Price transmission from international agricultural commodity markets to domestic food prices: Case studies in Asia and Latin America

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This brief analyzes the price transmission effects from international markets to domestic markets in a number of case studies in Asia and Latin-America. It finds positive transmission effects in the case of wheat in Latin American countries and in two out of three Asian countries. In Latin America for example, in the case of bread, the average transmission elasticity is about 0.20, which means that a 1 percentage point increase in the growth rate of the international price of wheat, translates into a permanent increase of 0.20 percentage points in the growth rate of the domestic price of bread. On the other hand, in case of wheat in Asia the biggest transmission effect is found in Bangladesh (0.74), followed by Pakistan (0.41) and much lower in Vietnam (0.11). There is also evidence of positive transmission effects in the case of rice for most Latin American and all Asian countries part of this analysis.

1. Objectives

During the 2007-2008 food crisis the international price of main agricultural commodities such as wheat, rice, maize, and soybeans more than doubled. Several studies have analyzed the impact of such price spikes on domestic economies, especially on developing economies as the potential adverse effects on the poor are large. The extent to which the increases in international commodity prices are transmitted to domestic food prices has major implications for the poor and the overall welfare of developing nations. As the international price of commodities like wheat, rice, or maize increases, it is expected that the domestic consumer price of basic food items such as bread, flour, wheat, corn, tortillas, rice, etc will also increase. The purpose of this brief is to summarize the empirical evidence, or lack thereof, about the price transmission effects from international markets to domestic markets in a number of case studies in Africa, Asia, and Latin-America. The findings suggest that there is empirical evidence of positive transmission effects in the case of wheat in Latin American countries and in two out of three Asian countries (Pakistan and Bangladesh). There is also evidence of positive transmission effects in the case of rice for most Latin American and all Asian countries part of this analysis.

2. Data and methods

In order to analyze and quantify the transmission effect from international to domestic prices, the study relies on an econometric approach with the following features. First, the analysis considers how changes in the growth rate of international prices induce changes in the growth rate of domestic prices. An alternative approach to this would be to analyze changes in price levels; however, due to the statistical properties of the price data, using growth rates is considered a

more accurate approach. Second, the analysis incorporates the idea that transmission effects might take more than one period or that they may come with time lags. Hence, the growth rate of a given international price might impact the growth rate of domestic prices, but only after a certain time has passed (weeks, months). Also, it is possible that at first only a fraction of the international price increase is transmitted into domestic prices, but as times goes by, a larger fraction of that initial increase is transmitted. Third, the analysis acknowledges that other factors might affect domestic prices, one of them being the exchange rate. As a result, in order to isolate its effects, in this quantitative analysis the exchange rate is held constant. Fourth, changes in international prices may affect domestic prices differently. A 10% increase in the growth rate of the international price of wheat, for example, may translate into a 2% increase in the growth rate of the domestic price of wheat flour and only 1% increase in the growth rate of the domestic price of bread. The reason behind this is that while wheat is an input of production for both, wheat flour and bread, its importance in determining their retail price can be very different. In the end it is an empirical question to examine the transmission effect for different commodities. In particular, the econometric approach in this study implies moving average regressions in which we regress the domestic price of a given commodity on the international price of the corresponding commodity (wheat, rice or corn). In addition, the study uses the growth rate of prices, as already noted, as well as the growth rates of the exchange rate. The quantitative analysis incorporates the contemporaneous and 5 lags of the international price and exchange rate[1] in order to allow for transmission effects that start with a time lag and can last for one or more periods. .

The data employed in this analysis come from different sources. For international prices, the study relies on the International Commodity Price Database of the Food and Agriculture Organization (FAO); in particular, on the monthly series for the U.S. Gulf of Mexico, No. 2 yellow corn, the U.S. Gulf of Mexico No. 2 soft red winter wheat, and Thai A1 white broken rice at Bangkok. Information on the exchange rates for each country is based on the International Financial Statistic Database (IFS) of the International Monetary Fund (IMF). The data available for domestic prices varies depending on the country. The sources are, in most cases, the national bureaus of statistics of each country. For most Latin American countries, the study uses national average[2] consumer price data for the following commodities: bread, wheat flour, pasta, corn, tortillas, and rice. For Asian countries, the study relies on domestic price data for wheat and rice, while in the case of Vietnam and Pakistan the analysis uses data for several cities as well as national average. One relevant difference between Latin American and Asian countries with respect to the price data available for country studies is that while for the former we use consumer (or retail) prices, for the latter we use wholesale prices — which are more linked to producers' price. All domestic price data and samples are available in Table 1 in the Appendix.

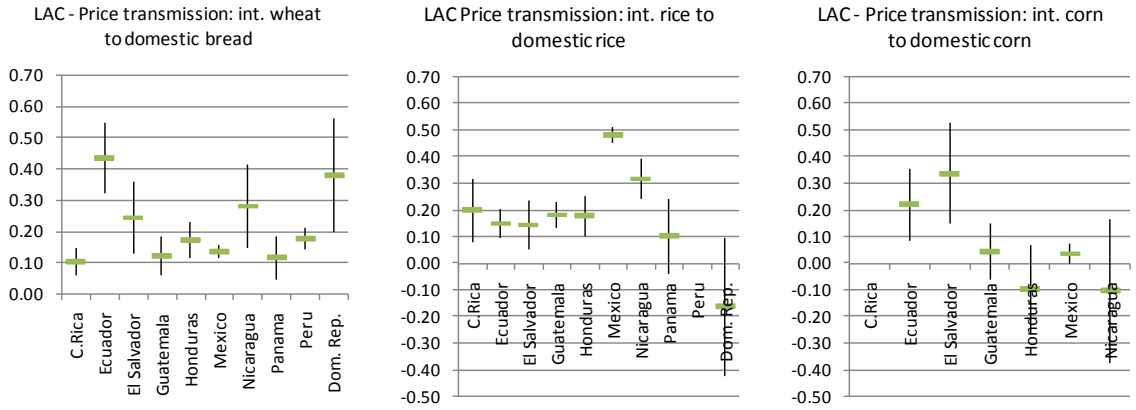
[1] See in Appendix the moving average equation estimated

[2] National average usually correspond to average prices in the largest cities of the country

3. Results

The results are summarized in graphs, which may be interpreted as follows. The vertical axis measures the change in the growth rate of a domestic price when there is a permanent change of 1 percentage point in the growth rate of the international price of a commodity. This is called the elasticity transmission effect. The graphs show the estimated expected (or average) elasticity transmission effects as well as an interval that subtracts and adds one standard deviation to the average estimate. This is done in order to determine how precise (or imprecise) the average estimates are.

The results indicate that in Latin American countries (LAC) there is, indeed, a positive transmission effect from the international price of wheat to the domestic price of wheat-related commodities such as bread, wheat flour, and pasta[3]. In the case of bread, the average transmission elasticity is about 0.20, which means that a 1 percentage point increase in the growth rate of the international price of wheat, translates into a permanent increase of 0.20 percentage points in the growth rate of the domestic price of bread. Countries with relatively higher transmission elasticities are Ecuador, Nicaragua, and the Dominican Republic. It is important to note, however, that even if one assumes that these effects are overestimated (e.g. one standard deviation) in all countries, we can still be confident that the true elasticities are positive. Similar results are true for wheat flour and pasta. There are positive elasticities in all countries, where the cross country average transmission elasticities are 0.3 and 0.24. Also, it is interesting to note that Ecuador—which is a fully dollarized country— shows the highest transmission elasticity for bread and wheat flour.

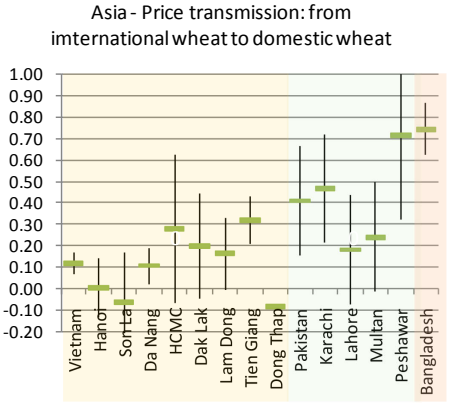


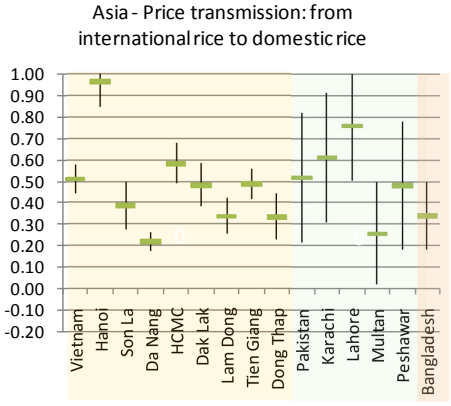
In the case of rice, we can also say with a reasonable level of confidence that most Latin American countries show a positive transmission effect, with the exception of Panama and the Dominican Republic. The average elasticity is 0.18. In the case of corn, our evidence points to either a very low or lack of transmission effect for most Latin American countries. Again,

[3] See Appendix for graphs on wheat flour and pasta

Ecuador is one of the two countries with positive transmission, the other one being El Salvador. Similar conclusions emerge if one analyzes the price of tortillas. Two reasons might explain this lack of transmission. First, while the international price corresponds to yellow maize, in most countries production and consumption is more related to white maize. Second, as maize is a major staple, especially in Central America, it is not unusual that Governments impose some degree of price control on corn and tortillas.

In the Asian region, our analysis for Bangladesh, Pakistan, and Vietnam shows overall positive transmission effects in both wheat and rice. However, there are some differences across countries and within country. For wheat, the biggest transmission effect is found in Bangladesh (average transmission elasticity 0.74), followed by Pakistan (0.41) and much lower in Vietnam (0.11). In the latter case there is only one province — Tien Giang — where we can have good confidence of a positive transmission effect. In all other provinces, the lack of positive transmission cannot be disregarded. For rice the transmission effects seems much stronger in all three countries. The national transmission elasticities are very similar in Vietnam and Pakistan (0.51) and little lower in Bangladesh (0.34). Also, in Vietnam and Pakistan there is a tendency to observe larger transmission elasticities in larger cities (Hanoi and Ho Chi Min City in Vietnam, and Lahore and Karachi in Pakistan).





Appendix

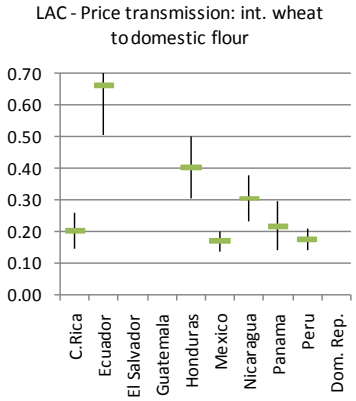
Table 1: Monthly domestic price data

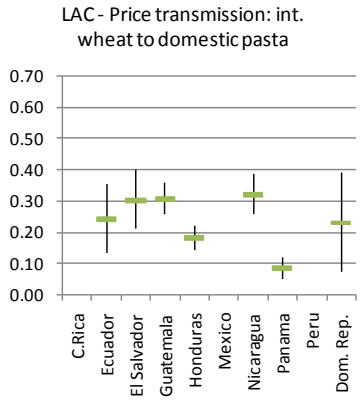
Country	Commodities	Cities	Sample start	Sample end
Latin America:				
Mexico	white bread, wheat flour; tortillas, corn; rice	average	2000m1	2008m10
Guatemala	bread, pasta; tortillas, corn; rice	average	2000m12	2008m4
El Salvador	bread, macaroni; tortillas, corn; rice	average	2000m1	2008m3
Honduras	bread "semitas", spaghetti, wheat flour; tortillas, corn; rice	average	2000m3	2008m3
Nicaragua	bread, spaghetti, wheat flour; tortillas, corn; rice	average	2000m3	2008m3
Costa Rica	bread, wheat flour; tortillas; rice	average	2000m1	2008m4
Panama	bread, pasta, wheat flour; rice	average	2003m1	2008m3
Dominican R.	bread, pasta; rice	average	2003m1	2008m3
Ecuador	bread, spaghetti, wheat flour; corn; rice	average	2005m1	2008m10
Peru	price index for bread cereals and grains	average	2000m1	2008m9
Asia:				
Bangladesh	wheat; rice	average	2005m6	2009m3
Pakistan	wheat; rice	Karachi, Lahore, Multan, Peshawar	2005m12	2009m4
Vietnam	wheat; rice	Hanoi, Son La, Da Nang, HCMC, Dak Lak, Lam Dong, Tien Giang, Dong Thap	2001m1	2008m12

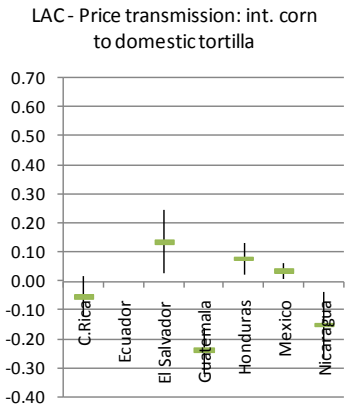
Moving average first difference regression:

$$\mathrm{d}\ln(P_t) = \alpha_0 + \beta_0 \mathrm{d}\ln(P_t^*) + \cdots + \beta_5\, \mathrm{dln}(P_{t-5}^*) + \gamma_0 \mathrm{d}\ln(E_t) + \cdots + \gamma_5\, \mathrm{dln}(E_{t-5}) + \varepsilon_t \qquad \varepsilon_t \sim iid$$

where P_t is the domestic price in local currency in period t, P_t^* is the international prices in US dollars in period t, E_t is the exchange rate in period t and ε_t is an error term. ln (X) is the natural logarithm of variable X and dY_t is the first difference of Y_t such that $dY_t = Y_t - Y_{t-1}$







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