Food Policy 44 (2014) 103–114

Contents lists available at ScienceDirect

Food Policy

journal homepage: www.elsevier.com/locate/foodpol

Market integration and price transmission in consumer markets of developing countries ☆

Felix G. Baquedano *, William M. Liefert

U.S. Dept. of Agriculture, Economic Research Service, 355 E Street, SW, Washington, DC 20024-3221, United States

ARTICLE INFO

Article history:
Received 4 June 2012
Received in revised form 23 September 2013
Accepted 2 November 2013

Keywords:
Food prices
Market integration
World price transmission
Exchange rates
Agricultural trade
Single equation error correction model

ABSTRACT

World prices for agricultural commodities surged in 2006–08, and then again in 2011–12. In many developing countries, consumer prices for staple foods, such as bread and rice, mirrored these movements. This paper examines whether prices in urban consumer markets within developing countries are co-integrated with prices in world agricultural commodity markets. Using a single equation error correction model, we examine the response of consumer prices for wheat, rice, maize, and sorghum to changes in world market prices and exchange rates in urban centers of the developing world. Analyzing over 60 country/commodity pairings, we find that developing countries' consumer markets are co-integrated with world markets. Yet, we also find that the transmission of changes in both world prices and real exchange rates to domestic consumer prices is not high, and that the movement of domestic consumer prices to new equilibrium with world prices after a shock to the latter is relatively slow.

Introduction

World prices for agricultural commodities surged in 2006–08, and then again in 2011–12. In many developing countries, consumer prices for staple foods, such as bread and rice, mirrored these movements. The response of consumer food prices to changes in world prices – particularly for imported goods – in the urban centers of developing countries suggests a high degree of co-movement and price transmission between them.

World price volatility and high price transmission can result in countries importing world price shocks into their economies (though whether consumers and producers specifically suffer or benefit from a shock depends in part on whether prices rise or fall). The surges in world agro-food prices of recent years along with apparent high price transmission to many developing countries' domestic markets substantially reduced consumers' real income (especially where food purchases comprised a large share of households' total expenditure), drove many households into poverty, and among the poorest created or exacerbated hunger and malnutrition.[1] It therefore would be useful to know the degree to which fluctuations in consumer food prices within developing countries are a direct result of world price movements.

This paper examines whether food prices in urban consumer markets within developing countries are co-integrated with prices in world agricultural commodity markets, as measured by the degree of co-movement and price transmission between the latter and the former. We focus on urban markets within countries because urban consumers typically depend more on imported food than do their rural counterparts.

Although empirical work on market integration and price transmission has centered more on producer rather than consumer prices (Mundlak and Larson, 1992; Quiroz and Soto, 1995; Sharma, 2003), some studies have examined the latter. Using a mix of monthly and annual consumer, wholesale, and producer agricultural prices for 16 countries (with most series ending in 2001), Conforti (2004) finds that transmission of world to domestic prices for Latin American and Asian countries is higher than for their African counterparts. Examining a subset of Sub-Saharan African countries with monthly consumer prices over a 5–10 year period, Minot (2011) also finds low transmission. On the other hand,

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* Corresponding author. Address: Viale delle Terme di Caracalla, Rome 00153, Italy. Tel.: +39 06 570 54729 (F.G. Baquedano). Tel.: +1 (202) 694 5156 (W.M. Liefert).

E-mail addresses: Felix.Baquedano@fao.org (F.G. Baquedano), wliefert@ers.usda.gov (W.M. Liefert).

[1] Although the importing of world price shocks by free-trading open economies can hurt domestic food security, closed economies are vulnerable to a different type of food insecurity – domestic supply shocks that reduce food availability can send prices soaring. FAO (2003) discusses the various types of food insecurity and their relationship to trade policies.

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http://dx.doi.org/10.1016/j.foodpol.2013.11.001

Cudjoe et al. (2010) determine for Ghana, and De Janvry and Sadoulet (2010) for Guatemala, that the recent price surges substantially increased consumer food prices, though the price transmission was not complete. Baquedano et al. (2011) find that although there is almost no transmission to domestic producer prices for rice in Mali, transmission to rice consumer prices is high.

The empirical scope of our paper is the examination of market co-integration and price transmission to consumer prices for wheat, rice, maize, and sorghum in the major urban centers of selected countries in Asia, Latin America and the Caribbean, and Sub-Saharan Africa during the 2000s. During the last 20–25 years, all the countries in our study have liberalized their agricultural domestic and trade policies, some quite substantially, in order to integrate into world markets and thereby capture the gains from trade based on comparative advantage. Yet, major trade impediments and distortions still exist within many countries (Anderson, 2009).

The four commodities covered by our study are major food staples within the developing world. Moreover, two of these foodstuffs – wheat and rice – are heavily imported by countries, while for the other two – maize and sorghum – domestic production supplies the bulk of domestic needs. The average import dependency of countries in our study for wheat and rice is 72% and 41%, respectively, while the import dependency of countries for maize and sorghum is 25% and 2%.

Our paper complements and expands on earlier studies in several ways. With the exception of Dawe and Slayton (2010), previous work largely ignores the effects of movement in exchange rates on domestic consumer prices in developing countries. We follow the methodology of Baquedano et al. (2011) and use a single equation error correction model, or SEECM, that separates out the effect on consumer prices of changes in world prices from changes in countries' real exchange rates. This separation is especially important in cases where a country depends heavily on imports to meet domestic demand, given that an appreciating (depreciating) currency lowers (raises) domestic prices for imported goods. We first estimate our SEECM in a panel framework, which allows us to compute and compare aggregate results (covering all countries) for each commodity. We then also compute results for each individual country/commodity pairing.

In the paper's second section, we examine factors that can affect the transmission of changes in world prices and exchange rates to a country's domestic prices. In the third and fourth sections, we present the paper's SEECM methodology and examine the data used. In the subsequent section we discuss our empirical results, and in the paper's final section we present major conclusions.

Factors affecting price transmission

The following factors can impact price transmission: (1) price and border policies; (2) changes in exchange rates; (3) market structure and conditions and transaction costs; and (4) substitutability between domestic and foreign goods. Transmission-impeding policies include systems of managed (or fixed) prices, state trading, import quotas, and trade-prohibitive tariffs (Liefert and Persaud, 2009). Exchange rate changes can also retard transmission, where the change can result from either a macroeconomic policy decision or economy-wide developments within a system of floating exchange rates. For example, the world trade price for a commodity could rise, such that if the price increase were transmitted to a country's domestic price, the latter would also rise. Assume, though, that the country's currency appreciates vis-à-vis its main trade partners for the commodity, which would have the isolated effect of lowering the domestic price for the good. The exchange rate change could thereby mitigate the trade price increase, or even dominate it, such that the domestic price for the good falls (Dawe, 2008). In addition, weak exchange rate transmission could reduce expenditure-switching (substitution) between domestic and foreign produced goods by producers and consumers in response to world price changes (Campa and Golberg, 2005).

Market structure and conditions that can affect price and exchange rate transmission include domestic market power and weak infrastructure. Market power gives domestic producers price-setting potential, such that changes in border prices are not transmitted completely to domestic prices. Weak infrastructure (physical, commercial, and institutional) increases transaction costs and impedes the flow of price and other key market information from borders to interior regions (Fackler and Goodwin, 2001; Barrett, 2001; Barrett and Li, 2002). This can be a particular problem within developing countries. Being landlocked could increase the infrastructure and price transmission challenges for countries, as Baquedano et al. (2011) find for Mali. Yet, whether countries are coastal or landlocked, the infrastructure servicing large urban centers is probably better than that for rural areas.

Lastly, domestic products and their foreign counterparts might not be complete substitutes (homogenous). Consequently, the transmission of world (foreign) to domestic prices for these goods will probably be incomplete.

We present transmission estimates in this paper for over 60 country/commodity pairings. Given the large number of pairings, it in infeasible to examine the possible reasons why the calculations show incomplete transmission for specific cases.

Methodology: The single equation error correction model (SEECM)

Our empirical analysis is motivated by the law of one price, which states that the price for a homogeneous commodity in two different markets should be the same, once transportation and transaction costs are adjusted for, and assuming no policy intervention. For a traded good, we can examine this causal relationship between the border price and the domestic consumer price in an error correction framework. This framework allows us to separate out and measure domestic price shocks from world markets in both the short run and long run. It also allows us to directly estimate the rate at which the domestic price returns to its equilibrium relationship (if one is shown to exist) with the world price after a change in the latter (De Boef and Keele, 2008).

We define the data generating process (DGP) for the relationship between the domestic consumer price and the world border price as:

$$p^d_{ijt} = \alpha_0 + \alpha_1 p^d_{ijt-1} + \beta_0 p^b_{ijt} + \beta_1 p^b_{ijt-1} + \varepsilon_t \quad (1)$$

where p^d_{ijt} and p^b_{ijt} are the natural log of the domestic and border price, respectively, in real terms in the domestic currency of country i of a homogeneous commodity j at time t. However, the border price equals the world price in foreign currency times the country's exchange rate. We therefore can expand the functional form in Eq. (1) by breaking p^b_{ijt} into its two parts, dropping the subscripts for country i and commodity j for simplicity:

$$p^d_t = \alpha_0 + \alpha_1 p^d_{t-1} + \phi_0 wp^f_t + \phi_1 wp^f_{t-1} + \psi_0 e_t + \psi_1 e_{t-1} + \varepsilon_t \quad (2)$$

where wp^f_t and e_t are in natural logs and represent the real world price of the commodity in foreign currency and the real exchange rate between the two countries' currencies. The coefficients ϕ_n and ψ_n measure the effects on p^d_t of an immediate and lagged change in wp^f_t and e_t, respectively.

The model in Eq. (2) represents a general form of the augmented distributed lag model, or ADL. This general form of our