Box 8

## ASSESSING RECENT DEVELOPMENTS IN INVENTORIES

Changes in inventories contributed positively, by 0.5 percentage point, to euro area quarter-on-quarter real GDP growth in the first quarter of 2007, more than offsetting their negative contribution of 0.4 percentage point in the fourth quarter of 2006 (see Chart A). Both contributions to growth were exceptional. For example, the strong contribution in the first quarter of 2007 was, in absolute terms, more than two times as large as the historical average.

Owing to the residual character of inventories in national accounts, any economically meaningful interpretation of the recent volatile behaviour is surrounded by a large degree of uncertainty. In view of these developments, this box starts by briefly describing the role of inventories in the cyclical real output fluctuations of the euro area. It continues by reviewing the role of special factors, particularly for Germany, in explaining the strong contributions of changes in inventories to real GDP growth in the fourth quarter of 2006 and the first quarter of 2007.

### The role of inventories in the euro area business cycle

The contribution of changes in inventories to real GDP growth is typically very volatile. For the euro area, the variance of changes in inventories since 1996 (relative to their average contribution to quarter-on-quarter real GDP growth) is fifteen times larger than the corresponding variance of the joint contributions to growth of the other expenditure components. However, the volatility of euro area real GDP growth has declined over recent decades, which in part is due to a decline in the volatility of changes in inventories.[1] Moreover, inventory movements seem to have become more coincident with the business cycle. While they clearly lagged cyclical GDP movements up to 1990, the lag now seems to have almost disappeared.

The literature on inventories offers one main explanation for the decrease in volatility and the more coincident movements of changes in inventories and real GDP, known as the production smoothing hypothesis. The motive for holding inventories, according to this hypothesis, is to avoid the risks associated with production delays at a time of unanticipated increases in demand. However, such risks have decreased over time as a result of improvements in production processes (through the implementation of just-in-time production techniques) and better inventory management technologies (e.g. information technology improvements and enhanced transport management due to better logistics).[2]

### Recent developments in inventories: the role of special factors

The exceptional inventory developments in the fourth quarter of 2006 and the first quarter of 2007 in the euro area appear to be related mainly to special developments in Germany. First, inventories may have been depleted in Germany in the fourth quarter of 2006 due to extra demand ahead of the VAT increase in January 2007, and some restocking may have taken place in early 2007 in order to increase inventory levels. Second, inventory data for Germany were affected by a statistical distortion. The time series for German extra-EU real exports of goods was affected by some late reporting of such activities, which upwardly distorted the data for September, October and November 2006. As real imports of goods and services were not affected by late reporting, and as the German statistical office decided that the associated strong contribution of net exports should not impact on the quarterly growth rate of real GDP in the fourth quarter of 2006, this distortion of trade data was compensated by a corresponding downward adjustment in the contribution of inventory accumulation to real GDP growth.[3] In the absence of such a distortion in the first quarter of 2007, the contribution of inventory accumulation turned substantially positive.

1 See, for instance, "Quarterly report on the euro area", Vol. 6, No 1, European Commission Directorate General for Economic and Financial Affairs, 2007, p. 37. A similar conclusion is reached for the United States in M. McConnell and G. Pérez-Quirós, "Output fluctuations in the United States: what has changed since the early 1980s?", *American Economic Review,* Vol. 90, No 5, 2000, pp. 1464-1475.
2 See the box entitled "The contribution of inventory changes to business cycle fluctuations" in the June 2003 issue of the Monthly Bulletin.
3 See German Statistical Office (February 2007), "Detailed results on the economic performance in the 4th quarter of 2006".

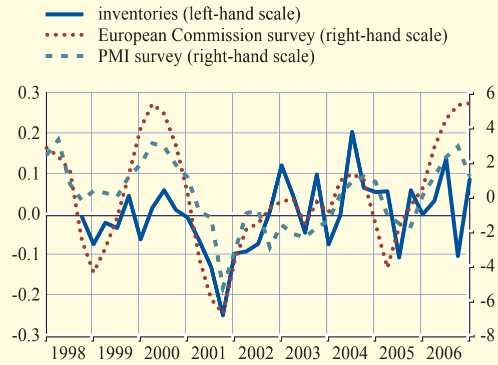
**Chart A Contribution of inventories to GDP growth**

(quarter-on-quarter growth rates; quarterly percentage point contributions)


Source: Eurostat.

**Chart B Inventories and survey data**

(percentage point contributions; indices)




Sources: Eurostat, NTC Economics, European Commission and ECB calculations.
Note: European Commission survey data have been inverted and both survey series have been mean-adjusted. The series on inventories is expressed as a four-quarter moving average of the contributions to quarter-on-quarter real GDP growth.

Recent developments in changes in inventories at the euro area-wide level have not been in line with firms' expectations as captured in survey data. Two institutions publish results on inventory developments in the context of their business surveys, namely NTC Economics (the Purchasing Managers' Index (PMI) survey) and the European Commission.[4] Chart B displays both surveys alongside a four-quarter moving average of the contribution from inventories to quarter-on-quarter real GDP growth. Overall, in the last few years both survey indicators have broadly co-moved with the actual series on inventories. However, the sharp decline in the contribution of inventories in the last quarter of 2006 and the subsequent strong rise in the first quarter of 2007 contrast with movements in survey data. This misalignment, particularly in the last quarter of 2006, is consistent with recent developments in inventories being heavily influenced by statistical factors.

4 The PMI survey on stocks of purchased goods started in August 1997 and the European Commission survey on stocks of finished products started in January 1980. The difference between purchased goods and finished goods is that the former are raw materials used in the manufacture of a product, whereas the latter are goods that have been completed but not yet sold or distributed to the end-user. The PMI survey also provides results on stocks of finished goods, which are not considered in this box.