (called scenario ETIT), and import taxes are fixed at the level of scenario

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IT0 –no import subsidy- and export taxes are endogenous such that the real domestic price of wheat remains constant (called scenario ETIT0).[5]

<Table 3 included here>

4.2 Results

Table 4 presents import taxes required in net importers of wheat to keep domestic price of wheat constant. Variations of import tariffs are substantial, in particular in Middle East and North Africa, the European Union and the region "Rest of Europe". The European Union is obliged to implement an import subsidy in order to keep domestic price of wheat constant.

<Table 5 included here>

Table 5 presents the augmentations of export taxes needed to keep the domestic price of wheat constant in next exporting countries under three scenarios. When only export taxes are implemented in net exporters of wheat, the changes of export taxes are systematically less than 6% while it is always more than 45% when import taxes are also implemented in net importers of wheat. This illustrates the interdependence of trade policies and how a process of retaliation and counter-retaliation can worsen the whole process of policy decision. If no import subsidies are implemented (column ETIT0), which may be a more realistic case, the changes in export taxes are much less important but remain substantial, in particular as compared to the scenario ET. In this case the range of export is quite realistic too: from 19% to 50%.

<Table 7 included here>

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[5] In a scenario where export and import taxes are both endogenous countries enter in a never-ending escalation of export taxes and import subsidies spiral since on the importing countries side, the government have no fiscal constraints and can finance the subsidies using a lump-sum transfer from household.

Table 8 indicates how world prices of agricultural goods are affected in various scenarios. Almost all agricultural prices are positively affected by various shocks due to substitution effects on the demand and supply sides, but wheat is by far the most exposed commodity to world price shocks. While world price of wheat increases by 10.8% thanks to the demand shock, it increases by 16.8% when net exporters of wheat 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 aspect of the initial shock. The effects are even larger when net importing countries implement reduction in import tariffs (27.3%). When no import subsidies are implemented, the impact of import taxes on world prices (12.6%) is much more comparable to the one of export taxes. Finally, the combination of increased export taxes in net wheat-exporters and reduced import taxes in net wheat-importers causes dramatic increase of this commodity's world price (41.1% when import subsidies can be implemented; 20.6% when they are not).

<Table 8 included here>

Figure 3 indicates how national real income of a few countries is affected by these various policy shocks. From the previous section, it was expected that net wheat-exporters' welfare would be positively affected by the initial shock and their 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 is significantly increased under all shocks, in particular under the one which combines endogenous export taxes and import tariffs with allowed import subsidies (scenario ETIT): its real income is increased by 0.6%. Australia (+0.23% under ETIT), Canada (+0.18%), and Ukraine (0.07%) are other beneficiaries. On the

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other side net wheat-importers are significantly hurt by these shocks in terms of real income: -0.85% in the case of Egypt under the ETIT scenario, -0.37% for Eastern Africa.

The case of Argentina also reveals how increased export taxes on primary commodity can be used in order to promote high value processed sectors buying this primary commodity as an intermediate good. When the demand shock augments the world price of wheat by about 10%, the Argentinean production of wheat is increased by 4.5% (in volume) while the one of the 'OtherFood', that includes milling industries and other flour related products, sector is reduced by 0.6%. Under the ET scenario where governments of net wheat-exporting countries increase their export taxes as a reaction to this world price shock, the production volume of wheat and 'Other food' sectors are constant. An increased export tax on a primary commodity is clearly a way of promoting the production of sectors using this commodity as an intermediate consumption.

5. CONCLUDING REMARKS

This paper provided an economic analysis of the use of export taxes and illustrated why they have been so popular during the food crisis. Several elements can justify the implementation of such trade practices: (i) export taxes can raise the world price of exports and therefore improve terms of trade; (ii) export taxes can reduce the domestic price of the taxed commodity and benefit final consumers of this commodity; this element is important when the commodity is an agricultural one and food security is at stake; (iii) export taxes can reduce the domestic price of the taxed commodity and benefit intermediate consumption of this commodity; this element is important when the commodity is a primary one and expansion of the manufacturing sector that buys it is at stake; (iv) export taxes increase public revenue which is beneficial in a country

where fiscal receipts on domestic base are small; (v) export taxes are means of redistributing income from domestic producers to domestic consumers and public sector.

As a consequence export taxes are attractive trade policy instruments. This paper helps to focus on one key element of the implementation of export taxes; these are typically "beggar-thy-neighbor" policies that deteriorate terms of trade and real incomes of trading partners. This leads to the consideration of retaliation by partners whose terms of trade have been negatively affected by initial export taxes. We showed in this paper that these trading partners can react by either reducing import tariffs or augmenting export taxes depending on their status of either net importer or exporter of the commodity. The 2006-2008 food crisis clearly illustrates the point about retaliation and counter-retaliation of either reduce import duties or augmented export taxes.

Several policy conclusions are worthwhile: (i) first, this process implies the implementation of non-cooperative policy equilibrium which worsens world welfare and calls for an international cooperation; (ii) while large countries can implement "beggar-thy-neighbor" policies which increase national welfare at the expense of trading partners, small countries do not have this policy option and changes in their own policy neither improves their welfare nor hurts partners' situation; (iii) there is a key asymmetry between net exporters and net importers of an agricultural commodity in a situation of food crisis as net exporters can benefit from increase in world prices while net-importers are hurt and have no capacity to retaliate efficiently.

Today, the EU and the US are wondering if certain Chinese export taxes are WTO-consistent and if they can bring the case to the WTO dispute settlement body (see Crosby, 2008). In 2008 China has raised export taxes on some metal resources products such as parts of steel products, metal ore sand, ferro-alloy. The objective of this policy is to re-orientate the supply of these goods on

the domestic market in order to decrease the price of intermediate goods for domestic manufacturing sectors.

In these conditions it is understandable that the European Union has just proposed to discipline such practices.[6] While this proposal has been well received by countries like Canada, the US, Switzerland, and Korea, it has been highly criticized by some developing countries like Argentina (which also confirms what was expected from our analytical framework), Malaysia, Indonesia, Brazil, Pakistan, Cuba, India, and Venezuela, with Argentina leading the opposition to this proposal. 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 noteworthy that the European Union makes a distinction between trade-distorting taxes and "legitimate" export taxes like those applied in the context of Balance-of-Payments imbalances. The EU proposes a full prohibition of trade-distorting export taxes. The EU and the US frequently implement bans of export taxes in bilateral agreements that they negotiate.

The EU has been very active by demanding under the Doha Development Agenda substantive commitments by all WTO members to eliminate or reduce export taxes. Our paper shows that export taxes and import tariffs exhibit strong similarities, or are even equivalent in terms of their impact on (domestic and foreign) welfare. It may justify bringing some disciplines into the WTO context in the area of export taxes as these disciplines exist in the domain of import tariffs. Moreover another justification is the consideration of net food-importing small countries that can be strongly hurt in case of food crisis and by escalation of export taxes throughout the world, and

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[6] The EC's proposal is available on WTO website (TN/MA/W/11/add. 6).

that do not have many policy instruments to face this kind of issue. Export taxes and export restrictions could clearly become a new and major bone of contention between high-income countries and agrofood exporting middle-income countries in trade negotiations.

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Tables and Figures

Figure 1: A partial equilibrium analysis of an export tax

Small Country

Big Country

Figure 2: A general equilibrium analysis of export tax and import tax under domestic price target

TABLE 1: GEOGRAPHIC DECOMPOSITION

MIRAGE label
Australia
Rest of Asia
China
Thailand
VietNam
Bangladesh
India
Pakistan
Rest South Asia
Canada
United States
Mexico
Rest of Europe
Argentina
Rest of LAC
Brazil
Oil exporters
EU 27
Rest of CIS
Russia
Ukraine
MENA
Egypte
West Africa
Easf Africa
Southern Africa
South Africa

TABLE 2: SECTOR DECOMPOSITION

MIRAGE label
Paddy and pocessed rice
Wheat
Other grains
Vegetable and fruits
Oilseeds
Sugar
Plant fiber
Other crops
Livestock
Other natural resources
Other Food
Fossil Fuels
Meat
Vegetal Oil

Dairy products	
Textile	
Wearing and Apparel	
Leather	
Other manufacturing products	
Chemical products	
Motor vehicles and transport equipment	
Capital goods	
Services	
Construction	
Transportation	

TABLE 3: SCENARIOS

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

TABLE 4: ADDITIONAL IMPORT TAXES

Country/Region	IT	ETIT
Rest of Asia	-19.9%	-19.9%
China	-29.8%	-29.8%
Thailand	-28.1%	-28.1%
Vietnam	-12.6%	-12.6%
Bangladesh	-18.6%	-18.6%
Pakistan	-28.8%	-28.8%
Rest of South Asia	-19.3%	-19.3%
Mexico	-27.5%	-27.5%
Rest of Europe	-32.0%	-32.0%
Rest of Latin America	-30.0%	-30.0%
Brazil	-25.2%	-25.2%
EU27	-32.0%	-32.0%
Rest of CIS	-29.8%	-29.8%
Midde-East and North Africa	-41.9%	-41.9%
Egypt	-25.8%	-25.8%
West Africa	-21.3%	-21.3%

East Africa	-24.3%	-24.3%
Southern Africa	-18.7%	-18.7%
South Africa	-27.7%	-27.8%

Source: Authors' calculation

TABLE 5: ADDITIONAL EXPORT TAXES

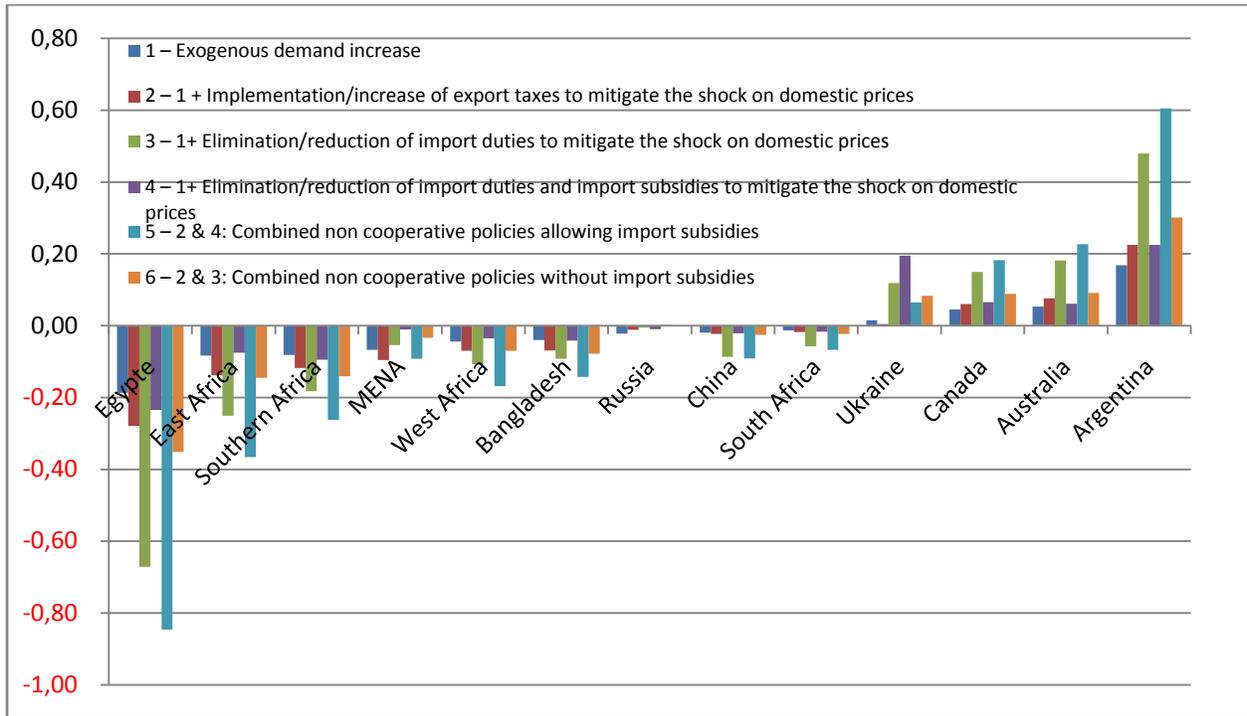|	ET	ETIT	ETIT0
Australia	3.3%	47.0%	19.0%
India	3.9%	46.0%	21.0%
Canada	3.6%	52.0%	25.0%
US	4.2%	52.0%	27.0%
Argentina	3.8%	50.0%	25.0%
Russia	5.6%	57.0%	37.0%
Ukraine	4.5%	50.0%	50.0%

Source: Authors' calculation

TABLE 6: WORLD PRICES (% CHANGES 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
Vegetal Oil	0.01	0.01	-0.01	0.00	0.00	0.00

FIGURE 3: WELFARE IMPACT OF VARIOUS SCENARIOS (% CHANGES COMPARED TO REFERENCE SITUATION)

Legend:
- 1 – Exogenous demand increase
- 2 – 1 + Implementation/increase of export taxes to mitigate the shock on domestic prices
- 3 – 1+ Elimination/reduction of import duties to mitigate the shock on domestic prices
- 4 – 1+ Elimination/reduction of import duties and import subsidies to mitigate the shock on domestic prices
- 5 – 2 & 4: Combined non cooperative policies allowing import subsidies
- 6 – 2 & 3: Combined non cooperative policies without import subsidies

Annex

TABLE A.1: IMPLEMENTATION OF EXPORTS RESTRICTION DURING THE FOOD CRISIS (2006-2008)

Country	Trade restriction
Thailand	*Export ban on rice (05/07/08)
Russia	*Russia raised wheat export tariffs from 10 to 40% (02/08)
Indonesia	* The government passed new exports laws to prevent produce from flooding out of the country, selling at high international prices. Under Indonesia's new rules, only state procurement agency Bulog is allowed to sell overseas, and only when national stocks are above 3 million tonnes and domestic prices are below a government target price. (04/08)
Bolivia	*Ban on exports of grain and meat products has been introduced. (04/08) *Ban on export of vegetable oil.
Egypt	*Ban on rice exports from April to October 2008. (04/08-10/08)
Pakistan	*Banned private wheat exports to Afghanistan. (04/08) *Imposed a 35% tariff on wheat and wheat products exports. (04/08)
Vietnam	*Extended ban on rice exports until June. The permitted rice exports will be cut to 3.5 million tonnes in 2008, from 4.5 in 2007 between the months of January to September. (03/08)
Ecuador	*Restriction on exports
Nepal	*The government announced on April 30th, 2008 that it will ban exporting paddy, rice and wheat until mid-November 2008. (04/30/08)
Bangladesh	*The government banned exports of all but aromatic varieties of rice for six months, until November 7th, 2008. (05/07/08) *The government banned exports of soybeans and palm oil for 6 months. (04/08)
Madagascar	*The government banned rice exports. (05/14/08)
Kazakhstan	*The government banned wheat exports, which led to the WFP not purchasing 5,500 mt as planned. (04/08) *The government restricted exports of sunflower seeds. (06/08/08) *The government has set new export tariffs on cereals. (02/08)
Ethiopia	*The government has banned exports of major cereals and grain stockpiling, and suspended WFP's local purchases for emergency interventions. (02/08)
China	*The government has banned rice and maize exports to ensure sufficient domestic supply and to prevent further increase in food prices. (01/01/08) *China began to adopt export quota license administration on some grain powder products. (01/01/08) *The government increased taxes on food exports. (02/26/08) *The government announced that it will remove the value added tax (VAT) rebate for grain exports and levy provisional export taxes on grains and their flour products to discourage grain exports. (03/01/08) *Government introduced export duties of 20 percent on wheat, buckwheat, barley and oats and stepped up wheat and maize sales from state reserves. (early 2008) *China began to collect a one-year-long provisional export tariff on 57 categories of raw grain and powder products such as wheat and corn in the range of 5-25%. (02/12/08)
Brazil	*The government has temporarily banned rice exports. (04/25/08)
Niger	*The government imposed export controls on key agricultural commodities. (03/13/08)
Iran	*The government imposed US$300,000 export tax on the World Food Program and as a result the WFP had to cancel 3000 mt of wheat. (05/14/08)
Cambodia	*The government issued a two-month ban on rice exports. (04/08)
India	*The government will ban exports of maize until October 15, 2008. (07/03/08) *The government has banned exports of non-basmati rice, wheat, and edible oils, raised the minimum export price of basmati rice from $1100 to $1200, and has extended the ban of exports of pulses for one more year beginning April 1, 2008. (03/31/08) *The government banned exports of rice at less than $650 per ton, which is a 30% increase. This does not include the 500,000 tons bought by the Bangladesh under a state-to-state deal negotiated Nov 15., 2007. (03/09/08) *The government banned milk powder exports (2007) *The government banned rice exports priced under $505/ton. (12/31/07) *The government banned rice exports priced under $425/ton. (10/07) *Export of non-basmati rice has been restricted, with the imposition of a high minimum export price of $500/ton (02/09/08)
Tanzania	*The government will ban re-exports of rice in order to curb a looming food shortage. (05/02/08) *The government banned exports of agricultural commodities (02/08)

Argentina	*To guarantee domestic grain supplies during an election year and keep prices under control, the government closed its wheat export registry in March 2007. (05/14/08) *The government has halted rice exports except to Brazil. (04/08) *The government has delayed the reopening of its export registry from March 17 to April 21. (04/08) *The government raised export taxes on soybeans from 35% to 45% and increased a tax on exports of corn, wheat and beef to curb rising fast-rising domestic food prices. (04/02/08) *The government in order to boost revenue introduced a new system of sliding-scale export taxes on grains and oilseeds, which significantly raised levies on soy and sunseed products. (04/08) *The government reinforced the variable tax system for oilseeds and cereal exports. *The government postponed the renewal of the liberalization regime for bovine meat exports.			
Malaysia	Flour exports are only allowed with a special license. (03/09)			
Zambia	The government has reinstated the export ban applicable for any new maize contracts.			

(Source: IFPRI)

TABLE A.2: EXPORTS RESTRICTION IMPLEMENTED TODAY (NON EXHAUSTIVE LIST)

Country	Product	Tax rate (%)	Date	Source
	Soy	35	Nov-07	http://www.worldenergy.net/public_information/show_news.php?nid=97
	Soy meals; soy oils	32	Nov-07	
	Soy-based biodiesel	2.5 (effective)	Nov-07	
	Corn	25	Nov-07	
	corn and sugar-based ethanol	1	Nov-07	
Argentina	biodiesel	20	Mar-08	
Indonesia	Crude Palm Oil	3	Jun-09	http://www.worldenergy.net/
	Raw hides and skins	15	Dec-07	http://trade.ec.europa.eu/doclib/docs/2008/february/tradoc_137761.pdf
	Anthracite, not agglomerated, pulverized or non-pulverized	0	Jan-08	http://www.steelchinese.com/index.php?option=com_content&task=view&id=32&Itemid=2
	Bituminous coking coal, not agglomerated, pulverized or non-pulverized	0	Jan-08	
	Other bituminous coal, other than coking coal, not agglomerated, pulverized or non	0	Jan-08	
	High-carbon content coal, not agglomerated, pulverized or non-pulverized	0	Jan-08	
	Briquettes, ovoids & similar solid fuels manufactured from coal	0	Jan-08	
	Coke & semi-coke, agglomerated or non-agglomerated	0	Jan-08	
	Retort carbon	0	Jan-08	
	Coal, water, producer gas & similar gases, other than petroleum gases & gaseous hy	1	Jan-08	
	Tar distilled from coal, lignite, peat or other mineral tars, whether or not dehydrate	1	Jan-08	
	Motor gasoline & aviation gasoline	1	Jan-08	
	Naphtha	1	Jan-08	
	Aviation kerosene	1	Jan-08	
	Light diesel oil	1	Jan-08	
	Fuel oil No.5 to No.7 (National Code)	3	Jan-08	
	High-purity polysilicon, weight less than or equal to 99.99% of silicon	2	Jan-08	
	Nickel ore sand and concentrate	15	Jan-08	
	Unalloyed pig iron	25	Jan-08	
	Partial steel billet	25	Jan-08	
China	Semi-finished stainless steel products	15	Jan-08	

(Source: Authors' investigation)