

**EUROPEAN COMMON AGRICULTURAL POLICY IMPACTS ON
DEVELOPING COUNTRIES COMMODITIES PRICES**

CARACCIOLO, Francesco*

GOTOR, Elisabetta

SANTERAMO, Fabio Gaetano

Abstract

This study assesses the effects of CAP changes on the agricultural commodities' price transmission mechanism between selected developing countries and world markets. The analysis refers to four different countries: Bangladesh, Ethiopia, Ghana and Tanzania and three important staple food: maize, rice and wheat. Time series econometric models analyze price dynamics within different levels of EU subsidies. During the evaluation period (2000-2010) no empirical relationship has been detected among the EU subsidies for rice and world price of rice. On the contrary at least for maize sector and for Ethiopia and Tanzania, EU agricultural policies seemed not neutral.

Keywords: CAP, staple food, price transmission.

JEL: F13; Q17; Q18

1. Introduction

Any agricultural policy reforms might have strong impacts on income distribution of developing countries (DCs), and the larger the distortions implied by subsidies or trade policies the stronger the expected impact of policy changes (Winters *et al.*, 2004). The European Union (EU) is one of the largest markets in the world and might exercise considerable influence on world markets as one of the world's major trading powers, accounting for the 19% of world trade (Huan-Niemi *et al.*, 2009). According the latest WTO statistics, EU, in fact, the largest exporter country.

There is a recurrent opinion in the literature that "old CAP" imposed considerable externalities on DCs, in particular negative ones on developing-country producers (Koning & Pinstруп-Andersen, 2007). Indeed, several authors argue that EU export refunds caused significant distortions of competition and pushed farm prices down especially in countries where producers were fully exposed to world markets (Elbehri and Sarris, 2009; Anderson, Martin, & Valenzuela, 2006). Put simply, changes in international food prices due to policy reforms are likely to redistribute resources in any domestic economies as long as the pass-through or link between international and local food prices exists. *Ceteris paribus*, "the effect of changes in the level and volatility of food prices will depend on whether the country is net exporter or importer of the relevant commodities" (Aksoy and Hockman, 2010) and on the functioning of the price transmission mechanism. Transposing this outcome into developing country context at a micro perspective, rural and urban households may experience contrasting impact caused by commodities price changes (Caracciolo *et al.*, 2013) and at least in the short term, if low food prices tended to benefit urban consumers, they could largely harm rural households (Hertel, Keeney, Ivanic, & Winters, 2007; Caracciolo and Santeramo, 2013):

* Francesco Caracciolo, PhD, MRes, Dept. Agriculture - Economics&Policy Group. University of Naples "Federico II", Italy. E-mail francesco.caracciolo@unina.it
<http://wpag.e.unina.it/francesco.caracciolo/>

Not only for these reasons, the CAP has thus been accused of discouraging developing countries from adopting an agriculture-based development strategy (Elbehri and Sarris, 2009).

However these circumstances together with the external pressure (e.g. the Uruguay Round Agreement and the potential Doha Agricultural Agreement) as well as internal one (e.g. the enlargement process and the EU budgetary discipline) have pressed - and are still pressing - for changes in the CAP. Among the other things, the CAP post 2013 reform process needs to be coherent with the EU's Programme on Policy Coherence for Development¹, taking account of the objectives of the EU's development cooperation policy², aiming at encouraging cooperation by harnessing the potential growth of small farmers and small agricultural enterprises³.

What follows from this normative outline have sparked a renewed debate over the international/external dimension of CAP changes, notably the possible linkages between changes in the EU agricultural policy and agriculture in developing countries, involving international organizations (Keijzer & King, 2012) and academic scholars (Revoredo-Giha et al., 2013).

This study contributes to this stream of studies by assessing the effects of CAP changes on the agricultural commodities' price transmission mechanism between developing countries and world markets. In particular, this paper aims to assess this chain of linked events: firstly, if EU subsidies for specific commodity under investigation, have an effect on its world price; secondly if any links exist between world and national food prices in selected developing countries understating the role of CAP changes on the mechanisms of price transmission. The joint assessment of the two linked hypotheses will help to quantify the likely impact of CAP on DCs commodities prices.

The relationships between world and domestic prices in selected countries have been evaluated in order to investigate the effects of CAP changes on their price transmission mechanisms that is to assess how and to what extent CAP reforms would impact on prices relationships. More specifically, We have analyzed the period from year 2000 to 2010 in order to infer from past events the links among world and national prices in selected countries.

Empirically, the analysis has been conducted using world and national prices series with monthly frequency of three main staple foods for the studied countries: maize, wheat and rice: an empirical approach based on several time-series econometrics specifications was applied. The remainder of the study is organized as follows: Section 2 describes the data and methodology; Section 3 presents and discusses the results while Section 4 provides some concluding remarks.

¹ Commission Staff Working Document "Policy Coherence for Development Work Programme 2010-2013" (SEC(2010)421 final).

² Articles 3 and 21 of the Treaty on the European Union (TEU) and Article 208 of the Treaty on Functioning of the European Union (TFEU)

³ "An EU policy framework to assist developing countries in addressing food security challenges" (COM(2010)127).

2. Data and methods

The countries under analysis have been identified according to the following criteria: c) Food insecure status, according to Global Hunger Index (GHI⁴); d) Geographical representation (West Africa, East Africa, Southern Africa, Asia); e) Trade balance: exporters of agricultural commodities with preferential access to EU market (i.e. EBA and interim EPAs); exporters without preferential access to EU market; net food importers.

Table 1: Developing countries analyzed and the selection criteria

Country	GHI ⁵	Region	Trade regime
Ethiopia	29.8	Eastern and Southern Africa	EBA
Tanzania	20.7	East African Community	Interim EPA initialled
Ghana	10	West Africa	Interim EPA initialled
Bangladesh	24.2	Asia	EBA

Ethiopia, Tanzania, Ghana, Bangladesh have been selected according to the above mentioned criteria (Table 1). Bangladesh is a net agri-food⁶ importer, whereas Tanzania, Ethiopia, Ghana are net agri-food exporters⁷.

Table 2 reports the commodities chosen per each country in order to give empirical evidence to the relationship and to the transmission mechanism between the CAP, the world and domestic prices, which are the most disaggregated data and the closest ones to household prices available in most developing countries. The empirical analysis of price-transmission is a data-demanding procedure, and it can be performed on price series with monthly or higher frequencies. The analysis has been performed for the selected commodities according to the structure of the production of the country and their relevance on the household diet (Table 2), conditionally to the availability of monthly data. As a proxy of the EU subsidies effects, it has been considered the Nominal Rate of Assistance of the main EU producers for each product (Table 3).

The Nominal Rate of Assistance is defined as: $NRA = (P_d - P_f)/P_f$, where P_d is the observed domestic price in local currency for a given product, country and year, and P_f is the estimated domestic price that would hold in the absence of commodity-market or exchange-rate intervention. By definition, such an NRA would be zero in a competitive free-trade regime, positive if producers are subsidized by taxpayers or consumers, and negative if producers are taxed by trade policy.

⁴ The Global Hunger Index (GHI) is a multidimensional statistical tool, developed by Wiesmann (2004) and the International Food Policy Research Institute (IFPRI), and used to describe the state of countries' hunger situation.

⁵ The GHI Index ranks countries on a 100 point scale, with 0 being the best score ("no hunger") and 100 being the worst.

⁶ Agri-food is defined as all raw food, cash crops and agricultural raw materials in SITC Revision 2 excluding processed food and seafood products (Aksoy and Ng, 2008).

⁷ Our study is under-representing the net agri-food importer countries (1/4). According Aksoy and Ng (2008) only one country over three (1/4) are net-agri food importer among the low income countries.

Table 2: Commodities selected for price-transmission mechanism analysis

Country and Crops for world-local prices-transmission evaluation ^a	Criteria	Local Prices Data sources
Bangladesh: Rice	Rice is the staple food produced and consumed throughout the country. Rice accounted for 71% of the total dietary energy supply (DES) in 2003-05. The self-sufficiency ratio of rice was 97%.	Monthly 7/1998 - 12/2010 Source: Bangladesh Department of Agriculture Marketing
Tanzania: Maize & Rice	Maize products accounted for 34% of the total dietary energy supply (DES) in 2003-05. Rice is the second cultivated crop after maize and it accounted for 9% of the total dietary energy supply (DES) in 2003-05.	Monthly 8/1997 - 12/2010 Source :Regional Agricultural Trade Intelligence Network
Ethiopia: Maize & Wheat	Maize and maize products accounted for 19% of the total dietary energy supply (DES) in 2003-05. Wheat Major staple food mainly consumed in urban areas. Wheat and wheat products accounted for 16% of the total dietary energy supply (DES) in 2003-05	Monthly 2/1999 - 12/2010 Source Ethiopia Grain Trade Enterprise
Ghana: Maize & Rice	Maize and maize products accounted for 13% of the total dietary energy supply (DES) in 2003-05. Rice is consumed especially in urban areas. Rice accounted for 8% of the total dietary energy supply (DES) in 2003-05.	Monthly 9/2005 – 7/2009 Source: tradenet

Table 3: Nominal Rate of Assistance EU main producers

	Maize	Wheat	Rice
1997	0.195	0.369	0.308
1998	0.321	0.111	0.178
1999	0.387	0.042	0.001
2000	0.267	0.001	0.006
2001	0.143	0.021	0.423
2002	0.089	0.023	0.244
2003	0.336	0.004	0.184
2004	0.389	0.369	0.008
2005	0.191	0.111	0.019
2006	0.189	0.042	0.028
2007	0.217	0.001	0.008

Source: Anderson and Valenzuela (2008)

From an empirical point of view, main objective of our analysis is twofold: firstly we aim to investigate the relationships between world prices and EU subsidies; secondly, we aim to assess the links between world and national food prices in selected developing

countries, understating the role of CAP changes on the mechanisms of price transmission. Several issues need to be considered to reach the proposed goals: firstly, it is important to analyze the price tendencies and their long-run behavior; secondly, price adjustments in the short-run provide information on the degree of dependence of national prices from international dynamics; finally, since EU is one of the main actors on the world scene, the role of EU agricultural policies need to be taken into account in our framework, even if other changes in macroeconomic environment, domestic situation, policies elsewhere, domestic policies cannot have taken into account. In particular, we investigated the long-run and short-run relationships, that is how prices tend to co-move around a common trend and how shocks are transmitted among each others, and exploited to what extent EU agricultural subsidies influence the above mentioned relationships. Even though our analysis is simplified and cannot be considered exhaustive, since many factors influencing prices dynamics are not taken into account (*e.g.* macroeconomic policies, market structure, etc.), we believe it sheds some light on the role that CAP changes have had on prices dynamics of developing countries.

In order to reach the above described aims, we will adopt empirical methods based on several time-series econometrics specifications.

Model 1. In order to assess whether or not the EU subsidies, in particular the nominal rate of assistance (NRA) for the specific commodity under investigation, have an effect on world prices. we estimated the following log-log model autoregressive of order one by OLS

$$(5) \quad \ln(WP_t) = \alpha + \beta \cdot \ln(WP_{t-1}) + \gamma \cdot NRA_t + \varepsilon_t$$

where WP_t is the world price at time t , NRA_t the annual Nominal Rate of Assistance provided in Anderson and Valenzuela (2008).

Model 2. In order to assess the relationships among world and national prices, we estimated a vector error correction econometric model of price transmission (Cramon-Taubadel, 1998):

$$(6) \quad \Delta X_t = \alpha + \sum_{i=1}^n \beta_i \cdot \Delta X_{t-i} + \rho \cdot X_{t-1} + \varepsilon_t$$

where X_t is the price difference (World price-National price) and ΔX_t its first-order difference ($X_t - X_{t-1}$). The number of lags (n) is chosen according to the autocorrelation of residuals, that is we chose the maximum number of lags until residuals do not show autocorrelation: results are confirmed also by the approach based on the minimization of Information Criteria (AIC, SIC and HQ). The coefficient ρ represents the “speed of adjustment” between world and national price. If the coefficient is statistically significant the prices show a long-run relationship.

Model 3. A further step of the analysis consists in estimating short-run relationships among prices using an autoregressive model with the national price as dependent and

including the world price as explicative variable. If the latter is significant, short-run relationship⁸ would exist:

$$(7) \quad X_t = \alpha + \varphi \cdot X_{t-1} + \vartheta \cdot WP_{t-1} + \varepsilon_t$$

Model 4. Finally, following the literature on TAR model, we formulated an *ad hoc* threshold autoregressive specification able to take into consideration the possible effects of EU subsidies on price relationships. In particular, since the aim of the present analysis is not to detect the presence of non-linearity among prices, but rather to conclude on the presence of possible effects of the EU subsidies on national prices, following an approach similar to Cioffi *et al.* (2011), we adopt a threshold specification capable to assess whether price transmission differs in the periods in which the NRA are higher than the median from the periods in which the subsidies are low.

(8)

$$\Delta X_t = I_t \cdot \left\{ \alpha_I + \sum_{i=1}^n \beta_{I,i} \cdot \Delta X_{t-i} + \rho_I \cdot X_{t-1} + \varepsilon_{I,t} \right\} + (1 - I_t) \cdot \left\{ \alpha_{II} + \sum_{i=1}^n \beta_{II,i} \cdot \Delta X_{t-i} + \rho_{II} \cdot X_{t-1} + \varepsilon_{II,t} \right\}$$

$$\text{where} \quad \begin{cases} I_t = 1 & \text{if } NRA_t < \text{median}(NRA) & \text{first regime} \\ I_t = 0 & \text{if } NRA_t \geq \text{median}(NRA) & \text{second regime} \end{cases}$$

3. Results

The asterisks indicate the statistical significance at 10% (*), 5% (**) and 1% (***) level

3.1 Maize

The dataset is homogenous with respect to the quality of maize and contains data related to white variety at local level and yellow variety at the international level, which had to be chosen due to constraints on data availability. At the international level, yellow variety has been chosen since it is the main commercialized variety produced in Europe.

Model 1 estimates yield the following results:

$$(9) \quad \ln(WP_t) = 0.03 + 0.98^{***} \cdot \ln(WP_{t-1}) - 0.08^{***} \cdot NRA_t + \varepsilon_t; \text{Obs.124}; R^2 = 0.92$$

An increase in the NRA index, which quantifies the level of subsidies at commodity and country level, is shown to have a negative impact on world maize price. In order to take into consideration the presence of possible structural breaks, we computed several Chow tests, failing to reject the null hypothesis of no breaks⁹. In other terms, we cannot conclude on the presence of breaks in time series. In particular, the elasticity of world price to NRA of the two main EU maize producers (France and Italy¹⁰) is 0.08, that is, *ceteris paribus*, a 10% would increase in NRA will

⁸ According to our model a long-run relationships consist in a common trend for the series under analysis whereas a short-run relationship is intended as a 1-period reaction to price series shocks.

⁹ We computed Chow tests by specifying several break dates under the null hypothesis: in June 2002 we registered the lowest p-value, 0.054, but even in this polar case we fail to reject the null at 5% significance level.

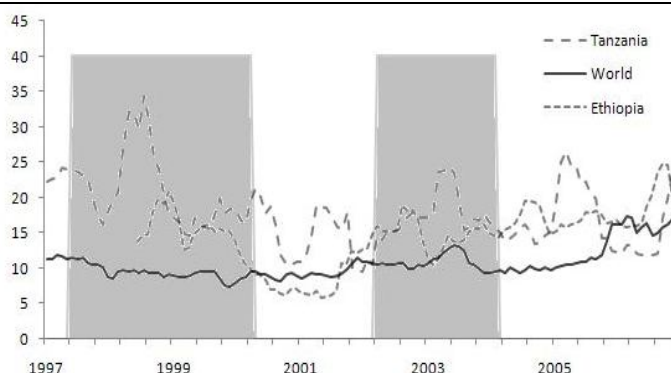
¹⁰ The production of maize in France and Italy is, on average, 25 million tons per year (half of total EU production). The NRA has been weighted based on volumes of production.

result in a world price lower by 0.8%¹¹. In other terms, a change in the level EU subsidies might result in a lower world price. However, in order to deepen the analysis, we estimated a first-order specification which takes into account the possible non stationarity of world prices. Results suggest that the NRA does not influence world prices. Summing up, this first analysis suggests that EU subsidies for maize might have no effect on world prices.

Selected countries: Ethiopia, Tanzania, Ghana

Prices are expressed in US dollars per ton and span from 1997 to 2010¹², while NRA cover the period 1997-2007¹³. For Ethiopia the price series are available from 1999. World and national prices (Ethiopian and Tanzanian) are illustrated in figure 1 where the two regimes (high and low EU subsidies) are clearly distinguished. Prices of Ghana are not illustrated since the available data span over a short period (September 2005 – July 2009). Maize is undoubtedly one of the main staple foods in the selected countries. Ethiopian maize is produced in Central, Southern and Western areas, and accounted for 19% of the total dietary energy supply (DES) in 2003-05 and on average during 2004-08 per capita consumption was 44 kg/yr. Ethiopia shows a self-sufficiency ratio around 100%. In Tanzania it accounted for 34% of the total dietary energy supply (DES) in 2003-05, and on average in 2004-08 the per capita consumption (as food) was 68 kg/yr.

Figure 1: Tanzanian, Ethiopian and world maize prices in high and low EU subsidies regimes.



Note: the shadow areas represent the EU high-subsidies regime.

Tanzania is fully self-sufficient (the ratio is 102%). Finally, as regard Ghana, maize and cassava are the main staple foods. The former is produced and consumed in the Centre and South of the country providing 13% of the total dietary energy supply (DES) in 2003-05. The per capita consumption (as food) of maize in 2004-08 has been 40 kg/yr.

¹¹ According to the Jarque-Bera, we reject the hypothesis of normal distribution at the 5% level but not at the 1% significance level. Similarly, the Breusch-Godfrey test for serial correlation suggest we cannot reject the null of serial correlation of residual at 5% level but we can reject at 1% level (p-value is 0.014). We cannot reject the null hypothesis of a Ramsey RESET test (p-value is 0.41), that is omitted variables, incorrect functional forms and correlation among explicative variables and error terms are not an issue.

¹² Data collected for Ethiopia range for 1999 to 2010.

¹³ Since the NRA is only available at yearly frequency, it has been included the monthly time series as repeated observations spanning the entire year.

Ghana is not completely self-sufficient, in fact the self-sufficiency rate is 96% (FAO GIEWS).

The results provided by the Model 2, assessing the relationships between world price and Ethiopian price (equation 10) and the relationships between world price and Tanzanian price (equation 11)

$$(10) \quad \text{Ethiopia: } \Delta X_t = 0.39^{**} + 0.39^{***} \cdot \Delta X_{t-1} - 0.11^{***} \cdot X_{t-1} \quad (R^2 = 0.22)$$

$$(11) \quad \text{Tanzania: } \Delta X_t = 0.71^{**} + 0.29^{***} \cdot \Delta X_{t-1} - 0.11^{***} \cdot X_{t-1} \quad (R^2 = 0.12)$$

show national and world prices tend to co-move, linked by a long-run relationship. In both cases the variable X_t is $I(0)$ as suggested by both the ADF and ERS unit root tests¹⁴.

Moreover, the speed price adjustments are similar in the two cases. Finally, the price of Ghana and the world price do not show any significant relationships neither in the long period. Our findings might be due to several reasons: from a methodological point of view, the shortness of price series results in poor statistical properties of models of price transmission. From an economic point of view, lack of transport infrastructure, high transaction costs and market segmentation might play a crucial role leading to the absence of prices relationships (Sarris and Rapsomanikis, 2009). To sum up, we can conclude that world prices do not influence maize prices in Ghana. Based on the above mentioned results we can assert that Ethiopian and Tanzanian prices are influenced by world price tendency.

A further step of the analysis consists in estimating short-run relationships among prices using a autoregressive model with the national price as dependent and including the world price as explicative variable (Model 3).

Results suggest that Tanzania and Ghana are not linked in the short-run with world price (not statistically significant at 10%). Conversely, Ethiopian prices adjust to the world price either in the long and in the short run (the coefficient α of short run is 0.11, statistically significant at 1%). The coefficient is easily interpretable since the higher its value the higher the degree of price transmission. The coefficient is bounded to 1, a value which would indicate a full price transmission.

Moreover, we investigate the influence of the EU subsidies on national prices of Tanzania and Ethiopia, we estimated Model 1 including the NRA as regressor which is found to be statistically not significant. For simplicity and shortness the estimation results are not reported.

Despite a clear relationship cannot be discovered, we also tested if price transmission differs when the EU subsidies are relatively “high” or “low” (Model 4).

¹⁴ As regard Ethiopia the ADF and ERS tests are rejected at 5% level (the ADF p-value is 0.033 and the ERS statistic 1.33, far below the 5% critical value, 3.11); for Tanzania we found the ADF p-value 0.037 and the ERS statistic equals to 1.94.

Results show that price transmission between world and Ethiopian national prices is detected when subsidy are high, while there is no transmission when the subsidies are low.

$$(12) \Delta X_t = (NRA_t < median(NRA)) \cdot \{0.25 + 0.29^{**} \cdot \Delta X_{t-1} - 0.08 \cdot X_{t-1}\} + \\ + (NRA_t \geq median(NRA)) \cdot \{0.96^{*} + 0.52^{***} \cdot \Delta X_{t-1} - 0.20^{**} \cdot X_{t-1}\} \\ (Obs. = 123; R^2 = 0.15)$$

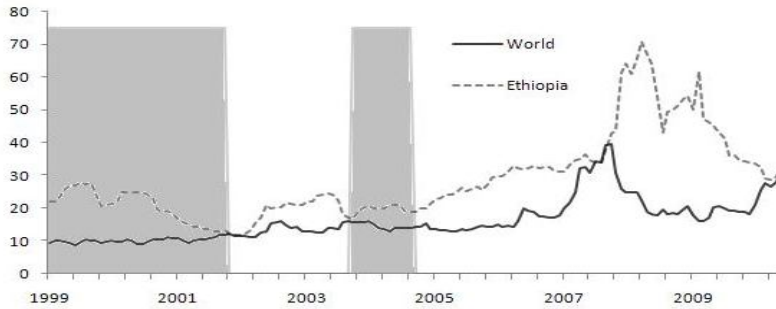
Results show that price transmission between world and Tanzanian national prices is detected in both regimes, with coefficients equal to 0.11 and 0.15 respectively in the first and second regime.

$$(13) \Delta X_t = (NRA_t < median(NRA)) \cdot \{0.44 + 0.33^{**} \cdot \Delta X_{t-1} - 0.11^{*} \cdot X_{t-1}\} + \\ + (NRA_t \geq median(NRA)) \cdot \{1.56^{***} + 0.25^{**} \cdot \Delta X_{t-1} - 0.15^{***} \cdot X_{t-1}\} \\ (Obs. = 105; R^2 = 0.22)$$

Summing up, the estimations would suggest that high subsidies tend to strength the relationships among world, Ethiopian and Tanzanian prices¹⁵. In other terms, under the assumptions and with the limitations of the present study, our findings allow to conclude that EU subsidies might play a role in international markets, and in particular EU subsidies might play a significant role in world price dynamics.

3.1.2 Product: Wheat

Figure 2: Ethiopian and world wheat prices in high and low EU subsidies regimes.



Note: the shadow areas represent the high-subsidies regime.

In order to assess the effects of EU subsidies on world prices, we estimated Model 1 obtaining the following results:

$$(13) \ln(WP_t) = -0.03 + 1.00^{***} \cdot \ln(WP_{t-1}) - 0.03 \cdot NRA_t \quad (Obs= 106; R^2 = 0.06)$$

¹⁵ A possible interpretation would be that higher subsidies might strength the influence of EU prices on world market to the detriment of smaller countries (e.g. Ethiopia and Tanzania) whose prices would be more linked to the world price. It seems important to stress once more that, despite results do not take into account other factors such macroeconomic policies, market structure, etc., they allow to provide some evidence on the likely impact of EU subsidies on world and national prices.

where WP_t is the world price at time t , NRA_t the Nominal Rate of Assistance of France and Germany, the two leading EU wheat producers. The coefficient of the NRA index is statistically not significant, suggesting that EU subsidies have no impact on world price¹⁶. We further explored the issue by estimating a specification which takes into account the possible non stationarity in world prices. Results do not differ from (13) and once again the coefficient of the NRA index is statistically not significant:

$$(14) \Delta \ln(WP_t) = -0.01 + 0.17^{***} \cdot \Delta \ln(WP_{t-1}) - 0.07 \cdot NRA_t \quad (\text{Obs}=106; R^2=0.06)$$

Selected country: Ethiopia

Wheat is a major staple food in Ethiopia and mainly consumed in urban areas, accounted for 16% of the total dietary energy supply (DES) in 2003-05. The average per capita consumption in 2004-08 was 38 kg/yr. Ethiopia is not fully self-sufficient (the self-sufficiency ratio is 76%).

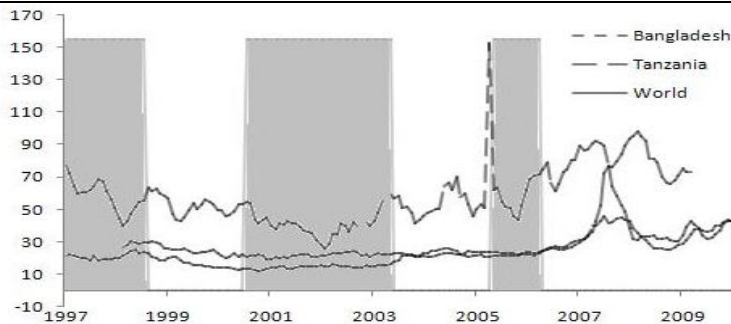
The relationships between world and Ethiopian prices have been detected through the Model 2, where X_t is the price difference (World price-Ethiopian price) and ΔX_t its first-order difference $X_t - X_{t-1}$ ¹⁷.

$$(15) \Delta X_t = 0.66 + 0.15^* \cdot \Delta X_{t-1} - 0.05^* \cdot X_{t-1} \quad \text{Obs} = 141; R^2 = 0.06$$

We can assert that the two prices are weakly linked in the long-run. Moreover prices adjust to the world price in the short run, in fact the coefficient γ of model (10) is 0.15 (statistically significant at 10%).

3.1.3 Product: Rice

Figure 3: Tanzanian, Bangladesh and world rice prices in high and low EU subsidies regimes.



Note: the shadow areas represent the high-subsidies regime.

¹⁶ Despite the value of β suggests a possible unit root process, the results do not differ from those obtained by a first-order differenced specification. In both case the coefficient γ is statistically not different from zero, that is the NRA do not influence world price. Results presented in equation 14 are robust to heteroskedasticity (Breusch-Pagan-Godfrey p-value is 0.016) and serial correlation of residual (the PACF of residuals in level and squared show no autocorrelation of residuals).

¹⁷ Unit root tests (ADF and ERS) and stationarity test (KPSS) do not allow to conclude on the presence of unit root: the former suggest the presence of a unit root, while the latter fail to reject the null hypothesis of stationarity, hence we kept specification (7) to preserve the comparability of results.

In order to assess the effects of EU subsidies on world prices, we estimated the model 1, obtaining the following results:

$$(16) \quad \ln(WP_t) = -0.04 + 1.00^{***} \cdot \ln(WP_{t-1}) - 0.02 \cdot NRA_t + \varepsilon_t$$

$$(Obs = 127; R^2 = 0.96)$$

where WP_t is the world price at time t , NRA_t the Nominal Rate of Assistance of Italy and Spain, which produce the 85% of the total EU wheat production. The coefficient of the NRA index is statistically not significant, suggesting that EU subsidies have no impact on world price¹⁸.

Selected countries: Tanzania, Bangladesh, Ghana

As regard Tanzania, rice is accounted for 9% of the total dietary energy supply (DES) in 2003-05 and the average per capita consumption in 2004-08 was 20 kg/yr. The self-sufficiency ratio of rice was 85%. In Bangladesh rice accounted for 71% of the total dietary energy supply (DES) in 2003-05 and the average in per capita consumption was 149 kg/yr. The self-sufficiency ratio of rice is 97%. Finally, rice accounted only for 8% of the total dietary energy supply (DES) in Ghana where the per capita consumption of rice is 28kg/yr. Moreover, Ghana is not self-sufficient for rice and its self-sufficiency ratio is slightly above 20%.

Tanzania, Bangladesh, and Ghana are net importers of rice. Tanzania imports from Asian countries (Vietnam, Thailand, Japan, India and China) while the largest share of Bangladesh imports is provided by India. Finally, Ghana imports mainly from India, Thailand and Vietnam. Trade flows from and to European Union are rather limited.

World and Tanzanian prices are linked to each other. Results of model 2 are the following, where X_t is the price difference (World price-local price) and ΔX_t its first-order difference ($X_t - X_{t-1}$)¹⁹.

$$(17) \quad \Delta X_t = 12.05^{***} - 0.17^{**} \cdot \Delta X_{t-1} - 0.34^{***} \cdot X_{t-1}$$

$$(Obs = 145; R^2 = 0.23)$$

In order to deal with the possible presence of structural breaks, we computed a Chow test by specifying several break points: in January 2008 we reject the null of no break points. However, the explicit inclusion of a dummy variable to take into account of such a break point does not affect the results²⁰.

Similar statement can be asserted for the relationships between the world and Bangladesh price²¹

¹⁸Results do not differ from those obtained by a first-order differenced specification as in both case the NRA do not influence world price. According to the Jarque-Bera, we reject the hypothesis of normal distribution at the 5% level but not at the 1% significance level (p-value is 0.04). We cannot reject the null hypothesis of a Ramsey RESET test (p-value is 0.06), that is omitted variables, incorrect functional forms and correlation among explicative variables and error terms are not an issue.

¹⁹ ADF and ERS unit root tests assume values -4.239 and 0.78 allowing to conclude the series are I(0).

²⁰ The coefficient of interests, ρ , is not affected by the structural changes.

²¹ ADF and ERS unit root tests assume values -6.201 and 1.45 allowing to conclude the series are I(0).

$$(18) \quad \Delta X_t = 0.35 + 0.44^{***} \cdot \Delta X_{t-1} - 0.14^{***} \cdot X_{t-1}$$

$Obs = 148; R^2 = 0.23)$

We computed a Chow test by specifying several break points: we reject the null of no break points in January 2002. The parameter ρ changes over time and assume values from -0.12 to -0.27 being statistically significant from 2002. In other terms the price transmission increases over time being stronger during recent years.

On the contrary, we cannot observe long-run relationships among Ghana and world prices. Finally, in all cases a short-run relationship is detected. However, the coefficient ρ for the model 3, is equal to 0.39 for Tanzania, while assume smaller values for Bangladesh and Ghana, respectively 0.04 and 0.13 (statistically significant at 5%).

4. Conclusion

The present analysis aimed at understanding the linkages between world and national prices of some important staple crops, namely maize, rice and wheat in selected developing countries. The data refer to the period from 1997 to the most recent available data²² and to four different countries: Bangladesh, Ethiopia, Ghana and Tanzania. The analysis has been conducted through a time series econometric model, on monthly prices, able to capture price dynamics and the presence of different levels of EU subsidies. A preliminary consideration needs to be stated prior conclusive to remarks: the econometric model adopted might suffer of low explanatory power due to its simplicity and the exclusion of macro-economic variables. These limitations need to be borne in mind when interpreting the results of this work. Only when more detailed studies will be carried out, the accuracy of the results of this study can be fully assessed.

According to our findings, we can state that during the evaluation period (2000-2010) no empirical relationship has been detected among the EU subsidies for rice and world price of rice. The results would also pick out the absence of a direct link between the EU subsidies for wheat production and wheat world price. On the contrary at least for maize sector and for Ethiopia and Tanzania, EU agricultural policies seemed not neutral, indeed they can influence domestic maize prices²³.

Among the selected countries, Bangladesh and Ethiopia seem quite integrated with international markets: their national prices tend to react to world price dynamics. On the contrary, Ghana markets are rather isolated from international shocks. Finally, Tanzanian markets appear to be quite integrated, and more specifically rice prices tend to largely follow world dynamics.

Considering the results, we can state that Tanzania and Ethiopia, being net agri-food exporters, may benefit, at macro-level²⁴, by a reduction of EU level of subsidies. Ghana and Bangladesh seem not effected at all, at least with reference to the considered crops.

²² The analysis on the impact of EU subsidies cover the period 1997-2007 lacking more recent data on the NRA index.

²³ It seems important to stress once more that, despite results do not take into account other factors such macroeconomic policies, market structure, etc., they allow to provide some evidence on the likely impact of EU subsidies on world and national prices.

²⁴ As mentioned in previous paragraphs, the analysis is focused on macro-level due to the lack of household prices for the selected commodities/countries.

Despite the difficulty to analyze the impact of EU policies on poor such as the small scale farmers due to the large heterogeneity of factors influencing such impacts, our study took into consideration two possible CAP change scenario. However several limitations restrict the generalization of the results of the present study. According to the purpose of the analysis, only the Nominal Rate of Assistance of the main EU producers for each considered product is evaluated. In order to try to “isolate” and assess this impact, the CAP change is artificially treated in the simulation as the only factor without accounting for other structural or market changes: the interaction effects between household groups are not considered in this study²⁵.

Table 4 – Summary of price relationships

	EU subsidy effect on world prices		Bangladesh	Ethiopia	Ghana	Tanzania
Maize	Yes	LR		0.11 ^(s)	-	0.11 ^(s)
		SR		0.11	-	-
Wheat	No	LR		0.05		
		SR		0.17		
Rice	No	LR	0.14		-	0.34
		SR	0.04		0.13	0.39

LR and SR indicate, respectively, long and short-run relationships coefficients.

^(s) Indicates that NRA influences the long-run relationships.

These limitations have to be kept in mind interpreting the results of this work. Only when more detailed studies are carried out, the accuracy of the results of this study can be fully assessed. According to our findings, we can state that during the evaluation period (2000-2010) no empirical relationship has been detected among the EU subsidies²⁶ for rice and its world price. The results would also pick out the absence of a direct link between the EU subsidies for wheat production and wheat world price. On the contrary at least for maize sector and for Ethiopia and Tanzania, EU agricultural policies seemed not neutral, indeed they can influence domestic maize prices. As regards the different options actually under discussion of “CAP after 2013”²⁷, the possible impacts of the three policy options²⁸ might be similar among the countries as the options for market measures relate mainly to the safety net mechanism, and Green Box measures.

²⁵ Only the first order approximation of the welfare effect of changes of prices are considered (See Chap 4.1 for details).

²⁶ In order to assess the effects of EU subsidies on the relationships between world and national prices, it has been considered the Nominal Rate of Assistance of the main EU producers for each considered product (Anderson and Valenzuela, 2008).

²⁷ The CAP towards 2020: Meeting the food, natural resources and territorial challenges of the future (COM(2010) 672 final).

²⁸ Outlined in the Communication “The CAP towards 2020: Meeting the food, natural resources and territorial challenges of the future”.

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