

ECONOMIC GROWTH FACTORS IN 2014 – H1 2015

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The results of decomposition of output growth rates for the period of 2014 – H1 2015 point to recent changes in the relative significance of different growth factors, which has been demonstrating a shift from the extensive factors towards negative inputs of the intensive factors. Over the first half-year of 2015, the growth rate of labor and capital inputs (which was sustained at the same level as in the past few years) failed to adequately compensate for the adverse situation with regard to price movement in the world's raw materials markets, thus pushing down output. As before, the structure of extensive factors is dominated by the capital inputs backed by steady growth of fixed assets.

It has become a widespread international practice, when analyzing the prospects of economic development, to apply methods based on by-factor decomposition of economic growth. Decomposition means that the rate of output growth is broken into extensive and intensive components depending on the specific values of differential production function. Labor and capital inputs are considered to be extensive factors whose value is derived by multiplying the values of both factors (the actual number of employed persons and the volume of fixed assets) by the intensity of their use (the working hours of one employed person and the load on production capacities). The input of each of the extensive components can be derived by multiplying the growth rate of that component by the weighting coefficient. Intensive growth components are represented by the residual that cannot be explained by the effect of the main factors, and is called combined factor productivity (CFP). The results of decomposition reflect transformations in the structure of economic growth, thus making it possible to single out the most relevant factors determining changes in the dynamics of the rate of output growth.

According to data published by the Federal Statistics Service (*Rosstat*), the period of 2014 through the first half year of 2015 showed shrinkage of the quarterly rate of GDP growth amounting on the average to 1.0 pp. In 2014, the GDP growth rate was on the average at the level of 0.6%, which represents a twofold drop on 2013 (1.3%). In the first half year of 2015, the growth rate of real GDP shifted into negative zone, amounting to (–3.4%)¹, and the rate of decline was accelerating on a quarterly basis from (–2.2%) in Q1 to (–4.6%) in Q2 2015.

In 2014, the indices of GDP volume and main production factor inputs were moving in the same direction: output growth was followed by increasing inputs of the main extensive factors. Over the period under

consideration, with the exception of Q1 2014, labor and capital inputs demonstrated a higher growth rate than that of GDP. On the contrary, over the first half-year of 2015, the continuing growth of main production factor inputs was taking place alongside GDP decline.

As shown by factor decomposition (*Table 1*), the structure of the growth rate of GDP observed over the first half-year of 2015 differs significantly from its structure in the 2014. On the average in 2014, the most relevant component of the growth rate of GDP was the input of the main production factors, whose dominant role was determined by changes in the capital inputs in production. With the exception of Q1, the capital input growth rate was higher than that of output, so that its role was not simply to contribute to a major part of economic growth – its input in the growth rate of GDP was more than 100%. In the first half-year of 2015, CFP was the principal factor responsible for the decline of GDP; the negative value of CFP was the sole reason for the shrinking output.

Both the structure of labor inputs and their input in GDP growth varied from quarter to quarter. The fluctuation in the growth rate of labor inputs was determined by the multi-vectored movement of its two components. The number of employed persons displayed a rising growth rate from (–0.1%) in Q1 2014 to 1.0% in Q2 2015. The average by-quarter growth rate for that period amounted to 0.2 pp. (when fitted to a linear trend – 0.3 pp.). The index of the working hours of employed persons, on the contrary, displayed a declining growth rate, which on the average over that period amounted to 0.2 pp. (when fitted to a linear trend – 0.4 pp.); it is noteworthy that, from Q4 2014 onwards, this component of labor inputs slipped into negative territory. These observations have confirmed the assumption that the number of working hours of employed persons is a more flexible instrument from the point of view of adaptation to a changeable market

¹ As estimated by the RF Ministry of Economic Development.

Table 1

THE STRUCTURE OF GDP GROWTH RATE (AGAINST SAME PERIOD OF PREVIOUS YEAR)

	Q1 2014	Q2 2014	Q3 2014	Q4 2014	Q1 2015	Q2 2015
Growth rate						
GDP	0.6	0.7	0.9	0.4	-2.2	-4.6*
I. Factor inputs	0.5	1.7	2.7	4.1	1.5	2.8
I.1 Labor	0.2	0.2	0.4	-0.2	-0.9	0.3
Employment	-0.1	0.1	0.1	0.3	0.6	0.6
Working hours	0.3	0.1	0.2	-0.5	-1.5	-0.3**
I.2 Capital	0.3	1.5	2.3	4.3	2.4	2.5
Fixed assets	1.7	1.8	1.9	1.8	1.6	1.6
Capacity load	-1.4	-0.3	0.5	2.4	0.9	0.9
II. CFP	0.1	-0.9	-1.8	-3.6	-3.8	-7.4
As % of GDP growth rate						
GDP	100.0	100.0	100.0	100.0	100.0	100.0
I. Factor inputs	91.1	231.7	313.5	941.0	-68.2	-60.7
I.1 Labor	43.4	28.1	41.3	-50.0	39.8	-5.5
Employment	-9.4	10.5	13.4	64.6	-27.1	-12.0
Working hours	52.8	17.6	27.9	-114.6	66.9	6.5
I.2 Capital	47.7	203.6	272.2	991.0	-108.0	-55.2
Fixed assets	293.5	247.2	219.2	423.7	-69.6	-35.0
Capacity load	-245.8	-43.6	52.9	567.3	-38.4	-20.2
II. CFP	8.9	-131.7	-213.5	-841.0	168.2	160.7

* the RF Ministry of Economic Development's estimates

** the values of working hours for Q2 2015 are based on an autoregressive – moving-average model, calculated by applying data submitted over the period from Q1 1999 through Q1 2015.

situation, and so it more promptly responds to changes in economic conditions. The results of by-quarter decomposition of the number of working hours of employed persons show that, in the majority of periods under consideration, this was the most significant component determining the size and direction of labor inputs in the growth rate of GDP. In Q2 and Q3 2014, the input of changes in the work intensity of employed persons in the growth rate of output was twice higher than that of changes in the number of employed persons. In Q1 2014, the longer working time of employed persons compensated for the shrinkage in their numbers, and so produced a positive labor input in the growth rate of output. In Q4 2014 and Q1 2015, the rate of decline displayed by the work intensity of employed persons was higher than the growth rate of their numbers, thus determining an overall shrinkage of the labor input.

In the period from 2014 through the first half-year of 2015, capital inputs acted as a more relevant factor than labor inputs in terms of GDP growth. This component displayed a rising growth rate, its average by-quarter growth amounting to 1.0 pp. In accordance with the applied assessment methodology,¹ the dynamics

of capital reserves was determined by changes in the volume of investments in fixed assets, whose decline rate was gaining on the average 0.3 pp. every quarter (from -5.3% in Q1 2014 to -6.7% in Q2 2015). As a result, in conditions of the existing degree of wear and tear of fixed assets, the growth rate of capital reserves remains practically unchanged, demonstrating only a negligible average by-quarter decline of 0.07 pp. At the same time, over the entire period under consideration, the growth rate of capital reserves remained steadily above that of GDP, so that their input in the growth rate of output in 2014 was more than 100%, and in the first half-year of 2015 it was negative. In contrast to the volume of fixed assets, the growth rate of the capacity utilization of capital reserves varied from quarter to quarter. Over the period under consideration, their movement displayed a positive trend: the average by-quarter increase in the growth rate of this component of capital inputs amounted to 1.0 pp. In Q1 and Q2 2014, the shrinking load on production capacities was responsible for an overall reduction in capital inputs in the growth rate of output. The positive growth rate of the index of the intensity of use of fixed assets in Q3 and Q4 2014 were determining their increasingly positive input, and in Q1 and Q2 2015 –

1 In the absence of quarterly statistics, growth of the main factors is assessed on the basis of the assumption that the coefficient of retirement of fixed assets and the share of investments earmarked for their renewal are constant values. It should be noted

that the estimates thus obtained may be biased because they are not adjusted by the time lag between the receipt of investments and the moment of their use.

their negative input in the growth rate of GDP determined by the input of capital reserves.

As shown by the decomposition results, over the period under consideration, the combined factor productivity (CFP) was on the decline from Q2 2014 onwards, demonstrating a 1.5 p.p. increase in the average quarterly productivity decline rate (when fitted to a linear trend – 1.4 pp). In 2014, the decline rate of CFP amounted on the average to (–1.6%) vs. 0.5% in 2013. In the first half year of 2015, the productivity decline rate significantly accelerated – to (–5.6%), jumping up every quarter from (–3.8%) in Q1 to (–7.4%) in Q2 2015.

The observed influence of CFP on the movement of output by no means reflects only the impact of productivity factors determined by technological changes. It also incorporates some components not included in the estimates of the main factors, as well as biases caused by the specific assessment methodology, in particular those determined by an uneven movement of the value indices applied in the decomposition (output and capital)¹. As shown by the estimates obtained for earlier periods, these biases are significant in conditions of Russia’s economic system, which is strongly influenced by changes in prices on international raw materials markets, especially in a short-term perspective.

In accordance with the obtained decomposition results (Fig. 1)², during the period under considera-

1 The ‘value’ estimate of productivity becomes similar to its physical estimate in a situation of long-term balance in the economy and perfect competition. In other words, this similarity can be possible only when a system’s current balance incorporates all the potential exogenous shocks.

2 The singling out, in CFP’s structure, of a ‘situational’ component and further decomposition of the rate of output growth is based on the existence of a statistically significant correlation between the growth rates CFP and world oil prices, which is estimated by applying a regression model based on annual data for the period 1993 – 2013. The resulting ‘final residual’, cleared of the

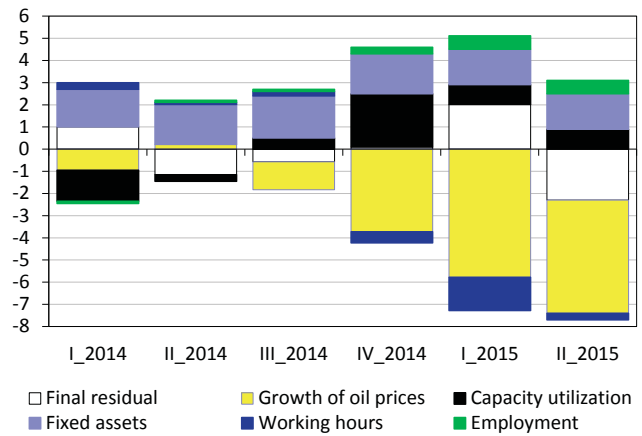


Fig. 1. By-factor Decomposition of GDP Growth (Against Same Periods of Previous Year), with Estimates of Input Provided by Oil Prices.

tion (the only exception being Q2 2014) the changes in oil prices resulted in a slowdown of economic growth, and compared with the previous periods, this slowdown was significant. In 2014, due to the negative inputs of the price factor, the growth rate of output dwindled (on the average) by 2.8%, and in the first half-year of 2015 – by 5.4%. Changes in the growth rate of the ‘technological’ component obtained as a result of singling out, as a separate factor, the situation on world raw materials markets, somewhat differ from the movement pattern displayed by CFP. The growth rate of the ‘final residual’ was negative in Q1 2014 and in the period of Q4 2014 through Q1 2015. However, on the whole over the period under consideration, the movement of the ‘technological’ component demonstrated a declining growth rate – on the average by 0.7 pp. per quarter (when fitted to a linear trend – by 0.3 pp.). ●

effects produced by fluctuations of prices on world raw materials markets, represents a more correct index of technological productivity, i. e., the intensive component of output growth.