On what Factors the Wheat Production and Price Depends

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Abstract: Wheat is a basic cereal in the catering in Europe. There are a lot of factors which can affect the price and quantity of this crop. The experts need to understand the main factors of price and quantity changes. The aim of this article is to find what factors can affect the price and production of wheat. Why is it so important and useful? With the knowledge of these factors, we can predict the volume and price of wheat based on explanatory variables. If these explanatory variables change, the characteristics of wheat would change expectedly. Using international and Hungarian bank, statistical, price data to find these factors, and some basic statistical methods (mainly correlation analysis) this paper examines the main factors influenced. The hypothesis of the article is that oil price, exchange rates, transportation, population increase, climate change are some of the main factors which can affect the question of this grain. The cost of transportation influences the price of wheat and there are some links between the characteristics of wheat and factors examined. The most significant factors are oil price, increase of population, and ruin of soils. The world commercial has to take into account these changes in the wheat markets. Preventing the ruin of soils is standard protocol for wheat production, but how to deal with an increasing population is a much more complex question.

Keywords: wheat production, effects, prices.

Introduction

People in different parts of the world use various sources of energy for subsistence. In many developing countries, up to 75% of energy demands by the body is provided by carbohydrates.

The world's 30 most important food plants include cereals, root crops, fruits, vegetables and legumes. Some, for example corn and wheat, are widespread and in different amounts across North America, South America, Europe, Africa, Asia

and Australia. The three most important cereal crops are wheat, rice and maize, followed by sorghum, barley and oats. The corn, oats, barley and grain sorghum in the US as fodder plants is also used in large quantities. In 2000, the amount of grain produced in the world was 1871 million tons, of which 332.2 million tons were the US share of volume. Corn and wheat are widely grown in North America, Central America and South America, with large quantities concentrated in certain areas. Rice production is greatest in Asia.

Grain crops are relatively cheap and easy, and contribute to the reduction of hunger and population explosion. Crops and potatoes cover over of 75% of the caloric needs of the world's population. This ratio is even higher in certain parts of Asia, approaching 90% (Sárvári, 2011).

One of the major food crops is wheat, which plays a very important role in the nutrition of the world and Hungary. There were times when some prisoners survived on only bread and water for months or even years. Food is also a matter of wheat, mainly in the temperate climate zone countries. Biological parameters in addition to the main purpose of the article is to briefly examine what are the main factors that affect world trade in wheat markets, and the impact on the domestic wheat trade. As with any product market, there are special features specific to wheat, and this article examines the possible influencing factors one by one. If a relationship(s) exists between these factors, it is necessary to determine the strength of this (or multiple) relationship(s). I hope by reading this article the reader understands the most important factors in the world trade of wheat, because knowing these factors can predict future trends.

Wheat is a basic food mainly in the temperate climate zone countries. The main purpose of the article is to briefly examine the main factors that affect world trade wheat markets, and the impact on the domestic wheat trade. As with any product market of wheat, there are specialties, with features that can only occur with him. The article looks through one by one and examine the possible influencing factors, and to consider if there is a relationship between the factors, then how is strength. So I hope by reading this article the reader understands what are the most important factors in world trade of wheat and knowing this, what are the likely future trends.

In general, agriculture is a sector with the highest risk in the production process. It is very sensitive to different factors like changing temperature, rain/lack of rain and other precipitation patterns as well as frequencies of extreme weather events. Effects on agriculture trickle down to producers, yield, and eventually production prices. The qualiy of the soil can dictate if one country reaches a high yield and another country simultaneously produces almost zero because of drought or other extreme weather. Some studies have dealt with these types of factors (for example Mendelsohn et al., 1994, Nelson et al., 2014, Mitterl et al., 2015 in Fogarai et al., 2016)

Prices of agricultural commodities are naturally unstable. The variability of prices is caused by the fluctuation of weather and pest events that influence harvest and that are aggravated by the varaible nature of demand and supply. Besides these, agricultural commodities are connected to financial and energy markets, with destabilizing impacts on prices (von Braun and Tadesse, 2012).

This study would examine factors influencing the world market price of wheat. Since Hungarian food markets are the part of the global market, it is necessary to take into account international trends. The question arises: what are these factors? Based on practice we have to examine the price changes of petroleum, the fluctuation of exchange rates, competitivness, the changing eating habits, climate change, the effects of competitors, logistics and other important effects.

Sixty percent of world cereal production consists of wheat and corn. Therefore, they are vital to the evolution of mankind in terms of nutrition. According to the UN Food and Agriculture Organization, the FAO final data for 2012 was a harvest of 872.8 million of the world's corn, and wheat amounted to 671.5 million tonnes. The yield of corn was the second while wheat was the fourth largest after sugar cane, - animal goods origin - involving agricultural products ranking. In terms of the cereals harvested in 2012, the global quantity of corn was 34%, 29% for paddy rice, and wheat was 26%. Compared to 2005, the increase in yield for maize and wheat in recent years was 22% and 7%, respectively. The increase in yield occurring over seven years in the case of maize growing area is caused by the predominantly growth (21%), while in the case of wheat in respect of expansion experienced solely due to the rise in yields (8%).

66% of the wheat grown in the world serves to feed people. In addition, only 20% is used as animal feed, while the remainder are seeds, starch, and ethanol production material. Human nutrition in developing countries, twice as many cereals (mainly flour) were consumed on average than in developed countries. (Statisztikai Tükör, 2014.)

My main aim is to identify the factors which concern the wheat production and price in general. According to practical experiences there some explanatory variables which are likely influencers, for example the price of wheat. In this article, I will examine if this is true or false. As aforementioned, one aim is to discover the connection between price changes of oil products and wheat. I assume that the price change in oil prices can affect the wheat production. Furthermore, I can search the affect of the exchange rate, transportation, biodiesel, speculation in finance markets, population change, climate change, rain and irrigation, water and soil effects.

1   Methodology

This article examines the scope for Króner Csilla's (2016 Szent István University) thesis as it presents the scientific literature and experts views. However, where data is available, I would like to support or criticize the factors listed and to question the existence of a relationship using statistical and mathematical methods. This articles examines the issue in greater depth and I intend to present the results in the context of the relevant research. Therefore, I will examine the relation of the characteristics of wheat (for example price changes of petroleum, the fluctuation of exchange rates etc.) with the method of correlation analysis.

If both of the cause and the effect is mediated by quantitative criteria we speak about a correlational relationship. Hereinafter primarily shown in the relationship between a factor or explanatory variables (X) and a dependent variable (Y) is measured, however, it should be understood that in reality it is not usually one, but several factors formed jointly in a complex result from a phenomenon. However, in the measurement of correlation analysis, the combined effect of several factors can be easily resolved. The nature of correlation allows for the interpretation of the following relationships between variables: monotonic correlation, which encompasses linear relationship. Both connections can be positive or negative, which helps with perceiving the graphical display. Two existing relationships between the quantitative criteria can be represented well in the Cartesian coordinate system, a so-called points chart. The correlation between the measurement of the most widely used indicator of the linear correlation coefficient (labeled r), assuming a linear relationship between the variables in which the application or if the linearity assumption is not far from the studied problem. The correlation coefficient calculates how characteristic variables move together and includes a measure of standard deviation in covariance variables (Ács, 2014.).

1.1   The effects of the price of petroleum

The markets of today are based on the industry of fossil energy, transportation, and logistics; agriculture has to use petroleum products to work. Petroleum, natural gas and coal are a large part of energy needs. The basic production sectors are exposed to the energy sector including petroleum sector. Energy resources desposing of humanity will be exhausted, therefore the energy sources of our societies have a level of uncertainty. There is concern about the over-consumption of energy. An average American citizen consumes 95-100 times more energy than a Tuareg one. In 1860, 15% of the world's entire energy usage was still human origin, 73% was animal origin, and 12% had "other" origins. Today, territories with the poorest animal and human energy resources produce 99% of their total energy by "other" resources. The average energy consumption equals the power of 60 slaves or the energy of 6 draft horses. Hungary's average equals 2 times the average of the world, and the average of the US is 6 times. The African average is one sixths of it. (Tóth József, 2010.)

In addition, the question of food issues also appears. On Earth, about 925 million people are chronically underfed. This is 8% of humanity. Every year millions of people die from starvation or chronic malnutrition. These deaths are almost certainly avoidable if given access to basic needs, such as good medical care and adequate nutrition. Overproduction is a crisis in some regions, and some states pay the farmers not to produce. The solution is to increase food production commensurate to population growth in poor countries. In particular, appropriate agricultural production technologies are exported widely to resolve issues of irrigation, proper seeds to use, reducing crop losses, pest management and fertilizer solution and mechanization spreading. (Tóth József, 2010.; A világ helyzete 2013.)

Let us examine under several sets of data, and observe if there is a close correlation is between oil and oil products market price and the wheat and the market prices of wheat-based products. Króner's studies covered prices of unspecified petroleum-based or corn-based product groups between 2006 and 2015. The author has found a correlation between the two sets of data values. Furthermore this article examined the issue using correlation analysis. The correlation coefficient is 0.69 which points to a moderate connection. But, there is a strong relationship over 0.7, so actually the price of petroleum products can influence the prices of wheat products from moderate to heavy. The determination value is 48%. We can tell that the cost of petroleum-based products defined the price of wheat-based products with 48% in this period. We definitely assume the fuel prices' influence.

R=0,8245	Wheat purchase price HUF/kg	Crude oil price HUF/Barrel
2004	23,4	7396
2005	20,5	10111
2006	26,3	12858
2007	43,7	12699
2008	40,1	16227
2009	29,9	12350
2010	39,2	16121
2011	51,2	21593
2012	60,4	24667
2013	47,8	23683
2014	48,4	22389
2015	48,7	13830
2016	40	11421

Table 1.

Wheat purchase price and Crude oil price in Hungary in HUF 2004-2016.

Source: Ksh, MNB, own editing

My investigations included the relationship of the prices of wheat and of crude oil. Based on the data of the period between 2004 and 2016 it can be said that there has been a strong relationship among the different prices, such as there are changes in crude oil prices wheat price will change the price of it. The correlation coefficient is 0.82. Based on the coefficient of determination, 68% of the price of crude oil is explained by changes in the price of wheat. Continuing the tests, I compared the Hungarian fuel and bakery prices.

· R=0,813350157598501	· Bakery price HUF/kg	· Fuel price HUF/l
· 2004	· 188,7	· 233,5
· 2005	· 184,7	· 256
· 2006	· 190,7	· 274
· 2007	· 229,3	· 269,5
· 2008	· 262,7	· 301
· 2009	· 261,0	· 272,5
· 2010	· 261,7	· 328
· 2011	· 288,7	· 381,5
· 2012	· 289,0	· 430,5
· 2013	· 279,3	· 423
· 2014	· 269,0	· 413
· 2015	· 267,0	· 359
· 2016	· 268,7	· 331,5

Table 2.
Bakery and Fuel prices in Hungary 2004-2016.
Source: Ksh, MNB, own editing

Here I found an even stronger relationship than the previous ones. In our country, there is a close link between the average price of the bakery and fuels on the basis of data between 2004 and 2016. The fuel price explains the price of bakery products by 66.2%.

Third investigation concerns the international markets. The world market price of wheat and the crude oil price per barrel were compared, both in dollar terms.

· R=0,875219026 55203	· Wheat purchase price USD/bushel	· Crude oil price USD/barell
· 2004	· 3,6	· 36,5
· 2005	· 3,4	· 50,64
· 2006	· 3,7	· 61,08
· 2007	· 5,8	· 69,08
· 2008	· 6,5	· 94,45
· 2009	· 4,3	· 61,06
· 2010	· 5,4	· 77,45
· 2011	· 7,9	· 107,46
· 2012	· 6,8	· 109,45
· 2013	· 7,07	· 105,87
· 2014	· 5,4	· 96,29
· 2015	· 5,2	· 49,49
· 2016	· 4,3	· 40,76

Table 3.

Wheat purhase price vs. Crude oil price in the world market 2004-2016.

Source: http://inflationdata.com and http://www.macrotrends.net, own editing

Here we find an even stronger relationship. Crude oil prices explains 76.6% the price of wheat.

It can be stated that the price of wheat strongly influences the price of crude oil and the price of wheat-based products is strongly influenced by the prices of petroleum-based products (eg. Fuel).

Some writers can confirm this result. According to Lymperis (Lymperis, 2014) there is a connection between the energy and agricultural sector. The energy prices can take any information that could somehow explain future changes of the grains. His research found that oil prices affect wheat and soybean prices. For example the movement of oil prices was transferred to the agri-markets.

Villegas Ortiz has found that „nearby oil prices consistently have a negative and significant effect on wheat basis—both nationally and within regions in the US.

The effect of a USD $1 increase per barrel of oil ranges from 1 to 8 cents per bushel at the national level, from 0.1 to 0.5 cents within the Midwest region, and it is fairly stable at a 0.1 cent decrease in the Gulf Coast region." This research was based on wheat prices, not on grain prices. In the general literature, grain ranges from 11 to 18 cents per bushel. (Villegas Ortiz, 2016.)

Mutuc et. al. researched and found that the monthly changes of cotton, soybeans, corn, wheat prices were affected by changes in oil prices The global real economic activity can affect the oil prices, as well. (Mutuc et. al, 2010.)

There is a strong correlation among oil and commodity prices. According to initial statistical research there is no causal link between the energy and agricultural sector. But other research shows that the change of oil price can affect the prices of corn, soy and wheat prices. (Saghaian, 2010.)

Grain prices are converned by levels of oil prices. High oil prices have a direct impact on grain production and prices because thes cause higher production cost. (Kong et al. 2012)

These facts are verified by another research in 2009. „Recent oil price shocks appear to have triggered sharp price changes in agricultural commodity markets, especially the corn and wheat market, potentially because of the tighter interconnection between these food/feed and energy markets" (Xiadong et al., 2009)

1.2   The effects of exchange rates fluctuation

The economics is well known that weakening national currency favors exporters, while strenghtening the national currency helps the importers. Hungary's most important grain trade partners are: Italy, Germany, Austria, and Romania. The typical settlement currency with these countries is the euro. This is why I examined the relationship between the euro and the selling price of wheat using a correlation. Typically, most of the acquisitions are in the summer from June to September, and therefore I compared the data of these months to the foreign exchange rate with the euro. And I examined the annual average prices and exchange rate changes.

In the summer months there is a not loose correlation coefficient in the change of the euro, as the exchange rate only explained 16.5% of the prices of wheat.

What do we find in the case of annual average selling price of wheat?

. R=0,767074835	· Wheat price HUF/kg	· EUR/HUF
· 2002	· 22,8	· 242,9
· 2003	· 30,2	· 253,5
· 2004	· 23,4	· 251,6
· 2005	· 20,5	· 248
· 2006	· 26,3	· 264,27
· 2007	· 43,7	· 253,35
· 2008	· 40,1	· 264,78
· 2009	· 29,9	· 270,84
· 2010	· 39,2	· 278,75
· 2011	· 51,2	· 311,13
· 2012	· 60,4	· 291,29
· 2013	· 47,8	· 296,91
· 2014	· 48,4	· 314,89
· 2015	· 48,7	· 313,12
· 2016	· 40	· 311,02

Table 4.
Wheat prive and exchange rates of Euro and HUF 2002-2016.
Source: Ksh, MNB, own editing

Strong links exist between the wheat procurement price and the exchange rate of the euro. It is true that the change in the exchange rate affects the purchase price for wheat. The exchange rate of the euro explains purchase price for wheat by 58.8%.

What is the explanation for the deviation of two tests? On the one hand, seasonality, and on the other hand, we can speak about eating wheat in tha case of the summer average which represents a higher quality than all wheat. Thus, if the farmers seek higher quality, they can eliminate the influence of the exchange rate fluctuations. Furthermore, eating wheat is less exposed to external trade, compared to, for example, feed wheat which is more susceptible to export and import.

Abbott et. al argued that the depreciation of foreign exchanges (U.S. dollar researched) is one key factor which contributed to the food price increases in some years ago. (Abbott et. al., 2008.)

Correlations among energy, agriculture, and exchange rate markets are relevant. „A good reason for these correlations could be the fact that grains are directly linked with ethanol and oil markets through the oil–ethanol–corn linkages. Also, a large percentage of grain output is exported and because crude oil prices are denominated in U.S. dollars, oil price hikes increase the supply of the dollar worldwide that lead to dollar depreciation and, in turn, increase demand for U.S. grain exports." (Saghaian, 2010.)

1.3 The effects of transportation

There are different characteristics for different transport modes. Each one has its advantages and disadvantages. They have in common that an energy source (eg. Fuel, electricity) price depending on the shipping charge. For a diesel engine or a barge, there is a clear correlation of these factors, but this includes electric locomotive. Road transport is the most flexible mode of transport. The liability insurance, road tolls, weight tax, fuel price, the driver wages affect the cost. The advantage of road transport is that it is possible to deliver door to door, it is fast, has flexible pricing, it is not necessary to be transhipped, and the risk is not excessive. The disadvantages are pollution, high demand of labor and energy needs specifically, there is high waiting times at borders, restrictions on the road, unpredictable journey times, the limited dimensions and weight, and the bad quality of Hungarian roads.

The rail freight is a transport rail subjectes. Its advantages include: moving in a protected field, well calculated travel time, less expensive mode of transport, the ability to move large crowds, and Combined Transport. The disadvantage are that there is no door to door transportation, it's slower than the road, and uneconomical in short distances.

River or ocean shipping is the cheapest mode of transport. The advantages are: delivery of a large crowd, and Combined Transport. The disadvantages are the slowness, longer transport times, higher insurance premiums, and ports are a large distance from the destination (Sebestyén, 2013).

Air transport is not an option when we have to transport grain, specifically because it is the most expensive mode of transport, and as the grain is not perishable there is no need for fast transportation.

The main item of wheat costs are transport costs. As I mentioned, the wheat target countries are Central and Eastern European countries. Since delivery comes at a significant cost, the logistical issues have significant costs.

According to the Ksh data, we see that the most common mode of transport in the respect of mileage is the navigation on the Danube, and in recent years road transport has become the leading mode. River transport can be the most cost-effective, but is subject to changes in weather. Some sections of the river are

subsided in the summer drought period so the barges become stuck. They must then switch to road freight. With rising costs and decrease in profits, the deliveries slip. (Króner, 2016)

This is the impact of transportation cost on grain prices. There is a positive significant effect of oil price on transportation and oil prices can therefore affect the price of wheat. (Villegas Ortiz, 2016.)

1.4 The effects of biodiesel and bioetanol

Analysis on rising food prices usually assess the role of the biofuel industry (Popp - Potori, 2008 in Popp et al., 2010). Some researchers attributed surging biofuel demands in 75 percent of food price increases (The Guardian, 2008 in Popp et al., 2010), some in 10-30 per cent (eg. IFPRI, 2008 in Popp et al., 2010) alongside other factors mentioned above (eg. Drought, changes in consumer habits, speculation, etc.). According to Collins (2008), the use of corn for ethanol production has contributed in 25-50 percent increase of the price of the crop (in this case the growth of producer prices of maize) (Popp et al., 2010).

The role of wheat is small with regard to bioethanol production compared to corn, but there is a strong link between the evolution of the price of corn and wheat. There is close relationship in Hungarian purchase price of wheat and corn. We can observed the same in the world market prices. Our country stands at the 24th volume with 1500 barrel per days in the whole world bio-ethanol fuel manufacturing. The total amount is 1.45 million barrels per day worldwide.

· R=0,903303779	· Wheat purchase price USD/kg	· Corn purchase price USD/kg
· 2004	· 3,6	· 2,1
· 2005	· 3,4	· 1,89
· 2006	· 3,7	· 2,3
· 2007	· 5,8	· 4,09
· 2008	· 6,5	· 3,5
· 2009	· 4,3	· 3,4
· 2010	· 5,4	· 4,2
· 2011	· 7,9	· 6,8
· 2012	· 6,8	· 6,6
· 2013	· 7,07	· 5,8
· 2014	· 5,4	· 3,4
· 2015	· 5,2	· 3,7
· 2016	· 4,3	· 3,7

Table 5.

The average price of wheat and corn in the world market 2004-2016. Source http://www.macrotrends.net own editing.

Carriquiry et al. found that with ethanol consumption increasing, wheat prices trickle down to other crop prices. Higher ethanol demand pushes up the ethanol price and leads to higher production. There is another connection. As increasing demand of wheat as a feedstock in ethanol production, both wheat production and the wheat price increase. The world price of wheat increases. „The United States and other wheat exporters increase the supply of wheat to the world market to compensate for the short supply from the EU. U.S. wheat exports increase 0.03% and wheat area increases 0.008%. …As wheat accounts for a substantial share of the feed ration in the EU, livestock and dairy production are adversely impacted by the increasing use of wheat for ethanol production." (Carriquiry et. al, 2010)

Increased biodiesel consumption results in a higher biodiesel price, and a higher price of rapeseed causes expansion of its planting area while a sufficient rapeseed meal supply dampens the meal price. (Carriquiry et. al, 2010)

The Renewable Fuel Standard (RFS) makes compulsory a certain level of alternative fuels to be blended into gasoline annually. The level increases each year. Hanon found that RFS had a positive impact on corn and food prices. After

Hanon researched the question and the result was that corn prices were increased by the RFS but in the case of food prices the impact is more ambiguous. Wheat and barley prices also were impacted by the RFS. (Hanon, 2014)

1.5 The effects of speculation and monopolistic companies

Due to the 2008 crisis and brokering scandals in recent years, investors are looking for forms that are not sensitive to these effects. One option is to invest long-term values in which demand is stable or increasing. Eg. Gold, real estate, or even basic foods. Wheat is a possibility.

We can find representatives in brokerage firms specializing in trade in commodities and we may also find representatives who specialize in the cereal sector. Spot, futures and options are realizable in the Commodities Section. Customers and brokers can obtain physical goods with IGS on the cash market. The appropriate level of prices can be ensured in advance up to 17 months. The contracts relate to a quantity of 100 tonnes, and costs are valid with shipped to Budapest Csepel Freeport.

Central European grain contracts can be traded in euros are unique among the futures because they have multiple delivery points along the Danube. These contracts have become attractive to traders from the neighboring countries.

The three most active instruments - corn, wheat and sunflower – can be associated with buying and selling American-style options in the option market. The product range of the most popular cereal product is corn having been a turnover of more than 50% share. (Fodor et al, 2008).

Large multinational companies with the highest turnover are able to influence the grain markets and prices developed. These companies are in the largest markets, and in many of the countries where wheat cultivation is importance. Its subsidiaries are in the major stock markets to be able to efficiently informed or traded.

1.6 The effects of population changes

Does the yield of wheat and the number of population trends have any effect on each other? To determine whether the wheat harvest and the amount of the purchase price can affect each other can be used again in statistics methodology.

·	· Wheat harvested volume tons	· Wheat retail price HUF/kg	· Population of Hungary
· 2004	· 6 007	· 23,4	· 10 108 000
· 2005	· 5 088	· 20,5	· 10 097 549
· 2006	· 4 376	· 26,3	· 10 076 581
· 2007	· 3 987	· 43,7	· 10 066 158
· 2008	· 5 631	· 40,1	· 10 045 401
· 2009	· 4 419	· 29,9	· 10 030 975
· 2010	· 3 745	· 39,2	· 10 014 324
· 2011	· 4 107	· 51,2	· 9 985 722
· 2012	· 4 011	· 60,4	· 9 931 925
· 2013	· 5 058	· 47,8	· 9 908 798
· 2014	· 5 262	· 48,4	· 9 877 365
· 2015	· 5 331	· 48,7	· 9 855 571

Table 6.

The average price of wheat and harvested volume and population in Hungary 2004-2015.

Source Ksh. Own editing.

There is an inverse loose relationship between the price of wheat and the harvest, rather than the quantity is primary expositor of prices (R = -0.311). However, there is reverse strong link between the population and the price so that the development of the population has a strong impact on the price of wheat (R = -0.783). As the population decreases, the price of wheat increases. There is an additional explanation is needed. As the population decreases in normal way the demand can decreased. This study does not stay. Some of the wheat produced go for export, so the local market conditions can make the prices it looks like it would influence the population.

The strange situation occurs that the population of the wheat production leader countries is reduced and where can be observed growth in the population, those countries do not have wheat substantial volumes in wheat production, that started a hunger spiral, more and more people are suffering from hunger on Earth.

1.7   The effects of climate change

Many experts studied the relationship between climate change and agriculture. Because of extreme weather anomalies of last years, decades, ages we have to

make the question of how the weather could be expected and how the weather will affect on the yield and the market prices in the future.

Some modells are done to measure the effect of the climate change on the agriculture and analyze the correlation of different Factors and this one. Webster Some studies have dealt with this effect on Hungarian agriculture. (Fodor et al., 2014, 2014 Gaal et al in Fogarasi et al.,., 2016)

Fogarasi et al. Climate measures the effects of this on expected yields. Said article The hurt the average forecasted yields varied according to the climate scenario which Meant different systems of climate condition. There was no scenario is favourable climate for the crops. (Fogarasi et.al., 2016)

1.8   The effects of rain and irrigation, water

A significant portion of the Earth's surface is water, but the significant part of its water resources is in salt water. Due to the water cycle, 110,000 cubic meters water goes to the ground in snow, rain, etc. form. This is available in 39%. This is used in 70% by agriculture, in 20% by the industry while the remaining by the cities. 82% of arable land is irrigated by natural precipitation and does not receive supplementary irrigation. The main cause of the problems is that we take more water out of eg. the soil than it would be to maintain for the balance and this reason for some water supplies are starting to run out.
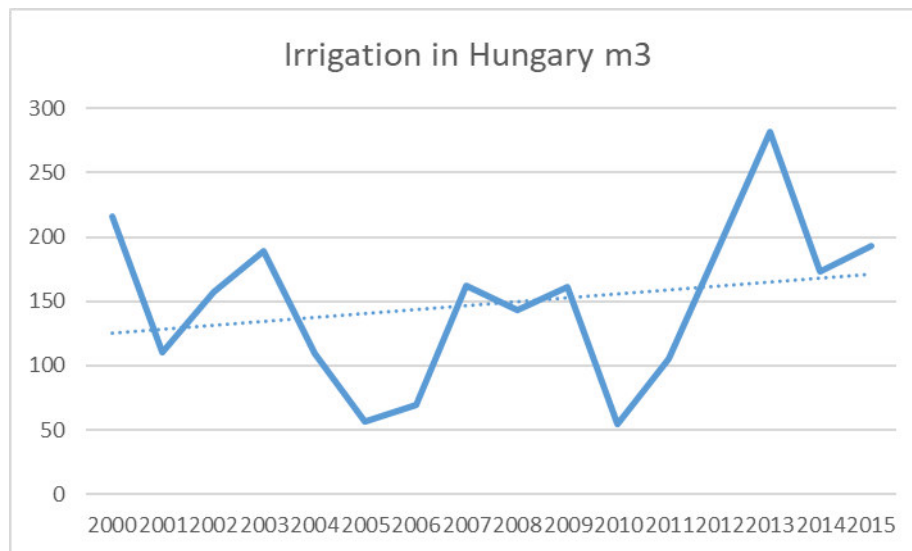
Graph 1.
Irrigation sold in Hungary 2000-2015. Source: Ksh own editing.

Similarly, the amount of water used increase in the Hungarian Agriculture. Mainly irrigation water should be used in order to protect the crop during drought period. In any case, the lack of water may result in lower quantities produced, which will cause an increase in consumer prices. (Világ helyzete 2013.))

1.9   The effects of soil (quality and quantity)

The land can decrease in both of in quantity and in quality. In the first case it may have positive effects because we are witnesses as withdrawn from cultivation of bad quality lands. It does not happens in every cases. Desertification does not affect our country, but in other parts of the world, yes. As a result of it, there can be reduced the amount of arable land. In our country there is decrease due to the non-cultivated virtue and the amount of withdrawal from cultivation of the land. If this occurs, then we can count price increasing impact of lower yield.

The other major problem is the deterioration of the quality of soils. The soils are exploited less and less organic matter and minerals, so it will reduce the nutritional value of crops as well. By contrast, soil fertilization is very serious problems, leading to soil nitration. The price of agricultural land has continues grown since 2008, and has an average of it is about 1 million HUF per hectare. It is increasingly difficult to get land and its improper use or even over long periods of set-aside will reduce the supply of crops. (Ksh)

Conclusions

Many factors affect the cultivation of wheat, the selling price of it in the world and in our country. The effect of oil is clear, but the effects of other transport fuels in the future will be demonstrated on the basis of the investigations. The exchange rate fluctuations of currencies and the impact of commodity speculation, we can not rule out, but they can affect regardless of the wheat. There could be an issue even changes in eating habits. As a developing country is developing a growing proportion of the population wouldeat foods of animal origin, which are needed to produce a unit of larger areas such as the cultivation of a vegetable grain. In the relationship to bioethanol production and consumption of wheat is likely to increase the increase of use, but this factor depends on law as well. The growth of population has a significant impact on the development of prices and the climatic changes and decrease of land and dwindling water resources is likely to cause trouble in the future, thereby influence the production or prices.

References:

[1] A világ helyzete Van még esély a fenntarthatóságra? Föld Napja Alapítvány, Budapest, 2013. World watch Institute: State of the World

[2] Abbott, Phillip.C., Hurt, Christopher, Tyner, Wallace,E.: ''What's Driving Food Prices?'' Issue Report, Farm Foundation

[3] Ács Pongrác szerk.: Gyakorlati adatelemzés, p. 228-231. PTE ÉTK, Pécs, 2014.
http://www.etk.pte.hu/protected/OktatasiAnyagok/%21Palyazati/Gyakorlat iAdatelemzes.pdf download 18th of March 2017.

[4] Carriquiry, Miguel, Dong, Fengxia, Xiaodong Du, Amani Elobeid, Jacinto F. Fabiosa, Ed Chavez, Suwen Pan: World Market Impacts of High Biofuel Use in the European Union Working Paper 10-WP 508   July 2010.
http://ageconsearch.tind.io/record/91923/files/10-WP_508.pdf   download 22th of April 2017.

[5] Du, Xiaodong ; Yu, Cindy L. ; Hayes, Dermot J.: Speculation and Volatility Spillover in the Crude Oil and Agricultural Commodity Markets: A Bayesian Analysis. Selected Paper prepared for presentation at the Agricultural & Applied Economics Association 2009 AAEA & ACCI Joint Annual Meeting, Milwaukee, WI, July 26-28, 2009.

[6] Fodor Lóránt, Szabó Imre László: Kereskedés az integrált budapesti értéktőzsdén Gazdálkodás 2008 1.sz.

[7] Fogarasi József, Kemény Gábor, Molnár András, Keményné Horváth Zsuzsanna, Zubor-Nemes Anna, Kiss Andrea: Modellin climate effects on Hungarian wheat and maize yields, Studies in Agricultural Economics 118, p. 85-90. 2016.

[8] http://inflationdata.com download 18th of March 2017.

[9] http://www.indexmundi.com/energy/?product=ethanol&graph=production &display=rank download 18th of March 2017.

[10] http://www.macrotrends.net download 18th of March 2017.

[11] Kong, Minji ; Han, Doo Bong ; Nayga, Rodolfo M., Jr. Interrelationship and Volatility Transmission between

[12] Króner Csilla: Magyarországi búzatermesztés lehetőségei és kihívásai a kereskedelemi értékesítésben, szakdolgozat SZIE KTK, 2016.

[13] Ksh: Külkereskedelem   2014.
(https://www.ksh.hu/docs/hun/xftp/idoszaki/kulker/kulker14.pdf) typically download

[14] Lymperis, Georgios:The Relationship of U.S. Agricultural Commodities with Oil and Ethanol Prices, London

[15] Mutuc, Maria M., Pan, Suwen, Hudson, Darren: What Drives Commodity Prices More: Oil Demand or Supply

[16] Popp József, Somogyi Andrea, Bíró Tamás: Újabb feszültség a láthatáron az élelmiszer- és bioüzemanyag-ipar között. Gazdálkodás, 2010., 6.sz.

[17] Saghaian, Sayed H.: The Impact of the Oil Sector on Commodity Prices: Correlation or Causation? Journal of Agricultural and Applied Economics, 42,3 (August 2010):477–485 2010 Southern Agricultural Economics Association

[18] Sárvári Mihály: Egyéb gabonanövények termesztése, DE, NYME, PE, 2011.
http://www.tankonyvtar.hu/en/tartalom/tamop425/0010_1A_Book_adaptalt _02_egyeb_gabonanovenyek_termesztese/ch02.html download 18th of March 2017.

[19] Sebestyén László: Szállítás, Fuvarozás, Szállítmányozás, Budapest, Kit kiadó, 2013.

[20] Statisztikai Tükör: A búza és a kukorica termesztése, kereskedelme és felhasználása a világon, 2014.

[21] Tóth József főszerk.: Világföldrajz, p.698-699. Akadémiai Kiadó, Budapest, 2010.

[22] Tristan Hanon: The new normal: A policy analysis of the US renewable fuel standard, SS-AAEA Journal of Agricultural Economics, 2014. https://ageconsearch.tind.io/record/232730/files/TristanHanonFinal.pdf download 2nd of May 2017.

[23] Villegas Ortiz, Laura: No train no grain: the impact of increased demand for rail services by the energy sector on wheat prices – a preliminary analysis. International Journal of Food and Agricultural Economics Vol. 4 No. 3, 2016, pp. 103-125

[24] von Braun, Joachim., & Tadesse, Ghirmai:. Food Security, Commodity Price Volatility and the Poor. In Masahiko Aoki, Timur Kuran & G. Roland (Eds.), Institutions and Comparative Economic Development: Palgrave Macmillan Publ. IAE Conference Volume 2012.

[25] www.ksh.hu download 18th of March 2017.

[26] www.mnb.hu download 18th of March 2017.

[27] www.mnb.hu download 18th of March 2017.