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Research Article

Bioresources Price Trend and GDP Growth Adjustment

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ABSTRACT:

After 1970s, the global wealth and international economic indicators had lost their gold base. Since that days till now the problems of the global material resources' real prices determination, its dynamics, balances and flows have stayed actual. Therefore, this article focuses on the dynamic of basic bioresources (wheat, rice) and minerals (crude oil, gold) prices, as well as on the indicator of the gross domestic product (GDP). Using of the data for the period from 1989 to 2018, econometrics methods are used to find out long run relationships between wheat price level and its determinates, such as world GDP growth adjustment. A related wheat-USD inflation model specifies that world GDP dynamic for the last year had a steady negative trend. The wheat-USD inflation implementation shows that US CPI index can be used to world GDP adjusting in some particular situation. The results reveal that word GDP adjusted for wheat-USD inflation is a useful method for global economic growth prediction.

Keywords: bioresource, minerals, wheat price, inflation, wheat inflation, GDP, economic growth

[I] NTRODUCTION

Understanding the factors of global economic growth and international inflation trends, an actual problem estimates a real prices of the basics bioresources, especially food. The World Bank has reported that population of the Earth has been increasing, from 5.2BLN in 1989 to 7.5BLN in 2017, which equals to 82 million per year. During this period the world GDP in USD has increased from USD 20TLN to USD 81TLN [12]. Therefore, in average everyone has become richer in 2.8 times. But this is only nominal estimations. In 2009 the world GDP showed 1.7% rise, but food production rate did not change in that year. This is explained by the financial market fluctuations and the fact that any currency is subjected to inflation and USD is not an exception. Therefore, this is an actual direction for the economic researches and business activities.

As M. Friedman (1963) proved, the supply of specific goods constraints drives up its prices and

wider inflation trends [4]. The inflation of national currency can be regulated by monetary policies decisions. On the other side, global supply and prices of the basic bioresources, and minerals can't be regulated by some national government directions or developed on the basic economic principles.

There is a number of appropriate studies considering the topic of inflation [5], "food inflation" in India and Pakistan [8; 10] and economic growth estimation [7; 11; 2]. In studies [8; 10] the key factors of CPI in appropriate regions are identified. They are: credit growth, broad money growth and the money supply, wheat support price, fiscal deficits etc. All of that studies are based on national inflation trends, but global food prices are not much dependent on the national monetary policies of individual state.

The other directions of studies conduct macroeconomic trends analysis and prediction. In the study [11] long run relationship between carbon dioxide emissions and GDP growth, as productivity factors of economic development, is confirmed. In the study [7] relationship between populations and GDP growth is explored. All of these studies show GDP prediction method and can be used as pattern to future investigations.

[II] MATHERIALS AND METHODS

2.1. Statistical data and study area

In economics, inflation is the rate of consumer prices (*CPI*). In common, the inflation is given by [9]

$$CPI = a(e+p^*) + (1-a)\,p,$$

a – the consumption goods that are imported to country; e – the changes from the preceding period in the exchange rate; p^* - the change in the price index of foreign goods in foreign currency unit; p – the change in the price index of domestically produced goods in domestic currency units.

This definition is good for domestic inflation and economic dynamic estimations, but as for the international trade, the inflation has become a complicated phenomenon. It is based on estimating price dynamics of the reserve currencies and limited resources.

Input and output parameters for global GDP growth analysis of bioresources (wheat, rice etc) prices trends depend on next parameters – Table-1.

[Table-1]. Input and output parameters*

Inputs	Parameters description
Wheat	Wheat price, USR per Metric Ton
Rice	Rice price, USR per Metric Ton
Gold	Gold price, USD per Troy Ounce
Oil	Crude Oil price, US per bare;
WGoldRatio	Wheat price, Troy Ounce per Metric Ton
WExportUSD	Gross Wheat Export, BLM USD
WExportTon	Gross Wheat Export, BLM Ton
WProdTon	Global Wheat Production, BLM Ton
GDP	World GDP, current USD TLN
GDP_CPI	World GDP, USD TLN adjusted to price 2009 by US CPI index
GDP_Wheat	World GDP, USD TLN adjusted to price 2009 by Wheat-USD index
Population	Population, total BLN
FoodExport	Food exports, current USD BLN
FoodProd	Food production index (2004-2006 = 100)

* data sources [3; 6; 12]

2.3. Models performance evaluation

The classical multiple regression method [1; 5] is used for relationships between basic economic trends and bioresources (Wheat, Rice) together mineral (Gold, Crud Oil) prices.

Predictive performances of the proposed models and coefficients are presented as the Multiple R-squared, Adjusted R-squared, F-statistic,
p-value [1].

[III] RESULTS AND DISCUSSION

3.1. Estimates of the global prices level

Gold prices, as traditional monetary good, in the long run are regulated only by gold supply and demand. Nowadays the gold has lost its monetary functions, but there are many other basic goods on the global markets that can be taken as money equivalent. For example, such bioresources and minerals as oil (crude oil), wheat, rice etc. That resources are limited, and their supply is predictable.

Table 2 shows that changes in the wheat, rice, gold and crude oil prices are the same (linear correlation more than 0.7). The most significant linear correlation shows pairs in “Wheat” and “Oil”, “Gold” and “Crude Oil” prices dynamic.

[Table-2] Correlation matrix between the basic resources and minerals price changing 1989-2018

Prices	Wheat	Rice	Gold	Oil
Wheat	1.00	0.78	0.74	**0.85**
Rice	**0.78**	1.00	0.79	0.78
Gold	**0.74**	0.79	1.00	**0.84**
Oil	**0.85**	0.78	**0.84**	1.00

Therefore, it can be assumed that this dynamic is determined by factors, other than supply and demand for basic resources, namely the monetary component.

As it is shown on Table 2, the wheat prices dynamic has the most significant correlation with base mineral (monetary) goods. Considering this conclusion, we can make more detailed analysis of wheat price dynamic.

The wheat prices, as well as other goods, can be explained by dynamic of its supply and demand. There are key factor variables, such as: wheat and food production, population, wheat export, food export and other thigs like that.

Table 3 shows that the level of the wheat price depends on many fundamental factors, especially Food and Wheat Export Levels, Food and Wheat Production Levels. Unfortunately, the Population variable has one of the lowest dependencies with wheat price. This can be explained by the inequality distribution of the food resources.

[Table-3]. Correlation matrix between the wheat price and basic monetary factors dynamic 1989-2016

	Names	y	x1	x2	x3	x4	x5	x6	x7
y	Wheat	1.00	-0.66	0.91	0.79	0.74	0.79	0.77	0.96
x1	WGoldRatio	-0.66	1.00	-0.83	-0.76	-0.72	-0.73	-0.82	-0.77
x2	FoodExport	**0.91**	-0.83	1.00	0.93	0.90	0.90	0.94	0.97
x3	FoodProd	0.79	-0.76	0.93	1.00	1.00	0.89	0.95	0.87
x4	Populatin	0.74	-0.72	0.90	1.00	1.00	0.87	0.94	0.83
x5	WProdTon	**0.79**	-0.73	0.90	0.89	0.87	1.00	0.91	0.89
x6	WExportTon	**0.77**	-0.82	0.94	0.95	0.94	0.91	1.00	0.89
x7	WExportUSD	**0.96**	-0.77	0.97	0.87	0.83	0.89	0.89	1.00

In addition, negative linear correlation Wheat GOLD Price Ratio with all parameters shows than wheat price in "real" money is falling.

Table-4 and Table-5 summarize the linear dependencies and accuracy results for key variables. It can be seen that multiple regression method shows lower level of the model and coefficients performances for Model 2 – growth rate situation. So, we will use Model 1 for the next analysis.

[Table-4]. Performance statistics of the R- squared, p-value, F-value for Wheat price correlation (Model 1: Current value)

Vars	coeff.	p-value	R- squared	F-value
(Intercept)	193.5	<<0.01*		
WExportTon	-1.559	<<0.01*		
WExportUSD	0.007671	<<0.01*		
		<<0.01*	0.9509	262.3

* "<<" means then p-value match less than 0.01

[Table-5]. Performance statistics of the R- squared, p-value, F-value for Wheat price correlation (Model 2: Growth rates)

Vars	coeff.	p-value	R- squared	F-value
(Intercept)	-0.02514	0.82563		
WGoldRatio	0.39941	0.00904		
WExportUSD	0.62275	<<0.01*		
		<<0.01*	0.7931	50.83

* "<<" means then p-value match less than 0.01

Also, Model 1 shows strong long-run relations between wheat price level on global market and wheat export dynamic in Tons and USD. This confirms the assumption about the decisive role of demand in the formation of prices on products.

3.2. Wheat-USD Inflation Index and GDP growth estimates: Table 4 specifies the regression model of the Wheat-USD inflation and estimates the annual Wheat-USD index. This model is based on the adjusted wheat prices to predicted values of fundamental factors (*WExportTon*, *WExportUSD*).

Thus, the model predicts data for estimating the annual Wheat-USD inflation rate by linear regression method (trend).

This Wheat-USD Index is used to adjust the world GDP in current USD into prices of 2009: Fig.1

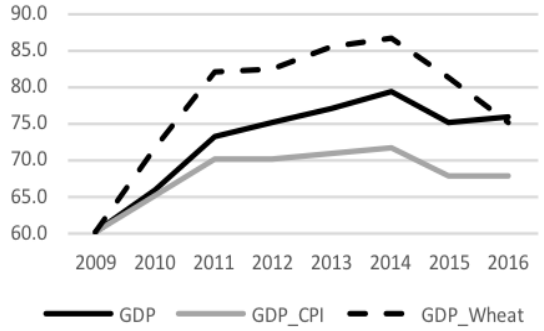

Fig: 1. World GDP trends 2009-2016, USD TLN per year

Since 2009, after global financial crises (2008-2009), the world economic had been showing the new growth trend. The world GDP in current price raise up to the level of 2014. But, in 2014 trend has changed. In 2015 the GDP in current USD had dropped to the level of 2012. The world GDP in USD, adjusted to 2009 prices by CPI-index, has shown identical trend in the USA. The appropriate fall has been observed to the level of 2011. If the adjustment has been used by Wheat-USD index

the common trend would be the same, but the fall has been more dramatical and it hasn't stopped in 2015.

[IV] DISCUSSION

After 1970s, bioresources and limited minerals prices trend were used as the base for monetary adjustment. This paper confirms the adequacy of this estimation (prediction). Sensitivity analysis performs the most influential factors for the GDP growth within current adjusted USD value.

For further research, it is necessary to develop a global CPI index. This index must include the prices of key bioresources and limited minerals, the key mining and production trends etc.

[V] CONCLUSION

An efficient regression model based on economic growth data shows the significant relation with the monetary factor. The money supply in all countries has increased for the last years. The wheat-USD inflation model shows how this methodology can be applied to estimate different quantitative indicators, as well as adjustments GDP trend.

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