

**Box 2****Different ways of calculating the growth rate of real GDP**

Developments in overall economic activity can be discussed in terms of different methods of calculating real GDP growth. The results obtained from the main calculations are reported in the table below for the period from 1998 onwards. Each of these calculations has its advantages and disadvantages, and therefore growth rates based on a range of different calculation methods should be monitored regularly.

**Euro area real GDP**

(levels; percentage changes; seasonally adjusted)

	EUR billions 1995 prices 1	Change on previous period 2	Change on previous period, annualised 3	Change on previous year 4
1998 Q1	1406	0.9	3.5	3.6
Q2	1409	0.3	1.0	2.7
Q3	1417	0.5	2.1	2.5
Q4	1420	0.2	1.0	1.9
1999 Q1	1431	0.7	3.0	1.8
Q2	1438	0.5	2.1	2.1
Q3	1453	1.0	4.1	2.5
Q4	1466	0.9	3.7	3.2
2000 Q1	1479	0.9	3.8	3.4
Q2	1493	0.9	3.8	3.8
1998 H1	2815	1.4	2.8	3.2
H2	2837	0.8	1.6	2.2
1999 H1	2869	1.1	2.3	1.9
H2	2918	1.7	3.5	2.9
2000 H1	2973	1.9	3.8	3.6
Memorandum				
1998	5651	-	-	2.7
1999	5787	-	-	2.4

Sources: Eurostat and ECB calculations.

For reference purposes, the level of real GDP is reported in column 1. In column 2, the levels for the quarter and six-month period of reference are compared with those for the previous quarter/six-month period. This growth rate considers developments in the reference period only, without being affected by past developments. The same information content is used for the annualised growth rates reported in column 3. These are the growth rates which would be achieved for the year as a whole if the pace of growth for any quarter/six-month period reported in column 2 were maintained over a period of one full year. For instance, GDP growth has been remarkably stable at high rates since the second half of 1999, with quarter-on-quarter growth of 1.0% in the third quarter of 1999 being followed by three consecutive quarters of 0.9% quarter-on-quarter growth. These high quarter-on-quarter rates of growth imply high quarterly annualised growth rates, which were 3.7% or above for four consecutive quarters. Following continuous strong growth for over one year, both annualised quarterly rates of growth and year-on-year growth rates (reported in column 4) stood at 3.8% in the second quarter of this year.

As they are based only on developments in the most recent period, growth rates based on a comparison with the corresponding previous period capture significant changes in the pace of growth. For instance, annualised growth increased sharply from 2.1% in the second quarter of 1999 to 4.1% in the third quarter of 1999, as activity gathered pace in the euro area after having been negatively affected by the Asian crisis. However, quarter-on-quarter rates of growth and annualised growth rates tend to be more volatile than year-on-year rates of growth.

The year-on-year growth rates not only report developments in the period of reference, they are also influenced by the quarter-on-quarter growth rates achieved in the preceding periods and thus capture cumulative developments. However, it is important to note that year-on-year growth rates are affected by base effects which have, for instance, been regularly discussed in the ECB Monthly Bulletin in connection with the impact on inflation of the strong oil price movements witnessed over the past two years. This must be borne in mind when using these rates to assess the most recent developments.

Overall, the different measures discussed here each have their advantages and disadvantages and should therefore be monitored in conjunction with one another. For example, the quarter-on-quarter rate of growth of 0.7% and its quarterly annualised rate of 3.0% in the first quarter of 1999 were clearly influenced by one-off factors for this quarter as compared with the corresponding growth rates in the adjacent quarters, i.e. 0.2% and 1.0% in the fourth quarter of 1998 and 0.5% and 2.1% in the second quarter of 1999. It may then be more appropriate to use the year-on-year rate of growth of 1.8% to put into perspective the developments which took place in the first quarter of 1999, following growth of 1.9% in the fourth quarter of 1998 and preceding growth of 2.1% in the second quarter of 1999. However, looking at the most recent periods, year-on-year growth rates give the impression of a continuous acceleration of growth in the year to the second quarter of 2000, while the annualised quarterly growth figures show that growth has remained at high levels in the last four quarters. These examples serve to illustrate that in assessing recent developments reliance should not be placed on a single estimate alone, but rather the different calculation methods of GDP growth should be considered together.