Carry-over effects on annual average growth rates of real GDP

Forecasts and projections of real GDP are often presented in terms of annual average growth rates. When interpreting these figures, it should be borne in mind that the annual average growth rate for a given year is not only determined by the quarter-on-quarter growth rates observed in the course of that year but also by the dynamics of growth in the course of the previous year. This latter impact can be summarised in terms of "carry-over" effects, as explained in this box.

Carry-over effects denote the annual average rate of growth that would result if the level of GDP reached in the fourth quarter of a given year ("year 1") remained constant throughout the following year ("year 2") (see Chart A). This is equivalent to the percentage difference between the level of GDP in the fourth quarter of year 1 and the average level for that year. The calculation of carry-over effects is therefore based on GDP developments in year 1 only. When the level of GDP in the fourth quarter of year 1 is above its average level for that year, the carry-over effect on annual average growth in year 2 is positive (see left-hand side of Chart A). Conversely, the carry-over effect is negative when the level of GDP at the end of year 1 is below its average level for that year (see right-hand side of Chart A). Given that GDP growth is most often positive, carry-over effects may be interpreted as the minimum annual average growth rate which will be observed in year 2 on the basis of developments in year 1. The actual annual average growth rate observed in year 2 will then be the combination of the carry-over effect and growth developments in the course of year 2.

Chart A: Calculation of carry-over effects
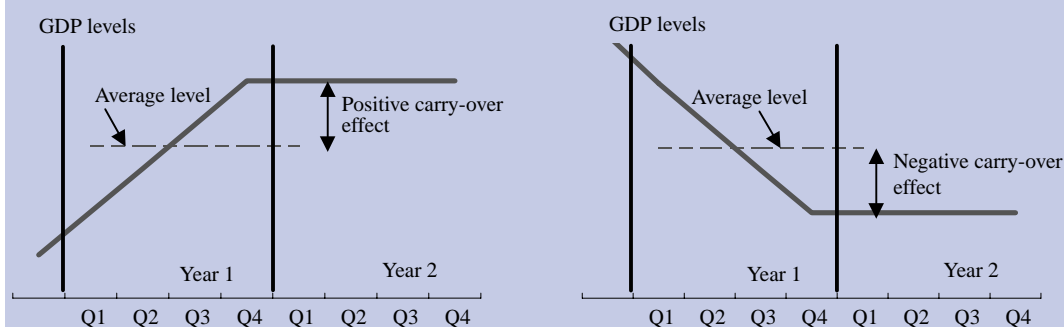
The stronger the quarter-on-quarter GDP growth is at the end of year 1, the higher the carry-over effect is and, everything else being equal, the higher the actual annual average growth rate is in year 2. Charts B and C illustrate the importance of growth dynamics in the course of year 1 on carry-over effects for growth in year 2. Three different paths for GDP in the course of year 1 are shown in terms of levels and growth rates. In Chart B, they result in the same annual average growth rate (2% as represented by the darker-shaded bars in Chart C). In case (1), quarter-on-quarter growth in GDP rises during the year, in case (2) it is constant and in case (3) it declines. The size of the carry-over effect is very different, ranging between 1.2% in case (1), i.e. when GDP growth is assumed to increase during year 1, and 0.4% in case (3), i.e. when GDP growth is assumed to flatten out in the course of year 1.

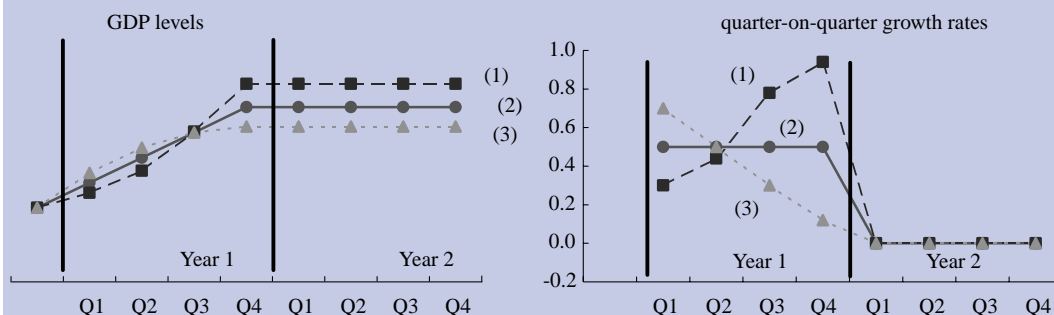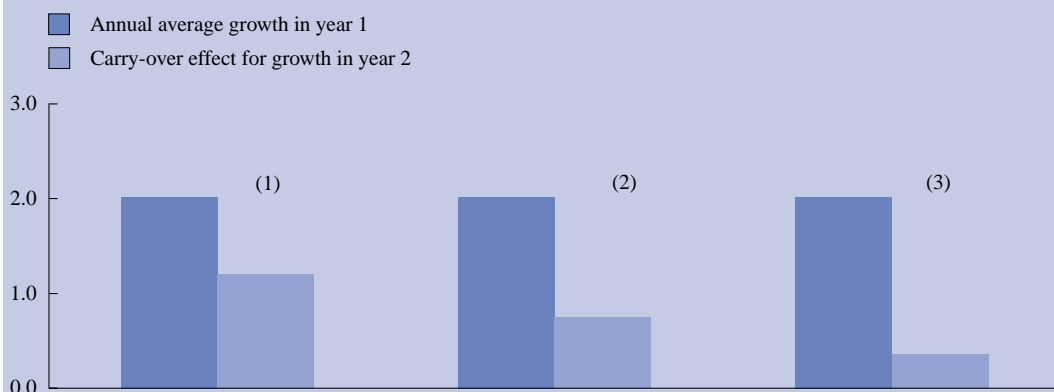**Chart B: Examples of path for GDP in the course of year 1**

GDP levels

(1)
(2)
(3)

Year 1   Year 2

Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4

quarter-on-quarter growth rates

1.0
0.8
0.6
0.4
0.2
0.0
-0.2

(1)
(2)
(3)

Year 1   Year 2

Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4

Chart C: Implications for annual average growth rates
(percentages)

■ Annual average growth in year 1
□ Carry-over effect for growth in year 2

3.0

2.0

1.0

0.0

(1)   (2)   (3)

Carry-over effects for the euro area since 1991 have ranged between -0.5% for growth in 1993 and 1.4% for growth in 1998 and in 2000. At the current juncture, it is important to bear these effects in mind, since a straight comparison of the annual average growth rates in 2001 and 2002 forecast by most institutions would give a misleading picture of growth developments observed in the course of this year and those expected in the course of next year. Euro area GDP growth is likely to have remained very subdued in the second half of 2001. As a result, the carry-over effect on annual average growth in 2002 will be very limited, much lower than the 0.9% recorded for 2001. Moreover, when looking only at the relatively modest annual average growth rates projected for next year by most institutions, carry-over effects conceal the fact that quarter-on-quarter GDP growth is expected to strengthen in the course of next year.