Agricultural support and vulnerability of food security to trade in developing countries

Laroche-Dupraz C., Huchet-Bourdon M.

SMART, AGROCAMPUS OUEST, INRA, 35000, Rennes, France

catherine.laroche@agrocampus-ouest.fr

marilyne.huchet-bourdon@agrocampus-ouest.fr

Introduction

Food security is a major concern, especially for developing countries where a large percentage of the population lives in rural areas and the agricultural sector represents a substantial weight in the economy. The food security issue has come to the fore in recent years with the 2007-2008 food crisis and agricultural price volatility. For decades before, the focus was more on producers with lower incomes due to lower agricultural price trends. The 2007-2008 price hike turned attention to poor consumers as food riots erupted in many developing countries. Low-income countries are vulnerable to agricultural price surges in particular due to the fact that most of them are net food-importing countries. Gilbert (2012) affirms that the level of the country's development is important and that global food security policy should be oriented towards the poorest countries. For instance, Dávila (2010) found that higher prices for maize have affected Mexican household living standards and food security both in urban and rural areas during the period 2006-2008. The World Trade Organisation (WTO) Ministerial Conference of 7 December 2013 in Bali decided to raise a negotiation on an agreement for the issue of public stockholding for food security and, in the interim, authorised, for food security reasons and under conditions, developing countries to provide support for traditional staple food crops (WTO 2013). Indeed, Dawe et al. (2015) have analysed the behaviour of cereals prices since cereals are the most important expenditure item for the poor and food insecure. According to them, price volatility is substantially higher in poor countries in particular in Africa.

First coined in the mid-1970s, food security is a multi-dimensional concept as shown by the many attempts to define it (Maxwell 1996; Smith 1998). Food security has been analysed at many levels (individual, household, regional, national and global) over time, but food security at one level does not guarantee food security at another level. According to the FAO, "Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life," (World Food Summit 1996). This definition includes four components: physical availability, economic access, stability and adequate utilisation. Van Diij and Meijerink (2014) proposed a review of major global food security studies from 2000 to 2013. They show that most of the scenari only deal with two of the four dimensions of food security: food availability and food accessibility while food utilisation and stability are largely ignored. Besides, a number of hunger estimates are proposed in the literature without any consensus (see for instance Clay 2002; Butler 2015). However, this paper does not set out to redefine and re-explain the food security concept (this is discussed in Regmi and Meade (2013), Grote (2014) for instance),

In this paper we are in line with Diaz-Bonilla et al. (2000) who take the traditional definition of food security and propose a conceptual framework, adapted from Smith (1998), which displays the multiple links and interactions between trade and food security at each level (from individual to global level).

Diaz-Bonilla and Ron (2010) demonstrate the key role played in national food availability by: i) agriculture, a major sector in most developing countries where food security is at risk; ii) domestic agricultural and food policies prompting agricultural price deviations that have opposite effects on net buyer *versus* net seller households; and iii) trade policies in developed and developing countries that affect the domestic and foreign agricultural markets, since WTO regulations have little influence on the use of trade policy tools. They also suggest considering the positive effects on employment and poverty alleviation of suitable macroeconomic policies in other areas such as agricultural, financial, human and institutional concerns.

The world agricultural price surge in 2007-2008 showed that developing countries, particularly in Africa, are constantly at risk of chronic food crisis. Food riots, rocketing prices and concerns about the future effects of climate change have led some to claim that food security is improved by agricultural trade liberalisation, because trade can offset local market shortcomings and provide consumers with commodities at low prices. Timmer (2010) suggests that the best way to prevent food crises in the long run is to invest in "agricultural productivity and policies on behalf of stable food production and prices" rather than "trying to cope afterwards with the food crisis impact on the poor."[1] To be more specific, agricultural and food imports play a key role on food security in low-income countries. Indeed, dependence on imports for food may raise some food insecurity in the case of sudden price hike putting up the national food bill. The national state of food availability in the form of food imports and domestic food production is therefore crucial information. Analysing the stability of food availability through agricultural domestic and trade policies of importing countries is the core of this paper.

Following Diaz-Bonilla et al. (2000), this contribution aims to shed light on the vulnerability of food security to trade at national level, and how some political tools may be used to reduce this vulnerability and instability of food availability. Section 1 analyses the economic links between national vulnerability of food security and different forms of policy interventions in agriculture. Those relationships are formalized using the Bonilla index as indicator of vulnerability of food security to trade. Then, we confront in section 2 this theoretical framework to empirical data in order to understand the weight of national policy responses to 2008 price surge. Section 3 tests statistically the extent to which our hypotheses and relationships are actually confirmed by the data covering the period 2005-2010, before concluding.

1. Agricultural assistance and food security

1.1. Effects of border and domestic measures on agricultural distortions

---

[1] A third view defended by the food sovereignty movement is that long-term food security cannot depend on food imports, but must be built on the development of domestic production with enough barrier protection to shelter it from world price fluctuations and unfair trading (Laroche-Dupraz and Postolle 2013).

National trade policies cover border import and export taxes (tariffs) and subsidies. The effects of such trade policies on domestic supply, imports and the economic welfare of producers and consumers are well known (Krugman et al. 2012): these tools impact on the relative competitiveness of domestic production compared with the world market. A protective policy (high agricultural tariffs) has positive effects on domestic supply, but negative impacts on domestic consumers. Given that agricultural commodities are a food staple, such a policy applied to the agricultural sector is conducive to self-sufficiency, but may not promote food security where domestic supply is not sufficient or not suited to the domestic population's food needs. At the same time, applied tariffs (resp. subsidies) represent resources (resp. costs) for national budgets. This impact on government revenues may contribute to (resp. threaten) the funding of domestic policies that directly or indirectly promote an increase in household incomes and hence individual food security or that invest in health and education. An open market (low or zero tariffs) is positive for urban consumers, but could discourage domestic producers from developing their production supply if they cannot compete with international competition. So an open market has a positive effect on food security in that it facilitates domestic access to international agricultural supply, but it can also have a negative impact on domestic supply and increase food dependence on imports, which becomes a serious problem in the case of high world food prices and price surges.

Agricultural domestic support measures are also taxes (if negative) or subsidies (if positive) applied to outputs or inputs. A positive domestic support coupled to production, like price support or production payments, introduces a gap between a higher domestic price and a lower world price. This is not the case with decoupled domestic support, which is not expected to have such a distortive effect on agricultural prices. As a result, positive domestic support, if coupled, has similar effects to border tariff protection, i.e. a positive impact on domestic supply and a negative effect on domestic demand. However, the impact on government revenue is not the same: price support is directly financed by domestic consumers, while subsidies are charged to the national budget.

Positive domestic support and tariff protection to encourage domestic supply may both have a negative distortive impact on the world price. This is why the use of border measures and domestic support measures has been regulated by the WTO in the agricultural sector since the Uruguay Round Agricultural Agreement (1994) in order to limit the negative impact of agricultural support on world agricultural prices. However, although WTO rules are binding on major developed countries, which have had to reform their agricultural policies to comply, most developing countries are not similarly bound for two reasons. First, most developing countries have known very low agricultural support levels, often even negative in the 1970s or 1980s. Second, WTO reduction commitments for developing countries are much lower than for the developed countries, and the recent WTO Ministerial Decision confirms this differential treatment at middle term for food security purposes (WTO 2013). Note that WTO regulations are only designed to counter negative agricultural world price distortions.

There are no rules to restrict support measures that have positive effects on world prices, such as export restraints or import subsidies.

In this article, we use the Nominal Rate of Assistance (NRA) as a consistent indicator of global agricultural support level. Calculated by the World Bank for a large panel of countries of all geographic regions, the NRA assesses the "agricultural incentive distortions" taking into account not only subsidies or taxes to agricultural sector, but also indirect effects due to other sectoral policies or exchange rate distortions (Anderson 2009, 2010). More precisely, we use the last updated data (Anderson and Nelgen 2012). Note that in this updated database, the only exchange rate-induced indirect effect covered is the case where a government imposes a different exchange rate for imports and exports that actually has an especially distortive effect on the agricultural sector. The "straightforward" overvaluation is disregarded, unlike in previous calculations, because the authors consider that such an overvaluation has a similar effect on imports and exports of all products and that the particular impact on agriculture is negligible.

However, the links between domestic policy and national food security indicators need to be analysed in order to understand how the determinants of food security interact, in particular by differentiating market context (falling *versus* rising, low *versus* high agricultural prices).

1.2. The Bonilla index and its determinants

Diaz-Bonilla et al. (2000) put forward that the ratio of national food import expenditure to the value of total exports is a useful indicator of national access to the world food supply (hereafter the Bonilla Index, BI).

$$BI = \frac{m^{value}}{X^{value}} = \frac{m \cdot p_m}{X \cdot p_X} \tag{1}$$

with m^{value} : value of food imports in local currency;

X^{value}: value of total exports in local currency;

m: quantity of food imports;

X: quantity of total exports;

p_m, p_X : domestic aggregated price in local currency for food imports and for total exports.

This Bonilla Index (BI) is a consistent indicator of the national capacity to finance food imports from exports. In this regard, it is an interesting indicator of the vulnerability of food security to trade in developing countries, especially for net food importing countries. This index is sensitive to variations in:

- The volumes of food imports and total exports, because food imports point to national food needs not covered by domestic production and total exports are indicative of the country's trade performance and competitiveness;

- The value of food imports and total exports; these values depend on world price trends and their effects on the local currency *via* the exchange rate.

The Bonilla Index assessment finds that food security is less vulnerable to trade when the BI decreases and more vulnerable when the BI increases. Contrary to the food trade position (food net importer/exporter), the BI considers the relative food import bill to total export earnings, hence pointing up the role of international trade and its effects on national food security.

In the following analysis, we focus on the agricultural food sector, assuming the relative stability, *ceteris paribus*, of the total export sector, at least in the short term.

In order to highlight world food prices in the equation, we introduce the exchange rate:

$$BI = \frac{m \cdot P_m \cdot E}{X \cdot P_X . E} \tag{2}$$

with m: quantity of food imports

X: quantity of total exports;

P_m: world price for food imports in foreign currency;

P_X: export price in foreign currency for total exports.

E: nominal exchange rate, i.e. the number of national currency units against one unit of foreign currency.

Border measures (export and import taxes and subsidies) and domestic support have direct impacts on the BI because they introduce the gap between world and domestic food prices. The Nominal Rate of Assistance (NRA) index on importable food products, as calculated by the World Bank (Anderson 2009; Anderson and Nelger 2012), provides information on the effects of agricultural policy domestic support and border measures. Thus taking into account these measures, equation (2) may be written:

$$BI = \frac{m \cdot P_m \cdot (1 + NRA^m) \cdot E}{X \cdot P_X . E} \tag{3}$$

with NRA^m: Nominal rate of assistance assessed for importable food products (in %).

This equation highlights the role of the several determinants of the vulnerability of food security to trade identified in previous sections: the world price P_m (and its potential volatility), the level of national or trade policies applied to the food imports sector (NRA^m), and the exchange rate policy with

the nominal exchange rate E may modify the value of the food import bill expressed in local currency after custom clearing.

1.3. Impact of NRA^m and E deviations on BI

In the very short term, in an environment of relative agricultural price stability, we observe that:

- In the event of the depreciation (resp. appreciation) of the local currency to the foreign currency, E rises (resp. falls), then the cost of food imports expressed in the local currency rises (resp. decrease). But the BI may not move because, expressed in local currency, food imports and total exports increase in the same proportion if X remains at the same level.

- If NRA^m increases (resp. decreases), for example due to higher (resp. lower) food import tariffs or domestic food production subsidies, the BI automatically increases (resp. decreases) due to the price distortion for imported food, increasing (resp. decreasing) the vulnerability of food security to trade.

In the longer term, the estimated effects of E and NRA^m on food security vulnerability to trade are not so clear because a local currency depreciation (resp. appreciation) or an increase (resp. decrease) in agricultural support may improve (resp. undermine) domestic agricultural competitiveness and stimulate (resp. cut back) domestic food production and total exports. This may have a negative (resp. positive) impact on food import demand m, positive impact on exports X and may drive down (resp. drive up) the BI by reducing (resp. increasing) food dependence on imports.

1.4. Impact of price volatility on food security

In 2000, the downward trend in world agricultural prices started to shift. Global demand rose more sharply than supply, slowing the downward trend in agricultural prices from 2000 to 2007. Suddenly, agricultural prices spiralled in 2007-2008, triggering hunger riots in a number of developing countries in 2008.

The price volatility debate was reopened following the 2007-2008 price surge as farmers' earnings and consumer purchasing power suddenly looked uncertain, putting food security at risk. Recent years have seen two peaks in world prices for cereals and other major food commodities: once in 2007-2008 and again in 2010-2011. And prices have generally remained at a higher level than during the period from the 1980s to the early 2000s. There may be a number of reasons for this trend such as a growing imbalance between food demand and supply, the rise in oil prices, exchange rate movements and trade restrictions.

Price hikes can have mixed effects in terms of food security. High food prices could be viewed as an opportunity for producers. They could drive an increase in food production, improving the physical availability and access to food and raising producers' incomes. Yet at the same time, the cost of consumption goes up such that, under the hypothesis of stable food aid, economic access to food is

reduced (Diaz-Bonilla and Ron 2010). This phenomenon is more of a concern in developing countries where a large proportion of household income goes on food. Households in these countries therefore face a drop in real income and greater uncertainty should shoot up agricultural prices suddenly. Moreover, many producers are net food buyers (being mostly small farmers, livestock producers and artisanal fishers in the developing countries). The main impacts of price variability on producers and consumers are in the uncertainty surrounding income, investment decisions and access to food. Price transmission from international prices to domestic prices can be limited for a number of reasons including previously analysed policies such as trade, exchange rate policy and other domestic policies, as well as other factors like infrastructure and transportation costs (Baffes and Gardner 2003; Meyer and von Cramon-Taubadel 2004; Greb et al. 2012; Dawe et al. 2015). Developing countries suffer from a lack of agricultural productivity and weak infrastructures. They may face obstacles such as poor access to credit.

The developing countries responded in different ways to the 2007-2008 price surge. At least as a short-term emergency measure in response to rocketing domestic food prices and to the threat to their cities' food supply, many chose to raise imports by lifting tariffs (and even subsiding imports) and to restrict their exports with export taxes and bans (FAO, 2009). Although 2008 clearly showed that export taxes generally made food crises worse, which is why they are widely criticised by both developed and developing countries along with many international agencies (Lui and Bilal 2009), it certainly strengthened the conviction of countries using such export taxes that it is in their best interests to retain the right to use them, in particular when the commodity is agricultural and when food security is at stake (Bouet and Laborde-Debucquet 2010). Looking into WTO members' responses to structural food crises, Crump (2010) concludes that export restrictions would most certainly be used on a massive scale in response to cases such as climate change.

The theoretical framework presented in this section points clearly to the potential impact when a national government implements corrective policies. Changing the local currency value and/or the level of domestic support theoretically offsets the effects of an agricultural price deviation. Equation (3) actually shows that by rising (resp. reducing) E and/or NRA^m, it is theoretically possible to offset a fall (resp. rise) in P_m and keep BI stable. The abovementioned policies adopted by importing countries in 2008 can be understood in this way: lifting import tariffs and reducing NRA^m may offset the food price surge and limit the BI deviation so as not to damage food security vulnerability to trade. The following section analyses the 2008 food crisis in a panel of developing countries for which data are available precisely to assess the scale of using such corrective policies on importable agricultural commodities.

2. Evolution of the food security vulnerability to trade of developing countries from 2005 to 2010

2.1. Available Data

BI is first computed from the BACI database using equation (1), ie. at the import border, before application of any distortive measure.

The annual food import value (numerator) and total export value (denominator) are used to calculate the BI for each country. The BACI-92 database provides consistent trade data in US dollars (import and export values) at HS2, HS4 and HS6. The HS4 level is used to differentiate food commodities from other products so that we can calculate food import values[2]. In order to be consistent with statistical regressions of section 3, highly transformed products are excluded because NRA^m data are only given for agricultural products. We consider chapters 1 to 12 of the HS4 classification (excluding chapters 5 and 6 and Code 1209[3]) as agricultural food commodities: we name "food imports" the agricultural food imports.

The World Bank's latest updated NRA data (Anderson and Nelgen 2012) present the nominal rate of assistance (NRA) for 81 countries worldwide from 1955 to 2009 or 2010. The data do not cover the entire period for all developing countries, but the years 1995 (or 1996) to 2009 (or 2010) are well covered. A number of NRA aggregates are calculated (as weighted averages) such as NRA applied to tradable products, importable and exportable products, total NRA and its components: NRA due to domestic measures *vs.* NRA due to border measures. Dealing especially with the food import bill in this section, this study focuses especially on total NRA applied to importable agricultural commodities (NRA^m).

Due to available data, our sample is composed of 39 developing countries. Characteristics of those countries are presented in Appendix, table A1. Our analysis essentially focuses on period 2005-2010.

2.2. BI evolution paths of developing countries from 2005 to 2010

Figure 1 presents 2005-2010 average BI of the sample's countries. Each country is represented by a point placed on a plan by including the value of food imports on the x-axis and the value of total exports on the y-axis. Axis values are plotted using a decimal logarithmic scale to allow the representation of the vast differences in national situations in our sample. The value of BI is growing when moving from the Northwest to the South East of the graph. In order to see more clearly the countries according to the value of their BI, 3 lines iso-BI are shown which respectively take the BI values of 1% (BI = 0,01), 10% (BI=0,1)and 100% (BI=1).
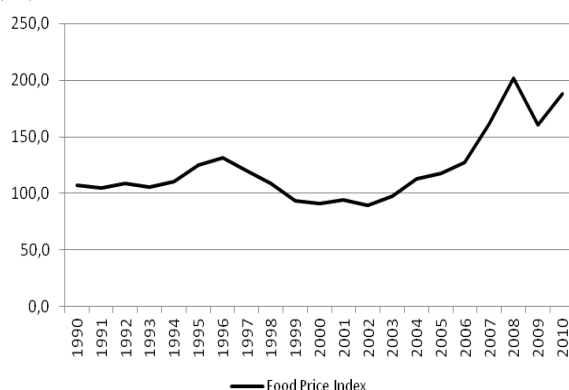
This graph enables to distinguish:

---

[2] The World Bank NRA database also computes the nominal exchange rate needed to convert USD trade data into local currency units, when necessary.

[3] Chapter 5 covers feathers and other animal products for non-food use, Chapter 6 covers ornamental plants and Code 1209 corresponds to seed for sowing.

- The countries at low or moderate BI (1 - 10%), and the countries with a high BI (10 - 100%), or greater than 100% (case of Benin). Remind that BI higher than 100% means that total exports value is insufficient to finance food imports;

- The big countries (China, Mexico, Asian countries, Egypt), which are located to the Northeast of the graph, and the small countries (Chad, Burkina Faso, Nicaragua, Benin, Mali, Togo, Madagascar), located in quarter Southwest. Indeed the value of total exports on the one hand and food imports on the other hand are correlated respectively to the economic size and the number of inhabitants of the country.

Figure 1: 2005-2010 average BI of our panel of 39 developing countries

We can check on this graph that countries which present very close BI averages are however not in the same situation. For example Egypt, with BI at level 34%, is a large country whose exports are important resources, while Burkina Faso, with BI at level 37%, is a much smaller country whose both food imports needs and export resources are lower than Egypt's ones.

During the period 2005-2010, food prices are characterized by an upward trend with a high level of variability, even in real terms (fig 2b), compared to the previous decade (fig 2a). Without corrective adjustments, one can expect that observed variations of food prices lead to similar fluctuations of food import value that would have an impact on their BI in particular for countries which are net food importing countries with limited export resources.

Figure 2 : FAO Food Price Index from 1990 to 2010 ; 2002-2004 = 100.

(2a)   Nominal Food Price Index evolution from 1990 to 2010   (2b)   Nominal and Real Food Price Index
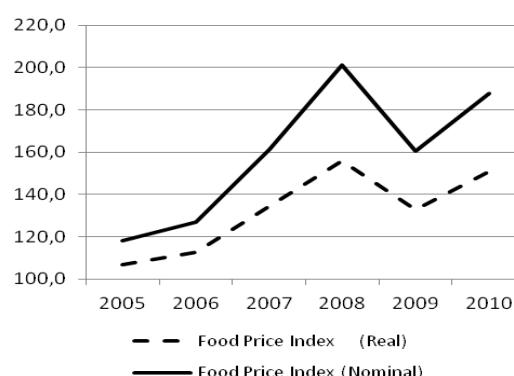
Source: authors from FAO data, website http://www.fao.org/worldfoodsituation/foodpricesindex/en/

 "Food Price Index consists of the average of 5 commodity group prices indices [meat, Dairy, Cereals, Vegetable Oils, Sugar]) weighted by the average export shares of each of the group for the base period 2002-2004: in total 73 price quotations considered by FAO commodity specialists as representing the international prices of the food commodities are included in the overall index".

Following figure 3 shows the temporal BI path from 2005 to 2010 of some countries which are from different geographic areas. Black lines correspond to BI calculated with food import value before import border measures while grey lines (named BI') refer to BI calculated including NRA^m ie. after import border measures.
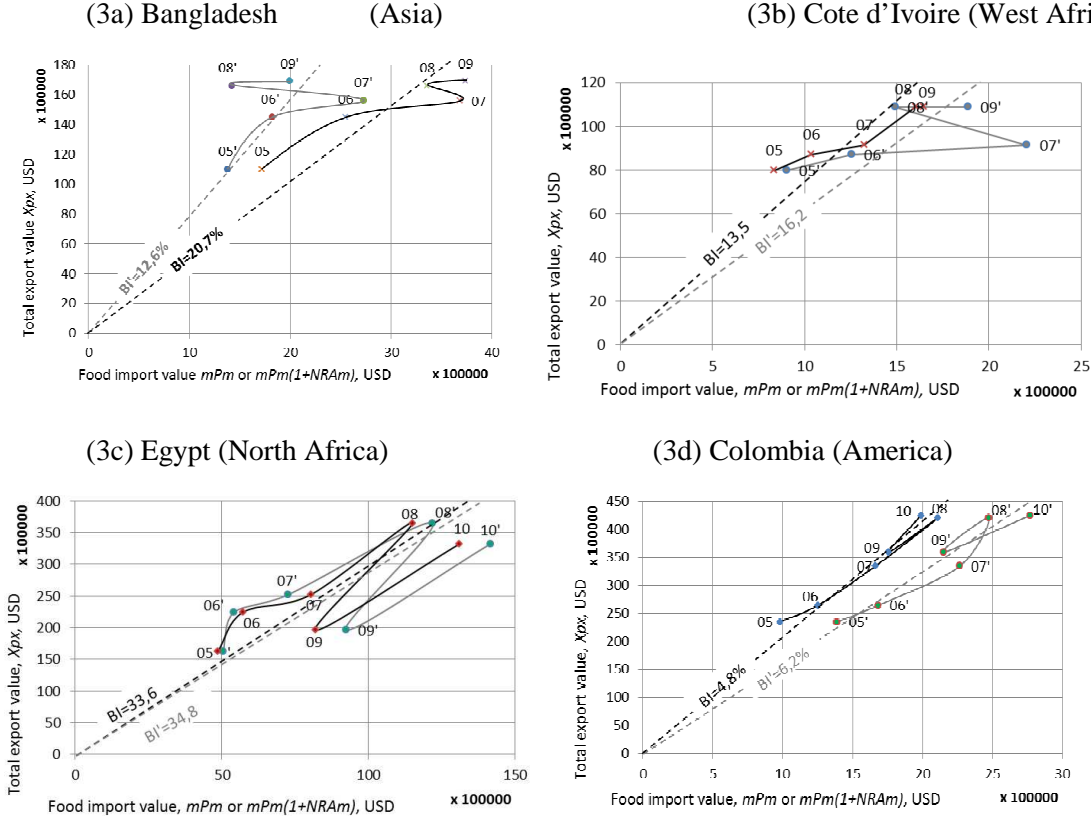
Over the whole period 2005-2010, the average BI calculated before application of trade measures at the import border (without NRA^m) may be higher (as in Bangladesh), lower (case of Cote d'Ivoire or Colombia) or very similar (as in Egypt) to the average BI calculated after applying NRA^m. This corresponds to the fact that during this period, agricultural products are subject to a greater or lower import protection by country: negative in Bangladesh, absent or low in Egypt but generally positive in Colombia or in Cote d'Ivoire.

Examination of the black curves shows that for the four countries there is a jump in the value of food imports between 2005-2006 and 2007-2008; that results in a strong Eastward shift of the BI points of the graph. We also observe a concomitant increase in the value of total exports. Graphically, BI points were located in 2005 and 2006 in the Northwest of the average BI line and move to the South East of this line in 2007, 2008 and 2009, except for Egypt.

The examination of the dashed curves (BI') shows that the evolution of the BI taking the NRA^m into account not substantially follows the same trend as the black curves. A correction appears between 2007 and 2008: BI points return Northwest of the average BI. This suggests that countries seek to adjust their level of NRA^m to stabilize the BI after crossing the border, at least when the variations in the value of food imports are not offset by the change in the value of total exports.

Indeed, as mentioned in section 1, many authors have shown that during the food price peak of 2008, lots of countries had reduced their food exports and reduced their protection against imported food.

Figure 3: BI paths from 2005 to 2010

(3a) Bangladesh   (Asia)   (3b) Cote d'Ivoire (West Africa)

(3c) Egypt (North Africa)   (3d) Colombia (America)

2.3. Was Agricultural support an adjustment variable during 2008 food price surge?

The numerator of BI corresponds to the value of food imports, i.e. the food import bill. At this stage and using equation (3) expressed in US dollar, we need to break down this food import bill into two main components:

$$food\ imports\ bill = [m \cdot P_m \cdot (1 + NRA^m)] = [m \cdot P_m] + [m \cdot P_m \cdot NRA^m] \tag{4}$$

In this section, in order to highlight the particularities of the period 2005-2010 in a longer term, figures of following graphs and table are reported since 1995.

Figure 4 shows the composition of the food import bill in case of Bangladesh.

Figure 4: Impact of NRA^m on food import bill 1995-2009 in US$ thousands in Bangladesh
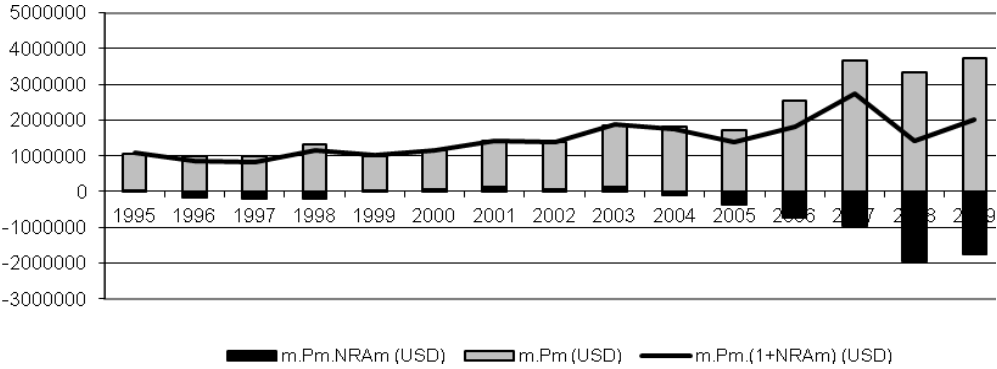
Source: authors' calculations using World Bank and BACI data

The line shows Bangladesh's actual food import bill value. The grey bars indicate the value of food imports in undistorted domestic prices and the black bars represent additional import cost if $NRA^m > 0$ or a reduction in the import bill if $NRA^m < 0$. In the case of Bangladesh, it can be seen that NRA^m is close to zero from 1995 to 2004. It is negative from 1996 to 1998 and slightly positive from 2000 to 2003 before becoming significantly negative from 2005 to 2009, especially in 2008. In this particular year, a negative NRA^m reduced the food import bill by more than half from USD 3.736 billion to USD 1.996 billion[4].

Figure 5: Bonilla index growth 1995-2009
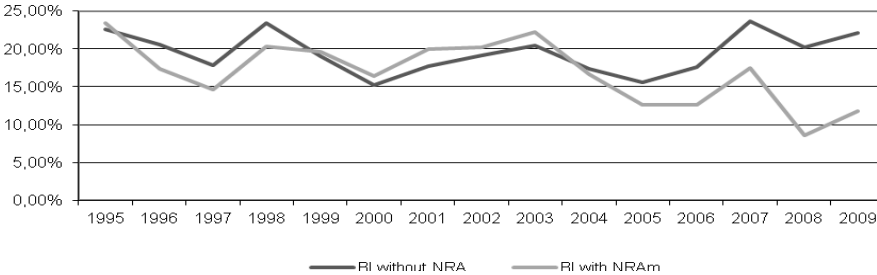
Source: authors' calculations using World Bank and BACI data

Beyond the food bill i.e the numerator, we notice that the downward adjustment of NRA^m observed from 2005 to 2009 led to a negative trend of BI over this period compared to a situation without NRA.

---

[4] Note that this result doesn't mean that if Bangladesh would not have provided such negative NRA^m in 2008, its food import bill would have been 3.736 billion USD. Actually, it would have been significantly less for two reasons. First, Bangladesh is a large country and its negative NRA^m in 2008 has certainly positive distorsive effect on P_m. Second, without negative NRA^m (i.e. without import subvention), Bangladesh would have imported less. However the reduction of the food import bill remains effective in the context of negative NRA^m provided by Bangladesh in 2008, compared to the food import bill calculated without NRA^m.

The use of NRA^m to offset price volatility and especially price surges seems to be effective for many developing countries. Table 1 sums up the impact of NRA^m on BI for each of the 39 developing countries across the 1995-2010 period and for 2008. The case of Bangladesh is particularly striking.

As shown by Figure 6, all countries – except Sudan and China – present a 2008 NRA^m below the 1995-2010 average NRA^m.

Figure 6: 2008 NRA^m compared to 1995-2010 NRA^m average
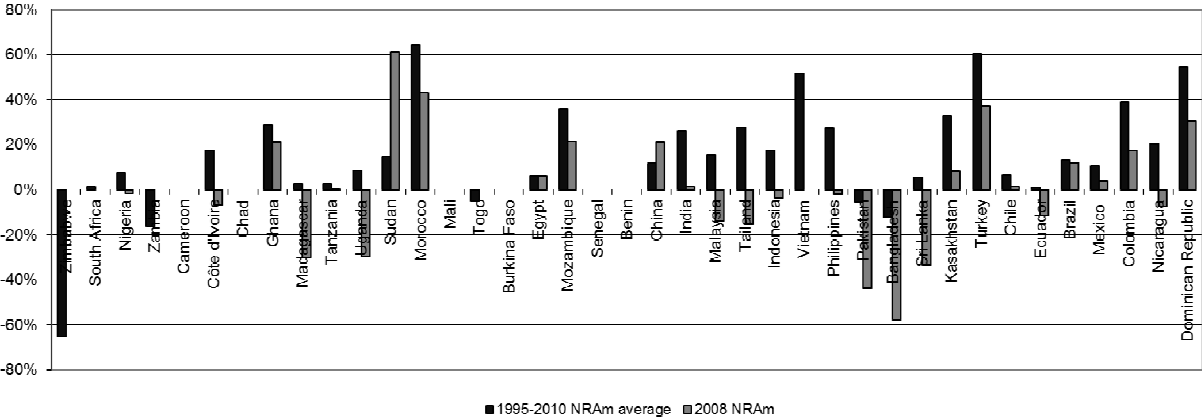
Source: authors' calculations, from World Bank and BACI data

Table 1: Summary statement of NRA^m impact on BI, 1995-2010 and year 2008 (Source: authors' calculations, from Word Bank and BACI data)

| Country	1995-2010 NRA^m minimum	1995-2010 NRA^m maximum	1995-2010 NRA^m average	2008 NRA^m	Deviation (%) NRA^m 2008 compared to 1995-2010 NRA^m average	1995-2010 BI minimum NRA included	1995-2010 BI maximum	1995-2010 BI average	2008 BI	Deviation (%) 2008 BI compared to 1995-2010 BI average	2008 BI without NRA^m	Overcost versus reduction cost on 2008 food import bill due to NRA^m (USD)
Zimbabwe	-0,915	-0,339	-0,654	na	na	0,003	0,028	0,015	na	na	0,117	na
South Africa	-0,145	0,122	0,013	0,000	-100,00%	0,012	0,035	0,022	0,020	-8,03%	0,020	0
Nigeria	-0,277	0,456	0,076	-0,017	-122,17%	0,027	0,109	0,057	0,037	-35,13%	0,038	-56 733
Zambia	-0,490	0,046	-0,164	na	na	0,042	0,158	0,079	0,000	-100,00%	0,047	na
Cameroon	0,000	0,000	0,000	0,000	/	0,011	0,192	0,088	0,120	36,76%	0,120	0
Cote d'Ivoire	**-0,069**	0,668	0,175	**-0,069**	-139,60%	0,113	0,241	0,149	0,137	-8,46%	0,147	**-110 999**
Chad	0,000	0,000	0,000	0,000	/	0,026	0,427	0,174	0,037	-78,67%	0,037	0
Ghana	0,046	1,108	0,285	0,212	-25,68%	0,078	0,319	0,176	0,176	-0,32%	0,145	183 354
Madagascar	**-0,300**	0,448	0,028	**-0,300**	-1186,34%	0,127	0,344	0,181	0,190	4,66%	0,271	**-133 571**
Tanzania	-0,521	0,308	0,026	0,002	-90,99%	0,158	0,396	0,259	0,198	-23,60%	0,198	1 614
Uganda	**-0,299**	0,223	0,085	**-0,299**	-452,74%	0,174	0,511	0,280	0,188	-32,99%	0,268	**-162 695**
Sudan	-0,937	0,624	0,146	0,611	317,90%	0,010	0,621	0,284	0,242	-14,57%	0,150	1 186 809
Morocco	0,429	1,010	0,640	0,429	-33,06%	0,234	0,446	0,292	0,275	-6,04%	0,192	1 952 514
Mali	0,000	0,000	0,000	0,000	/	0,181	1,972	0,356	0,210	-41,13%	0,210	0
Togo	-0,492	0,000	-0,053	0,000	-100,00%	0,206	0,650	0,373	0,320	-14,17%	0,320	0
Burkina Faso	0,000	0,000	0,000	0,000	/	0,232	0,641	0,453	0,558	23,22%	0,558	0
Egypt	-0,161	0,292	0,060	0,060	-0,96%	0,242	0,922	0,520	0,334	-35,85%	0,315	684 856
Mozambique	-0,052	0,694	0,357	0,215	-39,63%	0,185	1,333	0,614	0,203	-66,88%	0,167	159 258
Senegal	0,021	0,201	na	na	na	0,548	0,804	0,624	0,000	-100,00%	0,672	na
Benin	0,000	0,000	0,000	0,000	/	0,645	3,747	1,170	2,301	96,71%	2,301	0
China	0,011	0,233	0,117	0,212	81,92%	0,010	0,027	0,018	0,018	-3,77%	0,017	1 205 968
India	-0,113	0,553	0,258	0,013	-94,76%	0,016	0,033	0,024	0,016	-33,49%	0,016	45 563
Malaysia	**-0,140**	0,445	0,152	**-0,140**	-192,17%	0,020	0,034	0,026	0,021	-21,06%	0,024	**-744 317**
Thailand	**-0,154**	0,732	0,275	**-0,154**	-155,89%	0,020	0,042	0,031	0,021	-32,31%	0,025	**-741 946**
Indonesia	-0,210	0,731	0,173	-0,039	-122,24%	0,028	0,067	0,039	0,032	-17,72%	0,033	**-212 955**
Vietnam	0,000	1,188	0,514	0,000	-100,00%	0,032	0,058	0,048	0,039	-19,22%	0,039	0
Philippines	-0,146	0,596	0,274	-0,021	-107,48%	0,029	0,132	0,059	0,066	12,51%	0,067	-95 578
Pakistan	**-0,436**	0,232	-0,056	**-0,436**	683,16%	0,117	0,209	0,164	0,133	-18,84%	0,236	**-2 395 621**
Bangladesh	**-0,578**	0,121	-0,125	**-0,578**	362,34%	0,086	0,234	0,169	0,086	-49,41%	0,203	**-1 941 644**
Sri Lanka	**-0,334**	0,466	0,054	**-0,334**	-713,91%	0,142	0,288	0,187	0,145	-22,42%	0,217	**-663 786**
Kasakhstan	0,059	1,159	0,327	0,082	-75,00%	0,015	0,041	0,021	0,016	-24,57%	0,015	75 335
Turkey	0,167	1,285	0,605	0,371	-38,67%	0,018	0,087	0,047	0,040	-15,26%	0,029	1 571 356
Chile	0,009	0,149	0,066	0,015	-77,79%	0,020	0,049	0,032	0,029	-9,94%	0,029	28 408
Ecuador	-0,387	0,405	0,011	-0,117	-1166,39%	0,016	0,095	0,039	0,039	-0,66%	0,044	**-108 760**
Brazil	0,037	0,303	0,134	0,118	-12,30%	0,020	0,091	0,046	0,028	-38,65%	0,025	618 917
Mexico	-0,065	0,312	0,106	0,035	-66,54%	0,043	0,058	0,050	0,053	6,92%	0,051	513 285
Colombia	**0,172**	0,666	0,389	**0,172**	-55,75%	0,038	0,139	0,083	0,059	-28,90%	0,050	363 483
Nicaragua	**-0,075**	0,522	0,206	**-0,075**	-136,33%	0,080	0,294	0,134	0,086	-35,50%	0,093	-18 579
Dominican Republic	0,040	0,943	0,542	0,304	-43,84%	0,169	0,534	0,321	0,377	17,55%	0,289	657 513

Table 1 and Figure 6 suggest that almost all developing countries for which data are available[5] took measures to cut their food bill by reducing the agricultural rate of assistance on importable agricultural products and even by introducing negative NRA^m, i.e. import border subsidies on agricultural commodities (Nigeria, Cote d'Ivoire, Madagascar, Uganda, Malaysia, Thailand, Indonesia, Philippines, Pakistan, Bangladesh, Sri Lanka, Ecuador and Nicaragua are in this case). For ten countries (Cote d'Ivoire, Madagascar, Uganda, Malaysia, Thailand, Pakistan, Bangladesh, Sri Lanka, Colombia and Nicaragua), the 2008 NRA^m is the lowest NRA^m of the 1995-2010 period, and is even negative with the exception of Colombia.

Our sample includes several densely populated South East Asian countries with a sharply reduced 2008 food import bill due to NRA^m: USD 1.941 billion for Bangladesh, USD 2.396 billion for Pakistan, USD 0.664 billion for Sri Lanka and USD 0.744 billion for Malaysia and USD 0.741 billion for Thailand (Table 1). Note that this finding implies also large costs for national revenue: the World Bank NRA data analysis actually confirms that a negative NRA^m is due to border measures. In other words, in practice, a negative NRA^m actually consists of subsidising agricultural food imports in order to reduce agricultural import prices, so it costs the government budget to maintain household purchasing power. A number of these countries (particularly Bangladesh, Pakistan and Sri Lanka) saw violent food riots in 2008, which may explain the high level of government intervention in response to political and social unrest.

From this point of view, Egypt, where particularly violent food riots erupted in 2008, is surprising in that NRA^m remained positive in 2008 and pretty much at the average NRA^m for the period 1995-2010. Figure 7 sheds light on other elements that might explain such a paradox. The food bill rose steadily from 2000 onwards, but the Bonilla Index fell on the whole period due to the fact that total export revenue increased proportionally more than the food import bill. Consequently, the BI did not leap up in 2008 compared with previous years. In the case of Egypt, the macroeconomic food security situation as reported on by the Bonilla Index was not significantly worse in 2008 than in previous years, but the food import bill was actually significantly higher than at any point previously. So if export revenues were not well redistributed to the population, this could explain the violence of the food riots in Egypt.

---

[5] 2008 NRA^m data are not available for Zimbabwe, Zambia and Senegal.

Figure 7: Food Security in Egypt, 1995-2010 – focus on several determinants

Impact of NRA^m on food import bill   Food import bill, export value and BI
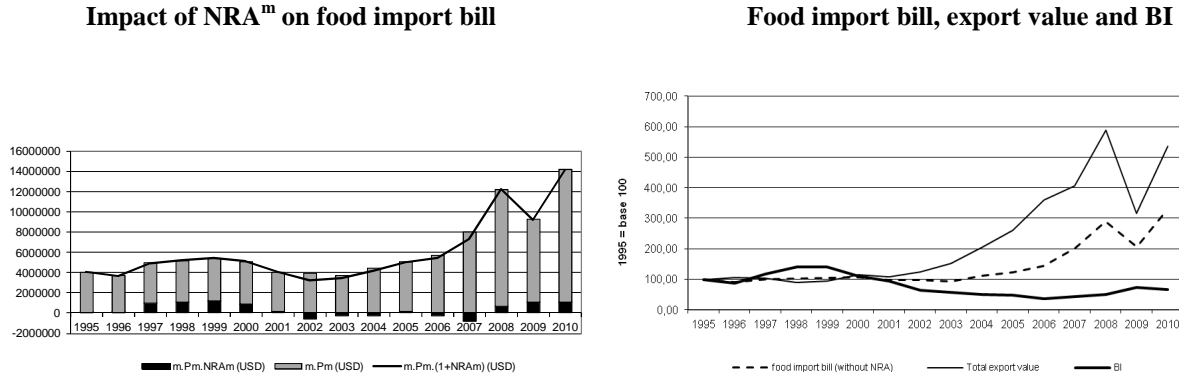
Source: authors' calculations using World Bank and BACI data

3. Is domestic support level an adjustment variable for the short-run stability of food security?

Section 2 has shown that most developing countries have used their possibility to play with the nominal rate of assistance level to compensate the effects of the 2008 food price surge. Was 2008 an isolated year or does it fit in a BI stabilization strategy in the longer term, global food prices varying upward or downward? Does the exchange rate play a role in stabilizing food availability at national level?

Based on the equation (3), this section assesses to what extent variations of NRA^m and E are adjusted to external variations of food import prices or exports prices on the recent period 2005-2010, for our sample of 39 developing countries. Our assumption is that countries which have to bear an external shock on food market price P_m, or on export price P_X, give the priority to stabilize their own perception of vulnerability of food security to trade, i.e. by stabilizing BI through NRA^m or E adjustments.

3.1 Materials and method

Trade and NRA data used are those presented in section 2.1. We use nominal exchange rate collected from the World Bank[6] (Anderson and Nelgen 2012): it is expressed as the number of local currency against one US dollar.

We estimate the following two equations by using random effects:

$$d\ln(1+NRA^m)_{i,t} = \alpha + \beta_1 d\ln(m.P_m)_{i,t} + \beta_2 d\ln(X.P_X)_{i,t} + \beta_3\, dum_{i,t} + \beta_4 dum_{i,t} * d\ln(mP_m) + u_i + w_{i,t} \quad (5)$$

$$d\ln E_{i,t} = \alpha' + \beta_1' d\ln(m.P_m)_{i,t} + \beta_2' d\ln(X.P_X)_{i,t} + \beta_3'\, dum_{i,t} + \beta_4' dum_{i,t} * d\ln(mP_m) + u_i + w_{i,t} \quad (5')$$

---

[6] We use the exchange rate as defined by Anderson and Nelgen (2012): estimated equilibrium economy-wide accounting for distortions in currency markets (in local currency per dollar). We have compared this exchange rate with the nominal bilateral exchange rate provided by the IMF (in local currency per USD) and both data exhibit closely the same patterns.

Where i is the number of observations over time; t denotes the time, α (α') is the average NRA (exchange rate) according to the equation, u_i is the individual-specific random effect and $w_{i,t}$ the error term.

$m.P_m$ and $X.P_X$ are expressed in USD. $(1+NRA^m)$ is computed with NRA^m in percentage, this term is always positive. E is the exchange rate in local currency per USD. The variables are introduced in growth rates.

Dum is a dummy variable equal to 1 for the year 2008.

As we are interested in the role of the value of food imports regarding the impact of the price shock of 2008, we add an interaction term $dum_{i,t} * d\ln(mP_m)$ as to test for a non linear effect of the value of food imports due to the price shock.

3.2 Results and discussion

We estimate two panel data models which provide information on two dimensions, over individuals (countries) and over time (years). Among the various types of panel data models, fixed and random effects models are those which are the most commonly analyzed. It then remains the question of which model to choose. Several arguments are found in the literature to justify the use of each of these models but they are often contradictory or inclusive (Clark and Linzer 2015).

The fixed effects model is also known as the within estimator. Its main assumption is that the error term is correlated with the individual specific term because the model can exclude time-invariant variables. In the random effects model, the specific term is assumed to be independent of the errors and also mutually independent (Greene 2005). It is generally considered that random effects models are more appropriate when the observations constitute a sub-sample of the whole population (Nerlove 2003).

Finally, the Hausman test (Hausman 1978) is frequently used to check the validity of the random effects assumptions, namely the conditional independence between group-specific intercepts and covariates. If the associated probability of the test (p-value) is over 0.05 (at 5% significance level) then we can conclude that the random effects model is most likely appropriated.

To better identify the role of custom union or monetary union, we split the sample in two sub-samples according to the membership to a custom union (we add a dummy variable cu is equal to1 in equation (5)) or to a monetary union (we add a dummy variable mu equal to 1 in equation (5')).

In our sample of 39 countries, 8 countries belong to a monetary union and 19 countries belong to a custom union.

Table 2: Results of estimated random models, period 2005-2010

	NRA^m Equation (5)			Exchange Rate Equation (5')		
	All countries	Countries belonging to a Custom Union	Countries not in a custom union	All countries	Countries belonging to a monetary union	Countries not in a monetary union
intercept	0.06	0.54	0.08***	-0.01	0.01	0.02
	(0.04)	(0.05)	(0.03)	(0.16)	(0.01)	(0.20)
dlnmpm	-0.35*	-0.45	-0.24*	0.36	-0.13**	1.24
	(0.18)	(0.37)	(0.14)	(0.76)	(0.06)	(0.98)
dlnxpx	0.03	0.04	-0.01	-0.54	0.01	-.2.20**
	(0.09)	(0.12)	(0.13)	(0.40)	(0.02)	(0.87)
dum	-0.29**	-0.24	-0.34***	0.54	-0.07**	0.93
	(0.12)	(0.19)	(0.11)	(0.51)	(0.04)	(0.63)
dlnmpm*dum	0.70*	0.86	0.53	-2.10	0.13	-3.51*
	(0.39)	(0.65)	(0.37)	(1.69)	(0.11)	(2.15)
Observations	174	91	83	181	35	146
Hausman test	Random effects	Random effects	Random effects	Random effects	Random effects	Random effects

Note: standard errors in brackets

***, **, *: statistically significant at 1%, 5% or 10% level.

The Hausman test suggests that random effects model fits better our data for all cases.[7] Random-effects models are estimated by using the Generalized Least Square (GLS) estimator.

The key coefficient of interest is that one associated to the value of importable food products whatever the estimated equation. With regard to the evolution of prices over the period, we interpret the changes in the value of imports as those from the food prices. We thus suppose that the volume remains broadly stable.

Our results suggest that NRA^m adjusts well to variations in food prices P_m to reduce the food import bill when we consider either the whole sample or the sub-sample of countries not belonging to a custom union: the estimated direct impact is respectively -0.35 and -0.24. It may suggest that the countries aim at stabilizing the Bonilla Index from one year to the other by using their agricultural and trade policies to compensate the effects of the changes in the prices of imported food products. On the contrary NRA^m doesn't adjust to variations in export prices P_X.

The year dummy variable set on 2008 emerges significantly. It therefore appears clear that the downward adjustment of NRA^m is particularly marked in 2008, year of global spike in food prices. To control for this price shock of the year 2008, we added an interaction term with mP_m deviation which appears to be significant when considering the whole sample.[8] The estimated impact of the food import bill once controlling for this shock price is -0.21. This confirms that countries have actually adjusted their NRA^m downward to compensate for the rising cost of food bills related to the 2008 peak

---

[7] Besides, when comparing both estimates of the models, we notice that there is no significant difference between fixed effects models and random effects models. Fixed effects models are available upon request.

[8] We also tested an interaction term with XP_X deviation but it remains not significant whatever the cases.

prices but this adjustment seems to be lower. The NRA^m adjustment for the change in the BI (compared to the previous year and compared to the average for the period) was also tested but never emerged significantly. It seems to exclude a strategy of countries to use border instruments as a stabilization tool of their BI over the long term.

Those results are however not found for countries which are belonging to a custom union. This may be explained by the fact that most of these countries are not flexible enough to use any trade policies (by cutting tariffs for instance) at the national level without a broader agreement at the custom union level. They depend on the trade policy of the area to which they belong.

According to the results of the exchange rate estimated equation, it appears that the exchange rate adjusts downward (appreciation of the local currency) in the event of rising food prices in countries belonging to a monetary union. Most of these concerned countries use Franc CFA as currency which is anchored to the Euro. Besides, the studied period is characterized, beyond the upward trend of agricultural and crude oil prices, by an appreciation of the Euro, and consequently the Franc CFA, relative to the Dollar. These countries probably have benefited from such an appreciation of the local currency that actually reduces the food bill expressed in local currency since prices of imported food products are expressed in foreign currency. It thus contributes to improve the purchasing power of domestic households of food importing country.

However this argument deserves to be deepened because the appreciation of the local currency presents the risk of reducing the competitiveness of exported products over the long-term. The capacity to finance food imports by exports revenue could then be prejudicially affected.

Note that the exchange rate growth adjusts to the variation of total exports value only when countries are not membership of a monetary union. In this case the estimated impact is negative meaning that the exchange rate decreases (appreciation of the local currency) when the value of total exports is increasing. This is consistent with the international macroeconomics expectations.

Conclusion

The main contribution of this paper is to shed light on the theoretical and empirical economic links between agricultural assistance, measured using the Nominal Rate of Assistance (NRA) and the vulnerability of food security to trade at national level, measured by using the Bonilla Index (BI). The novelty of this paper is to use NRA to assess the impact of domestic support on food security vulnerability to trade. We first draw an overall picture of government border intervention in the agricultural sector for 39 developing countries over the period 1995-2010 and especially during the 2005-2010 period.

BI calculated taking into account NRA^m seems not to follow the same pattern than BI calculated before custom clearing, as if the effects of changes in food prices were offset by direct intervention of States seeking to stabilize their ability to source food products on the world market, especially in case of food price surge observed in 2008. The assumption that, in a context of high volatility of food prices, developing countries aim to stabilize their vulnerability to trade by compensating food price deviations using trade policy is then partially checked over the period 2005-2010. Few conclusions emerge. First, this adjustment is mainly observed through NRA^m channel. Second, NRA^m adjustment seems to be correlated to food import value deviations for most countries but not to total export value deviations. This suggests that countries are more sensitive to the numerator of the BI, i.e. the food import bill, than to the global BI. Finally, the estimated adjustment appears to be more pronounced in case of a food price surge like that experimented in 2008 than out of this context.

Import subsidies actually have a highly significant effect on the level of food security by sharply reducing the food import bill for households in case of price surge. But this kind of intervention weighs heavily on the national government's budget, possibly at the expense of other intervention policies (such as agricultural policy). This cost probably prevents very poor countries from adopting a negative NRA^m. Poor countries may eventually reduce their NRA^m provided that the NRA^m is positive, but developing countries' NRAs are generally very low compared with developed countries. Moreover a negative NRA^m drives up world agricultural prices, having a worse effect on the level of food security in poor net food-importing countries.

Our analysis only considers the support applied to importable agricultural products (NRA^m). But agricultural products account for a large proportion of total exports for most developing countries. Hence positive or negative assistance for exportable agricultural commodities (NRA^x) can have an effect on total export value if this share is significant. For example, during the 2008 food crisis, a number of countries introduced export bans or taxes on food commodities. These decisions will normally result in negative NRA^x being applied to exported agricultural products with a positive effect on BI (and hence a negative effect on food security). Available World Bank (NRA) and BACI (trade) data could be used to complete this study by extending it to the BI denominator. Such a global analysis of the combined effects of NRA^m and NRA^x on BI could turn up clearer explanations of paradoxical situations (such as in Egypt) observed at this stage.

Moreover, this study focuses on the more recent period 2005-2010 characterized by a great instability and volatility of food prices, and an upward trend. It would be interesting to complete the analysis regarding developing countries behaviour in a different context, when world food prices were falling down during the nineties'.

References

Anderson, K. (2009). Distorsions to agricultural incentives, a global perspective 1955-2007. *The*

World Bank. Palgrave Macmillan, 644p.

Anderson, K. (2010). Krueger/Schiff/Valdes revisited: agricultural price and trade policy reform in developing countries since 1960. Policy Research Working Paper Series 5165. The World Bank.

Anderson, K., Nelgen, S. (2012). Updated National and Global Estimates of Distortions to Agricultural incentives, 1955 to 2010, spreadsheet at www.worldbank.org/agdistorsions, World Bank, Washington DC, March.

Baffes, J., Gardner, B. (2003). The Transmission of World Commodity Prices to Domestic Markets under Policy Reforms in Developing Countries. Journal of Policy Reform, 6 (3), 159-180.

Bouet, A., Laborde Debucquet, D. (2010). The economics of export taxation in a context of food crisis – a theoretical and CGE approach contribution. IFRI discussion paper 994, June.

Butler C.D. (2015). Revised hunger estimates accelerate apparent progress towards the MDG hunger target, Global Food Security, 5, 19-24.

Clark T.S., Linzer D.A. (2015). Should I use fixe or random effects? Political Science Research and Methods, 3 (2), 399-408.

Clay, E. (2002). Food Security: Concepts and Measurement, Paper for FAO Expert Consultation on Trade and Food Security: Conceptualising the Linkages Rome, 11-12 July 2002. Published as Chapter 2 of Trade Reforms and Food Security: conceptualising the linkages. Rome: FAO, 2003.

Crump, L. (2014). Adam Smith in a Warmer World: Climate Change, Multilateral Trade and National Food Security. Prometheus: critical studies in innovation, 32 (3), 297-318.

Dávila O. G. (2010). Food security and poverty in Mexico: the impact of higher global food prices. Food Security, 2 (4), 383-393.

Dawe D., Morales-Opazo C., Balie J., Pierre G. (2015), How much have domestic food prices increased in the new era of higher food prices ? *Global Food Security*, 5, 1-10.

Diaz- Bonilla, E., Thomas, M., Robinson, S., Cattaneo, A. (2000). Food security and trade negociations in the world trade organization: a cluster analysis of country groups. International Food Policy Research Institute.Division Paper n° 59.

Diaz-Bonilla, E., Ron, J.-F. (2010). Food security, price volatility and trade: Some reflections for developing countries. ICTSD Programme on Agricultural Trade and sustainable Development. Issue Paper 28.

FAO (2009). Policy Responses to Higher Food Prices. Committee on Commodity Problems. CCP 09/8. Rome.

Gilbert C.L. (2012). International agreements to manage food price volatility. Global Food Security, 1, 134-142.

Greb, F., Jamora, N., Mengel, C., von Cramon-Taubadel, S., Würriehausen, N. (2012). Price transmission from international to domestic markets, Georg-August-Universität Göttingen, Discussion paper 125,September.

Grote U. (2014). Can we improve global food security? A socio-economic and political perspective. Food Security, 6, 187-200.

Krueger, A.O., Schiff, M., Valde,s A. (1988). Agricultural Incentives in developing countries: Measuring the effect of sectoral and economy wide policies. The World Bank Economic Review, 2 (3), 255-271.

Krugman, P. R., Obstfeld, M., Mélitz, M. (2012). International economics: theory and policy. Pearson Education, 9th edition, 736 pages.

Laroche-Dupraz, C., Postolle, A. (2013). Food sovereignty and agricultural trade policy commitments: How much leeway do West African nations have? Food Policy, 38, 115-125.

Lui, D., Bilal, S. (2009). Contentious issues in the interim EPAS: Potential flexibility in the negotiations. European Centre for Development Policy Management. Discussion Paper No.89. www.ecdpm.ord/dp89. Accessed 15 January 2010.Maxwell, S. (1996). Food security: a post-modern perspective. Food Policy, 21 (2), 155-170.

Meyer, J., von Cramon-Taubadel, S. (2004). Asymmetric Price Transmission: A Survey. Journal of Agricultural Economics, 55 (3), 581-611.

Regmi A., Meade B. (2013). Demand side drivers of global food security. Global food security, 2, 166-171.

Smith, L.C. (1998). Can FAO's measure of chronic undernourishment be strengthened? Food Policy, 23 (5), 425-445.

Timmer, C.P. (2010). Reflections on food crises past. Food Policy, 35, 1-11.

Van Dijk M., Meijerink G. (2014). A review of global food security scenario and assessment studies: results, gaps and research priorities. Global Food Security, 3 (3-4), 227-238.

WTO (2013). Public stockholding for food security purposes, Ministerial Decision of 7 December 2013, Ministerial Conference Bali, 3-6 Dec 2013. WT/MIN(13)/38 WT/L/913.

Appendix:

Table A1: Some characteristics of the 39 developing countries of our sample

Continent	Country	CODE	Average BI	Monetary Union	Custom Union
Africa	Benin	BEN	153,83%	1	1
	Burkina Faso	BFS	36,82%	1	1
	Cameroon	CAM	11,17%	1	1
	Chad	TCD	3,66%	1	1
	Cote d'ivoire	CIV	13,52%	1	1
	Egypt	EGY	33,58%	0	0
	Ghana	GHA	11,98%	0	1
	Madagascar	MAD	24,85%	0	0
	Mali	MLI	25,46%	1	1
	Morocco	MAR	18,46%	0	0
	Mozambique	MOZ	18,73%	0	0
	Nigeria	NGA	4,78%	0	1
	Senegal	SEN	60,15%	1	1
	South African Republic	ZAF	2,10%	0	1
	Sudan	SDN	17,47%	0	1
	Tanzania	TZA	19,80%	0	1
	Togo	TGO	46,48%	1	1
	Uganda	UGA	26,98%	0	1
	Zambia	ZMB	4,52%	0	1
	Zimbabwe	ZWE	8,03%	0	1
America	Brazil	BRA	2,40%	0	1
	Chile	CHL	2,41%	0	0
	Colombia	COL	4,78%	0	1
	Dominican Republic	DOM	25,80%	0	0
	Ecuador	ECU	3,93%	0	1
	Mexico	MEX	4,46%	0	0
	Nicaragua	NIC	8,40%	0	1
Asia	Bangladesh	BGD	20,66%	0	1
	China	CHN	1,76%	0	0
	India	IND	1,79%	0	0
	Indonesia	IDN	3,28%	0	0
	Kazakhstan	KAZ	1,66%	0	1
	Malaysia	MYS	2,27%	0	0
	Pakistan	PKS	20,05%	0	0
	Philippines	PHL	4,21%	0	0
	Srilanka	SRL	20,70%	0	0
	Thailand	THL	2,30%	0	0
	Turkey	TUR	2,58%	0	0
	Vietnam	NVM	3,99%	0	0