II. Special topics on the euro-area economy

Macro models can be used to quantify the relative importance of various factors in explaining the recent recession in the euro area. An analysis based on the latest version of the Commission's QUEST III model shows that the drop in euro-area GDP after the middle of 2008 can be explained by a number of factors, in particular a strong fall in productivity and a decline of investment. While the decline of investment was common to both the euro area and the US and linked to deteriorating financial conditions, the cyclical behaviour of productivity contrasted strongly between the euro area and the US, signalling a very different response of the labour market to the crisis. The slump in world trade played an important role in deepening the recession. In contrast, the bursting of the housing bubble and the tightening of credit conditions for households had only a relatively moderate impact on the euro-area economic performance. The modelling exercise also shows the stabilising role of fiscal stimulus packages in the euro area.

Business cycle convergence is an important ingredient to a smooth functioning of the euro area. While cyclical synchronisation has remained high in the euro area since its inception - i.e. Member States' cyclical peaks and troughs have remained closely aligned – a period of cyclical dispersion took place during 2006-2008. It marks an accentuation of differences in business cycle amplitudes with historically high positive output gaps in Ireland, Greece, Spain and Finland. Elevated private demand supported by excessive credit growth was the main driver of the increase in output gaps in the first three of these countries, whereas strong exports fostered by booming world trade played a central role in Finland. Business cycle convergence increased again during the financial crisis as deleveraging triggered a sharper drop in demand and in activity in IE, EL and ES than in the rest of the euro area and as the slump in world trade took a heavy toll on Finland. The convergence may, however, be only temporary and diverging forces could resurface in the medium-term. In IE, EL and ES, both supply and demand are likely to be durably affected by the ongoing deleveraging process and these Member States could face a protracted period of sluggish growth relative to the rest of the euro area, leading again to a period of higher output gap differences within the euro area.

Economic theory suggests that price competitiveness is only one of the factors affecting export performance but relatively few empirical analyses include non-price competitiveness factors among its determinants. The objective of this section is to illustrate the role that some non-price competitiveness factors can have in explaining export performance. The focus is on competitiveness drivers related to innovation and the business environment, the former captured as R&D intensity and the latter as enforcement contracts conditions. The results show that innovative economies with favourable conditions for doing business export more, confirming that understanding better export performance requires going beyond traditional determinants such as external demand and price competitiveness.

II.1. Quantifying the causes of the crisis in the euro area

The financial crisis that started in 2007 was of an unprecedented scale in post-war economic history. It was marked by the biggest drop of GDP since the Great Depression and affected virtually all sectors. It also triggered a strong policy response from governments, which helped in saving economies from a complete collapse.

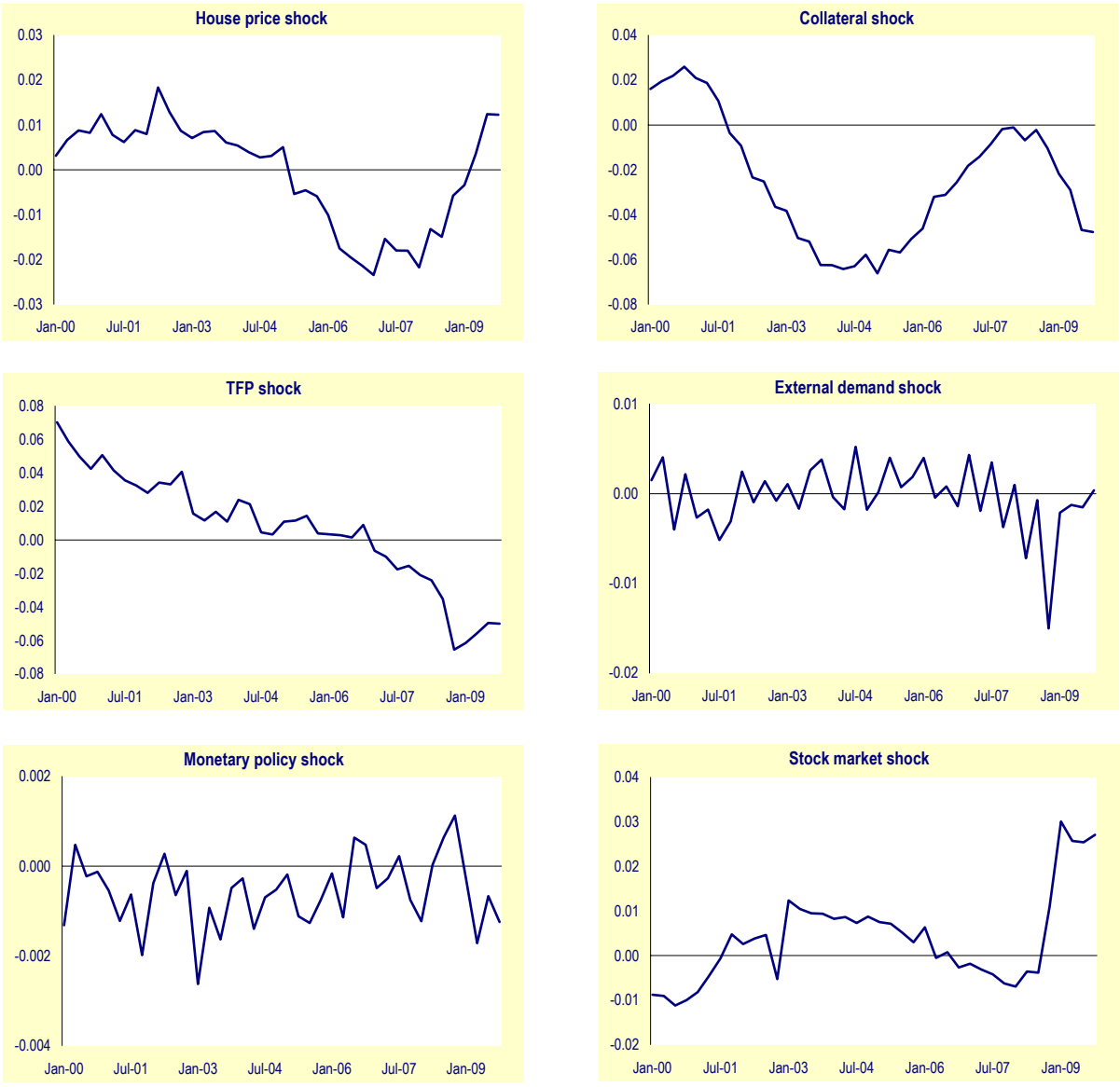
A number of factors contributed to the crisis. There is wide agreement that buoyant credit growth, excessive leverage and historically low levels of risk premia in the US but also in various European countries drove the boom and contributed to a property bubble, which eventually burst and revealed severe problems in an over-leveraged banking sector.([10]) There is also little doubt that the globalized financial sector was one of the main channels through which the crisis was transmitted outside the United States.([11]) Other plausible factors include the bursting of the stock market bubble, global imbalances and possibly a sudden revision of productivity growth expectations in the US (see Kahn and Rich 2007 and Kahn 2009).([12])

([10]) European Commission (2009), 'Economic crisis in Europe: Causes, consequences and responses', *European Economy,* July. European Commission (2009) 'Annual Report on the Euro Area 2009'

([11]) European Commission (2009) ibid.

([12]) Kahn, J. A. (2009). 'Productivity swings and housing prices', *Current Issues in Economics and Finance*, Vol. 15(3), Federal Reserve Bank of New York. Kahn, J. A. and R. W. Rich (2007), 'Tracking the new economy: using growth theory to detect changes in trend productivity', *Journal of Monetary Economics,* Vol. 54, pp. 1670-1701.

Graph II.1.1: **Developments in underlying shocks to key model variables** (2000-2010)



Source: Commission services.

While it is likely that all these factors contributed to the slump, their relative importance is much less obvious. This comment applies both to the crisis in the US and, perhaps even more significantly to the euro area, where idiosyncratic factors might have played an important role. These include, for example, domestic property and stock market bubbles but also external conditions, like the slump in foreign demand. This section describes the results of an attempt to quantify the relative importance of these factors for both the boom and the bust in the Euro area.

Looking more closely at a range of possible supply and demand factors

For this analysis we use the latest estimation of the QUEST III model for the euro area that includes data up to the last quarter of 2009. The structure of the QUEST III variant used for the estimation allows to account for the standard supply and demand factors that affect the economic cycle, like TFP growth, monetary policy or fiscal policy, as well as factors whose prominence has been fully recognized only in the current financial crisis, namely stock market and housing bubbles as well as changing credit market

conditions.([13]) The evolution of some of these variables, as identified by the model, is depicted in Graph II.1.1.

The model generates a path for households' access to mortgage credit, which shows a strongly cyclical pattern in *lending conditions*. After the dot-com bubble burst in 2001 there was a very rapid deterioration of households' access to credit in the euro area. It reached a trough in 2004 and then was followed by a gradual improvement of access conditions with a peak in the 2nd half of 2007. It is worth noting that the 2007 peak was visibly below the peak observed during the dot-com bubble in 2000-2001. This suggests that lax credit policy by banks in the euro area was not a major factor for the boom preceding the crisis. Households' access to credit has tightened again since the 2nd half of 2007 in the euro area, however, the pace of the tightening appears to be slowing down.

The *monetary policy* in the model is driven by a standard Taylor rule. Taylor rule assumes that the interest rate systematically adjusts to changes in inflation and output. The shock to monetary policy is then identified in the model by deviations of the actual policy rate from the interest rate implied by the Taylor rule. Positive deviations are interpreted as restrictive policy stance, while negative deviations suggest expansionary stance.[14] As can be seen in Graph II.1.1., the magnitude of the shocks during the recession remained subdued. This suggests that policy interest rate in the euro area did not deviate much from the one implied by the developments in output and inflation.

Asset price bubbles have been blamed for having played an important role in the recent boom-bust cycle. Two distinct estimates of possible bubbles related to corporate and housing investment are given in Graph II.1.1. Bubbles are identified as declining risk premia for corporate and housing investment respectively. A continuous fall of risk premia is an indication of the build up of a bubble, while a rapid increase points to a bursting of a bubble.([15])

As can be seen from Graph II.1.1 there was no strong indication of a bubble on the euro area stock markets in the period directly preceding the outbreak of the financial crisis. On the other hand, the pronounced increase in the risk premium observed during the crisis reflects a sudden pessimism of investors and a flight to safety which is not entirely explained by economic fundamentals.

By contrast, there is some evidence of a house price bubble, with house market premia slowly starting to decrease already in 2003 and dropping sharply between the 2nd half of 2004 and the beginning of 2007. Since 2007 (and preceding the onset of the global economic crisis), house price risk premia have been rising sharply, which is consistent with the view that the house price bubble started to deflate in 2007. It should be noted though that the estimated magnitude of the fluctuations in risk premia for *the euro area* is considerably smaller than what was estimated on US data.([16]) This is suggestive of a much sharper boom-bust cycle in housing markets in the US.

According to the results of our estimation, the growth rate of the euro area *Total Factor Productivity* (TFP) in the period between 2000 and the last quarter of 2009 has been significantly below its pre-2000 level.([17]) The decline in TFP further accelerated towards the end of 2008 with the start of the recession. This deterioration in productivity is likely to have a cyclical character

([13]) For the detailed description of the structure of a similar model estimated for the US as well as the empirical strategy followed to identify bubbles and financial constraints see Ratto M, W. Roeger and J. in 't Veld (2010), 'Using a DSGE model to look at the recent boom-bust cycle in the US', *European Economy Economic Paper*, no. 397.

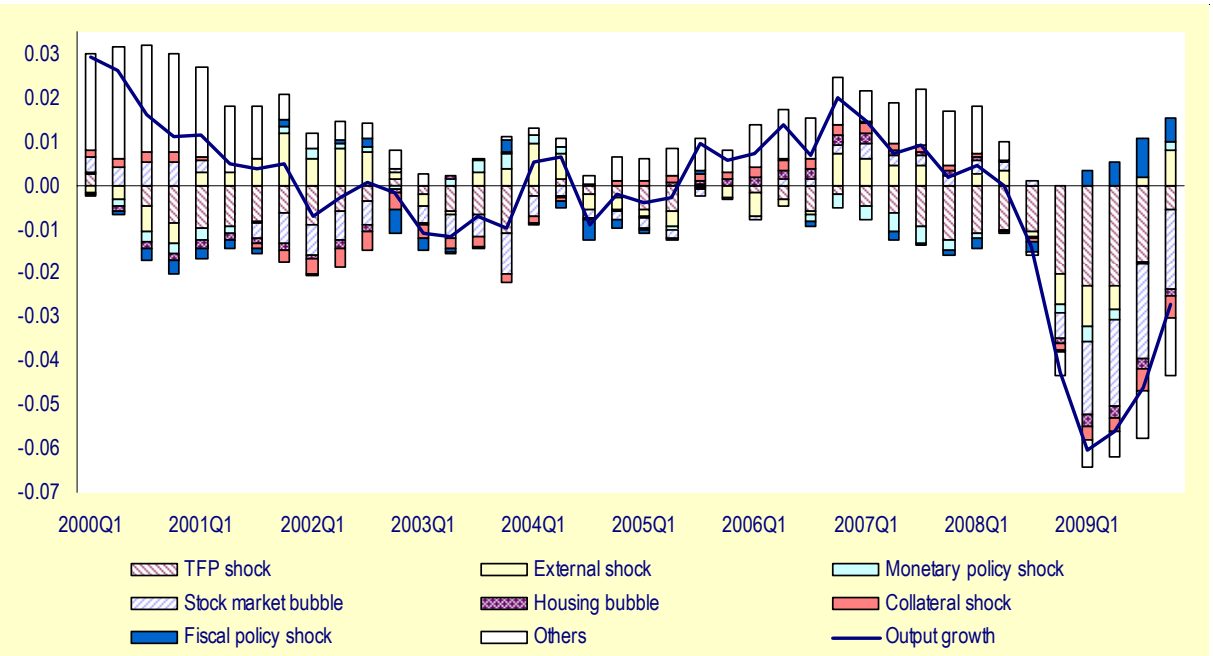
([14]) Note that according to this definition near-zero policy rate does not necessarily imply expansionary policy; such a rate can also be consistent with deflation or strongly negative output growth.

([15]) More technically, shares and housing investment in QUEST III are priced according to standard arbitrage conditions that require the current price of an asset to be linked to the present discounted value of the income stream from owning this asset in the future. However, unlike more traditional models, QUEST III does not impose that the current price is exactly equal to the present discounted value of investment. A non-zero difference between the two can be interpreted as an additional risk premium. To the extent that this risk premium does not reflect economic fundamentals, it can be associated with the emergence of a bubble.

([16]) See Ratto M, W. Roeger and J. in 't Veld (2010), ibid. Euro area averages, however, potentially hide more pronounced house price volatility in a limited number of individual Member States.

([17]) The TFP shock shown in the graph is defined as the logarithm of TFP de-trended using the average TFP growth rate calculated over the whole period of estimation (1990-2009). The visible downward trend that resulted from this transformation suggests that the current TFP growth rates are considerably lower than those that prevailed prior to 2000. This is consistent with trend estimates using the Commissions production function methodology which suggests that labour-augmenting TFP growth has fallen by roughly 1% since the end of the 1990s.

Graph II.1.2: **Contributions to GDP growth** (in pp, 2000-2010)



Source: Commission services.

and be linked to at least two crisis-specific phenomena: the composition effect and labour hoarding. Concerning the first, it is likely that the decline in world trade hit especially severely the comparatively more productive euro-area manufacturing sector, while in the other economies (for example the US) the effects of the crisis spread across a larger range of sectors or may have even hit low productivity sectors more severely (e.g. construction). As to the second phenomenon, the European labour market is characterized by significant labour adjustment costs, which prevent European employers from easily shedding workers in order to preserve competitiveness. This effect was strengthened by efforts of European firms to retain qualified personnel and policy measures targeted at cushioning the impact of the recession on the labour market ([18]). To the extent that these factors are mainly cyclical, one could expect that a reversal of the TFP decline should accompany the end of the recession ([19]).

Apart from a small dip immediately after the burst of the dot-com bubble, growth in *external demand* during the years 2004-2007 remained relatively stable and contributed positively to growth in 2006-07. However, since the beginning of the financial crisis in the 2nd half of 2007, the euro area has experienced a series of strong negative shocks, with the most unfavourable external conditions observed in the last quarter of 2008. In the second half of 2009, external demand visibly improved, a likely effect of the return to strong growth in many emerging economies.

A model-based GDP growth decomposition exercise

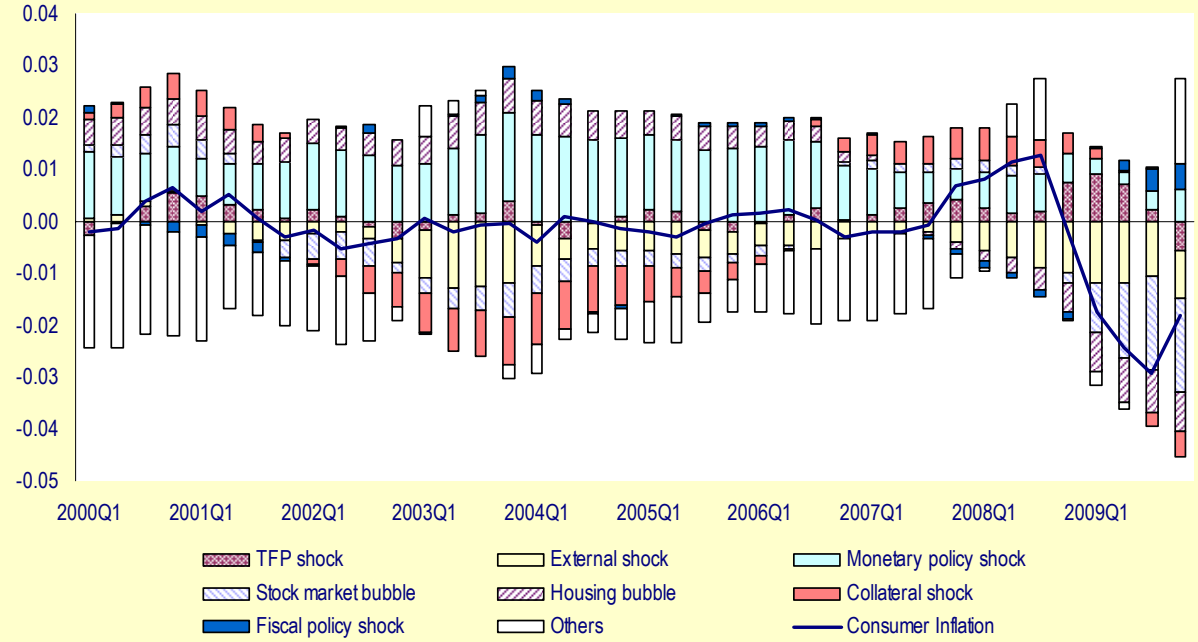
How have the factors identified above contributed to GDP growth and inflation over the last 10 years? The discussion concentrates on the period after 2004 which captures both the boom and the bust. The decomposition of GDP into its most important driving forces can be found in Graph II.2.3.

The results of the estimation reveal that changes in households' *access to credit* as well as *housing and stock market bubbles* only mildly contributed to the mini boom of 2004-2007. In 2006 and the beginning of 2007, favourable *external conditions* had an additional strongly positive impact on euro

([18]) A.Arpaia, N. Curci (2010), EU labour market behaviour during the Great Recession, European Economy. Economic Papers. 405.

([19]) The model controls for capacity utilisation, but this variable alone is unable to pick up all the cyclical factors in the economy.

Graph II.1.3: **Contributions to consumer price inflation** (in pp, 2000-2010)



Source: Commission services.

area GDP. It is notable that *monetary policy* appears relatively restrictive during the boom ([20]).

Also declining *TFP* growth rates contributed negatively to GDP growth over that period. Finally, other factors, which have not been explicitly accounted for in the decomposition, also contributed to GDP growth during this period ([21]).Turning to the recession, the factors emphasised at the beginning of this section explain almost completely the growth of euro area GDP since 2007. Two factors, the slump in total factor productivity and the increase in the stock market risk premium, are found to have played a major role in the 2007-2009 crisis. The former effect appears especially strong as it combines, as earlier explained, two independent developments: a permanent structural fall in TFP trend growth rates in euro area in the 2000s and a cyclical slump of TFP due to unfavourable composition effects and labour hoarding ([22]).

The effect of the increase in stock market premium is consistent with the previously formulated hypothesis that the euro area experienced a negative investment shock over that period.([23]) Unfavourable external conditions, presumably having to do with the collapse in world trade from the last quarter of 2008 until mid 2009, appear to have had some negative effect on euro-area GDP growth during the crisis. This is consistent with the view that factors that originated outside the euro area played an important role in deepening the recession. By contrast, the bursting of the housing bubble and the tightening of credit conditions for households had a relatively moderate impact on the euro area's economic performance. Finally, government fiscal packages are found to have had a strong positive effect on GDP growth in every quarter of 2009, confirming the significance of the coordinated European effort for pulling the euro area out of the crisis. Fiscal measures began to show a detectable impact in the first quarter of 2009, which suggests a relatively short implementation lag.

The contribution of different shocks to consumer price inflation during the decade is shown on Graph II.1.3. The graph suggests that in the

([20]) See footnote 14.
([21]) An important factor is improved labour supply conditions.
([22]) The cyclical effect may still be overestimated due to the problems in properly disentangling temporary and lasting shocks to TFP.

([23]) In the model as it is specified now, the fall in investment is attributed to a rise in the stock market risk premium, but unlike in the case of housing investment a further decomposition into tightening of lending conditions and a negative equity bubble shock is not yet possible. In other words, the identified investment shock might reflect restricted access to credit as much as the collapse in equity markets.

middle of the decade, the ECB compensated negative shocks to inflation arising from the external side, subdued investment and credit constraints with a slightly expansionary monetary stance in order to stabilise inflation around its target rate.([24])

In the period directly preceding the most recent crisis, a relaxation of credit conditions led to a temporary spike in consumer inflation.([25]) During the crisis, falling imports prices passed through into domestic inflation. The collapse in the stock market and the bursting of the housing bubble also exerted downward pressure on prices.

Conclusion

This section has tried to quantify the importance of various factors which are regarded as relevant for explaining the recent recession in the euro area by using a macro model as an accounting device. The analysis shows that financial factors contributed positively to growth in the euro area prior to the onset of the crisis, but to a smaller extent than for private demand in the US. Easier access to credit by households allowed for higher growth between 2005 and 2007 in the order of magnitude between 0.2 and 0.6% p.a. But especially in 2006 and early 2007 external conditions were equally important, while low productivity growth exerted a permanent drag on growth in the euro area. The analysis also shows that over this period, both fiscal and monetary policy were mildly countercyclical. The drop in euro area GDP since the middle of 2008 is made up of a number of factors, in particular a strong fall in productivity and a decline in investment. While the latter is common to both the euro area and the US and linked to stock market developments and a tightening of access to credit, the cyclical behaviour of productivity contrasts strongly between the euro area and the US, reflecting a very different response of the labour market. External demand had a strong negative effect on GDP from the last quarter of 2008 until mid 2009, while it contributed positively to growth in the last quarter of 2009. The empirical results confirm the positive role of fiscal stimulus packages for stabilising GDP growth.

([24]) Other important shocks for this period, not shown, include the mark-up shocks to prices and wages.

([25]) Another important factor might have been the rapid surge in oil and commodity prices in 2007-2008. The current version of the estimated Euro Area QUEST III model does, however, not incorporate this sector of the economy. The spike in oil prices probably explains the positive contribution of the "other" factor in Graph II.1.3.