The Paradoxes of the World's Progress(II)

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Abstract
An unbiased systematic view on the modern innovation allows you to see three key groups of innovations that are still very few people differentiate. The first is the technical and technological innovations that are the basis of development and change in technological ways of the world. Secondly, it is monetary and financial innovation, the progress of which determines the change in monetary ways of life of the world. And third, it is the socio-political innovation, progress of which is in the basis of the change of socio-political models of the world. A clear distinction between these three "floors" of innovations is crucial for understanding the global crisis and the ways to quit it. Since the essence of it lies in the tangle of clearly long overdue and contradictions between the rates of introduction of the world's technical and technological, financial and socio-political innovations. As the global crisis clearly shows, technical and technological way today, is not decisive for the country's prosperity and peace. Exactly the countries with the highest level of technology development have become the main source and a key cause of the global crisis.
Keywords Global crisis, SONA analyzer, Technical and technological innovation, Monetary and financial innovation, Socio-political innovation

3 The Range of Application of the Analyzer SONA

3.1 The Main Directions of Analytics of Macroeconomic Policy

Area of practical applications for the SONA analyzer in macroeconomics is very promising and productive. The basic formula that can be successfully used in the management of market economies are:

1.To estimate the rate of STP and modeling of balanced economic growth

$$c(t) = GDP(t)/(QP(t) + GDP(t)) \tag{1}$$

2. Calculation of purchasing power of money and the price of world currencies

$$pp(t) = (c(t) * i2)/i1 \tag{2}$$

3. To determine the index of market prices of goods and services

$$1/pp(t) = i1(c(t) * i2) \tag{3}$$

4. To determine the index of balanced economic growth with PPP

$$\mathrm{i3} = \mathrm{c(t)} * \mathrm{i2} \quad (\mathrm{C1}) \quad \mathrm{i3} = \mathrm{pp(t)} * \mathrm{i1} \quad (\mathrm{C2}) \quad \mathrm{c(t)} * \mathrm{i2} = \mathrm{pp(t)} * \mathrm{i1} \quad (\mathrm{C}) \tag{4}$$

5. To determine the nature of the GDP deflator as the ratio of the nominal indices (I1) and real (I2) of growth

$$p(t) = c(t)/pp(t) \tag{5}$$

6. Calculation of net growth rate of STP and comparative analysis of the competitiveness of the countries

$$\mathrm{dc(t)} = \mathrm{c(t)} - 100\% \tag{6}$$

Since purchasing power of the national currency is picked for each country, based on the principles of calculation of SDR, we have:

$$\begin{aligned} pp(SDR,t) = \sum_{i=1}^{i=n} NGDP(i)/[pp(1) * NGDP(1) + pp(2) * NGDP(2) \\ + ... + pp(n) * NGDP(n)] \end{aligned} \tag{7}$$

where n - total number of IMF member countries willing to be engaged in foreign trade.

3.2 Debates about Economy Management Regulators: Questions and Answers

During the debates of S. Baizakov conducted with famous Russian professor, doctor of economic sciences, corresponding member of the RAS - K.Valtuh, the following questions and answers that can actually reveal the effectiveness of anti-crisis measures in the countries of the world and the capability of market economy management had appeared.

Question 1. How is STP coefficient defined?

Answer. STP coefficient is defined by formula:

$$c(t) = \frac{\mu(t)}{1 + \mu(t)} \tag{8}$$

After conversion, it turns out that $c(t) = GDP/X$, where X is output, which is the sum of costs of intermediate QP consumption and GDP for production - $QP+GDP$. At any anti-crisis event involving the purchase and sale, a coefficient $c(t)$ is always known value, it can be determined with an accuracy of $GDP(t)$ and $X(t)$.

Question 2. What determines the rate of scientific and technological progress (STP) if it does not reflect the performance?

Answer: Indeed, the indicator called the coefficient of scientific and technological progress (STP), and defined by the formula:

$$c(t) = \frac{\mu(t)}{1 + \mu(t)} \tag{9}$$

Where the indicator

$$\mu(t) = \frac{NGDP(t)}{QP(t)} \tag{10}$$

expresses the organic composition used in the production of GDP of material resources, which are not directly related to labor productivity.

Comment by Valtuh K.K. Concept of organic structure is occupied. It does not applied here. This itself is substantively different (see "Capital" t I)

Answer: In this formula, the money in one case serve as money capital (NGDP). In another case acts as a commodity-capital (X). In this formula, commodity-capital is represented by its denominator. According to the theory of Emerson, it is the equivalent of the capital expended plus a normal profit [Emerson, Twelve Principles of productivity. C.62].

Comment by Valtuh K.K. Macroeconomic indicator of labor productivity exists and is systematically used (see, for example, the annual reports of the President of the United States). In general, the opposition of macroeconomics and the real economy is unacceptable. As for economics (not to be confused with the widespread literature, claiming - without evidence - for non-Marxist economic theory), it is precisely the subject of the real economy (and for this literature - largely fictional).

Answer: I am here for the organic composition of social labor meant the ratio of money capital (NGDP) to the commodity-capital (X). My statement follows logically from Marx's remarks on the work Shtibelinga in "Capital", Volume III, Part I, p. 25.

Question 3. What does the coefficient of $\mu = GDP/QP$ expresses, which is included in the formula for determining the rate of scientific and technological progress?

Answer: Output$(X) = QP + GDP$ is the sum of the intermediate material resources (QP) and GDP. And coefficient $\mu = GDP/QP$ expresses the performance of material resources - QP.

Comment by Valtuh K.K. Output is not the amount of material resources and GDP, but the amount of current material costs and GDP.

Answer: Agree.

Question 4. Scientific and technological progress (STP) is always associated with labor productivity. Why do not you have that connection!

Answer: If the level of macroeconomics goes to the level of the real economy, contribution directly to the dynamics of STP performance will appear, and then

its share of the output will be determined.

Advises by Valtuh K.K.: representative calculations of this coefficient should be hold. It turns out that it varies in a narrow range. But the main - quickly changing, usually growing - the effect of technological progress does not change the value c(t) and the growth of productivity of human labor. This effect is not expressed in the formula. There are also a number of other NTP effects.

Answer: Performance of living labor is reflected at the level of the coefficient of STP - $c(t)$. Thus, the formula coefficient NTP $c(t) = GDP(t)/X(t)$ can be replaced with an equivalent ratio of the productivity of living labor in GDP to performance of output X. But the growth of productivity of human labor will have a positive effect with domination of productivity growth for GDP over growth in productivity of the production. We are not interested in productivity growth, and its impact on the price of goods and services. As you know, the prices of goods and money change after the drop of productivity of labor and capital. It should be noted here that my opponent propose a coefficient of production to replace with the sources of real, not nominal growth. But, we are referring to the fact that the highest levels of productivity can be extinguished corresponding increase in average wages.

The important point for a market economy it is not a productivity growth, the so-called living labor, but the importance of economic dynamics of labor productivity, which is defined as the ratio of labor productivity of living to the average annual salary. As has been justified above, the variation coefficient of STP in this case expresses the integrated expression of the effects of the anti-crisis measures and subjective actions of managers of production from a position of economic growth and stability in the country. Table 1 shows the NTP coefficient calculated by formula - $c(t) = GDP(t)/X(t)$.

As shown in the Table 1, the range of the ratio of NTP does not vary within a narrow range, as K. Valtuh thought, and its actual range of variation increased from 31% in Cyprus and 54% in Estonia to 148% in Brazil and 162% in the Czech Republic. These range changes occurred in only 10 years, so we cannot speak about the narrowness of the range of variation of this indicator.

Do the obtained results allow us to provide answers to the question how to determine the ratio of scientific and technological progress (STP)?

Indeed, for a long time economists could not estimate a contribution of scientific - technological progress, which remained exogenous, into the model of growth. Mathematical models of economic growth, which appeared in the 80s, included the externality of economic growth.?Only Paul Romer argued persuasively that the growth of capital by 10%increases the production of nearly 1%, rather than 0.25, according to calculations based on the Solow's model.?The costs of research and experimental development (NIEKR) provide the growing impact of scientific

Table 1 Coefficient of scientific and technological progress (STP), 2000 = 100%

	Country/Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1	Austria	98	97	97	96	94	91	92	88	90	88
2	Belarus	104	114	117	115	117	116	115	115	108	105
3	Belgium	99	85	71	65	74	87	87	89	95	94
4	Bulgaria	100	100	99	94	93	90	87	89	93	98
5	Brazil	98	96	95	94	94	103	111	116	113	148
6	United Kingdom	100	101	101	101	98	101	100	103	77	96
7	Hungry	101	106	107	108	106	103	105	99	109	106
8	Germany	100	102	102	101	99	96	97	92	98	95
9	Greece	102	102	103	104	105	106	105	120	105	107
10	Denmark	98	99	100	100	98	97	94	100	95	96
11	India	101	100	99	97	96	96	96	88	89	114
12	Ireland	76	69	69	68	68	66	65	70	64	64
13	Spain	100	99	99	98	97	96	96	96	103	104
14	Italy	100	100	100	100	99	98	98	95	103	101
15	Kazakhstan	117	107	93	98	93	106	107	166	123	130
16	Cyprus	95	87	70	60	55	51	26	31	31	31
17	China	101	101	100	100	100	99	102	100	121	131
18	Latvia	100	101	98	94	91	93	96	100	77	65
19	Lithuania	98	98	99	97	91	92	96	95	75	74
20	Luxemburg	99	104	106	98	93	88	83	83	89	78
21	Malta	107	107	104	103	103	96	109	108	106	107
22	Netherlands	101	103	104	103	103	102	101	100	100	99
23	Poland	100	100	99	96	97	97	99	97	101	110
24	Portugal	100	102	102	101	101	100	97	96	91	114
25	Russia	97	98	98	99	100	100	99	99	98	98
26	Romania	98	98	99	97	100	100	101	94	75	74
27	Slovakia	99	100	100	104	109	115	140	161	110	73
28	Slovenia	101	101	102	101	104	102	100	100	105	103
29	United States	102	104	103	103	101	101	100	99	107	104
30	Finland	100	102	102	101	101	100	87	85	98	97
31	France	100	98	99	98	97	96	97	96	99	98
32	Czech Republic	99	100	100	98	99	96	98	109	103	162
33	Sweden	99	101	102	101	98	96	98	98	102	102
34	Estonia	117	123	105	92	70	70	66	67	56	58
35	Japan	82	89	101	102	92	88	91	100	102	109
36	Turkey	100	86	100	100	100	100	101	101	101	101
37	Iran, Islamic Republic	107	85	97	94	90	85	86	104	102	107
38	Afghanistan	99	112	70	70	71	70	71	59	54	59
39	Pakistan	101	102	103	104	105	106	107	108	109	111
40	Uzbekistan	98	99	100	102	103	104	105	107	108	109
41	Turkmenistan	100	100	100	101	101	101	101	101	101	102
42	Tadzhikistan	86	86	87	92	94	97	101	102	93	93
43	Azerbaijan	106	106	102	100	107	114	117	124	117	140
44	Kyrgyzstan	102	102	102	101	101	101	100	85	92	94
45	South Africa	98	105	108	105	105	107	111	109	116	127

and technological progress [1].

Reversibility principle has allowed us for the first time in world economics make a significant step forward in measuring the contribution of scientific and technical progress in the development of the real economy through the exact formula $c(t) = GDP(t)/X(t)$.

Question 5. The purchasing power of money, how is it determined?

Answer: The purchasing power of money is relative measure. NTP coefficient is directly related to the index of purchasing power of money. The index formula of purchasing power of money, as indicated above, is defined by the ratio of the coefficient of STP to the GDP deflator index of official statistics. Table 2 shows the changes in indices of purchasing power of money obtained by calculation according to global statistics. It defined the purchasing power of money is the national currencies of 45 countries for 2000 - 2010, which have over 80% of the GDP of the world economy. Estimated formula: $pp(t) = a(t)/p(t)$, where $c(t)$-factor of STP, $p(t)$ - the GDP deflator.

As it can be seen from Table 2, the range of changes in the purchasing power of money is wide as the range at the rate of STP. It is changed over the past decade in the range of 0.12 to 1.20 in Cyprus in Japan.

The nature of change in the index of purchasing power of money in this case expresses the effectiveness of monetary and financial management system in the countries.?Only one-quarter of these countries has saved the purchasing power of their currencies at a level higher than 50% of their value in the base year 2000.This group includes Japan (1.20), the U.S. (0.81), China (0.66) and Brazil (0.53).In the same group there were majority of OECD countries.On the contrary, outsiders with weak national currencies are the half of the European Union countries, including the ten countries that have a power of their currencies less than one-third of their base power: Bulgaria with a coefficient of 0.25, Hungary - 0.30 Ireland - 0.22, Cyprus?- 0.12, Latvia - 0.20, Lithuania - 0.22, Luxembourg - 0.30, Romania - 0.18, Slovakia - 0.17 Estonia 0.27. These figures increase the likelihood of permanent crisis in Europe and create difficulties for?these countries to implement the Pact for economic growth and stability, adopted in mid-2012.

Question 6. Can you comment on the formula $RGDP(t) = NGDP(t)/p(t)$?

Answer. Formula $NGDP = p * RGDP$ refers to the work of official statistics. Statistics are watching over the production and determine the Physical volume index (PVI) of goods and displays the GDP deflator (p) by the formula:

$$p = NGDP/RGDP \tag{11}$$

The ratio of the growth rate of $NGDP$ to $RGDP$ growth rate represents the rate of inflation or GDP deflator. Emphasize: the GDP deflator is a product of PVI. The more growth of PVI index, the lower the GDP deflator. Therefore, the more stable, seems to be evolving economy. And vice versa. The lower the

Table 2 The dynamics of the purchasing power of national currencies of the world for the period 2000-2010 (2000 = 1)

	Country/Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1	Austria	1,00	0,92	0,74	0,65	0,60	0,58	0,52	0,46	0,49	0,39
2	Belarus	0,92	0,89	0,81	0,68	0,58	0,51	0,45	0,38	0,43	0,39
3	Belgium	1,01	0,96	0,79	0,68	0,63	0,59	0,53	0,49	0,55	0,44
4	Bulgaria	0,99	0,82	0,62	0,49	0,42	0,38	0,31	0,27	0,29	0,25
5	Brazil	1,19	1,31	1,20	0,95	0,71	0,61	0,55	0,50	0,50	0,53
6	United Kingdom	1,03	0,95	0,83	0,70	0,66	0,64	0,63	0,60	0,53	0,51
7	Hungry	0,98	0,82	0,64	0,53	0,47	0,46	0,38	0,34	0,41	0,30
8	Germany	1,03	0,98	0,81	0,72	0,70	0,67	0,61	0,54	0,59	0,47
9	Greece	1,00	0,89	0,69	0,59	0,55	0,54	0,48	0,48	0,47	0,45
10	Denmark	1,01	0,93	0,76	0,67	0,62	0,60	0,53	0,50	0,50	0,44
11	India	0,97	0,92	0,78	0,67	0,56	0,50	0,40	0,34	0,34	0,35
12	Ireland	0,73	0,57	0,43	0,36	0,33	0,29	0,25	0,25	0,26	0,22
13	Spain	0,99	0,87	0,68	0,57	0,52	0,47	0,40	0,37	0,41	0,35
14	Italy	1,01	0,93	0,75	0,65	0,63	0,59	0,52	0,48	0,52	0,42
15	Kazakhstan	1,09	0,99	0,75	0,62	0,49	0,43	0,37	0,46	0,40	0,35
16	Cyprus	0,95	0,77	0,51	0,36	0,31	0,26	0,11	0,12	0,12	0,12
17	China	0,91	0,90	0,87	0,81	0,75	0,70	0,66	0,57	0,65	0,66
18	Latvia	0,95	0,88	0,71	0,57	0,51	0,39	0,31	0,26	0,22	0,20
19	Lithuania	0,92	0,80	0,61	0,51	0,45	0,38	0,31	0,26	0,22	0,22
20	Luxemburg	0,99	0,95	0,78	0,60	0,54	0,44	0,35	0,32	0,36	0,30
21	Malta	1,11	1,04	0,86	0,75	0,72	0,64	0,56	0,50	0,51	0,52
22	Netherlands	1,02	0,94	0,76	0,66	0,63	0,59	0,51	0,45	0,48	0,39
23	Poland	0,92	0,89	0,79	0,69	0,57	0,49	0,40	0,31	0,41	0,42
24	Portugal	1,01	0,94	0,77	0,66	0,63	0,61	0,50	0,45	0,44	0,44
25	Russia	0,89	0,82	0,67	0,53	0,47	0,37	0,30	0,30	0,32	0,28
26	Romania	1,24	0,98	0,76	0,55	0,42	0,34	0,24	0,19	0,18	0,18
27	Slovakia	1,00	0,86	0,62	0,53	0,47	0,42	0,39	0,35	0,25	0,17
28	Slovenia	1,07	0,94	0,74	0,62	0,57	0,51	0,42	0,36	0,39	0,35
29	United States	1,00	1,00	0,97	0,94	0,89	0,86	0,83	0,81	0,85	0,81
30	Finland	1,00	0,92	0,74	0,65	0,62	0,60	0,45	0,40	0,43	0,35
31	France	1,02	0,91	0,74	0,64	0,62	0,58	0,51	0,47	0,50	0,40
32	Czech Republic	0,98	0,81	0,65	0,52	0,46	0,39	0,33	0,29	0,30	0,31
33	Sweden	1,11	1,02	0,83	0,70	0,67	0,62	0,54	0,50	0,60	0,47
34	Estonia	0,95	0,81	0,63	0,50	0,46	0,39	0,32	0,31	0,27	0,27
35	Japan	0,95	1,07	1,14	1,10	0,98	0,97	1,04	1,02	1,10	1,20
36	Turkey	1,44	1,11	1,04	0,88	0,78	0,76	0,65	0,58	0,72	0,67
37	Iran, Islamic Republic	0,98	0,82	0,86	0,73	0,62	0,54	0,45	0,48	0,49	0,40
38	Afghanistan	1,13	0,75	0,49	0,47	0,45	0,42	0,38	0,26	0,25	0,23
39	Pakistan	1,06	1,09	1,01	0,93	0,91	0,84	0,79	0,70	0,79	0,74
40	Uzbekistan	1,23	1,53	1,54	1,41	1,29	1,17	0,99	0,88	0,82	0,75
41	Turkmenistan	0,87	0,81	0,72	0,68	0,64	0,57	0,52	0,86	0,89	0,91
42	Tadzhikistan	0,89	0,86	0,75	0,66	0,64	0,59	0,50	0,39	0,38	0,36
43	Azerbaijan	1,08	1,09	0,99	0,90	0,80	0,72	0,63	0,50	0,54	0,57
44	Kyrgyzstan	0,97	0,91	0,82	0,76	0,68	0,60	0,48	0,38	0,39	0,39
45	South Africa	1,18	1,32	0,92	0,76	0,73	0,75	0,75	0,83	0,80	0,64

growth rates of PVI, the greater the rate of inflation, and inflation - the scourge of the market economy.

Comment by Valtuh K.K.: inflation index - the concept is much broader than that of the GDP deflator.

Answer: We do not think so. We put the question differently: when earlier economists following A. Marshall asked "what determines the price of the goods or services?" And what the rate of inflation, our initiative group asks "what determines the purchasing power of money and what is the level of balanced growth?"

Comment by Valtuh K.K.: this question was discussed long before Marshall. See also, in particular, my results in statistical test value theory.

Question 7. What is the relationship Q of a particular product with a Q in the Fisher's equation of exchange? Do you want to aggregate the value of a specific product j and associate it with the indicators of macroeconomics?

Answer: In fact, the relationship Q of a specific product j and Q in the Fisher's equation does not exist.

Comment by Valtuh K.K.: There is no direct connection. But it means in the "Fisher's equation" that the product of this equation is the sum of the prices of specific products.

Continued answer: As for the aggregation of indicators specific product j and link it to macroeconomic indicators, such problems in our economic management technology does not exist. It can be explained by the fact that we are willing to work with four indicators that are available in the statistical reports and businesses, and sectors of the economy, and in SNA issue, the nominal $GDP(GDP)$ and real $GDP(GDP)$ deflator and $VVP-NGDP/RGDP$. Aggregation of indicators is the work of statisticians, and the GDP deflator is defined by them also-$NGDP/RGDP$. Scientist has to work with analysis, and not the aggregation of indicators.

Conclusion by Valtuh K.K.: I replied on your thoughts. Further discussion between us is not necessary:in fact, the cause of our differences lies in the fact that we work in different ways, and not just have different understandings of a particular issue.

Conclusion by S. Baizakov: For the conclusive answers to a system of all questions, I have reinterpreted presented the findings of the study. If to be precisely I introduced the concept of "balanced growth rate"(I3), which allowed me to remove many unclear answers to the questions in that discussion:

$$I3 = pp\,(t) * NGDP\,(t) = c\,(t) * RGDP\,(t) \tag{12}$$

Table 3 shows the comparative data rates of balanced growth in the European Union and neighboring countries and regional organizations in developed countries.

Table 3 The calculation of the rate of balanced economic growth in 2010, 2000 = 100

Countries, Regions	A coefficient of scientific-technological progress (STP)	Real growth rate (I2 index)	Balance growth rate (I3 index)	Nominal growth rate (I1 index)	Purchasing power parity (PPP)
1	2	3	4=(2)*(3) =(5)*(6)	5	6
U27	98,50	100,8	99,34	239,08	0,42
U15	97,13	100,1	97,21	233,39	0,42
U9	96,15	100,1	96,28	226,66	0,42
EEC	99,83	165,0	164,74	566,25	0,29
BRIC	126,22	183,1	231,16	437,77	0,35
35 countries	105,46	121,8	128,43	200,97	0,64
ECO	108,02	179,3	193,63	331,54	0,58
United States	103,70	114,5	118,74	146,22	0,81
Japan	109,35	129,1	141,20	117,40	1,20
United Kingdom	95,85	104,5	100,12	197,78	0,51
Germany	94,51	109,3	103,28	219,53	0,47
France	97,55	101,2	98,75	245,13	0,40

As can be seen from the calculation formula of balanced growth rate and results of calculations based on this formula (Table 3), the changes in coefficient in real GDP leads to changes of coefficient in nominal GDP. The source of any changes in rates of economic growth is scientific - technological progress, in particular changing of its coefficient $c(t)$.

The overall conclusion of our discussions with Valtuh K.K. Valtuh K.K. believes that "in fact, the cause of our differences lies in the fact that we work in different ways, and not just have different understandings of this or that particular issue". If so, then the K. Valtuh's desire to stop further discussion of the current issues in the world economy, I consider premature. My challenge is based on a K. Valtuh's study on value theory [2]. The results of this study are shown in Section 4.

4 The Mathematical Substantiation of Necessity of Determining the Rate of Balanced Growth

4.1 Econometric Models are Meaningful if They Relate to the Economic Laws of the Market

The modern theory of value is based, in addition to the works of Marx and Marshall on the major achievements of the twentieth century in the development of economic science. In this direction of economic theory a lot of work was done by Novosibirsk school of economists led by Corr. RAS K. Valtuh. K. Valtuh said

the current prejudice against labor theory of value extremely negative affects the state of economic science, including formulated of practical recommendations on behalf [2,3].

More specifically, it is recommended to give a general theory of the cost a place in economic science, which it in its content deserves. Theory of Value responds well known concept of the theory in general - meets the criteria of external justification and internal perfection. First of all, it is justified by the classical law of value in its findings related to pricing, which in measuring the outcome of the economy has not yet taken its rightful place.

As we know, in modern economic science the difference between cash and trade flows is generally measured by the GDP deflator. According to these scientific and theoretical considerations, the official statistics determines it by the ratio (index) of the amount of the final internal current prices of products manufactured of a certain the country to amount of the same output as measured in the prices of some base year.

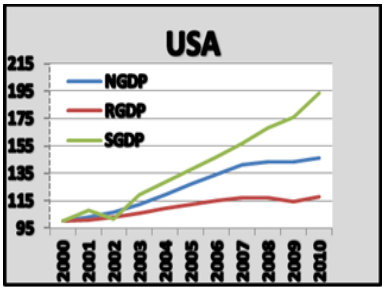
Subsequently, the GDP deflator is identically defined as function (the product) of the three variables identified in the labor theory of value: (1) reciprocal relationship of payroll to GDP, measured in current prices, (2) average payment of unit of labor and (3) direct labor intensity of GDP, measured in base year prices. Accordingly, the dynamics of the GDP deflator is identically determined by the dynamics of these three variables (for example, the growth rate of the deflator for a certain year - the growth rate of these quantities for the same year). However, as a result of this expansion, we have only the identity [2].

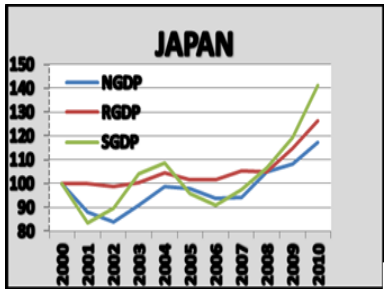
So to express deflator in motion, as a model of the GDP deflator Valtuh has taken advantage of econometric analysis methods. But, in our opinion, he is trapped in a simple modeling technique and missed the point of research of the economic content of the GDP deflator, before engaging its modeling. Valtuh just wrote "in modern economics the difference between cash and trade flows is generally measured by the GDP deflator" [ibid.]. Further, he was in the wrong chain of reasoning, taking at face value the econometric model of the GDP deflator.

One of the examples of failed economic modeling of inflation and GDP deflator in Kazakhstan we have given above. These econometric models do not take into account the contributions aspirations, successes and risks of the entrepreneurs to the economy. "The first most important of the innate properties of matter - Karl Marx wrote - a movement, not only as a mechanical and mathematical movement, but even more as a desire, a life spirit, stress, or, to use the expression of Jacob Boehme, flour of [Gual] matter" [4]. As you know, the driving force, the spirit of the economy is every desire, which is called the scientific and technological improvement of production, in short, scientific and technological progress (STP) in the economy. The level of scientific and technological progress in each moment

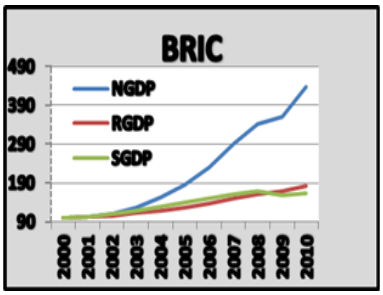
of time locked by the one or more indicators. And the result of this desire can also be described as the contribution of the NTP activities undertaken. In our system of models the result of STP is its ratio - $c(t)$, and the level of scientific and technological progress - $GDP(t)/X(t) : c(t) = GDP(t)/X(t)$. And the purchasing power of money, which sets the cost of money, therefore, the value of the currency is defined by the formula: $pp(t) = c(t)/p(t)$. Here, the GDP deflator is given by official statistics on all types of goods and services, industries and economic activities. Its clearance from the influence of scientific and technological progress is precisely defined by the formula - $(t) = (t)/(t)$. These indicators of STP contribution and the purchasing power of money successfully complement the GDP deflator (inflation index) for analytical work and predictive calculations of economic development. The advantage of these indicators is to analyze the three indices of economic growth which reveal the essence of the true value and balanced economic growth rate (Fig.2).

USA	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
NGDP	100	103	107	112	119	127	134	141	144	143	146
RGDP	100	101	103	106	110	112	115	118	118	115	118
SGDP	100,0	108,3	101,4	119,2	128,3	137,4	146,6	157,1	168,1	176,0	193,6
JAPAN											
NGDP	100	88	84	91	99	98	94	94	105	108	117
RGDP	100	100	99	100	105	102	101	105	105	115	126
SGDP	100,0	83,4	89,7	104,1	108,7	96,0	91,1	97,5	106,7	119,3	141,2





Kazakhstan	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
NGDP	100	121	135	169	236	312	443	573	729	630	809
RGDP	100	114	125	136	149	164	181	197	204	206	221
SGDP	100,0	132,5	133,3	126,9	146,2	152,6	192,2	210,2	338,1	252,7	286,9
BRIC											
NGDP	100	103	110	127	153	185	229	291	342	360	438
RGDP	100	101	106	113	119	126	137	150	162	169	183
SGDP	100,0	102,3	109,9	118,1	128,6	138,5	150,1	161,8	169,9	156,9	164,7



United Kingdom	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
NGDP	100	121	135	169	236	312	443	573	729	630	809
RGDP	100	114	125	136	149	164	181	197	204	206	221
SGDP	100,0	132,5	133,3	126,9	146,2	152,6	192,2	210,2	338,1	252,7	286,9
Germany											
NGDP	100	103	110	127	153	185	229	291	342	360	438
RGDP	100	101	106	113	119	126	137	150	162	169	183
SGDP	100,0	102,3	109,9	118,1	128,6	138,5	150,1	161,8	169,9	156,9	164,7

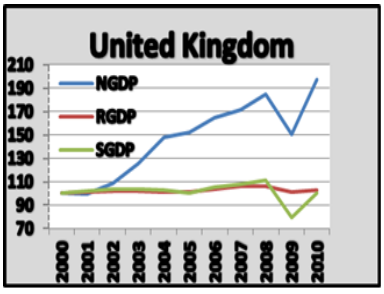


Fig.2 Example of illustrations of the possible outcomes of the analysis of three levels of balanced economic growth

On the Fig.2 to illustrate the possible outcomes of the analysis there are the three levels of balanced economic growth. In the first row is the state of the economies of the U.S. and Japan in 2000 and 2010. In these countries the rate of balanced growth is higher than the growth rate of nominal (second place) and real growth.

On the second row there are the states of the BRIC and Kazakhstan economies for the same years. Their balanced growth rate was lower than the nominal, but higher than the actual growth rate.

The third row shows the states of the economies of United Kingdom and Germany. As the chart above shows the development of the economies of these countries in the same years, both, the rate of balanced growth was lower not only

than the nominal, but the real rate of development.

These analytical calculations confirm the findings of the President of Kazakhstan Nursultan Nazarbayev made on the VI Astana Economic Forum that definitely the developed countries caused the recession in some countries of the world[5].

In the practice of predictive calculations of economic development of countries STP contribution is still accepted, mainly exogenously. In the simplest case, non-decreasing function of time is introduced to the production function as a multiplier. These calculations in Soviet times allowed us to determine the STP type (capital-intensive or labor-intensive) to take into account the structure of NTP, which is defined by technology used in the production, grouped according to their degree of progressivity [6,7].

But since the end of the twentieth century intensive work was started to integrate the STP function into models of economic analysis. Thus, in the collective monograph SOPS at the Academy of Sciences of the Russian Federation, published under the imprint of the academic series "The problems of the Soviet economy" in 1988 there were stress that the key "direction of account of STP progress is to use so-called STP functions (for example, the first equation of the model Kaldor-Mirrlees, the function proposed by Baizakov S. in the Institute of economic Research). Here, dependence of the relative indicators of the STP development is accepted as a function. According to Kaldor-Mirrlees, STP function is defined by dependence of growth of labor productivity on growth of capital-labor. In a model of S. Baizakov it is determined by the dependence of growth in capital productivity per unit of labor embodied in the organic composition of production (capital-degree lead over costs to pay for it). In contrast to the first type of production functions, where NTP is autonomous, in these models, the latter a driving force of macroeconomic dynamics. Similar analysis of unit of production functions as a method of accounting for NTP in the prediction was given in the works of S. Baizakov, V. Dadayan, N. Kulbovskoy, etc.[8,9]".

Indeed, as our Russian colleagues point out, the implementation of STP functions in macroeconomic models would allow defining more precisely the most important synthetic indicators of the economy development (gross domestic product growth rate of labor productivity, capital productivity, etc.). If using a macroeconomic model the contribution of STP can be estimated, it would open the possibility for the treatment of price indices of goods and services from the influence of the GDP deflator.

However, the analysis carried out by the Institute for Economic Research in recent years has shown that the problem is not so simple. Even if the amount of money corresponds to the number of produced commodity supply and circulation process is going well, the choice of indicators of measuring the final result pro-

duction in terms of money is not a simple technical problem. In fact measuring the final product by the value of nominal GDP, real GDP and the GDP deflator is only a necessary condition, but the system of indicators is not sufficient for the detection of defective mechanisms bottlenecks in economic management.

Indeed, the GDP deflator is one of the most important indicators of economic management. Because it is determined by the ratio of nominal GDP this year to real GDP, the GDP deflator itself needs meaningful economic expertise. Our conclusion is that before engaging in mechanical treatment the GDP deflator by econometric methods, its economic content should be thoroughly understood.

Econometrics will give meaningful results when economic models, based on it, meet the aspirations of entrepreneurs. It's not a secret that the most widely used econometric models and production functions do not fully reflect the contribution of scientific and technological progress (STP) in the economy.

4.2 Limitations of Monetary theory of Economic Growth

There is given a new interpretation of monetarist model, based on which the limitations of the GDP deflator ($p(t)$) and its inadequacy are mathematically proved as a key instrument of financial management:

$$Q_t x p_t = v_t x M_t \tag{13}$$

Here, Q_t is the product of the base year, which equals the nominal GDP, pt is inflation index, defined by the velocity of circulation of money of the base period $vt = v0$. For example, if according to the national economy one of the countries had rates Q_t = \$14 366 700 000, M_t= \$12 460 100 000, and v_t =$v_0 = Q_0$ /M_0 = 9 817 000/7 173 800=1,36845, then pt = v_t x M_t /Q_t =1,36845 x 12 460 100 / 14 366 700 = 1,187 or 118,7%.

As can be seen from these calculations, they do not take into account change in counter of technological excellence of production $c = \mu/(1+\mu)$, where $\mu = GDP/QP$, QP is a product of intermediate consumption in the system of national accounts or the cost of current material expenses in the amount of salesC = $QP + GDP$. Increasing dynamics of indicator $\mu(t)$ by M. Porter is an increase in productivity of current material costs with the cost of QP, used in the production of GDP, and their sum is constant at any given point in time - $X = QP+GDP = const$.

From the standpoint of environmental protection and green economy indicator $\mu(t)$ is the most important criterion for competitiveness, as well as the GDP/QP at X = const means a maximum of GDP production at current low cost of energy and use of raw materials and other natural resources.

In turn, the monetarists formula $Q_t x p_t = v_t x M_t$ at $v_t = v_0$ is represented as $Y_t x p_{2,t} = v_0 x M_t$, where $Y_t = Q_t x p_t$ - nominal GDP, and $p_{2,t} = v_0/v_t$ - money inflation index. Now let's consider the ratio of the data of values of the current

year t to cost in the base period of time:

$$\frac{Q_t \times p_t}{Q_0 \times p_0} = \frac{v_t \times M_t}{v_0 \times M_0} \tag{14}$$

or

$$\frac{Y_t}{Y_0} = \frac{v_t \times M_t}{v_0 \times M_0} \tag{15}$$

In another way, it appears as a product of growth of indicators Q and M, as well as the growth rate of the control indicators p and v:

$$\frac{Q_t}{Q_0} \times \frac{p_t}{p_0} = \frac{v_t}{v_0} \times \frac{M_t}{M_0} \tag{16}$$

or

$$\frac{Y_t}{Y_0} = \frac{v_t}{v_0} \times \frac{M_t}{M_0} \tag{17}$$

So, the product of the growth rate of real and GDP deflator is equal to the product of the growth rate of money turnover (= index value of one unit of money in relation to nominal GDP) and growth rate of the money supply.

Or, in other words, we can say: the growth rate of nominal GDP is equal to growth rate of the product of the circulation of money multiplied by the money growth rate.

Hence the price index is equal to one unit of money:

$$\frac{v_t}{v_0} = \frac{Q_t/Q_0}{M_t/M_0} \times \frac{p_t}{p_0} \tag{18}$$

or

$$\frac{v_t}{v_0} = \frac{Y_t/Y_0}{M_t/M_0} \tag{19}$$

That is, the growth index of the price of one unit of money equals to the ratio of real GDP growth and money supply multiplied by the GDP deflator.

Or, growth index of value of one unit of money equals to the ratio of growth rates of nominal GDP and the money supply.

If the prices of goods and services for final use did not change, the rate of growth of the price of one unit of money would be determined only by the ratio of real GDP growth in the money supply. Since the price index for goods and services in real-life is greater than one, then multiplying this ratio to the GDP deflator leads to an increase in index of the price of money. The real index of the "price" of money expressed by physical benchmark is the ratio of the index of price of money received by the GDP deflator and in other words is the ratio of the rate of real GDP to growth rate of the money supply:

$$\frac{v_t}{v_0} / \frac{p_t}{p_0} = \frac{Q_t/Q_0}{M_t/M_0} \tag{20}$$

Equation (4) shows how the physical contents of one unit of money changes when the real volumes of end-products and the money supply change.

The reciprocal of the growth rate of money turnover represents an index of monetary inflation (relative to nominal GDP):

$$\frac{v_0}{v_t} = \frac{M_t/M_0}{Q_t/Q_0} \times \frac{p_0}{p_t} \tag{21}$$

or

$$\frac{v_0}{v_t} = \frac{M_t/M_0}{Y_t/Y_0} \tag{22}$$

If the prices of goods and services have not changed, then the monetary inflation would be determined by the ratio of the rate of growth of the money supply to growth rate of real GDP. And because the prices of goods and services change, the monetary inflation is determined by the ratio of the rate of growth of the money supply and nominal GDP.

Let us call the ratio of the rate of growth of the money supply to growth rate of real GDP in the base year price as index of real monetary inflation. It will be equal to the product of monetary inflation index for inflation in prices of goods and services for final use:

$$\frac{M_t/M_0}{Q_t/Q_0} = \frac{v_0}{v_t} \times \frac{p_t}{p_0} \tag{23}$$

Hence it is not difficult to get a formula to determine the nature of the GDP deflator, familiar to us from the official statistics:

$$\frac{p_t}{p_0} = \frac{M_t/M_0}{Q_t/Q_0} . \frac{v_t}{v_0} = \frac{Y_t/Y_0}{Q_t/Q_0} = I_1/I_2 \tag{24}$$

where$I_1 = Y_t/Y_0$ - is the rate of economic growth in the current year prices, and$I_2 = Q_t/Q_0$ - is the rate of economic growth in base year prices or the same as index of physical volume.

As can be seen from (A1), the GDP deflator expresses the ratio of the rate of economic growth in the prices of the current year to the rate of growth in the prices of the base year. It does not take into account possible changes in the cost of the currency.

As a result, the index of the GDP deflator is the ratio of a fixed state of the economy in two different time points, which does not react to changes in a rapidly changing reality, above all, to changes in the purchasing power of the national currency.

4.3 Limitations of the duality theory of economic growth

Clarifying the roles of the GDP deflator is possible through the use of the principle of duality of Kantorovich-Koopmans, which is written as:

$$Q_t x p_t = c_t x X_t \tag{25}$$

Here, as noted above, indicator c represents the efficiency of the trade or expresses the contribution of scientific and technological progress in the real economy. At $c_t = c_0$ it is represented as$Y_t x p_{1,t} = c_0 x X_t$, where $Y_t = Q_t x p_t$ - is nominal GDP, and $p_{1,t} = c_0/c_t$ - is the index of counter of technological excellence of production.

Now consider the formulas analogous to 1-6 with a contribution of scientific and technological progress in the real economy. First, we consider the ratio of the data values of the current year t to cost in the base period of time:

$$\frac{Q_t \times p_t}{Q_0 \times p_0} = \frac{c_t \times X_t}{c_0 \times X_0} \tag{26}$$

or

$$\frac{Y_t}{Y_0} = \frac{c_t \times X_t}{c_0 \times X_0} \tag{27}$$

In another way, it appears as a product of growth rates of indicators Q and X, as well as the growth rate of the control indicators p and c:

$$\frac{Q_t}{Q_0} \times \frac{p_t}{p_0} = \frac{c_t}{c_0} \times \frac{X_t}{X_0} \tag{28}$$

or

$$\frac{Y_t}{Y_0} = \frac{c_t}{c_0} \times \frac{X_t}{X_0} \tag{29}$$

That is the product of the growth rate of real GDP to the GDP deflator is equal to the product of the rate of counter of technological excellence of production of output of goods and services (including products for intermediate consumption). The term "technological improvements" for the first time in the economic cycle is entered, apparently, by Alfred Marshall.

Or, in other words, we can say: the rate of growth of nominal GDP is equal to the product of rate of counter of technological excellence of production to the rate of production of goods and services (including products for intermediate consumption).

Hence, index of counter of technological excellence of production (STP coefficient) equals:

$$\frac{c_t}{c_0} = \frac{Q_t/Q_0}{X_t/X_0} \times \frac{p_t}{p_0} \tag{30}$$

or

$$\frac{c_t}{c_0} = \frac{Y_t/Y_0}{X_t/X_0} \tag{31}$$

That is, index of counter of technological excellence of production (STP coefficient) equals to the ratio of the rate of growth of real GDP and gross output multiplied by the GDP deflator.

Or, index of counter of technological excellence of production (STP coefficient) equals to the ratio of Nominal GDP growth rate and gross output.

If the prices of goods and services for final use did not change, then STP coefficient would be determined only by the ratio of real GDP growth to gross output. Since the price index for goods and services in real-life is greater than one, then multiplying this ratio to the GDP deflator leads to an increase in the rate of counter of technological excellence of production. Real growth rate of STP coefficient expressed by physical benchmark is the ratio of the resulting index of growth rate of STP coefficient for the GDP deflator and in other way is the ratio of real GDP rate to gross output:

$$\frac{c_t}{c_0}/\frac{p_t}{p_0} = \frac{Q_t/Q_0}{X_t/X_0} \tag{32}$$

Equation (10) shows how the physical contents of one unit of output (one unit of money needed to trade - X) changes when the real volume of the final product and gross output changes.

The reciprocal of the STP coefficient represents the index of excess of the gross output relative to nominal GDP:

$$\frac{c_0}{c_t} = \frac{X_t/X_0}{Q_t/Q_0} \times \frac{p_0}{p_t} \tag{33}$$

or

$$\frac{c_0}{c_t} = \frac{X_t/X_0}{Y_t/Y_0} \tag{34}$$

If the prices of goods and services have not changed, then the index of exceeding the gross output of the nominal GDP would be determined by the ratio of the rate of growth of gross output to growth rate of real GDP. And because the prices of goods and services change, the index of exceeding the gross output relative to the nominal GDP determined by the ratio of growth rate of gross output and nominal GDP.

Let us call the ratio of the rate of growth of gross output to growth rate of GDP as real index of exceeding the gross output relating to the nominal GDP. It will be equal to the product of the index of exceeding the gross output and the nominal GDP deflator:

$$\frac{X_t/X_0}{Q_t/Q_0} = \frac{c_0}{c_t} \times \frac{p_t}{p_0} \tag{35}$$

Hence it is not difficult to obtain a new specification of the formula of the GDP deflator, which reflects the changes in the real economy, and the changes in the monetary and financial system:

$$\frac{p_t}{p_0} = \frac{c_t/c_0}{pp_t/pp_0} \tag{36}$$

where$p_t/pp_0 = \frac{Q_t/Q_0}{X_t/X_0}$means the rate of change of purchasing power of money, andp_t and c_t have the same values.

As can be seen from (A2), the GDP deflator saves its money status and its quantitative value determined by the model of monetarism. But its economic nature has now become meaningful and richer. According to its new formula, the nature of the GDP deflator revealed the unity of the two mutually independent indicators of economic management. One of them represents the ratio of scientific and technological risk of entrepreneurs' work in the real sector, and the other expresses the purchasing power of money in the monetary and financial system. One of them expresses the performance of the real sector; the other expresses the quality of the financial sector of the economy.

Thus, the "crossing" of Keynesian and monetarists' theory based on the duality theory of Kantorovich-Koopmans has been successful.

4.4 Balanced economic growth as the key to the management of the market economy

Due to the formula (A2), the rate of balanced economic growth (growth index $I3(t)$) is defined as the product of the purchasing power of money and the growth rate of nominal GDP (growth index $I1(t)$):

$$\mathrm{I3(t)} = \mathrm{pp(t)} * \mathrm{I1(t)} \tag{37}$$

On the other hand, the same rate of balanced economic growth (growth index $I3(t)$) is determined by the product of the ratio of STP coefficient and the real growth rate of GDP (growth index $I2(t)$):

$$\mathrm{I3(t)} = \mathrm{c(t)} * \mathrm{I2(t)} \tag{38}$$

The equality of the given rate of nominal GDP growth - $pp(t) * I1(t)$ with the given rate of real GDP growth - $c(t) * I2(t)$ means that any point on the path of balanced economic growth $t = t0$ is an equilibrium point in prices of goods and services to the purchasing power of the national currency:

$$\mathrm{pp(t)} * \mathrm{I1(t)} = c(t) * I2(t) \tag{39}$$

Thus, the identification of "explosive feature" of the GDP deflator has allowed the Initiative Group of Kazakhstan to present it by two conjugated indicators of scientific and technological progress of the real sector of the economy and the purchasing power of the currency.

Indicator of scientific and technological progress is a barometer of management of the real sector of the economy. Managing the dynamics of change is a function of private sector entrepreneurs, and government agencies that monitor the development of the natural monopolies.

Indicator of the purchasing power of money is the barometer of management

of the financial sector of the economy. Managing the dynamics of change is a function of the representatives of monetary and financial system, and of the National Bank, which oversees the activities of banks.

The initiative group of economists of Kazakhstan believes that the speech of the President of Kazakhstan Nursultan Nazarbayev at the VI Astana Economic Forum has given a new impulse to the study of sustainable development issues and served as a key to unlocking the essence of the GDP deflator. Thus it opened the way to the justification of the rate of balanced growth as the criterion of economic governance of the world economy.

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