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Price Transmission in Wheat Flour Market in Georgia

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Abstract

Georgia highly depends on food imports. In particular, the share of wheat import in total wheat consumption is around 90%. This study investigates how prices are transmitted from international (Black Sea) wheat market to domestic (Georgia) flour market. We used the Vector Error Correction Model (VECM) to measure the price transmission. Our estimations show that local Georgian flour prices are indeed cointegrated with international wheat prices. In addition, using Engle-Granger method we tested asymmetry in price transmission in wheat flour market in Georgia. The analysis showed that roughly 14% of deviation from long run equilibrium is corrected in one period. As we used monthly data, this means that four months are needed to correct more than half of the deviation and seven months to fully adjust. The results also show that there is no asymmetry in price transmission from international to Georgian wheat market; both negative and positive shocks transmit to the Georgian market within seven months period.

Introduction

Between August 2014 and May 2015, international wheat prices declined by 18%, rice prices dropped by 14% and maize prices declined by 6% (World Bank, 2015). This decreased prices are expected to be transmitted from international to domestic consumer prices of food items (e.g., wheat flour, bread). However, there are many factors that hinder this transmission process. Several studies analyzed price transmission from international to domestic markets (e.g., Acharya et al. 2012; Götz 2008). In particular, after so called food crises of 2007–2008 and 2010–2011 many studies

were focusing on the role of integration of domestic markets to international markets, the price transmission of food prices between large markets and small ones. These crises made interesting to understand and investigate the price relationships in a main food products more thoroughly. Also, to study the implications for food security and livelihoods in food-insecure countries (IFPRI, 2016).

Georgia highly depends on food imports. In particular, the share of wheat import in total wheat consumption of the country has been around 90% in recent years (GeoStat, 2016). Wheat products are the main staple foods both in rural and urban areas in Georgia. Wheat accounted for 41% of the total dietary energy supply in 2005-07. On average in 2005-09 per capita consumption of wheat and wheat products (as foods) was 150 kg/yr. Therefore, improved understanding of market integration of Georgian wheat sector is important for country's food security.

This policy paper investigates how prices are transmitted from international wheat market to Georgia's flour market. In particular, this research will address two research questions. First, we measure how international wheat market prices are integrated with domestic prices in Georgia. Furthermore, we conducted Engle-Granger ECM test to understand asymmetric price transmission (APT), whether the positive or negative shocks are transmitted within the same time period.

Overview of food security conditions and wheat market in Georgia

Georgia is traditionally an agricultural country. Almost half (42.8%, Population census 2014, Geostat) of the population lives in rural areas. Farm activities are the major source of income for those who live in rural areas. The share of agriculture in total GDP declined significantly from 25% in 1999 to about 9.2% in 2015. The percentage of the workforce classified as employed in agriculture has remained fairly constant, 52.1% in 2000, 53.1% in 2011, and 46% in 2015. Very low productivity of Georgian agriculture are related to existing structural and institutional problems in the sector. Land plots are usually small (1.25 ha on average) and unproductive, demonstrating a low-input/low-output model of production. As a result, many small farmers and rural communities remain poor and insecure. Georgian household spend around 50% of their expenditure on food (OXFAM 2016).

Self-sufficiency in food production is low for many agricultural products in Georgia. As for wheat, self-sufficiency was between 8 and 19% in the recent 6 years (Table 1).

Table 1: Balance Sheet for Wheat

	2011	**2012**	**2013**	**2014**	**2015**	**2016**
Import	677	970	743	651	647	552
Domestic Production	97	81	81	50	133	127
Consumption	653	671	680	650	643	624
Self-sufficiency ratio, %	13	9	12	8	17	19

Source: Geostat.ge

Georgia imports wheat predominantly from Black Sea region, namely from Russia, Ukraine and Kazakhstan. On Graph 1 it is clear that share of Russian Market in wheat import is very high (99% in 2016).

Graph 1. Wheat imports in Georgia

Import of Wheat
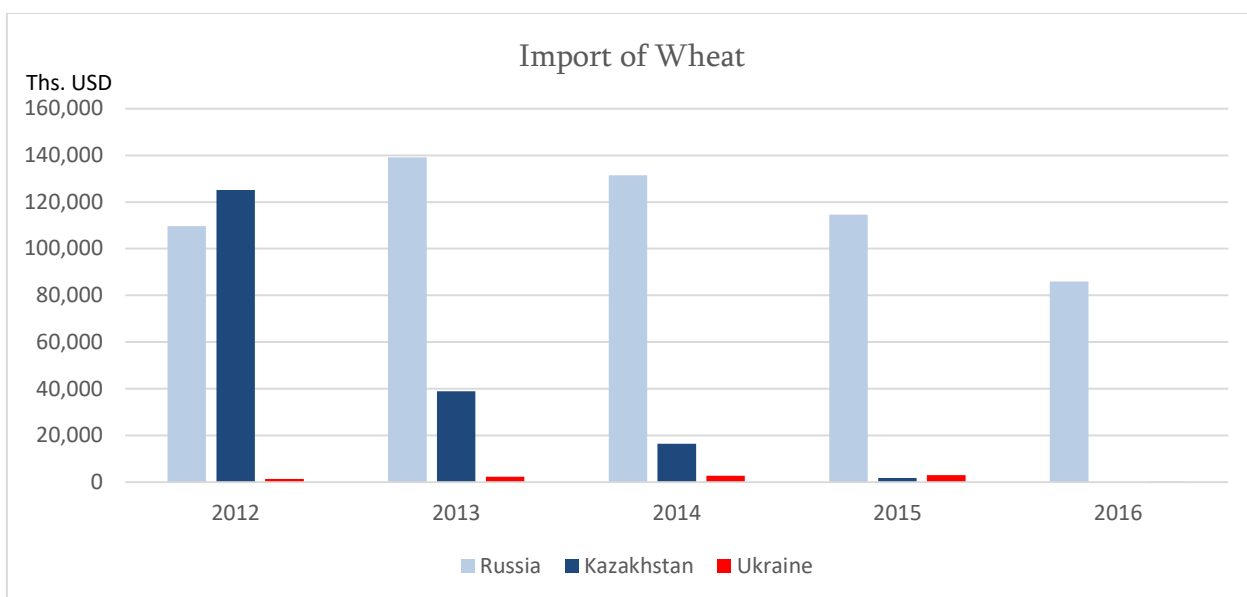
Source: Geostat.ge

Georgia mostly imports wheat and then it is processed domestically by local mill companies, which are the important players on the flour market. There are about 54 flour mill plants in Georgia. Out of these, 13 are large flour mills. "Karat Holding", an Azeri company who holds three large scale mill plants in Georgia, produces around 1400 tons of flour daily. This constitutes about 40% of the flour market.

Price Transmission Studies

Recent developments in the international food prices raised the issue of price transmission from the world market to developing countries. One of the paper about this issue studies small open economy where mainly the prices are determined in the international market, so the prices in small county in most cases follows international prices. So the price increase or decrease in international market impact domestic prices across many countries. There can be negative and positive shocks, which might not be transmitted symmetrically and price shocks transmission of has been studied widely. Price transmission can happen in different forms. Price transmission might be imperfect, which can be caused by different factors. Government intervention (such as different tariffs or price stabilization measures) might be one reason for imperfect price transmission. Other factors can be

transportation cost, marketing costs, and the degree of processing. The important aspect of price transmission is market structure and consumer preferences. (Swinnen, 2014)

Different study conducted around this issue suggests that market structure plays important role in the process of price transmission. The researches show that those countries with oligopolistic markets were considered to have positive Asymmetric price transmission (APT). However, it is important to note that some studies showed that both negative and positive APT are possible which is based on specifications of the country (Bailey & Brorsen, 1989). The possible explanation of this issue is based on expectations of firms. If a firm believes its competitors to be more elastic towards positive changes, it will have the same behavior and result in positive asymmetry; otherwise, a negative case takes place. Another possible explanation for negative APT in the oligopolistic market is avoidance from the market share loss. Firms will maintain prices above the competitive level as long as their sales remain above a threshold level. This is why oligopolistic firms often enter into unspoken agreements.

Empirical studies of price transmission could be divided into two main groups. Studies which were conducted on early stages were based on pre-cointegration methods. Other studies that were conducted in the 1980s changed the according to the new methodology. Ardeni (1989) emphasized the importance of the issue of price transmission and stared using cointegration based methods. The newest researches done by Cramon-Taubadel & Fahlbusch(1994) uses basic cointegration method to study price transmission, despite the fact that the suggested method is easy and not structural, only uses prices, no consideration of trade flows or transaction costs.

The most used and consistent method of studying price transmission is Error Correction Model (ECM) (Engle and Granger, 1987). The test determines whether two-time series (in our case international and domestic prices) have the long-term relationship or not. When two price series have the same integration level and the residual predicted from their OLS regression is stationary, the series are called to be co-integrated. If the long-run relationship is detected, using the first step of the Engle-Granger method the residual variable is predicted. Then it is divided into positive and negative parts and inserted into the model. This modification of the Engle and Granger two-step ECM method is used to obtain asymmetric ECM. With this methodology price increases and

decreases are separated and testing can be done for both upward and downward rigidity. The method was first used by Granger and Lee (1989).

Another test for cointegration is provided by Johansen (1988, 1991). In the case of finding cointegration between two series with any of the methods, Error Correction Model (hereafter, ECM) is used for further analyses. The latter provides estimates of adjustment parameters which show how quickly the dependent variable returns to its equilibrium path in case of price changes.

In this paper as a methodology for measuring price transmission, both Johansen one step and Engle-Granger two-step methods of ECM will be used. In the case of short time series one step method provides more precise estimates (Wee and Tan, 1997); however, only with Engle-Granger method, the possible asymmetry can be tested. Thus, the results of both methods are essential for understanding the price transmission process.

Data and Empirical Methods

FAO Global Information and Early Warning System (GIEWS) provides monthly wheat flour national average prices for Georgia, with 141 observations running from December 2004 to February 2016, and world market prices (Black Sea) for the same period. For Georgia, monthly prices on the national average wheat flour (high grade) retail price is available from Geostat.

In order to analyze and quantify how prices are transmitted from international to domestic markets, the study uses an econometric approach - the Vector Error Correction Model (VECM).

We conducted the following empirical analyses:

- Estimating a long-run relationship between international wheat price and domestic flour price, also short-run impact and error correction coefficients using Johansen 1 step method. Also Augmented Dickey-Fuller (ADF) method is used to test time series of Georgian and world wheat market prices to identify their integration level. If f both variables are unit root and their first difference is stationary, this means the existence of (1) processes. This analysis use Engle-Granger

test to find if two time series are cointegrated or we have a case of spurious regression. The two times series are the international prices of wheat and the Georgian flour prices.

Results

The data show the existence of rank 1 cointegration. This can be interpreted as an existence of a long-run relationship between Georgian wheat flour and Black Sea wheat prices (I(1) processes).

As Georgia is a small country it is obvious that Georgian wheat flour prices do not have impact on international wheat prices and we have a case of price taker. Granger causality test (Granger, 1969) is performed with null hypothesis of having no causality. This test implied that Georgian wheat flour prices do not Granger cause Black Sea wheat prices. The long run relationship between prices in Georgia and Black Sea are following:

$$lndom_t = 2.812 + 0.718 lnInt_t$$

As analysis were conducted using natural logarithms we can interpret 0.72 as long run elasticity of transmission between these two prices. So, 1 percentage point increase in Black Sea wheat price would lead to corresponding 0.72 percent price increase of flour in Georgia

The magnitudes of the adjustment parameters suggest that Georgian flour prices react to international wheat prices and not vice versa. This is also what we would expect (wheat prices in Georgia are largely determined by world market conditions and policies which are largely exogenous to conditions in the milling industry)

As analysis showed roughly 14% of deviation from long run equilibrium is corrected in one period. Our data is monthly and 4 months is needed to correct more than half of the deviation and 7 months to fully adjust.

As we conducted Engle-Granger ECM results showed that there is no asymmetry in price transmission and both negative and positive shocks transmit to the Georgian market within 7 months period.

Conclusion

As Georgia is a small country, it is obvious that Georgian wheat flour prices do not have an impact on international wheat prices, and is therefore a price taker. The Granger causality test (Granger,

1969) is performed with a null hypothesis of having no causality. This test showed that Georgian wheat flour prices do not Granger cause Black Sea wheat prices.

The data shows the existence of a rank 1 cointegration. The interpretation of results is that a long-run relationship exists between Georgian wheat flour and Black Sea wheat prices. The analysis shows roughly 14% of deviation from long run equilibrium is corrected in one period. Our data is monthly and this means that 4 months is needed to correct more than half of the deviation, and 7 months to fully adjust. The results from Engle-Granger ECM showed that there is no asymmetry in price transmission, and both negative and positive shocks transmit to the Georgian market within the seven-month period.

The Georgian wheat flour market includes mill plants, which are the important players in this market, while Georgia mostly imports wheat and then process it domestically. Big share of flour market (40%) belongs to an Azeri Company, with potentially leading to using monopolistic power and asymmetrical price transmission from international to domestics markets. However, this policy research showed that price transmission process with Georgia wheat flour and international wheat price series shows a statistically significant long-term relationship. Moreover, the price transmission is not asymmetric and the market functions to the as highly competitive one.

The results from this study do not allow us to say that there is no market power in this market or signs of oligopoly, this needs further research, including exploring markets structure of Georgina wheat. However, no asymmetry in price transmission might be one sign of rather competitive wheat market in Georgia.

For the country to be integrated more with international market, more financed should be invested in domestic market infrastructure. If Georgia will be more integrated with international market it will lower price volatility. And, also for risk reduction it might be beneficial if Georgia will diversify import market further. Investment in market infrastructure (ports, roads, etc.), along with other trade policies and domestic competition reforms, are essential to stimulate more rapid price transmission.

Certainly, even in a volatile price environment, well-built integration with international markets is beneficial for countries. First of all, it will import lower volatility of international market into the domestic markets (FAO, 2011). The results from this study provide useful insights into policy

discussions on food security measures of Georgia, and help to guide effective responses to food price changes.

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