Box 4

STOCKBUILDING DEVELOPMENTS SINCE 2008

Inventories are an important factor in business cycle fluctuations. They played a major role in the deep recession that followed the collapse of Lehman Brothers in 2008, but also in the subsequent recovery, and again during the latest contraction in economic activity. This box reviews the role that inventories have played during these periods and considers the implications for the economic situation and outlook in early 2013.

Inventories and the business cycle

Inventory adjustments are a means to achieve smooth production in the face of volatile demand, notably when there are adjustment costs. Therefore, inventories are expected to rise when demand weakens and vice versa. However, empirical macroeconomic evidence suggests that changes in inventories are pro-cyclical, and accentuate both economic downturns and subsequent recoveries. Indeed, at the beginning of a downturn, involuntary stockbuilding typically occurs, as demand falls faster than production can be adjusted. However, this is soon followed by deliberate destocking, as companies seek to reduce inventory levels and cut production accordingly, which depresses the economy further. Once the pace of destocking slows, inventories contribute positively to GDP growth, thereby supporting the overall economic recovery.

Conceptually, it is important to note that it is not the change in inventories that has an impact on GDP growth, but the extent to which the change in inventories becomes larger or smaller.

Put differently, the contribution of inventories to GDP growth depends on whether there is a pick-up or slowdown in the pace of destocking or restocking. Thus, a positive contribution by inventories to growth may arise from faster restocking, but also from slower destocking. Slower destocking often occurs during a recovery, just after the trough, when the pace of destocking is often the fastest.

In practical terms, inventory analysis at the macroeconomic level is challenging. There are substantial data issues, because changes in inventories are difficult to track and measure, and hard data on inventories are prone to revision. The analysis of inventories in the euro area is predominantly carried out on the basis of quarterly national accounts data as no monthly statistics are available.[1] National accounts data are usefully complemented by business surveys published by the European Commission and other sources.[2]

The inventory cycle in the 2008-09 recession and the subsequent recovery

Following the bankruptcy of Lehman Brothers in 2008, amid very tight financing conditions an abrupt destocking movement was set in motion on the back of worsening prospects for demand. As shown in Chart A, in the second quarter of 2009 there was a reduction in inventory levels in

1 The advantage of national accounts data is that they provide, in principle, full coverage. However, caution is needed when interpreting changes in inventories on the basis of national accounts, because inventories are the least reliable component of the expenditure breakdown of GDP. Owing to the frequent lack of actual source data on inventories at a 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. See the box entitled "The reliability of estimates of euro area GDP growth and its components", *Monthly Bulletin*, ECB, June 2006.

2 See for more details the box entitled "Stockbuilding – theoretical considerations and recent developments", *Monthly Bulletin*, ECB, May 2012.

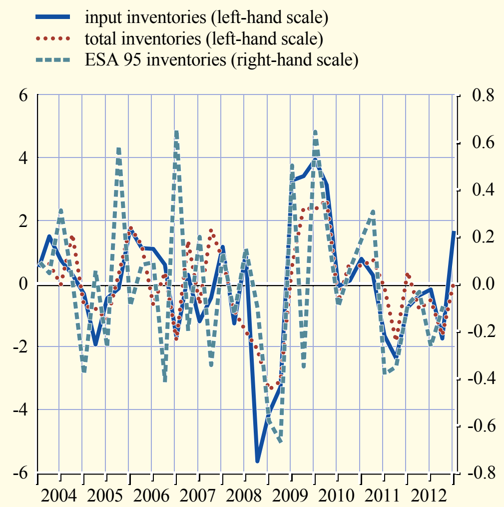
Chart A Changes in inventories in the euro area according to national accounts data and the PMI

(diffusion indices; EUR billions)

Sources: Markit, Eurostat and ECB calculations.
Notes: National accounts data: change of inventories, in value terms. PMI: average of retail inventories and manufacturing input and finished goods inventories.

Chart B Contribution of inventories to GDP growth in the euro area according to national accounts data and the PMI

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



Sources: Markit, Eurostat and ECB calculations.
Notes: National accounts data: contributions in chain-linked volumes. PMI: changes in indices (in percentage points).

Euro area GDP growth rate and contribution by demand component

(percentage changes; percentage points)

	Q3 2008 - Q2 2009	Q2 2009 - Q2 2011	Q2 2011 - Q4 2012
GDP	**-4.7**	**3.9**	**-1.1**
Contribution of domestic demand	-2.9	1.1	-2.1
of which:			
Private consumption	*-0.5*	*0.6*	*-0.9*
Government consumption	*0.4*	*0.2*	*-0.1*
Fixed capital investment	*-2.8*	*0.4*	*-1.1*
Contribution of net trade	-0.6	1.2	2.2
Contribution of change in inventories	-1.4	1.5	-1.2

Source: Eurostat.

the euro area of €19 billion, or 0.8% of GDP, a sharp turnaround from the pace of stockbuilding in the first quarter of 2008 (0.7% of GDP, or an increase of €17 billion). Anecdotal evidence at that time suggested that there had been a general striving for cash, and that the saving of cash had been a key factor driving the destocking. Also, voluntary destocking of inputs by manufacturing firms and by retailers and wholesalers alike initially contributed to the involuntary stocking of finished goods by manufacturers, who were unable to cut production fast enough to prevent the ratio of finished goods inventories to sales from rising above desired levels.[3] This was in line with a typical pattern, whereby an "inventory shock" leads first to a change in the composition of inventories and then to a change in the level of overall inventories, when increasingly larger production reductions permit an increasingly faster pace of destocking.[4] Eventually, inventories accounted for more than a quarter of the overall decline in real GDP of 4.7% between the third quarter of 2008 and the second quarter of 2009, a significantly greater negative contribution than that of private consumption (see the table).

From mid-2009 improved demand expectations, more favourable financing conditions and perhaps excessively lean inventories led to a rapid easing in the pace of destocking, which eventually turned into restocking in early 2010 according to national accounts data (see Chart A). The slowdown in the pace of destocking alone lifted GDP significantly in the third quarter of 2009, contributing to an earlier and faster recovery than had been generally anticipated. In addition, from the third quarter of 2009 to the second quarter of 2011, a long sequence of mostly positive quarterly contributions of the changes in inventories to GDP growth amounted to a cumulated total of 1.5 percentage points, or about two-fifths of GDP growth over that period (as documented in the table).

Inventory correction of 2011-12

The restocking reported in the national accounts since the first quarter of 2010 peaked in the second quarter of 2011 at 0.9% of GDP (in value terms). This rather vigorous restocking was probably more a reflection of the stronger than anticipated recovery in activity at that time, rather than a deliberate attempt by firms to relax the tight inventory policies that had been put in place after the bankruptcy of Lehman Brothers. Indeed, surveys and anecdotal evidence pointed

3 See the box entitled "Recent developments in stock building", *Monthly Bulletin*, ECB, May 2009.

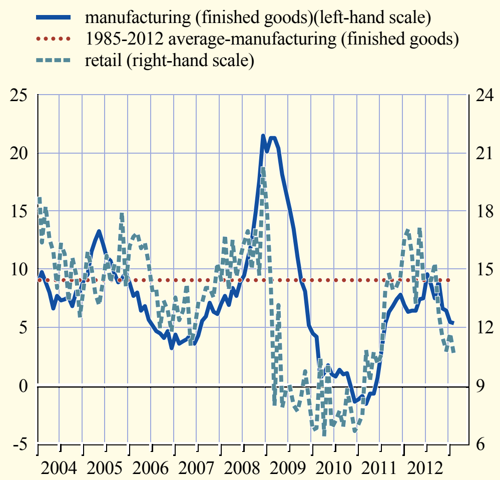
4 The destocking that occurred after the collapse of Lehman brothers was also a worldwide phenomenon. It was seen in the United States, the United Kingdom, China and Japan, but also, spectacularly, in certain countries such as South Korea and Russia (where the inventory adjustment was the largest in the fourth quarter of 2008). This contributed to the very marked contraction in international trade in the fourth quarter of 2008 and the first quarter of 2009.

towards tightly managed inventories along the supply chain from 2010 to mid-2011, as firms continued to take a cautious approach to cash.

Nonetheless, when substantial flows of net additions to inventories in mid-2011 coincided with a marked deterioration in business perspectives, firms swiftly reassessed their inventory levels within a few months. According to European Commission business survey data (see Chart C), the assessment of inventory levels compared with normal was close to the historical average, after having been at historical lows for more than a year. In addition, as at the end of 2008, at the end of 2011 the Purchasing Managers' Index (PMI) surveys pointed to faster destocking (or less stocking) of inventories in input and retail than in finished goods inventories by manufacturers.

Chart C Level of inventories in manufacturing (finished goods) and retail

(balances of opinion; monthly data)



Source: European Commission.
Note: Survey respondents' assessment of the level of their inventories "compared with normal".

According to the national accounts data, this new situation led to a sharp slowdown in the pace of stocking, and even to a slight destocking in the fourth quarter of 2011.[5] This implied a strong negative contribution to growth of 0.7 percentage point in the second half of 2011, while GDP fell by only 0.2 percentage point over the same period. After the pace of destocking stabilised during the first half of 2012, it accelerated again somewhat in the second half of 2012. In the second half of 2012 GDP fell by 0.7 percentage point and the contribution of inventories to GDP growth was negative at -0.4 percentage point.

Situation and outlook in early 2013

Against a background of fairly lean inventories in general across the supply chain, the current pace of destocking seems unlikely to continue. Therefore, in the foreseeable future inventories may make more positive contributions to growth, but this will also depend on other factors, such as a reduction in uncertainty. According to the most recent PMI surveys, destocking may already be slowing down somewhat. Similarly, the European Commission's business surveys suggest that inventories are currently considered to be significantly below their historical average in both manufacturing (finished goods) and retail.

5 The fact that the decline in the pace of destocking indicated by the PMI survey since the second half of 2011 is slower than that indicated in the national accounts data reflects the imperfect measurement of inventories by both sources; in addition, revisions of national accounts figures may eventually reduce the gap that can currently be observed.