PREDICTING THE STRENGTH OF RECOVERIES

There is a consensus among professional forecasters that it is particularly difficult to predict turning points in the business cycle and to forecast the amplitude of GDP changes around such turning points.[1] In particular, there might be a tendency to systematically underestimate the depth of recessions and the strength of recoveries. This box aims to shed light on whether there is indeed a tendency to underestimate the strength of recoveries and on what the potential reasons for such a tendency might be.
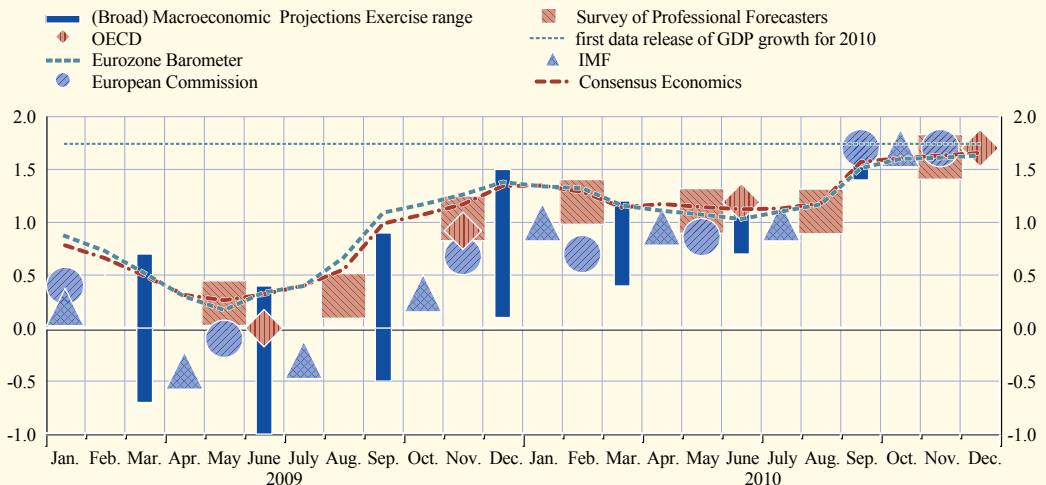
Professional forecasters' experience

Recent experience illustrates that there may indeed be a tendency to underestimate the strength of recoveries. For example, the strength of the recovery in the euro area in 2010 was underestimated. Projections by professional forecasters of annual euro area real GDP growth for 2010 were too low from January 2009 to mid-2010 (see Chart A).

Empirical studies by professional forecasters about predicting the strength of recoveries are scarce. Apart from some case studies which focus on the recovery following the financial crisis of 2008-09, earlier US evidence shows that the strength of recoveries has been underestimated.[2]

Chart A Vintages of projections of annual euro area GDP growth for 2010

(annual percentage changes)

- (Broad) Macroeconomic Projections Exercise range
- OECD
- Eurozone Barometer
- European Commission
- Survey of Professional Forecasters
- first data release of GDP growth for 2010
- IMF
- Consensus Economics

Sources: Consensus Economics, ECB, Eurosystem, Eurozone Barometer IMF and OECD.
Note: GDP growth for 2010 has been revised upwards to 2.0%, from 1.7% in the first release.

1 Against this background, "qualitative" leading indicators have been designed which aim to provide early signals of turning points in the business cycle. For euro area evidence, see "The measurement and prediction of the euro area business cycle", *Monthly Bulletin*, ECB, May 2011; and de Bondt, G. and Hahn, E., "Introducing the Euro Area-wide Leading Indicator (ALI): Real-time signals of turning points in the growth cycle from 2007 to 2011", *Journal of Forecasting*, 33(1), 2014, pp. 47-68.
2 See, for example, Braun, P. and Zarnowitz, V., "Twenty two years of the NBER-ASA quarterly outlook surveys: Aspects and comparisons of forecasting performance", NBER Working Paper 3965, New York, 1992.

**ECONOMIC
AND MONETARY
DEVELOPMENTS**

Output,
demand and the
labour market

Forecast errors of professional forecasters for real GDP growth[1]

(percentage points)

| | | Business cycle phase[2] | | | |
	Overall	Expansion	Recession	First year of recovery	Second year of recovery
Forecast error for current year	0.1 [-0.1 - 0.2]	-0.2 [-0.4 - -0.1]	1.2 [0.8 - 1.6]	-0.6 [-1.0 - -0.2]	0.1 [-0.4 - 0.5]
Forecast error for next year	1.0 [0.6 - 1.5]	0.0 [-0.2 - 0.3]	4.7 [3.5 - 5.8]	-1.1 [-1.7 - -0.6]	0.2 [-0.4 - 0.8]

Sources: Consensus Economics and ECB calculations.
Note: The figures in square brackets refer to two standard deviations around the mean of the average forecast error (forecast of GDP growth minus actual GDP growth) with the average error first calculated for each individual country and then for all 25 countries.
1) Results based on 25 countries in the period 1990-2013.
2) Expansions refer to all years except recessions (identified as years with negative GDP growth) and the first year of recoveries.

However, an empirical analysis of aggregated survey data of professional forecasters from Consensus Economics for 25 economies between 1990 and 2013 indicates that this applies to other economies as well. It shows that there is indeed a tendency to underestimate GDP growth for the first year of a recovery, but that there does not seem to be any bias for the second year (see the table). This finding holds for forecasts both for the current year and the next year, with the bias being somewhat more pronounced for forecasts for the following year.

These results suggest that there is potentially a risk that the projections of professional forecasters of GDP growth for 2014 will be too low, given that 2014 should be the first year with positive real GDP growth following the 2012-13 recession.

**The role of the inventory cycle**

One reason for the apparent tendency to underestimate the strength of recoveries might relate to the inventory cycle. It is common practice among professional forecasters to expect changes in stocks to have a neutral effect and to therefore project their contribution to be equal (or close) to zero in general. The reasons behind this practice may be that the long-run average of the contribution from stocks to GDP growth is usually close to zero, that national accounts data on stocks are sometimes revised considerably and that, in some countries, there is a lack of reliable data for estimating changes in stocks.

However, the literature describes an inventory cycle with a well-defined pattern over the business cycle. This pattern, which is confirmed by US evidence, entails a pronounced negative contribution from stocks in a recession and a positive contribution in a recovery. Changes in stocks are found to be the main driver of strong rebounds in GDP during recoveries.[3] Moreover, looking at data for 16 advanced economies in the period 1970-2013, there is evidence for pronounced changes in stocks around business cycle turning points. In the first year of a recovery the contribution from stocks to GDP growth is about 0.7 percentage point, while the negative contribution to GDP growth in the year before a recovery (which is, by definition, a year with negative GDP growth) is roughly 1 percentage point (see Chart B). While the contributions in the first year of a recovery and in the year before a recovery are highly significant, the contributions in other years are not significantly different from zero. These results are valid

3 See, for example, Sichel, D.E. "Inventories and the three phases of the business cycle", *Journal of Business and Economic Statistics*, 12(3), 1994, pp. 269-277; and Bec, F. and Ben Salem, M., "Inventory investment and the business cycle: the usual suspect", *Studies in Nonlinear Dynamics and Econometrics*, 17(3), 2013, pp. 335-343.

Chart B Contribution from stocks to GDP growth

(percentage points)

— typical inventory cycle [1]
····· euro area 2010-recovery
— euro area 2014-recovery [2]
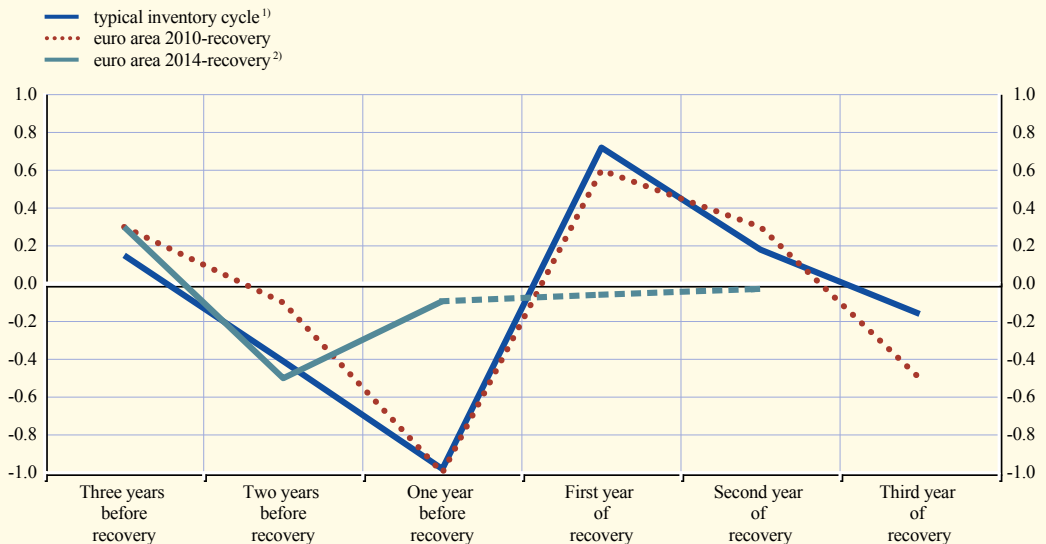
Sources: European Commission and ECB calculations.
1) Based on data for 16 advanced economies for 1970-2013.
2) The green dashed line refers to European Commission forecasts for 2014 and 2015.

both for recoveries following financial crises and for those following "normal" recessions. A regression analysis reveals that there is a strong and significant relationship between the negative contributions before a recovery and the positive contribution in the first year of a recovery. In other words, the more negative the contribution of inventories in the year before a recovery, the more positive the contribution in the first year of the recovery.

The contribution from stocks to GDP growth in the euro area in the recovery that started in 2010 (the first year of the recovery) and in the years before it began was largely in line with the typical inventory cycle. In the current cycle, however, the contribution from stocks to GDP growth is likely to be less strong. Notably, the European Commission forecasts the contribution from changes in inventories for 2014 (the first year of the recovery) and 2015 to be close to zero. While past evidence points to a risk of underestimating the strength of recoveries, stemming from a stronger than expected reversal of changes in stocks, this risk seems to be relatively limited in the current cycle, as the negative contribution from stocks to GDP growth in 2013 (one year before the recovery) was only moderately negative compared with previous cycles (at -1.0 percentage point).

Bounce-back effects on GDP

Recoveries may sometimes be characterised by (non-linear) "bounce-back" effects on GDP, meaning that the weaker GDP growth is during the preceding recession, the stronger it is during the recovery. These bounce-back effects are driven by factors beyond the inventory cycle and may be particularly evident when an economy is hit by temporary shocks that are not expected to dampen the level of GDP permanently. It is hard to draw any conclusions from the available literature on the existence or otherwise of a bounce-back effect on GDP during recoveries. While there is some evidence for its existence, in particular for the United States (before the 2008-09

financial crisis), the evidence for several other advanced economies is considerably weaker or even indicates that there is no bounce-back effect in some of these economies.[4] Moreover, the type of recession (i.e. normal or financial crisis-driven) that took place before the bounce-back may also be relevant. In particular, the literature finds that financial crises are usually followed by particularly weak recoveries and that such crises have permanent adverse effects on the level of GDP.[5] This finding is broadly in line with the projections of a gradual strengthening in the economic recovery in the euro area, as currently foreseen by professional forecasters.

Conclusion

In general, there seems to be some evidence that professional forecasters underestimate the strength of recoveries in the first year after a recession. However, the upward risks for euro area GDP growth currently seem to be somewhat smaller than during previous recoveries. First, the upward risk stemming from the inventory cycle seems to be limited because the negative contribution from stocks to GDP growth in the recent recession was moderate and, as such, a moderate positive contribution for 2014 is more likely. Second, the risk of a bounce-back effect on GDP during the current recovery seems to be limited because the euro area has been hit by a financial and sovereign debt crisis, and strong bounce-back effects are less likely after such severe financial crises.

4 See, for example, Bradley, M.D. and Jansen, D.W., "Nonlinear business cycle dynamics: Cross-country evidence on the persistence of aggregate shocks", *Economic Inquiry*, 35, July 1997, pp. 495-509; and Kim, C.-J., Morley, J. and Piger, J., "Nonlinearity and the permanent effects of recessions", *Journal of Applied Econometrics*, 20(2), 2005, pp. 291-309.
5 See, for example, Reinhart, C.M. and Rogoff, K.S., "This time it's different: Eight centuries of financial folly", University Press, Princeton, 2009; and International Monetary Fund, "From recession to recovery: How soon and how strong?", *World Economic Outlook*, Washington D.C., 2009.