Wheat Prices in Kazakhstan and World Oil Prices: Analysis and Conclusions

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Abstract: Price volatility of food products is one of the reasons of hunger in the world. Different factors influence on food price volatility. In the papers of scientists proves the link between food and energy markets. This connection is due to the dependence of food and oil prices. In our research, we tried to study the correlation between the prices of wheat in Kazakhstan and world oil prices. The main conclusion of our study is the absence of this dependence. However, we have found the dependence of the price of wheat in Kazakhstan on the price of wheat in Russia and the world wheat prices - Canadian wheat.

Key words: Food security · Food prices · Price volatility · Food market

INTRODUCTION

The problem of food security is one of the most important in the world. Taking into account, that millions of people are starving and the world's population continues to grow, this problem requires a search for further ways to address it. Country's food security is procuring of the food products availability for the population, at the expense of domestic production, as well as import within the permissible limits. One of the causes of hunger and malnutrition in the modern world are the high food prices.

Among the researchers there is a view of the dependence of food prices on oil prices [1-6].

This view is justified, due to the close interdependence of energy and food markets. This manifests itself in a variety of relationships: the use of petroleum-based fertilizers, transport costs of agriculture producers. Accordingly, the increase of oil prices promotes raise prices of food products. In this case spikes on oil market can bring high price volatility on food market. One of the important factors which promote correlation between oil and food prices is production of biofuel [3].

Moreover, biofuel production has created a link between food and crude oil prices that will make food prices extremely volatile. Thus, biofuel is a significant factor that explains part of the food price increases in both 2008 and 2011 and the increased hunger in the developing countries [6].

In a purely descriptive sense volatility refers to variations in economic variables over time. Here we are explicitly concerned with variations in agricultural prices over time. Not all price variations are problematic, such as when prices move along a smooth and well-established trend reflecting market fundamentals or when they exhibit a typical and well known seasonal pattern. But variations in prices become problematic when they are large and cannot be anticipated and, as a result, create a level of uncertainty which increases risks for producers, traders, consumers and governments and may lead to sub-optimal decisions. Variations in prices that do not reflect market fundamentals are also problematic as they can lead to incorrect decisions [2].

Therefore, the dependence of food prices on the price of oil is not without risks, as a result of price shocks in the oil market. In turn, high food prices have a direct impact on food security in the country.

The primary impact of high oil prices on agricultural commodities seems still to be through the supply-side, via increased costs of production, rather than the emerging demand-side channel of biofuels. Fuel and fertilizer
account for over half of operating costs of crop farms but many commentators have ignored oil’s ongoing importance as an input into agricultural production.

Medium-term economic models agree that biofuel demand has and will put upward pressure on prices for those agricultural commodities used in biofuels production. Historically crude oil and agricultural commodity prices have “spiked” together – circa 1973, 1979 and 2008. What should also be borne in mind is that much of the increase in demand for biofuels seen over recent years is policy-driven rather than market-driven (i.e. government policies rather than oil or energy prices have shifted the demand curve. The impacts are also dependent on how the policies are implemented, whether in the form of one or more of quantitative blending mandates, import tariffs, subsidies or tax incentives to producers [1].

Recent experience indicates the need for greater caution in adopting policies that subsidize or, worse, mandate further diversion of grains or grain-producing land to biofuel. These are likely to have serious negative effects on the security of grain for consumption by the world’s most vulnerable consumers.

On the other hand, the reality that substantial quantities of grains and oilseeds will continue in the near future to be converted into biofuel or animal feed in many countries suggests a new strategy by which to reduce price volatility and improve market access. Options could be created to give governments the right to acquire, in serious food supply emergencies, grains or oilseeds that would otherwise be allocated to biofuel production or animal feed. These grains could then be distributed to people most seriously affected or substituted in feed for grains that are more suited to the needs of vulnerable populations. All parties could gain from trade in such options [7].

More than 840 billion people are chronically undernourished and for them food security is still far away. In view of this fact, production of bioethanol from sugar cane, wheat and maize and of biodiesel from palm, rape seed and soybean appear controversial. The question to be asked is if agriculture can provide sufficient edible biomass not only for food production of an expanding world population but also for some biofuel production for the world’s cars.

People skeptical to using primary agricultural products for car fuel argue that today’s highly intensive agriculture requires lots of fossil energy, threatens biodiversity in large areas of monocultures and leads to deforestation by converting for example rain forest land to agricultural land. A global demand-driven expansion of biofuels such as ethanol can therefore result in further homogenization of ecosystems and landscapes which will have far-reaching effects on fresh water, rivers, coasts and oceans.

Prior to the industrial era, agriculture and forestry were primary net producers of energy. Today the food system is a net user of energy especially so in industrialized countries, where each calorie of food produced requires many times more externally delivered energy. There are many different opinions on how much bioenergy that could be provided from agriculture.

The pessimists reason that crops will be needed primarily for human food and animal fodder so that biofuel cannot be an important non-fossil energy alternative since. They contend that the expansion potential for global agriculture is limited by availability of land, water and energy. A future decrease in supply of fossil energy and ongoing land degradation will cause difficulties for increased production from agriculture. Nearly all of the present crop production will be needed for feeding people and cattle. The biofuel from crops represents presently only about 1% of the liquid-fuel consumption. If instead 10% of the oil were to be substituted, about half of the crops used for food would be needed. This is clearly impossible since it is hard to see any drastic increase of crop production. With a growing global population, in the competition between food and fuel, food production must take priority. Increases in food production must come to the largest extent from a more efficient use of actual crops and intensified farming since a large increase of crop land cannot be expected. Intensified farming should be planned so that excessive leakage of greenhouse gases and nitrogen and phosphorous is avoided and preservation of the humus layer is secured. Intensive farming requires an ample supply of water and energy for machinery, fertilizers and transportation. The production of ethanol and other automotive fuels from primary crops is thus questionable for several reasons [8].

In Kazakhstan, the issue of food security is not as acute as compared with other countries. According to the FAO in 2010-2012 in Kazakhstan, the number of undernourished people is less than 5% [9].

However, the problem of food prices accessibility requires further study and search ways for it solving. Thus, the study of the dependence of food prices in Kazakhstan on world oil prices is relevant and important for the food security of the country.
Literature Review

Oil Prices, Economic Growth and Other Economic Indicators: The imbalance of the energy market, especially oil, is a bigger threat to the world economy. The lack of clarity with regard to the price of oil negatively influences the economic development plans. It is clear that the exorbitant price of oil, as well as very low, unprofitable as for the manufacturer and for consumers.

Oil prices influence on the economic and political processes that determine the value of the oil companies’ shares, the rate of their economic growth and level of inflation in oil-importing countries, as well as the intensity of the processes of centralization and concentration of production. It should also be noted that the oil prices are a guide in the formation of the prices of other energy sources.

Oil prices are one of the main indicators of the world economy. The increase of prices leads to a redistribution of financial flows and makes adjustments in world trade. The impact of this factor on the economy on a country varies depending on the share of the cost for oil in the national budget. The higher oil prices and the longer the situation persists, the greater the overall impact on the country from the macroeconomics point of view. Oil prices increase also influence on the change of trade balance exchange rate. In the long term, inflation increase and unemployment rise [10].

The importance of energy in general and oil in particular, in the economy became a source of widespread analysis in the early 1970's.

The first major oil price shock occurred when the Organization of Petroleum Exporting Countries (OPEC) cut back supply. Prior to this, oil prices were remarkably stable. Roughly at the same time as the oil price shocks occurred, the major economies fell into a worldwide recession. The timing of the two events tended to suggest a line of causality from oil prices to economic activity that spawned an exhaustive search for the macroeconomic effects of oil price shocks. Christopher Michael Jaeyk studied the relationship between oil price and Gross Domestic Product. His study attempts to separate the macroeconomic effects of oil price shocks into the effects on the Consumer Price Index (CPI) and the effect on the Industrial Production index (IPI) [11].

Bakhitbay Embergenov study whether the price of oil and output growth are moving in the same direction (so that the increase in the price of oil was primarily due to an increase in the demand for oil) or in the opposite direction (so that the increase in the price of oil was primarily due to an oil supply shock) [12].

Hannes Mellquist and Markus Femermo examined how the price of oil affects the unemployment in Sweden. Their main objective was to see whether a change in the oil price will cause a change in unemployment at a later stage. They performed linear regression analysis relating current changes in the variables and Granger causality tests to conclude if there exists a direct relationship [13].

Nir Klein explored the relationship between the oil and non-oil sectors among 23 oil exporters over the last two decades. He used a panel VAR approach, which allows for assessing the interaction between the two sectors without a priori assumptions on causation and time length in which the variables affect each other. The estimation results show that the “natural resource curse” effect is dominant only in high oil intensity countries. In this regard, the estimated coefficient implies that a one percent growth of the oil sector leads to a decline of 0.15 percentage points in the non-oil sector’s growth in the subsequent two years [14].

Udalov Vladimir evaluated the mechanism of distribution from oil revenues and determined the coefficients of correlation of macroeconomic indicators of the Russian economy with the dynamics of world oil prices. Interconnection of macroeconomic indicators of the Russian economy with the dynamics of prices on the world market of energy estimated with using of linear regression models [15].

Marc Gronwald, Johannes Mayr and Sultan Orazbayev analyzed the effect of oil price declines on key macroeconomic variables such as real GDP, inflation and real exchange rates using vectorautoregressive (VAR) models [16].

Oil Prices and Food Prices: Frank, J. and Philip Garcia estimated the linkages among agricultural commodities, oil and exchange rates in the new market environment.

First they identified the point of break and perform the analysis for each period, before and after the observed rise in prices. For the first period, from 1998 to 2006, the estimated VAR model indicates that exchange rate and crude oil have limited effect on agricultural markets, which appear to be most affected by the lags in their own prices. For the second period, from 2006 to 2009, the estimated VEC model indicates that the effect of own lags in the agricultural markets are smaller and the effect of the exchange rate and crude oil are more pronounced, especially in the corn market.
They also estimated impulse response functions from exchange rate and oil to agricultural commodities and the forecast error variance decomposition for each agricultural commodity.

The results suggest that an increase in oil prices is transmitted to agricultural markets via increases in production costs. On balance, the overall results suggest that the linkages among agricultural commodities and more macroeconomic variables such as exchange rates and oil prices have increased. In recent periods, agricultural commodity markets appear to more dependent on exchange rates and to a lesser extent on oil prices [17].

Gal Hochman, Scott Kaplan, Deepak Rajagopal and David Zilberman researched the relationship between food and fuel markets and identifies gaps between two bodies of literature: one that investigates the relationship between food and fuel prices and another that investigates the impact of the introduction of biofuels on commodity-food prices. The former body of literature suggests that biofuel prices do not affect food-commodity prices, but the latter suggests it does. They tried to explain this gap and then show that although biofuel was an important contributor to the recent food-price inflation of 2001–2008, its effect on food-commodity prices declined after the recession of 2008/09. They also showed that the introduction of cross-price elasticity is important when explaining soybean price, but less so when explaining corn prices.

The price of corn spiked in 2008. It then rebounded in 2009 and eventually reached US$223 a bushel in 2011; from 2001 to 2011 world corn prices increased by 150%. They found that biofuels contributed about 23% of the increase in the price of corn while economic growth contributed more than 50%. Exchange rate and energy price also contributed, however economic growth overshadows these other factors. This suggests changes in meat consumption and as a result the demand for feed, are the main drivers of the spike in corn prices during the last decade.

Their analysis suggests that further growth in income and thus demand for feed, also resulted in the spike of corn and soybean prices in 2010/11. The introduction of biofuels led to a 25% increase in the price of corn and soybean in 2011 relative to 2001, while economic growth contributed more than 50%. The remaining percent increase in corn and soybean prices was, among other factors, due to the consequences of low inventories, weather, large land-use shifts, speculative activity and export bans [18].

Ardian Harri, Lanier Nalley and Darren Hudson examined the price relationship through time of the primary agricultural commodities, exchange rates and oil prices. Using overlapping time periods, they examined the cointegration relationship between prices to determine changes in the strength of the linkage between markets through time. In general, they found that commodity prices are linked to oil for corn, cotton and soybeans, but not for wheat and that exchange rates do play a role in the linkage of prices over time. The results provide clear evidence that the strength of the relationship between corn and oil, which is indicative of the growing use of corn for ethanol, has increased over time. At the same time, greater use of petroleum-based inputs in both corn and cotton also link these markets. Equally important is the finding of the relationship between exchange rates, corn and oil, suggesting that all of these prices are interrelated. There are two main implications resulting from the findings of this research. The first implication has to do with the effect of the changes in the relationship between crude oil and corn prices in risk management strategies for corn producers. Changes in the relationship between the output (corn) prices and input prices (through crude oil) implies that the conventional strategies of managing output price risk may not work as well as before. [19]

Gábor Kemény, József Fogarasi, Tibor Varga, Orsolya Tóth and Kristóf Tóth are considered oil price volatility as a proxy of input prices. There is a strong link between input costs and output prices. Fertilizer prices, mechanize agriculture and freight costs are all dependent on oil prices which determine the price of wheat [20].

Joachim von Braun and Getaw Tadesse used seemingly unrelated regression to test the statistical and economic importance of supply shock, oil price shock and speculative actions in the commodity futures market.

The results indicate a significant difference between the data sets used for the analysis. If the whole data set from January 1986 to December 2009 is used, only excessive speculation is a highly significant determinant of food price spikes. But if price data since 2000 are used, oil price also has a significant effect on price spikes. The effect of supply shocks on spikes is limited to one commodity-soybeans.

- Generally, supply shocks are not an important cause of the price spikes. This result is in line with what would be expected because price spikes are very short-term fluctuations.
This also indirectly implies that declines in stock that may in fact aggravate the effect of supply shocks do not adequately explain the emergence of food price spikes.

As hypothesized, a market factor - excessive speculation-has significantly driven the extreme spikes seen in global food price dynamics.

The strong effect of oil price changes on recent food price spikes also highlights the increasing role of biofuel demand in the global food system. While the energy price mainly represents a demand shock via biofuels demand, it also impinges on supply via input- and transport costs, but much less so than via biofuels.

The general conclusion on price spikes is that they were driven by excessive volumes of futures trading more than by demand side (oil price) and supply side shocks.

The result also shows that demand-side shocks are stronger than market shocks (speculative volumes and financial crisis) and supply-side shocks. Both oil price shocks and supply shocks are statistically significant in all specifications. However, the effect of oil shocks is stronger. A 1 percent increase in oil price volatility increases food price volatility by about 0.47 percent (elasticity), which is stronger than the 0.35 percent increase due to financial crisis and the 0.19 percent increase due to a supply shock.

In general, a market-related shock (speculation) is a stronger cause than demand- and supply-side shocks for spikes and a demand shock (oil price) is a stronger cause than market and supply-side shocks for volatility. [6]

MATERIALS AND METHODS

There are different factors that influence the price of wheat in Kazakhstan. Prices for Kazakhstan wheat decline as due to external factors (increasing of the world wheat stocks, competition from Russia and Ukraine) and because of the limited logistics capabilities: the lack of grain carriers, ports congestion of the Black and Azov Seas by Ukrainian and Russian, the unfavorable political situation in the Black Sea area, impeding foreign trade [21].

In 2007 and 2008 for production of one wheat hundredweight were spent 1103.4 and 1594.9 tenge respectively. The largest share in the structure of costs are expenses for fuel, they make up 17-19%. Seeds (15-17%), wages (12.5-13.5%) and repair parts (10.3%) are also major components of first cost. For the other costs also spend significant amounts of funds. The smallest amount of funds spends for water, due to the technological feature of farming culture (unirrigated farming) in the northern regions, where the basic mass of the wheat is grown. Similarly, many times less energy is required, which also explains by the agro technological specific character of wheat cultivation in the north of the country. On specific weight of mineral fertilizers take about 5-6% of total costs [22].

In our analysis we used following factors which we assumed can influence on wheat prices in Kazakhstan (Y):

X1 = Gross yield of wheat in Kazakhstan in 2002-2011, thousand tons;
X2 = Wheat prices in Russia in 2002-2011, % by 2002;
X3 = World wheat (Canadian wheat) prices in 2002-2011, % by 2002;
X4 = World oil prices (Brent) in 2002-2011, % by 2002.

The Analysis Results of the Correlation Table Shows That:

- The wheat prices in Kazakhstan are dependent on the wheat prices in Russia (r_{xx2} = 0.87) and world wheat prices (r_{xx3} = 0.58);
- Interrelation between wheat prices in Kazakhstan and world oil prices is absent, also between these indicators observed opposite tendency.

One of the reason which can explain absence of world oil price influence on Kazakhstan wheat prices is small quantity biofuel production in the country.

Currently biofuel industry in Kazakhstan is evolving. Industry is represented by only one type of production of biofuels - bioethanol. Bioethanol is produced in Kazakhstan since 2007. The volume of production in 2007-2008 was 3845 tonnes and 2683 tonnes respectively [22].

Lack of world oil price influence on wheat prices in Kazakhstan can be also explained that price for wheat regulates by the National Company Food Contract Corporation in the country.
Linear regression model analyze the relationship between the price of wheat in Kazakhstan (Y) and the price of wheat in Russia (X2) and world wheat prices (Canadian wheat) (X3), using the. Because of multicollinearity relationship between wheat prices in Russia and in the world, it is wrong build a two-factor regression model. So, in this case restrict Simple Linear Regression is the right model.

Interconnection wheat prices in Kazakhstan (Y) and wheat prices in Russia (X2) and world wheat prices (Canadian wheat) (X3) is described by the following equations:

\[ Y = -25.9 + 1.05X_3 \]

\[ Y = 20.88 + 1.119X_3 \]

According to our estimates, we expect that in spite of the wheat gross harvest of in Kazakhstan price will grow according to a parabolic trend

\[ Y = 83.5t^2 + 1185.5t + 8405, 8 \quad (R^2 = 0.8) \]

**RESULTS**

There are many factors that contribute to high and volatile agricultural prices, making necessary a combination of policy responses. In order to meet their objectives, policies need to be legitimate and broadly owned by relevant stakeholders, particularly those policies that aim to restore trust in markets and avoid panic-driven behavior. The goal of the policies recommended is not to eliminate agricultural price volatility, but rather to reduce uncertainty and perhaps also the amplitude of variations by smoothing out the extremes. Most importantly, price volatility should reflect market fundamentals as accurately as possible and not convey incorrect signals as a result of missing or wrong information, speculation, panic or other disruptive factors [2].

We analysed correlation between world oil prices and wheat prices in Kazakhstan. Our main result of research is absent of this correlation, but we found dependence of wheat prices in Kazakhstan on world wheat (Canadian wheat) prices and wheat prices in Russia.
REFERENCES


22. Grain production development and its deep processing. The master - plan