

The impact of the carry-over effects on average annual real GDP growth rate

The calculation of the average annual real GDP growth rate in a given year includes contributions from both the quarter-on-quarter dynamics of the indicator in the reported year and those recorded in the previous year (hereinafter referred to as ‘base year’). The statistically-determined impact that the real GDP dynamics in a base year have on the average annual growth rate in the following year is the carry-over effect. Conceptually, it denotes the average annual growth rate that would result in a given year ($\Delta(\%)GDP_{t/t-1}$), if the level of real GDP reached in the fourth quarter of a base year (GDP_{t-1}^{Q4}) were to remain constant throughout the subsequent year. For example, the average annual growth of real GDP may be calculated as:

$$\Delta(\%)GDP_{t/t-1} = \frac{\overline{GDP}_t - \overline{GDP}_{t-1}}{\overline{GDP}_{t-1}} \cdot 100 = \frac{\overline{GDP}_t - GDP_{t-1}^{Q4} + GDP_{t-1}^{Q4} - \overline{GDP}_{t-1}}{\overline{GDP}_{t-1}} \cdot 100 = \frac{GDP_{t-1}^{Q4} - \overline{GDP}_{t-1}}{\overline{GDP}_{t-1}} \cdot 100 + \frac{\overline{GDP}_t - GDP_{t-1}^{Q4}}{\overline{GDP}_{t-1}} \cdot 100$$

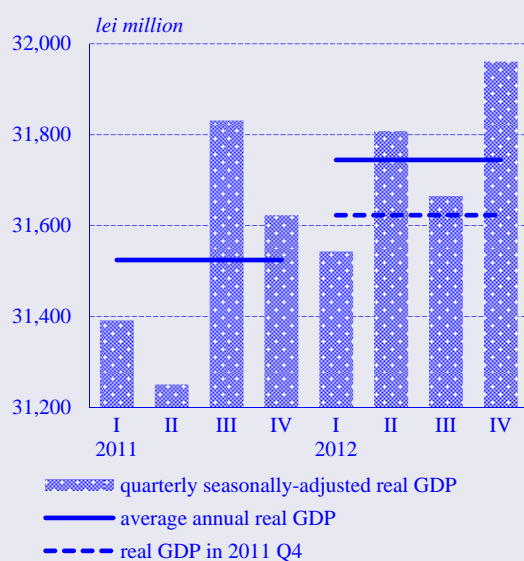
where (GDP_{t-1}^{Q4}) is the level of seasonally-adjusted real GDP in Q4 of the base year (t-1) and (\overline{GDP}_t) is the annual average in that year.

The first term in the last part of the equation is the carry-over effect that measures the percentage change of real GDP in the fourth quarter (Q_4) of the base year (t-1) against average GDP for the year as a whole (\overline{GDP}_{t-1}). According to this equation, if the level of real GDP in the fourth quarter of a year (GDP_{t-1}^{Q4}) rises above the annual average, the carry-over effect in the subsequent year will be positive.

The second term of the sum measures the average real GDP growth rate in the current year (\overline{GDP}_t) relative to the last quarter of the previous year (GDP_{t-1}^{Q4}) expressed in percent-to-GDP in the base year (\overline{GDP}_{t-1}). Against this backdrop, the contribution from real GDP dynamics in the course of the four quarters of the current year to the average annual real GDP growth will be the difference between its average annual growth rate ($\Delta(\%)GDP_{t/t-1}$) and the carry-over effect.

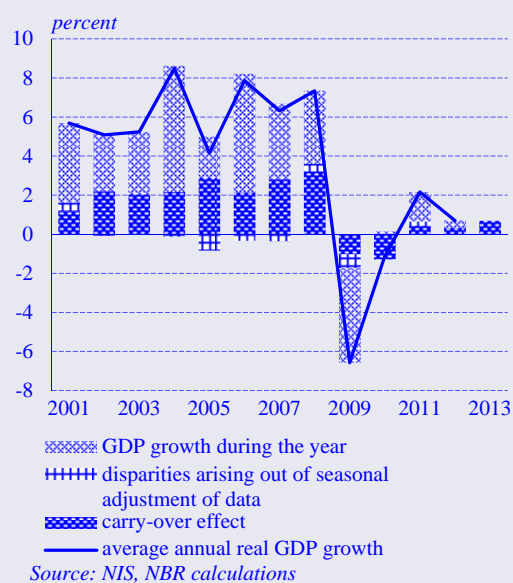
In order to underscore the importance of the carry-over effect in explaining the annual dynamics of real GDP in 2012, the quarterly levels of seasonally-adjusted real GDP in 2011 and 2012 are presented in Chart A. Solid lines show the average levels of real GDP in each of the two years and the dotted line traces the average level of real GDP that would have been recorded in 2012 if it had remained constant in the course of the year at the level reached in 2011 Q4. The percentage change between the levels in the solid lines quantifies the average annual real GDP growth rate in 2012 ($\Delta(\%)GDP_{2012/2011} = 0.7\%$), whereas the percentage change between the level in the dotted line and that in the solid line in 2011 is the carry-over effect equal to approximately one-half of the average annual GDP growth in 2012.

Chart A. Real GDP in 2011 and 2012



Source: NIS, NBR calculations

Chart B. Average annual real GDP growth and the carry-over effect



Source: NIS, NBR calculations

Chart B sets out the carry-over effect on the average annual real GDP growth rates in the period 2001-2012. The chart also depicts the carry-over effect in 2013, calculated solely based on NIS-published historical GDP data for 2012. In Chart B, the years that were marked by negative carry-over effects were 2009 and 2010. The carry-over effect contributed, on average, 1.4 percentage points to the economic growth in the reported period, i.e. more than one-third of the average annual GDP growth.

The carry-over effect on the 2013 economic growth equals 0.7 percent¹, which is lower than the historical average but significant, given that GDP growth rebounded strongly into positive territory in the final quarter of the previous year².

¹ This assessment is based on the provisional GDP figures published by the NIS on 4 July 2013 and is surrounded by uncertainty, as the quarterly seasonally-adjusted real GDP levels reached in 2012 can be significantly affected by further data revisions in the NIS-compiled National Accounts. For example, according to NIS estimations on the GDP released on 2 April 2013, the estimated carry-over effect for 2013 was 0.4 percent.

² After having contracted by 0.4 percent in 2012 Q3, real GDP rose at a quarter-on-quarter rate of 0.9 percent in 2012 Q4.