

Box 8

STOCKBUILDING – THEORETICAL CONSIDERATIONS AND RECENT DEVELOPMENTS

Inventories are an important factor in business cycle fluctuations and played a major role during the financial crisis following the collapse of Lehman Brothers in 2008.¹ This box reviews the mechanisms by which inventories have an impact on economic activity, outlines recent developments in inventories and considers the implications for the current economic situation.

¹ See the box entitled “Recent developments in stock building”, *Monthly Bulletin*, ECB, May 2009.

Inventories and the business cycle

Inventory adjustments are a means to smooth production in the face of volatile demand. Therefore, they would be expected to rise when demand is weak – and vice versa. However, the empirical macroeconomic evidence suggests that inventory adjustments appear to accentuate both economic downturns and the subsequent recoveries. At the beginning of a downturn, involuntary stockbuilding occurs, as expected, as demand falls faster than production can be adjusted. However, this is followed by a process of destocking, as companies seek to reduce inventory levels through production cuts, which depresses the economy further during the downturn. Once the pace of destocking slows, inventories make a positive contribution to GDP growth, thereby supporting the overall economic recovery.

It is important to note that it is not the quarterly change in inventories that impacts on quarterly GDP growth, but the change in the pace of the change (whether there is an acceleration or deceleration). This is because it is the change in the stock of inventories that enters the GDP level “identity”, i.e. production that is not sold in the same accounting period increases inventories in that period. A positive contribution of inventories to growth therefore does not require actual stockbuilding to take place, but can occur if the pace of destocking merely slows down. This is often the case during a recovery just after the trough, when the pace of destocking is often at its highest.

Data issues

Inventories are difficult to track and measure, and hard data on them are prone to revisions. They are particularly difficult to track in the EU, because there is no equivalent to the important monthly sales and inventory indicators released by the US Department of Commerce, which are widely commented on and are central to analyses of inventory developments in the US. By contrast, in the EU, national accounts data are used for analysing inventories. They have the advantage of having full coverage, in principle, but caution is needed when interpreting changes in inventories on that basis, because they are the least reliable component of the expenditure breakdown of GDP. Owing to the frequent lack of actual or reliable source data on inventories at quarterly frequency, changes in inventories often play a prominent role in the balancing process of national accounts and thus contain a large residual component. Moreover, data on inventory developments are often substantially revised.² A further difficulty is that Eurostat does not release data on changes in inventories in volume terms (chain-linked), but only contributions of inventories to growth (or changes in inventories in value terms).³ For these reasons, the short-term assessment of inventory developments relies extensively on survey evidence.

Short-term indicators for inventory developments

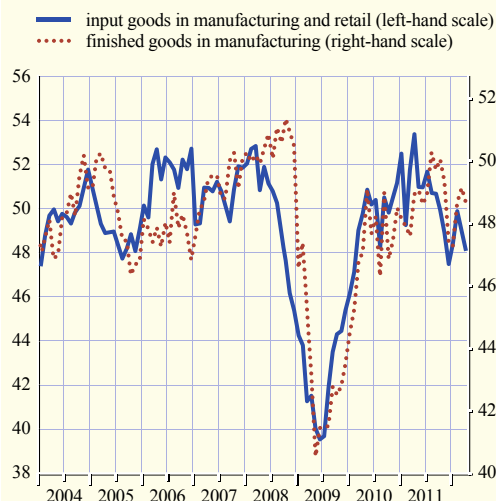
Survey data may be used for analysing cyclical movements in inventories. For instance, Chart A shows the change in inventories from the Purchasing Managers' Index (PMI). The indices are

² See the box entitled “The reliability of estimates of euro area GDP growth and its components”, *Monthly Bulletin*, ECB, June 2006.

³ It is important to note that the change in inventories in value terms excludes holding gains and losses on inventories. It thus differs from the change in the value of inventories, which includes them. Whereas the accounting identity that links GDP and its demand components holds in value terms as well as in constant price volume terms, it does not hold in chain-linked volume terms (but does hold for chain-linked contributions to growth). Thus, unless the statistical office releases an estimate (as in the US, Japan and the UK), chain-linked changes in inventories are difficult, if not impossible, to compile.

Chart A Changes in inventories according to the euro area PMI

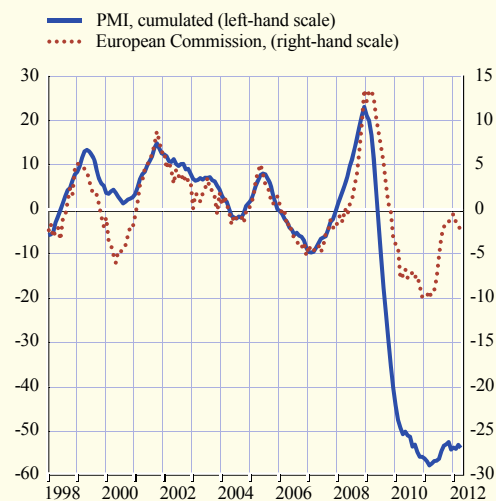
(diffusion indices; monthly data)



Sources: Markit and ECB calculations.
 Note: Simple average of input inventories in manufacturing and retail inventories.

Chart B Level of inventories of finished goods in the manufacturing sector in the euro area

(survey net balances; monthly data)



Sources: Markit, European Commission and ECB calculations.
 Notes: Based on the European Commission's de-measured series over the period 1997-2008 and the cumulated de-measured euro area PMI indices, further detrended and matched with the aforementioned European Commission's series.

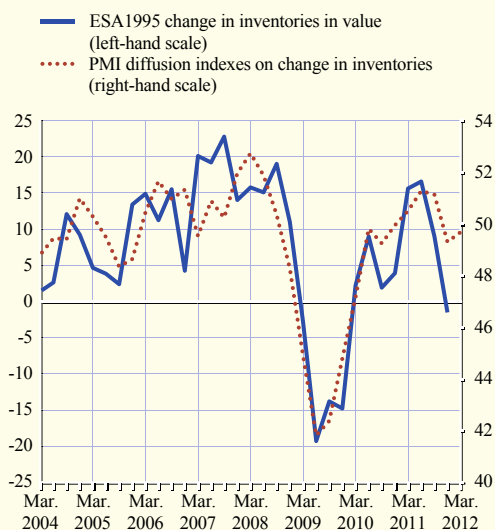
constructed such that, in principle, a value above 50 indicates a build-up of stocks and a value below 50 is consistent with destocking.

As can be seen in Chart A, the PMI indices point to significant differences in the evolution of inventories of finished goods in the manufacturing sector (which adjust later) and of inventories of inputs and of retail inventories (which adjust earlier). Firms can more easily adjust inventories of inputs, e.g. by delaying or cancelling orders/deliveries, whereas adjusting the inventories of finished goods requires adjustments to production, which are much more costly and take more time. At the time of the collapse of Lehman Brothers, for example, destocking of manufacturing inputs and retail inventories started as early as September 2008 and subsequently gathered pace. By contrast, the build-up of stocks of finished goods appears to have continued (and even slightly accelerated) until mid-December 2008. This suggests that the voluntary destocking of manufacturing inputs and retail inventories contributed to an involuntary increase in finished goods inventories, with producers appearing unable to cut production fast enough to prevent the ratio of finished goods inventories in the manufacturing sector to sales from rising above desired levels. An “inventory shock” thus leads first to a change in the composition of inventories, before having an impact on the overall level of inventories.

Other surveys provide information on the level of inventories rather than the change. This is the case for the European Commission's business surveys. Chart B shows that according to these surveys, levels of inventories of finished goods in manufacturing were assessed as having risen sharply relative to “normal” in the course of 2008, which is consistent with the PMI evidence of an accumulation of such stocks in 2008. It also points to the

Chart C Changes in euro area inventories, as derived from the national accounts and the PMI

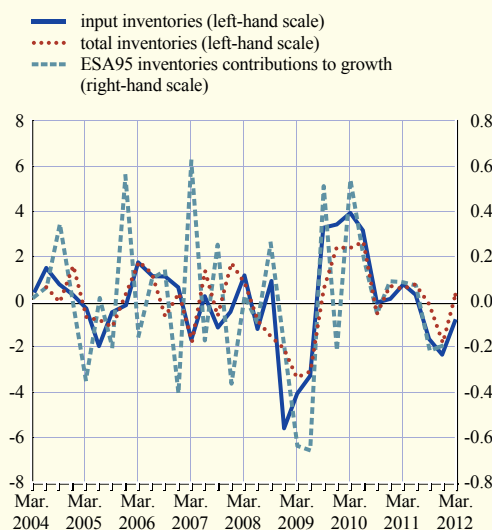
(diffusion indices; EUR billion)



Sources: Markit, Eurostat and ECB calculations.
 Note: National accounts: changes of inventories, in value.
 PMI: average of input and finished goods inventories in manufacturing and retail inventories.

Chart D Contributions of inventories to euro area GDP growth as derived from the national accounts and the PMI

(point changes in diffusion indices; percentage points of GDP)



Sources: Markit, Eurostat and ECB calculations.
 Note: National accounts: contributions in chain-linked volumes.
 PMI: changes in indices (in points). See Chart C.

involuntary character of this inventory build-up, as the level assessment was above its average. By contrast, stocks continued to be assessed as persistently higher than “normal” in early 2009, which may appear to contradict the evidence of pronounced destocking from the PMI. However, the apparent difference between the two series may in fact indicate that the voluntary destocking in finished goods shown by the PMI was simply deemed insufficient, with firms reducing their inventory targets in parallel to the reduction in their inventory levels.

The leading properties of some of these short-term indicators for developments in quarterly national accounts data on inventories are illustrated in Charts C and D. Chart C plots quarterly changes, seasonally adjusted, in euro area inventories according to national accounts data (in value terms) against the headline PMI. Chart D shows the contribution of inventories to GDP growth, in chain-linked volume terms, against the change in the PMI. The charts suggest that movements in inventories measured according to national accounts data and PMI survey data are broadly consistent.

Surveys relating to inventories are thus helpful when analysing economic developments, particularly because of their timeliness and reliability compared with the national accounts data. The expenditure breakdown of GDP is only available after 60 days and, unlike survey data, the data on contributions of inventories to GDP growth are subject to significant revisions.

Tentative analysis of inventory developments in 2011-12

According to recent evidence on movements in inventories, after a phase of restocking, the deteriorating outlook and tightening in financing conditions triggered, in mid-2011, a reversal

in the inventory cycle, with changes in inventories making negative contributions to real GDP growth in the third and fourth quarters. This was similar to developments in late 2008. However, against a background of fairly low levels of inventories (see Chart B) and of moderate destocking reported in national accounts in the last quarter of 2011 (see Chart C), the likelihood of a pronounced destocking weighing on GDP growth in early 2012, as was seen in early 2009, appears very limited. Furthermore, since January 2012, PMI surveys have pointed to a less rapid destocking, and thus to potentially less negative or more positive contributions of inventories to growth than previously expected (see Chart D).