

Consumer Model of Economic Development

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Abstract

The basic laws of the society development according to the consumer model were considered. Expressions for GDP per capita for various countries and for the whole world, in general, were received. The values calculated on these regularities were compared to real data, and good compliance was obtained between them. In addition, expressions have been derived for levels of overproduction, on the basis of which a conclusion is made about the approaching crisis.

Keywords: Consumer model of development; Social and economic parameters; Over production.

1. Introduction

The development of the economy entered a new phase, conditioned by objective processes in society. [Alksnis \(2018\)](#) specifies that the global political and economic system plunges into full-scale and comprehensive crisis more and more deeply. All previous attempts to manage the exit from it failed, the problems are only getting worse. The author warns that system failures will increasingly occur, the most important nodes of the global system will be increasingly torn.

The development of any society occurs in accordance with a specific economic model. In modern Russia, narrow-minded users of the economic structure of society initiated application of consumer model of development. Russia was "tied" to this model because the main economies of the world follow this system of the economic and social relations.

The essence of this model is that citizens are motivated to buy more, which gives additional money to entrepreneurs. With this money, they produce more products and pay more money to employees. Those buy more goods, and the cycle is repeated. Actually, it is not a cycle as everything occurs continuously, but it is so easier to describe the taking place events.

The problem of consumer society was considered by many economists, sociologists, and philosophers. [Baudrillard \(1970\)](#) pointed out that the consumer society is a society of self-deception, where neither genuine feelings nor culture are possible.

The consumer society attracts people by seeming freedom of action, resulting in unrestrained consumption.

However, in the eyes of broad sections of the population, this approach loses an appeal, as reported by [Orlova \(2015\)](#). The researcher notes that no matter what was optimism of consumers, fundamental factors of growth of consumption have lost the force recently.

Thus, the relation to the similar model of development is contradictory and doesn't give the complete idea of her features and opportunities.

2. Literature Review

[Leinonen \(2009\)](#) points to the difficult circumstances of the application of this model. The researcher notes that nations of the West (EU and North America) have failed to recover from the financial crisis. Emerging economies such as China, South Korea, Russia, and India are recovering better. Their economies are consequently still in growth and industry is beginning to serve domestic markets.

[Kupyrina \(2015\)](#) allocates a number of strengths of consumer society, partially referring to [Fromm \(1956\)](#). This is the rapid development of the world, the desire of people to high earnings, and, accordingly, to intensive work. These include relative social stability, the availability of incentives and motivation for development both among producers and consumers, low social tensions, emerging responsible governance, the development of the "third world" countries, the reduction of extremism, and increased tolerance.

The weaknesses of this model include the dependence and lack of independence of people who are accustomed to what everything is done instead of them. The weak points of this model are the loss of moral values, the rapid use of natural resources, the decreased sense of responsibility.

However, [Kupyrina \(2015\)](#) doesn't make any efforts for the numerical description of the happening processes.

Similarly, [Rudoy \(2015\)](#) highlights the main features of this model. He notes that the identity of individuals is based on their consumer activity to the same degree than on their work activity. The volume and quality of consumption are used as social markers. The lifestyle, including certain consumption standards, is used as

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determining the social position of the individual. Indicators of social differentiation become derivative of differences in consumption. An increasing number of social objects become commodities. Personality is replaced by a set of consumer standards.

Heiskanen *et al.* (2009) point to the role of stable consumption in sustainable development. They note that successful policies and policy measures should have an effect on consumption patterns and through the consumption patterns on overall sustainability. These impacts can occur in a variety of ways. Shifting consumption within a product group to less environmentally harmful products in the same product category. Shifting consumption from one product category to another. Reducing the consumption of certain product categories or commodities such as energy, water, meat or petrol. Reducing overall consumption (as defined in monetary terms), which on an aggregate level would lead to a reduced share of consumption in gross domestic product (i.e. more savings and investments, less consumption), or to a decline in gross domestic product.

Firat *et al.* (2013) note the positive features of the consumer society. They also point to important features of this model of society. Obey the 'consume now', do not postpone the desire. Economic growth depends on the consumption the key issues of enjoying life are consumption of goods and services to consume is the surest perceived route to personal happiness, social status and national success you are what you own and the more you own, the happier you will be in a consumer society, people use spending and materialism as a way to build a new ego or become a new person by buying products which support their self-image.

In all these works there are no attempts of the quantitative description of consumer model of development of a society, what doesn't allow to predict features of the development of society. The purpose of this article is the attempt of the phenomenological description of consumer model of development of society.

3. Materials and Methods

The population of Russia and other countries of the world, as well as of the world as a whole, was chosen as an object for research. The method of research was the content analysis of the first ten pages the main search engines the Internet. In addition, the necessary parameters were determined from the data of various literature sources. The information from the World Bank publications was mainly used.

4. Theory

The consumer model is based on the entrepreneur's aspiration to sell his products. The consumers who are employees of the enterprises are focused on the maximum consumption.

In this article, the production-consumption process is considered not as a cyclic, but as a continuous process. However, then the question arises about the initial stage. We are observing already the current process. Based on these ideas we can formulate the following hypothesis.

Hypothesis

Development of modern society in the different countries is defined by features of the national option of trends of consumer model of the economy.

Let the initial volume of production be the size "V₀". In the first stage for the time "dt" there is an increase in this volume by the value of "dx". $dx = V_0 dt$

C is the current cost per unit of output.

The cost of products at the initial stage is CV_0 .

The volume of production after the completion of the first stage becomes equal

$$V_0 + V_0 dt \quad (1)$$

Then the cost of the made products will be equal

$$E_1 = C (V_0 + V_0 dt) \quad (2)$$

Payments to workers for the work performed amount to

$$C k_1 (V_0 + V_0 dt), \quad (3)$$

where k_1 - share of income that goes to pay wages.

It is necessary to take into account the domestic savings of workers H.

For the purchase of goods workers spend

$$C k_1 (V_0 + V_0 dt) - H \quad (4)$$

The entrepreneur gets revenue

$$C (V_0 + V_0 dt) - C k_1 (V_0 + V_0 dt) + H = C (V_0 + V_0 dt) (1 - k_1) + H. \quad (5)$$

If to subtract the businessman's expenses on personal consumption, luxury goods, etc. of Q, then on production expansion the businessman can spend

$$C (V_0 + V_0 dt) - C k_1 (V_0 + V_0 dt) + H - Q + I, \quad (6)$$

where I is an inflationary additive to the entrepreneur's funds due to the fact that he buys components and materials at one price, and sells them as part of his products at another price.

To this amount, it is necessary to add borrowed funds B and deduct interest on loan G, as well as taxes N. Investments of L will go for deployment of production. Here and further the expenditure of means by the entrepreneur is understood in the socio-psychological sense. Workers put their scientific and technical potential which is described by S indicator (Human Development Index - HDI) in production.

Besides, they also invest in the production of products their desire for the efficiency of labor, which is measured by labor productivity of P.

Then the expenditure of funds for production at the second stage will be

$$C (V_0+V_0 dt) - C k_1 (V_0+ V_0 dt) + H - Q + B - G + I - N + L + P + S, \quad (7)$$

$$A = B - G + H - Q + I - N + L + P + S. \quad (8)$$

Here we don't consider payment of dividends because they are shifted in time in relation to the process of investments.

Return on this capital, i.e. the volume of production in value terms will be

$$E_2 = [(V_0 + V_0 dt) C - C k_1 (V_0 + V_0 dt) + A] dt = [(1 - k_1) (V_0 + V_0 dt) C + A] dt. \quad (9)$$

Workers can buy goods worth

$$M_2 = k_1 [(1 - k_1) (V_0 + V_0 dt) C + A] dt. \quad (10)$$

Overproduction of products will be in money terms by

$$P_1 = [C (V_0 + V_0 dt) (1 - k_1) + A] dt - k_1 [C (V_0 + V_0 dt) (1 - k_1) + A]. \quad (11)$$

At the next stage, the volume of production in value terms will be

$$\begin{aligned} E_3 &= [C (V_0 + V_0 dt) (1 - k_1) + A] dt + E_2 + E_1 = \\ &= [C (V_0 + V_0 dt) (1 - k_1) + A] dt + C [(1 - k_1) (V_0 + V_0 dt) + A] dt = \\ &= 2 [C (V_0 + V_0 dt) (1 - k_1) + A] dt + C [(1 - k_1) (V_0 + V_0 dt) + A] dt = \\ &= [C (V_0 + V_0 dt) (1 - k_1)] (2 dt + 2 Adt + 1). \end{aligned} \quad (12)$$

Ordinary people, workers, and other consumers can buy goods in terms of money for the sum

$$k_1 E_2 \quad (13)$$

The overproduction will amount to

$$P_2 = E_2 (1 - k_1). \quad (14)$$

In the third stage, the production volume will be equal to

$$\begin{aligned} E_4 &= [C (V_0 + V_0 dt) (1 - k_1) + A] dt + E_3 = \\ &= [C (V_0 + V_0 dt) (1 - k_1) + A] dt + [C (V_0 + V_0 dt) (1 - k_1)] (2dt + 2Adt + 1) = \\ &= [C (V_0 + V_0 dt) (1 - k_1) + A] dt (3dt + 3Adt + 1). \end{aligned} \quad (15)$$

The overproduction will be equal to.

$$\begin{aligned} P_4 &= E_4 (1 - k_1) = \\ &= \{ [C (V_0 + V_0 dt) (1 - k_1) + A] dt + E_3 (1 - k_1) + [C (V_0 + V_0 dt) (1 - k_1)] (2dt + 2Adt + 1) \} = \\ &= [C (V_0 + V_0 dt) (1 - k_1) + A] dt (3dt + 3Adt + 1). \end{aligned} \quad (16)$$

At the stage «n» the volume of production will be

$$E_n = [C (V_0 + V_0 dt) (1 - k_1) + A] dt (ndt + nAdt + 1) \quad (17)$$

At the stage "n" consumers can buy at the sum

$$k_1 E_n \quad (18)$$

Overproduction will be

$$P_n = E_n (1 - k_1) = [C (V_0 + V_0 dt) (1 - k_1) + A] dt (ndt + nAdt + 1) (1 - k_1) \quad (19)$$

The formulas (17) and (19) use the indefinite value of C. In fact, here

$$C = \Sigma C_i / n. \quad C = \Sigma C_i / n \quad (20)$$

"n" here has the same meaning as before, but is used to obtain the average value of the price of the products produced in time

Then

$$\begin{aligned} E_n &= [(\Sigma C_i / n) (V_0 + V_0 dt) (1 - k_1) + A] dt (ndt + nAdt + 1) = \\ &= (\Sigma C_i) (V_0 + V_0 dt) (1 - k_1) dt (dt + Adt + 1/n) + A (\Sigma C_i) dt (dt + Adt + 1) \end{aligned} \quad (21)$$

When n tends to infinity 1 / n tends to zero. The product of two dt, which are the variables of the second order of smallness, may be neglected. After transformations we will receive

$$E_n = A (\Sigma C_i) dt \quad (22)$$

GDP per capita will be

$$F = \int A (\Sigma C_i) dt \quad (23)$$

We will present integral in the sum form with a sufficiently large, but a finite number of summands. Let denote $\Sigma C_i = I$, where I is the current inflation rate.

$$n = T/t, \quad (24)$$

where T is the time constant for the processes in progress;

t – current time;

T = const,

$$F = \Sigma A_i I_i 1 = t n \Sigma (A_i I_i) / T. \quad (25)$$

Let's rename $n \Sigma (A_i I_i) / T = AI$.

Then

$$F = (B - G + H - Q + I - N + L + P + S) I t \quad (26)$$

We will continue to analyze the development of the consumer models for different countries and the world at large according to the formula (26).

The transformation of formula (19), taking into account the assumptions made above in deriving formula (22), gives for the level of overproduction the formula

$$U_\Sigma = [C V_0 (1 - k_1) + A] (1 - k_1) \quad (27)$$

Taking into account expression (20), as n tends to infinity, expression (27) is transformed to the form

$$U_\Sigma = A (1 - k_1) \quad (28)$$

Further, we will carry out the verification of the obtained expressions by means of the phenomenological description of the dependencies of individual indicators and by combining them into formulas (26) and (28). These dependencies will be compared for different countries with real values for GDP per capita of those countries.

When deriving formulas and performing calculations using them it is necessary to follow the certain rules following from simple expediency of actions:

- Approximation of the real dependency is best done only with the help of power polynomials of time. Then it is easy to bring similar members by folding and subtracting terms with equal degrees of dimensionless time;
- All the dependencies must be reduced to the same relative dimensionless form by the general formula $Y=(X - x_{min}) / (x_{max} - x_{min})$, where Y - the studied indicator, X - its current value by years, x_{max} and x_{min} , respectively, the maximum and minimum value of this indicator;
- When carrying out the approximation, one should strive to use polynomials with a minimal degree. The exception is especially difficult cases, such as for Russia, where the socio-economic situation changes arbitrarily and with great speed;
- Formulas of this type are very sensitive to any perturbations of the socioeconomic background. Therefore, it is necessary to smooth them with appropriate functions and adequately take into account the socially psychological circumstances of complex processes in society.

5. Results

5.1. Russia

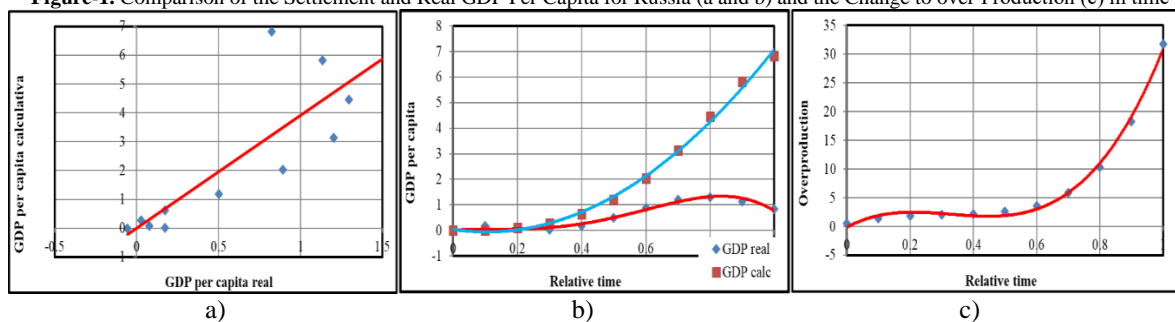
In the first part of a research, the analysis for Russia was carried out. Sources (Anonymous, 2011;2016;2018b; Capital Outflow from Russia, 2015; CBR, 2018; Popecon, 2014; World Bank, 2016a; Worldwide Inflation Data, 2017) allow us to construct the corresponding graphs and obtain the required dependencies presented below in Table 1.

Table-1. Dependencies Parameters for Russia

No.	Name	Designation	Formula
1	Level of credits	B	$B=0,866t + 0,062$
2	Interest on the loan	G	$G= -5,170t^3 + 9,347t^2 - 5,051t + +0,876$
3	Domestic savings	H	$H=1,157t - 0,112$
4	Expenses for consumption of entrepreneurs *	Q	$Q=-6,487t^4 + 20,268t^3 - 18,154t^2 + 4,673t - 0,259$
5	Inflation	I	$I=-0,633t + 0,809$
6	Corporate tax	N	$N= -0,455t + 0,318$
7	Investments	L	$L=5,676t^3 + 7,268t^2 - 1,161t + 0,051$
8	Labor productivity	P	$P=-1,324t^2 + 2,321t - 0,073$
9	Human Development Index HDI	S	$S=1,057t + 0,038$
10	Final consumption expenditure	k_1	$k_1=-2,521t^2 + 2,683t + 0,002$
11	Real GDP per capita	F_{real}	$F_{real}=51,603t^5 - 144,78t^4 + 135,8t^3 - 47,552t^2 + 5,810t - 0,055$

* Here, for Russia, a value is used that is calculated from the flow of funds being exported abroad. It is assumed that these funds just, with a small deduction, constitute the accumulation of entrepreneurs. For other countries, investment, in particular in the formation of fixed capital, is used as this parameter

Figure-1. Comparison of the Settlement and Real GDP Per Capita for Russia (a and b) and the Change to over Production (c) in time



Sources: (Anonymous, 2011;2016;2018b; Capital Outflow from Russia, 2015; CBR, 2018; Popecon, 2014; World Bank, 2016a; Worldwide Inflation Data, 2017)

The correlation coefficient for the graph in Fig. 1b) is 0.935 and it is substantial for all significance levels exceeding the level of 0.01. The regression equation shows that the calculated values almost triple understate the GDP per capita index. This indicates that the main trends are defined correctly, but there are other events, processes, and phenomena that affect the level of this indicator. These events, processes, and phenomena should serve as objects of a separate study.

Overproduction in Russia so far size small, but further, it can go into the phase of rapid growth.

Probably, this may be due to both the build-up of production capacities and the presence of external constraints, as well as the lack of funds from domestic consumers. It may also be affected by technological backlog, because of which the produced goods will not be sold abroad.

5.2. Germany

For calculations for Germany, the sources (Anonymous, 2018a; FRED, 2011; International Monetary Fund, 2016h;2016a;2016b; Sloman, 2017; United Nations Development Programme, 1990-2015; World Bank, 2016e;2016f;2016b; World Development Indicators, 2016c) were used and the following relationships were obtained, presented in Table.2.

Table-2. Dependencies Parameters for Germany

No.	Name	Designation	Formula
1	Level of credits	B	$B = -1,448t^2 + 2,192t - 0,095$
2	Interest on the loan	G	$G = -0,889t + 1,017$
3	Domestic savings	H	$H = 1,994t^2 - 2,470t + 0,955$
4	Expenses for consumption of entrepreneurs *	Q	$Q = 1,994t^2 - 2,470t + 0,955$
5	Inflation	I	$I = -0,466t + 0,723$
6	Corporate tax	N	$N = 1,050t - 0,012$
7	Investments	L	$L = 0,639t + 0,213$
8	Labor productivity	P	$P = 0,975t + 0,122$
9	Human Development Index HDI	S	$S = 1,064t + 0,055$
10	Final consumption expenditure	k_1	$k_1 = 0,910t - 0,041$
11	Real GDP per capita	F_{real}	$F_{real} = 6,086t^4 - 8,372t^3 + 1,738t^2 + 1,722t - 0,078$

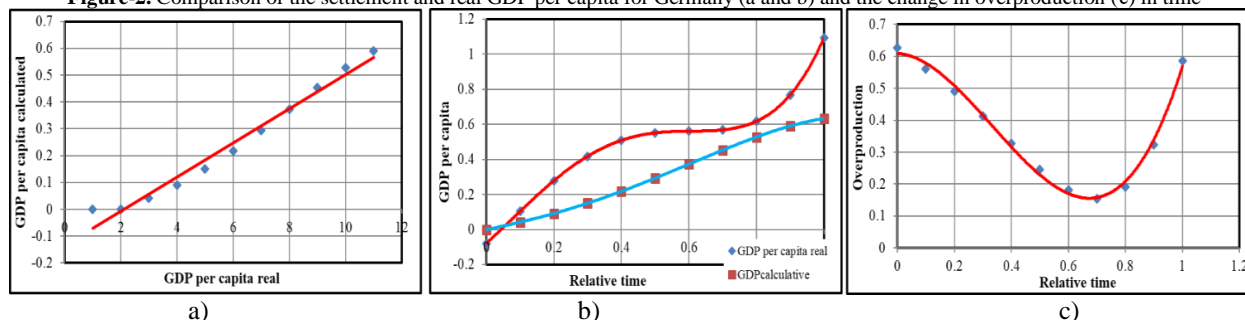
Based on the data in Table.2 the dependencies were inserted into the formula (26). The expression for GDP per capita and the level of overproduction is obtained:

$$F_G = t(-0,466t + 0,723)(1,204t^2 + 0,782t + 0,531) \quad (31)$$

$$U_G = (1,204t^2 + 0,782t + 0,531)(0,910t - 0,041) \quad (32)$$

The graphs of the functions obtained in this way are shown in Fig.2.

Figure-2. Comparison of the settlement and real GDP per capita for Germany (a and b) and the change in overproduction (c) in time



Sources: (Anonymous, 2018a; FRED, 2011; International Monetary Fund, 2016h;2016a;2016b; Sloman, 2017; United Nations Development Programme, 1990-2015; World Bank, 2016e;2016f;2016b; World Development Indicators, 2016c)

The correlation coefficient for the graph in Fig. 2b) is 0.919 and it is substantial for all significance levels exceeding the level of 0.01. The equation of regression $0,654t - 0,014$ testifies to an understating of about one and a half times the calculated index in comparison with the real index.

Overproduction is always positive, but it has a minimum near the mark of 0.65 periods, that is, after 19-20 years. The economy of Germany will be compelled all this time will work for sale abroad.

Here and further in calculations, a period of 30 years is used as the absolute time interval. It was chosen from the following considerations. Practically all dependencies are constructed for the time intervals beginning since 2000, so this year was chosen as the starting point of reference. The end of the interval falls in 2030, as the overwhelming number of predictive studies are attributed to this date. So for example, experts in the company PricewaterhouseCoopers used this date Pricewaterhouse Coopers (2018) in analyzing the driving forces of the future development of major world economic actors.

5.4. The USA

The calculations for the USA are based on the data given in the sources (Anonymous, 2018e; International Monetary Fund, 2016d;2016e;2016c;2016b; OECD, 2018; World Bank, 2016c;2016d;2016f; World Development Indicators, 2016a). The construction of graphs and their analysis made it possible to obtain the dependencies given below in Table.3.

Table-3. Dependencies Parameters for the USA

No.	Name	Designation	Formula
1	Level of credits	B	$B = 1,021t - 0,006$
2	Interest on the loan	G	$G = -0,732t + 0,638$
3	Domestic savings	H	$H = 0,908t - 0,068$
4	Expenses for consumption of entrepreneurs *	Q	$Q = 1,284t^2 + 1,822t + 0,175$

5	Inflation	I	$I = -1,353t^2 + 0,867t + 0,634$
6	Corporate tax	N	$N = -2,397t^2 + 2,351t + 0,530$
7	Investments	L	$L = 0,870t + 0,023$
8	Labor productivity	P	$P = -0,834t^2 + 1,819t + 0,015$
9	Human Development Index HDI	S	$S = 1,013t + 0,037$
10	Final consumption expenditure	k_1	$k_1 = 0,977t + 0,020$
11	Real GDP per capita	F_{real}	$F_{real} = 0,979t + 0,002$

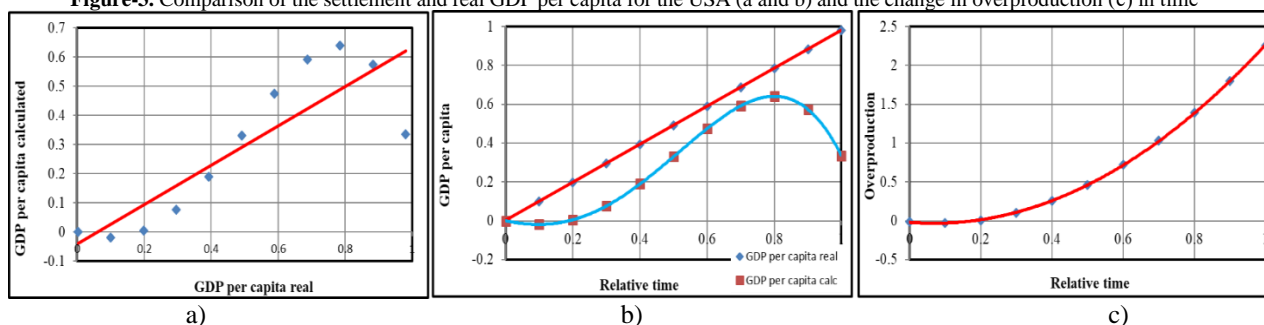
Based on these dependencies, the following expressions were obtained

$$F_U = t(-1,353t^2 + 0,867t + 0,634)(-0,24t^2 + 3,057t - 0,572), \quad (33)$$

$$U_U = (-0,24t^2 + 3,075t - 0,572)(0,977t + 0,02). \quad (34)$$

The graphs for the studied indicators are submitted in Fig. 3.

Figure-3. Comparison of the settlement and real GDP per capita for the USA (a and b) and the change in overproduction (c) in time



Sources: (Anonymous, 2018e; International Monetary Fund, 2016d;2016e;2016c;2016b; OECD, 2018; World Bank, 2016c;2016d;2016f; World Development Indicators, 2016a)

The correlation coefficient for the graph in Fig. 3b) is 0.86 and it is substantial for all significance levels exceeding the level of 0.01. The equation of regression of $y = 0,675x - 0,041$ shows that the calculated GDP per capita is understated in comparison with a real indicator. The falling of level of overproduction in the USA will last approximately within six years. After that, this country will need a substantial expansion of foreign trade opportunities.

5.5. China

The study of data from sources (Anonymous, 2018d; International Monetary Fund, 2016d;2016a;2016b;2016f; The Conference Board, 1950-2018; World Bank, 2016e;2016d;2016f;2016g; World Development Indicators, 2016b) made it possible to obtain the dependencies presented in Table.4.

Table-4. Dependencies Parameters for China

No.	Name	Designation	Formula
1	Level of credits	B	$B = 1,500t^2 - 0,918t + 0,260$
2	Interest on the loan	G	$G = -1,557t^2 + 1,257t + 0,305$
3	Domestic savings	H	$H = 1,156t - 0,145$
4	Expenses for consumption of entrepreneurs *	Q	$Q = 0,759t^2 + 0,433t - 0,046$
5	Inflation	I	$I = -1,971t^2 + 2,305t - 0,119$
6	Corporate tax	N	$N = 1$
7	Investments	L	$L = -2,256t^3 + 4,136t^2 - 0,885t + 0,047$
8	Labor productivity	P	$P = 0,561t^2 + 0,436t + 0,015$
9	Human Development Index HDI	S	$S = 1,035t + 0,016$
10	Final consumption expenditure	k_1	$k_1 = t - 0,042$
11	Real GDP per capita	F_{real}	$F_{real} = 0,645t^2 + 0,430t - 0,029$

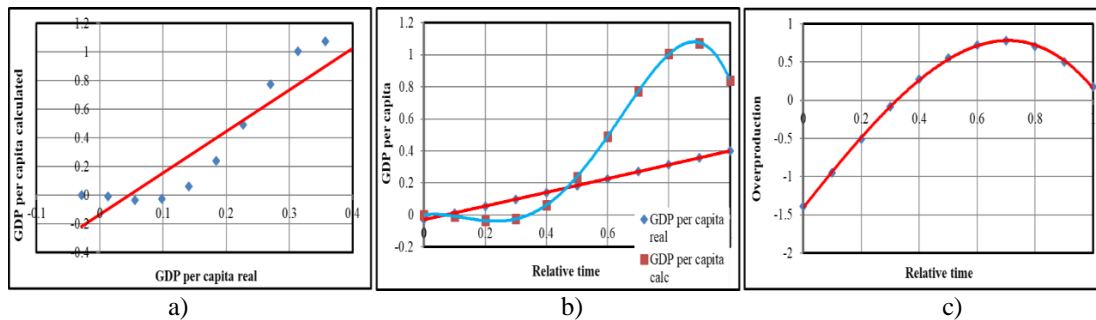
The data in Table 4 have given the chance to derive the following expressions:

$$F_c = t(-1,971t^2 + 2,305t - 0,119)(-2,256t^3 + 5,024t^2 + 2,474t - 1,33), \quad (35)$$

$$U_c = (-2,256t^3 + 5,024t^2 + 2,747t - 1,33)(-t + 1,042). \quad (36)$$

Calculations using these formulas allowed to build the graphs shown in Fig.4.

Figure-4. Comparison of the settlement and real GDP per capita for China (a and b) and the change in overproduction (c) in time



Sources: (Anonymous, 2018d; International Monetary Fund, 2016d;2016a;2016b;2016f; The Conference Board, 1950-2018; World Bank, 2016e;2016d;2016f;2016g; World Development Indicators, 2016b)

The correlation coefficient for the graph in Fig. 4b) is 0.928 and it is substantial for all significance levels exceeding the level of 0.01. The regression equation indicates that the calculations, for the most part, overstate the GDP per capita by almost two times compared to the real values. However, these indicators are close to each other in the initial part of the graph.

Overproduction in China in the next approximately 7-8 years will be negative. This means that the country will not meet even the needs of their population, possibly due to the low purchasing power of the population. Further the growth with the transition to the positive branch of the schedule will occur, i.e. the export will prevail. Next, perhaps, because of trade wars, some recession will begin.

5.6. World

Calculations on the global level were carried out with use of data from sources (Anonymous, 2018c; Derived, 2017; International Monetary Fund, 2016a;2016g; United Nations Development Programme, 1990-2015; World-Interest Rate Spread, 2016; World Bank, 2016l;2016h;2016i;2016j;2016g;2016k;2017). The calculation of the average world labor productivity was particularly difficult, since direct data on this issue could not be found.

Therefore, the world average level of labor productivity was calculated by dividing the total GDP by the level of employment in the world from sources World Bank (2016h) and Derived (2017).

The obtained dependencies are summarized in Table.5.

Table-5. Dependencies Parameters for the Whole World

No.	Name	Designation	Formula
1	Level of credits	B	$B=1,500t^2 - 0,918t + 0,260$
2	Interest on the loan	G	$G=1,398t^2 - 2,388t + 1,112$
3	Domestic savings	H	$H=7,145t^3 - 10,782t^2 + 4,057t + 0,212$
4	Expenses for consumption of entrepreneurs *	Q	$Q=-2,235t^2 + 2,550t - 0,043$
5	Inflation	I	$I=-1,931t^2 + 1,310t + 0,330$
6	Corporate tax	N	$N=1,444t^2 - 2,427t + 1,053$
7	Investments	L	$L=-2,446t^3 + 3,255t^2 + 0,213t - 0,015$
8	Labor productivity	P	$P=1,570t^2 - 2,682t + 1,113$
9	Human Development Index HDI	S	$S=0,970t + 0,018$
10	Final consumption expenditure	k_1	$k_1=1,028t - 0,044$
11	Real GDP per capita	F_{real}	$F_{real}=1,113t - 0,002$

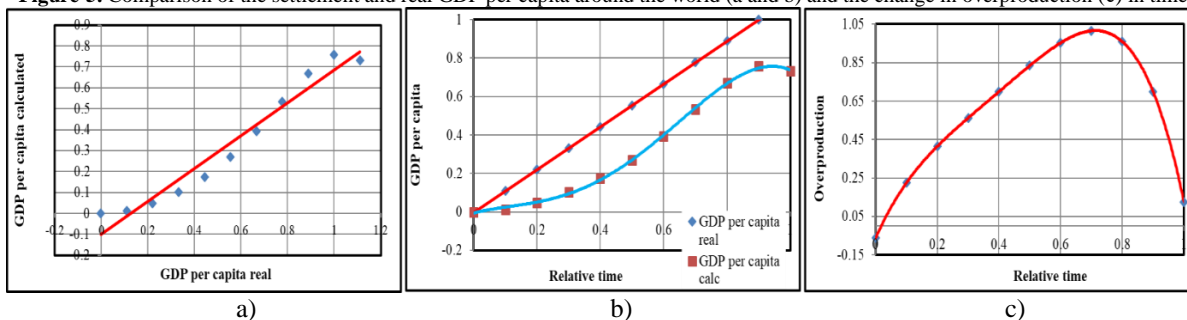
The following formulas are obtained using these dependencies

$$F_w = t(-0,501t + 0,594)(9,591t^3 - 5,064t^2 + 3,404t - 0,06), \quad (37)$$

$$U_w = (-1,028t + 1,044)(9,591t^3 - 5,064t^2 + 3,404t - 0,06), \quad (38)$$

The graphs constructed on the basis of these formulas are shown in Fig. 5.

Figure-5. Comparison of the settlement and real GDP per capita around the world (a and b) and the change in overproduction (c) in time



Sources: (Anonymous, 2018c; Derived, 2017; International Monetary Fund, 2016a;2016g; United Nations Development Programme, 1990-2015; World-Interest Rate Spread, 2016; World Bank, 2016l;2016h;2016i;2016j;2016g;2016k;2017)

The correlation coefficient for the graph in Fig. 5b) is 0.978 and it is substantial for all significance levels exceeding the level of 0.01. The regression equation and the graphs in Fig.5a) indicate that the calculations understate the GDP per capita values by about one and a half times compared to the real values.

At first, overproduction in the whole world will be negative for a short time, i.e. there won't be enough goods. Then, overproduction will rise sharply to about 0.7 periods, i.e. by more than 20 years, and then it will start to decline. The reason for this can serve as a decline in purchasing power. This can occur, possibly due to the increasing differences between countries and the aggressive policy of some of them. Trade wars and protectionist policy of some states and corporations can become other probable causes.

6. Discussion

In the analysis of the results presented in this work, it is necessary to remember that they were received with the use of certain assumptions which don't change a picture as a whole. However, at the more careful attitude to the data and the calculations made on their basis, the form of dependencies may change slightly. The same can happen when trying to extrapolate the ideas received in this way, in the future to a longer period. And even already made assumptions aren't insured from the changes of regularities socio-economic processes.

Nevertheless, the drawn conclusions in the first approximation reflect the real situation. This is due to the fact that correlation coefficients are positive, sufficiently large and substantial for all acceptable levels of significance for all studied countries and the world as a whole. In addition, the direct regressions satisfactorily describe the relationship between the calculated and real values of GDP per capita.

If to speak about concrete results of work, then the tendency to the growth of overproduction attracts attention. In this regard, it is worth remembering Rosa Luxemburg's ideas (Luxemburg, 2003). Despite extensive criticism the topicality of them has not been canceled, and in their main part, they remain still useful. The essence of its provisions is that capitalism, in its then-form and in its modern form, needs markets, and that means, and in expansion. The opportunities for such expansion are practically exhausted. New colonies which will be created on unoccupied lands, on undeveloped continents, and subsequently and outside the planet will become the field of activity soon. It is these colonies that will become new consumers in emerging markets. In any case, the development of the consumer model promises an extensive and long-lasting crisis. In any case, the development by consumer model promises an extensive and long-lasting crisis.

To overcome and prevent this crisis it is necessary to change the paradigm of development by moving to another model.

7. Conclusion

Thus, the hypothesis advanced at the beginning of the article that the development of modern society in different countries is determined by the peculiarities of the national variant of the trends in the consumer model of the economy is confirmed. The calculated values agree reasonably well with real values. The regression equations for different countries are similar, although their differences make it possible to determine for each country the speed at which the crisis approaches. The level of overproduction varies considerably from country to country, but the trends of its change indicate an approaching crisis for all countries studied and the world as a whole. In anticipation of this, it is possible to prepare the optimal tactics for each country to overcome the crisis.

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