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The **Quarterly Report on the Euro Area** is written by staff of the Directorate General for Economic and Financial Affairs (DG ECFIN). It is intended to contribute to a better understanding of economic developments in the euro area and to improve the quality of the public debate surrounding the area's economic policy. The views expressed are the author's alone and do not necessarily correspond to those of the European Commission. The Report is released every quarter of the year.

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Marco Buti
Director-General

According to the European Commission's latest forecast, published in May 2016, the economic recovery in the euro area is expected to continue at a fairly modest pace, especially when compared with pre-crisis standards. Underwhelming growth is mainly supported by internal demand and some tailwinds, in particular very accommodative monetary policies, supportive fiscal policies, low oil prices and a depreciating euro currency.

However, the downside risks to the outlook are considerable. On the external side, weaker growth in emerging market economies and/or stronger geopolitical tensions could affect euro area economies more negatively than expected. On the domestic side, the probably most important policy risk surrounding our forecast has materialised, namely the UK's vote to leave the EU. Its prospective impact on the economic outlook needs to be carefully assessed.

In this environment of lasting uncertainty, the euro area is not yet fully prepared to cope with large economic shocks. A major reason is that although domestic tax and benefits systems are quite extensive *within* euro area Member States, for example in comparison with the US states, the single currency area lacks an appropriate degree of cross-border risk sharing.

Cross-border risk sharing in the euro area would reduce the insurable risk of each country by sharing it with a large group, therefore supporting consumption smoothing in the face of asymmetric shocks. While the determination of the optimal degree of cross-border risk sharing is challenging, a comparison of the euro area and the US offers a good starting point. Following the seminal paper by Asdrubali et al. (1996), published in the Quarterly Journal of Economics, we can distinguish three main channels through which the risk of asymmetric shocks can be shared among countries: capital markets, credit markets (these two represent private risk sharing) and fiscal transfers (which represent public risk sharing).

Section I of this edition of the QREA provides updated estimates for these cross-border channels for both the US and the euro area taking the observations from the global crisis period into account. The findings show that around 75 % of an asymmetric output shock gets smoothed in the US. The most important contribution comes from capital markets in the form of cross-border ownership of assets (around 45 %), followed by credit markets (27 %) and fiscal transfers (8 %). The high share of private risk sharing in the US is strongly underpinned by a federal deposit insurance scheme supported by a public backstop, which is crucial for a complete integration of financial markets. By contrast, only around 25 % of an asymmetric shock is smoothed in the euro area. While cross-border fiscal insurance is virtually absent, the main reason for the substantial gap between the US and the euro area comes from the very limited degree of risk sharing through capital income flows between Member States.

Therefore, enhancing private risk sharing in the euro area, especially through the completion of the Banking Union (including a common backstop to the Single Resolution Fund) and a true Capital Markets Union as proposed by the Five Presidents' Report, remains a key policy priority. Well-functioning and integrated financial systems would also mitigate the propagation of financial shocks to the real economy as shown in Section II of this edition.

As stated in the June 2016 ECOFIN Roadmap to complete the Banking Union further risk sharing needs to go along with further risk reduction. This is important since a high degree of risk sharing can lead to excessive risk taking, as illustrated by Pauly's influential contribution in the American Economic Review (1968). This problem of moral hazard arises if individuals change their behaviour after benefitting from insurance (e.g. by increasing their risks), therefore shifting the risk from the party that can most efficiently protect it to a party that cannot. The risk of moral hazard is considered to be an issue in the euro area, and some financial market participants consider the so-called 'no bailout' clause codified in the European treaties as no longer credible. Moreover, experience has clearly shown that market

pressure does not build up gradually; it moves abruptly from neglect to excessive worries.

Hence, it is important that euro area Member States further strengthen their resilience to address economic shocks and remove macroeconomic imbalances.

A key objective that has repeatedly been stated in recent Commission documents, most prominently in the Commission's communication on the European Deposit Insurance Scheme (EDIS), is to reduce to a minimum the likelihood of having to resort to public risk sharing. Completing the Financial Union achieves precisely that: the more private risk sharing and risk reduction, the lower the need for fiscal risk sharing.

Many important steps have been taken in that direction notably but not exclusively with the establishment of the Single Supervisory Mechanism (SSM), and further steps are planned, for instance by eliminating the scope of remaining national options and discretions through EU regulatory measures, or by strengthening the availability of adequate 'bailinable' bank liabilities.

Without prejudice to the importance of risk reduction, it also needs to be stressed that elements of risk sharing also contribute to a process of risk reduction in the euro area, the European Stability Mechanism (ESM) being an important case in point.

Finally, the current macroeconomic policy predicament in the euro area also highlights the need to re-think the balance of risk sharing mechanisms. Most observers concur that monetary policy alone cannot provide the entire stimulus that the economy needs because of the constraints imposed by the zero lower bound and because the current fiscal framework focuses on curbing excessive deficits and debt, but does not offer any additional support to aggregate demand.

The overreliance on monetary policy at the current juncture brings the issue of a central fiscal capacity to the forefront. Such further fiscal integration would allow monetary policy to more quickly move away from the current unorthodox measures that it employs.

In brief, to better prepare the euro area for future economic shocks, we need to work towards a more suitable level and balance of risk sharing and risk reduction. The roadmap outlined in the Five Presidents' Report includes many important proposals to reach this goal. The UK 'Leave' vote makes it even more important to ensure an effective economic policy coordination to limit the fallout of the referendum outcome. In the medium run it is also clear that without further progress the EMU will remain incomplete. We urgently need to build a new narrative on how to react to the current challenges in both the short and long run with the ultimate goal to safeguard stability and prosperity in the single currency area and the EU as a whole.

I. Cross-border risk sharing after asymmetric shocks: evidence from the euro area and the United States

This section presents empirical evidence on the shock absorption capacity of the different channels of cross-border risk sharing in the euro area. The surge in economic divergence since the crisis has turned attention to the available cross-border mechanisms to smooth consumption in the face of asymmetric shocks. The main channels considered are: private risk sharing, through access to cross-border capital and credit markets and other cross-border factor income such as labour compensation; and public risk sharing, through cross-border fiscal transfers (public stabilisation through domestic means is not considered). This section shows that Economic and Monetary Union has likely facilitated cross-border shock absorption through private risk sharing, even taking into account the impact of the crisis on the financial sector. However, a direct comparison with the shock absorption capacity across US states shows that the size of the asymmetric shock that remains unsmoothed in the euro area is very high. The difference is mainly due to much less developed capital and labour market cross-border channels in the euro area. Therefore, enhancing private risk sharing among the euro area Member States, especially through capital markets, remains a policy priority. ([1])

I.1. Introduction

One of the most important characteristics of a well-functioning economic and monetary union is the capacity to absorb asymmetric (i.e. country-specific) shocks. The challenges specific to the euro area were clear from the beginning. ([2])

After a period of relatively high synchronisation in the run-up to and in the first years of Economic and Monetary Union (EMU), the surge in cyclical and structural differences during the economic and financial crisis has turned attention to the mechanisms available to smooth consumption in the face of asymmetric shocks. These include possible policy measures to improve cross-border risk sharing among Member States.

The Five Presidents' Report issued in June 2015 pays particular attention to enhancing the shock absorption capacity of the euro area, both through better integrated financial and capital markets (***private risk sharing***) and through a mechanism of fiscal stabilisation among euro area Member States (***public risk sharing***). ([3])

Currently, a high level of economic divergence among euro area Member States is still present. ([4]) By 2015, the divergent economic performance since the crisis resulted in an eight percentage point growth gap between the best and the worst performing Member State, while the gap between the highest and lowest unemployment rate in the euro area reached 20 percentage points. ([5]) In such an environment, even a small localised shock can have large effects if cross-border risk sharing among Member States is weak.

Therefore, the goal of this section is to present empirical evidence on the current degree of cross-border risk sharing in the euro area in the event of an asymmetric shock. The section starts with a brief review of the existing channels of cross-border risk sharing and presents some stylised facts on consumption smoothing following asymmetric

([1]) This section was prepared by Plamen Nikolov.

([2]) See 'EMU@10 The first ten years: a resounding success' in *Quarterly Report on the Euro Area,* Vol. 7, No 2 (2008) for a historical overview of the challenges in the functioning of the EMU and the design of the appropriate policy responses as seen by its early proponents and the policy-makers of the time. Common shocks could also have asymmetric effects across countries. A good example of an asymmetric effect of common shocks is presented in Box 6 of the report, which explains the differentiated response to a fall in US private demand in Germany, Italy and Ireland by referring to the differences in their trade openness and the structure of their exports.

([3]) 'Completing Europe's Economic and Monetary Union', Report by Jean-Claude Juncker in close cooperation with Donald Tusk, Jeroen Dijsselbloem, Mario Draghi and Martin Schulz, 2015.

([4]) For a presentation of asymmetries across euro area Member States see Ruscher, E. (2015), 'An overview of market-based adjustment in the euro area in the light of the crisis' in *Quarterly Report on the Euro Area,* Vol. 14, No 4 (2015).

([5]) In 2015 the fastest growing economy in the euro area was Ireland, at 7.8 %, while the worst performance was in Greece at -0.2 %. The highest unemployment was in Greece at almost 25 % of civilian labour force, while the lowest in Germany at 4.6 %. To be fair, US states also experience divergent growth performance. In 2014 real state domestic product in Alaska shrank by -1.4 % while in North Dakota it increased by 7 %. However, labour market divergence between US states is much more subdued, with a difference of only 4.1 pps. between the worst performer (Illinois) and the best performer (South Dakota).

output shocks. Next, the section presents quantitative results. Specifically, it employs an econometric approach to quantify the relative amount of smoothing of asymmetric output shocks that is due to three distinct cross-border channels: net factor income, fiscal support and savings. The section contrasts private and public risk sharing results obtained by this method in the euro area and the United States and shows that private risk sharing works better in the latter. The section concludes with policy implications for the efforts needed to increase the shock absorption capacity of the euro area through cross-border risk sharing.

I.2. Mechanisms of cross-border risk sharing

Cross-border risk sharing is linked to integration between countries: first and foremost economic and financial, but also political and institutional at least to some extent. Therefore it is important to examine the channels through which this type of risk sharing operates and the minimum degree of integration that makes it efficient. This needs to be done in order to anticipate necessary changes in policy.

The channels of operation of cross-border risk sharing can be divided into two broad categories: ***private*** and ***public***.

The ***private channels*** of cross-border risk sharing work through access to foreign financial markets, including through foreign capital markets and cross-border loans and deposits, as well as through labour compensation generated across borders.

The cross-border provision of financial services by financial institutions and markets is one of the main ways that private risk sharing operates. Residents of a country that experiences a negative output shock could smooth their consumption through property income streams generated by financial assets held in another jurisdiction, which is shielded from the shock. This is the capital market channel of risk sharing.

Alternatively, residents of a country that sees a negative output shock can secure consumption levels by drawing down savings accumulated during better times or by borrowing. This can also be done indirectly, for example when public borrowing is used to compensate for the loss of tax revenues after asymmetric shocks in order to sustain government expenditure levels and in turn smooth household consumption. This is what is called the credit market or savings channel of risk sharing. The savings channel does not necessarily involve a cross-border element, but integration helps deepening of financial markets, thus ensuring cost-cutting and efficiency. (6)

The operation of both the capital and the credit market channels is greatly facilitated by integrated financial markets and competition among financial institutions. This requires the adoption of a legal framework (among which insolvency laws and accounting standards) for competitive cross-border financial intermediation, the creation of an efficient financial infrastructure and the required institutional safeguards to ensure stable financial systems.

Another private channel of risk sharing that operates through streams of cross-border factor income is the cross-border labour compensation channel. Residents of a country that experiences a negative shock to output could smooth their consumption with labour income generated in another jurisdiction that does not experience the shock. Such workers are called commuter workers. (7) This channel requires free movement of labour as well as the prerequisites for a high degree of labour mobility, among which are investment in human capital, flexibility in compensation and hours worked, portability of social security rights, and facilitated firm entry and exit.

The public channels of cross-border risk sharing involve some form of fiscal redistribution between those countries that experience a negative output shock and those which do not. For example, the fiscal redistribution can be in the form of cross-border subsidies, social protection, including a common unemployment scheme, or cross-border financing of public investment, such as transport corridors.

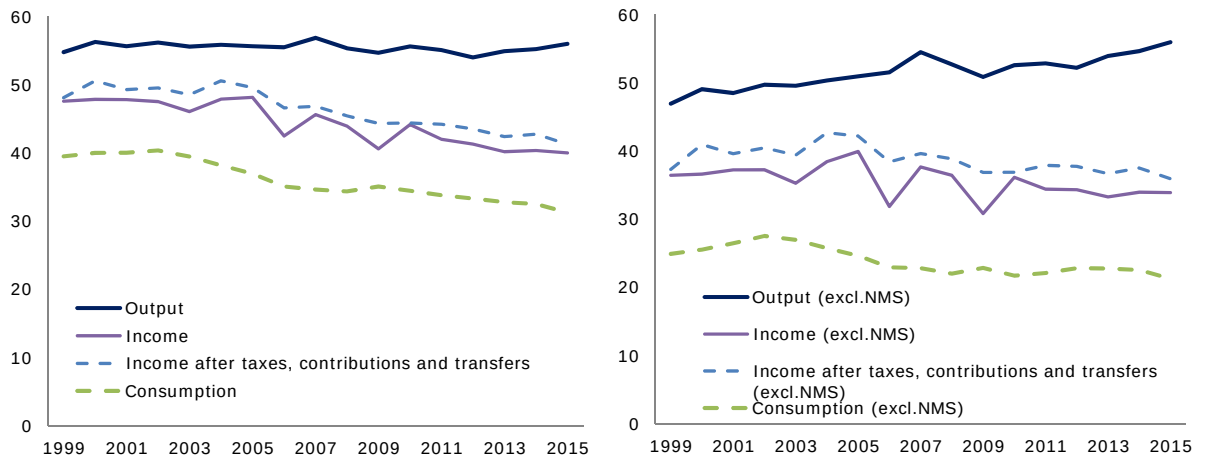
The public channels require a great deal of solidarity among the partners and naturally involve

(6) In the case of risk sharing measured by balancing items for the total economy a fixed level of household and government consumption after an output shock can only be achieved by borrowing or lending abroad.

(7) This channel is different from, although closely related to, risk sharing through remittances sent to the home country by workers residing abroad. The difference comes from the fact that remittances are sent by residents of an immigration country to residents of a country of origin and thus are measured differently in the national accounts.

Graph I.1: **Cross-country dispersion of output, income and consumption in the euro area (1)(2)**

(1999-2015, Index: EA-19=100)



(1) Standard deviation of real per-capita terms, output is measured by GDP, income by gross national income (GNI) and income after taxes, contributions and subsidies by gross disposable income (GDI).
(2) New Member States (NMS) of the euro area are those that joined after 2004.
Source: AMECO

a higher degree of political and institutional integration between them, including a system of common decision-making that ensures democratic legitimacy and accountability.

The initial EMU design did not envisage a substantial role for cross-border public risk sharing through common EMU fiscal support. The EU budget remains quite small in comparison to the sum of the Member States' national budgets and is mainly designed to support real convergence rather than smooth shocks across countries. ([8])

I.3. Methods to measure cross-border risk sharing

Empirical facts on cross-border risk sharing among Member States support the view that the EMU likely helped the process of smoothing cross-border output shocks, mainly through private channels. Graph I.1 shows the cross-country dispersion of output, income, ([9]) income after taxes and consumption in the euro area since the start of the EMU.

The dispersion of output among Member States has remained quite stable since the launch of the euro despite a minor increase in the boom years before the crisis and a minor drop after the crisis hit. Both income (including after-tax income) and consumption show a lower degree of dispersion among the Member States than output. ([10]) This suggests that asymmetric shocks to output are being smoothed among countries as part of the general income and consumption convergence process in the euro area.

Moreover, the years after the introduction of the euro as a common currency seem to coincide with a visible, even though slight, reduction in the cross-country dispersion of income and consumption. The trend is also visible when the sample excludes new Member States (right-hand panel). This suggests that the creation of the EMU has resulted in better convergence and possibly better cross-border risk sharing among Member States. ([11])

([8]) The amount of cross-border risk sharing in the EU through common public channels, such as spending through the multiannual financial framework (MFF), remains much lower than in federal states. The EU budget accounts for 1 % of the EU's combined GDP, while in the US it reaches 25 % of GDP.

([9]) Income is derived from GDP, adjusted for net factor income vis-à-vis rest of the world, plus net taxes and subsidies on products and imports. See also Box II.1.

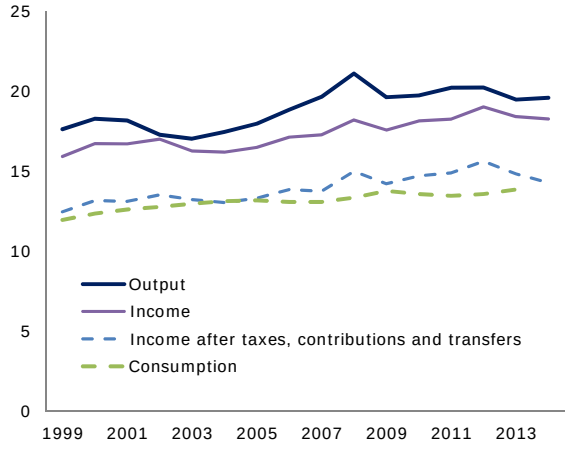
([10]) Measured by the standard deviation in real per capita terms. This remains valid even when the sample excludes the countries that joined the euro area after 2004. See right-hand panel of Graph II.1.

([11]) The fact that after-tax-income shows slightly more dispersion than pre-tax-income is hardly surprising given that fiscal policy in the euro area is decided at national level. If there is a common system of risk sharing through cross-border transfers to smooth income and governments can borrow, decentralised fiscal policy can also dampen variations in after tax income.

Looking at the same graph for the US reveals that the disparity of output, income and consumption among the 50 US states is much lower than between the euro area Member States. The crisis has affected divergence in the US as well, with a sharp increase in the cross-state standard deviation of output and income in 2008 (Graph I.2).

Another difference with the euro area is the smoothing role of taxes, contributions and transfers, with gross disposable state income having a much lower dispersion than unadjusted income in the US compared to the euro area. This is to be expected given the larger size of the US federal budget.

Graph I.2: **Cross-state dispersion of output, income and consumption in the 50 US states (1)**
(1999-2014, in %)



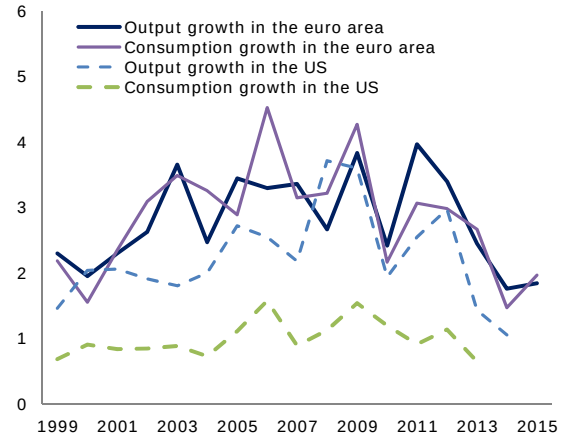
(1) Standard deviation of real per-capita terms, output is measured by gross state product (GSP), income by gross state personal and non-personal income and income after taxes, contributions and subsidies by gross disposable state income.
Source: US Bureau of Economic Analysis (BEA), US Office of Management and Budget (OMB), US Bureau of Labour Statistics (BLS), US Census Bureau, DG ECFIN calculations.

A more concrete representation of the process of cross-border risk sharing within a single year can be obtained by looking at the dispersion of output and consumption growth among euro area Member States and US states, shown on Graph I.3. The vertical difference between the dispersions of output and consumption gives the amount of a change in output that is not picked up by the change in consumption over the course of the year and thus appears to be smoothed. This is in contrast to dispersion of output, income and consumption in levels presented above, which contains in itself convergence irrespective of shocks as well as smoothing of past shocks that takes more than one year.

The graph shows that there were periods before the crisis when annual consumption growth within the euro area differed more than the growth in output. Conversely between 2010 and 2013 the dispersion of consumption growth was clearly below the dispersion of output growth suggesting smoothing in the course of each of these years.

The contrast with the US is visible here as well. Both output and consumption growths among the US states vary less than among euro area Member States and in the US the variability of consumption growth is consistently lower than the variability of output growth, suggesting a more consistent risk sharing process.

Graph I.3: **Cross-border dispersion of output and consumption growth in the euro area and the 50 US states (1)**
(1999-2015, in pps.)



(1) Standard deviation of growth in real per-capita terms.
Source: AMECO, US Bureau of Economic Analysis (BEA), US Office of Management and Budget (OMB), US Bureau of Labour Statistics (BLS), US Census Bureau, DG ECFIN calculations.

Labour mobility

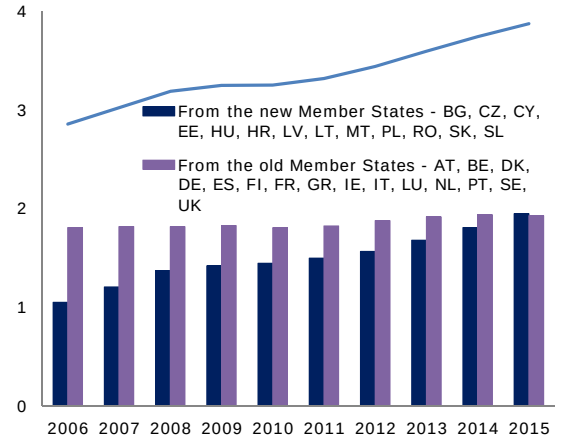
Looking at the specific channels of cross-border risk sharing, Graph I.4 attempts to illustrate the role of cross-border labour income with data from Eurostat's Labour Force Survey. [12] The graph

[12] The EU labour force survey is a large sample survey among private households in Europe and an important source for European statistics about the situation and trends in the EU labour market.
Visit http://ec.europa.eu/eurostat/web/microdata/european-union-labour-force-survey for more information.

provides statistics on employment by citizenship and thus on the number of euro area workers who work in another Member State. A caveat needs to be made here. Employment by citizenship only approximates the number of cross-border commuter workers. In the very narrow sense, risk sharing through labour mobility is performed by commuter workers whose number fluctuates almost simultaneously with a shock in output, while cross-border employment, as presented in the graph, also contains a structural pattern. (13)

The share of euro area labour force that has an EU citizenship different from that of the reporting country has been increasing since the start of the survey. There was a minor slowdown during the crisis, but by 2015 the share of euro area workers who are citizens of another EU country had reached almost 4 %. Most of the increase since the beginning of the survey in 2006 can be attributed to workers from the new Member States. By 2015 their number had surpassed the number of workers from the EU-15.

Graph I.4: **Cross-border employment in the euro area (1)(2)**
(2006-2015, y-o-y % change)



(1) Employment by citizenship other than of the reporting country, 15-64 year old, % of total employment
(2) New Member States of the EU are those that joined after 2004.
Source: Eurostat

There is quite a disparity among Member States regarding the share of cross-border labour. This means that cross-border risk sharing through this channel is not homogeneous across Member States as some countries likely benefit more from this form of risk sharing than the rest. In 2015 the share of workers that are citizens of another EU country varies between more than 10 % in Ireland and Cyprus to as low as 0.6 % in Portugal and below or close to 2 % in France, Finland, the Netherlands, Malta and Greece. Luxembourg, with its small size and high expatriate population, is a clear outlier. Workers from the new Member States are a clear majority of EU workers in Ireland, Austria, Spain and Italy. This diversity among Member States suggests that the pattern of cross-border risk sharing through this channel is quite different depending on the country concerned.

There is still quite a lot to be done to increase the impact of cross-border labour mobility on risk sharing among euro area Member States. The line on Graph I.4 clearly shows a pattern similar to the demand cycle during the crisis. This means that the aggregate number of cross-border workers within the euro area is pro-cyclical. This may help adjustment, for example when cross-border workers return to their countries of origin after a negative shock in the host country. (14) Yet at this stage, given the lack of precise information on the number of cross-border commuters in the euro area, it is difficult to arrive at more precise conclusions on the role of risk sharing through labour compensation in the various Member States.

Financial integration

The rapid financial integration in the years between the EMU's creation and the start of the global financial crisis undoubtedly provided conditions for better cross-border risk sharing in the euro area. The increase in the importance and size of the financial services sector in the Member States followed similar developments in the other

(13) Data on commuter workers that move in response to shocks are unavailable in the Labour Force Survey.

(14) Putting this channel in a more comparative perspective is difficult. Annual interstate mobility in the US (a flow concept) is found to be 2.5 % of working age population in 2005. This is a relatively high number compared to countries in Europe, given that in 2006 2.9 % of the euro area labour force had a citizenship of another EU country (a stock concept). See Bonin, H., W. Eichhorst, C. Florman, M. Okkels Hansen, L. Skiöld, J. Stuhler, K. Tatsiramos, H. Thomasen, and K. F. Zimmermann (2008), 'Geographic mobility in the European Union: optimising its economic and social benefits', *IZA (Forschungsinstitut zur Zukunft der Arbeit), Research Report,* No 19. The crisis may have affected these estimates in a different way in the two blocs. For evidence that the crisis has reduced the importance of migration across state borders as a labour market adjustment tool in the US see Foote, A., M. Grosz and A.H. Stevens (2015), 'Locate your nearest exit: mass layoffs and local labour market response', *NBER Working Paper Series*, No 21618. One possibility is that the Great Recession was unique given the role of the US housing crisis, which impeded mobility.

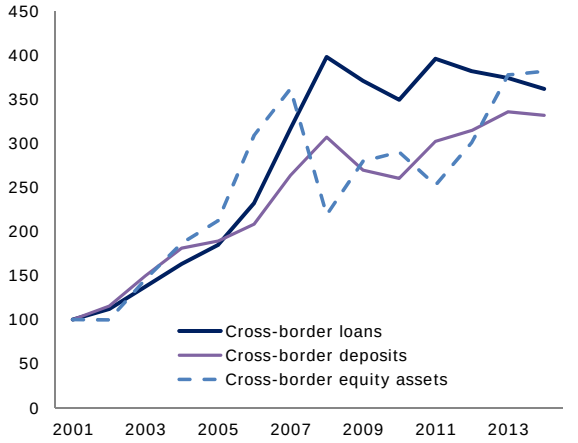
advanced economies but in Europe the process was given an additional impetus by the creation of the common currency and, linked to that, the decrease in the costs of borrowing. Previous analysis in this series has shown that financial market integration has supported cross-border risk sharing. However, this was less through equity markets and rather more through borrowing and saving on credit markets. ([15])

The crisis changed the perception about financial integration and the role of wholesale bank funding in a profound way. The rapid cross-border expansion up until 2007 was followed by a retrenchment of financial intermediation behind state borders. Moreover, capital misallocation during the boom years appeared as a major destabilising factor after the crisis hit, increasing the likelihood of asymmetries across Member States. ([16])

Not all cross-border financial instruments in the euro area have experienced the same deep fall since the crisis. Graph I.5 shows that in 2014 the cross-border deposits at euro area banks, excluding positions vis-à-vis other banks, stood at levels that were relatively close to those in the pre-crisis years, despite localised drops in the immediate vicinity of the sovereign-debt crisis in 2008. ([17])

Both cross-border loans and deposits expanded rapidly after the creation of the euro and, judging from their level today, the common currency plays an important role in risk sharing through cross-border provision of financial services. However, cross-border equity assets experienced a significant drop during the crisis and their recovery to pre-crisis levels has taken much longer than for cross-border deposits. It is also important to stress that the size of the cross-border equity market is several times lower than the cross-border loan and deposit markets.

Graph I.5: **Cross-border financial instruments in the euro area(1)**
(2001-2014, Index: 2001=100)



(1) For loans and deposits, other bank counterparties are excluded.
Source: Bank for International Settlements (BIS) reporting banks, IMF Coordinated Portfolio Investment Survey (CPIS)

The euro facilitates private risk sharing through lowering transactions costs and deepening financial markets. However, as the crisis has shown, appropriate measures to create a well-functioning Banking Union are also needed. This includes in particular establishing a European Deposit Insurance Scheme (EDIS), thus building the third pillar of the Banking Union. Given the current regime of country-based deposit insurance, there are still differences in the regulatory treatment of banks. Once operational, the EDIS will work against country-specific shocks since it is likely to be fiscally neutral over time because insured risks will be spread and private contributions will be raised by a larger pool of banks. In this way the EDIS, together with a credible common backstop to the Single Resolution Fund, will create further conditions for more cross-border presence of euro area banks by ensuring consistency in regulatory treatment and by shielding the financial sector from country-specific shocks. It will therefore be another supporting factor in increasing competition in the financial sector, lowering costs and increasing cross-border risk sharing.

([15]) For an overview of increased pre-crisis financial integration and its impact on risk sharing see 'Cross-border risk sharing: has it increased in the euro area?' in *Quarterly Report on the Euro Area,* Vol. 6, No3 (2007).

([16]) For a presentation of the limits of shock absorption in the EMU since the crisis see Jevcak A. and R. Kuenzel 'Recent capital flow developments in the euro area' in *Quarterly Report on the Euro Area,* Vol. 12, No2 (2013), Loublier A., 'Recent developments in cross-border capital flows in the euro area' in *Quarterly Report on the Euro Area,* Vol. 14, No1 (2015) and 'Financial integration and risk-sharing in a monetary union' in *Financial Integration in Europe (2016)*, ECB.

([17]) Naturally the share of large financial centres such as Ireland and Luxembourg as locations of cross-border financial positions in the euro area is disproportionately higher than their weight in the EMU population or GDP. This is another example of the Member States' uneven ability to share risk among each other through private channels.

Graph I.6: **Channels of risk sharing, 50 US States, anchored-start regressions with rolling end dates (1)**

(1990-2013, in % of total asymmetric shock to output)

(1) Regressions cover 1964 until the year shown on the horizontal axis. Regressions with rolling start and end dates did not give qualitatively different results.

Source: US Bureau of Economic Analysis (BEA), US Office of Management and Budget (OMB), US Bureau of Labour Statistics (BLS), US Census Bureau, DG ECFIN calculations.

I.4. Empirical results of cross-state risk sharing in the euro area and the US

Econometric results on the relative weight of the different risk sharing channels among euro area Member States and US states are given below. This sub-section updates findings of the canonical paper by Asdrubali et al. (1996) ([18]) for the US states in the years since the crisis. It next compares the US with the euro area and draws conclusions for the possible degree of risk sharing in the euro area had the latter possessed the capital and labour market characteristics of the former. The comparison also acknowledges that the US is a federal state with a sizeable budget, while the EMU does not have common fiscal means to cope with asymmetric shocks.

Cross-border risk sharing is measured using the system of national accounts. The approach consists of sequential regressions of the balancing items in the primary and secondary distribution of income accounts and in the use of income account for the total economy (so including both the private and the public sector) in order to quantify the amount of co-movement of output, income, including after taxes, and consumption after asymmetric shocks to output. The method provides a breakdown of the relative size of the three different channels of cross-border risk sharing (net factor income, fiscal transfers, and credit markets) and the proportion of an asymmetric shock that remains unsmoothed.

([18]) Asdrubali F., B. Sorensen and O. Yosha (1996), 'Channels of interstate risk sharing: United States 1963-1990', *The Quarterly Journal of Economics*, November.

Table I.1: **Cross-border risk sharing through different channels(1)(2)**
in % of total asymmetric shock to output

	Euro area	Euro area without the New Member States	Core vs. periphery	US
Risk sharing through:	all EA MS except CY, MT, LU, LT, AT, GR	EA12 except LU, AT and GR	DE, ES, IE, NL and PT	50 states
cross-border factor income(2)	5.6	2.0	3.4	44.8
of which cross-border labour compensation	0.2	-0.2	-0.1	
cross-border fiscal transfers	0.0	1.6	2.6	8.3
credit markets	18.2	24.6	18.0	26.7
unsmoothed	75.7	61.7	63.1	17.6

(1) Time period for the euro area is between 2000q4 and 2015q4, while for the US it is between 1964 and 2013. To increase the number of observations, risk sharing in the euro area is measured at a quarterly frequency (difference compared with the same quarter in the preceding year). However, regressions with annual frequency did not produce qualitatively different results.
(2) Cross-border factor income includes property income such as income from cross-border ownership of equity, rent income and cross-border labour compensation.
Source: DG ECFIN calculations, Asdrubali et. al (1996).

See Box I.1 for a full description of the model and its estimation.

The Asdrubali et al. (1996) methodology is applied to the 50 US states and to three sets of euro area Member States: the euro area (EA) 19, except Malta, Cyprus, Luxembourg, Lithuania, Austria and Greece; EA 12 except Luxembourg, Austria and Greece; and a set of euro area core and periphery countries (Germany, Spain, Ireland, Netherlands and Portugal). The choice of euro area countries is partly based on data availability in the European System of Accounts 2010 and partly on the option to have a sample that excludes new Member States. In this way it is possible to measure legacy effects from the closer integration even before the EMU and have a sample of countries in the EA12 core and periphery, which are likely to experience more asymmetries.

The time period chosen for the US is between 1964 and a rolling end date from 1990 until 2013. For the three different sets of euro area countries the time period is between 1999 and 2015. The time periods are chosen based on data availability, while for the US it extends the period in Asdrubali et al. (1996). The difference in the two time samples does not impair comparison between the two economies because risk sharing estimates for an economy vary little depending on the period chosen. ([19]) The main differences between two economies are driven by the legal, institutional and economic structures that underpin risk sharing, not by the different time samples.

The most important result of the econometric exercise is that risk sharing among Member States is lower than across federal states in the US. ([20]) The overall proportion of an asymmetric shock that is not smoothed in the euro area is more than four times larger than in the US (Table I.1, last row). Naturally the gap comes from the different

([19]) This is best illustrated when comparing estimates in the original Asdrubali et al. (1996) paper and its extension here. See the small scale of the vertical axis in Graph II.4. Note also that the econometric approaches in Asdrubali et al. (1996) and the extension here are different: 2-step generalised least squares vs panel-corrected ordinary least squares. See Box II.1 for more information.

([20]) The lower degree of risk sharing after asymmetric shocks in the euro area compared with the US was reported already after the first couple of years of the EMU. For an overview see for example Demyanyk Y., C. Ostergaard and B. Sorensen (2008), 'Risk sharing and portfolio allocation in EMU', *European Economy Economic Papers 334* and Sorensen B. and O. Yosha (1998) 'International risk sharing and European monetary unification', *Journal of International Economics*, Vol. 45, pp. 211-238. On the other hand, Furceri D. and A. Zdzienicka (2013), 'The euro area crisis: need for a supranational fiscal risk sharing mechanism?', *IMF WP/13/198* point out that the crisis has hampered the ability of the euro area countries to share risk.

political and institutional setups for sharing risks in the US and the euro area, as well as the relatively big role of capital and labour markets for risk sharing in the US.

Graph I.6 shows the estimates of the amount of risk sharing through the different channels between the 50 US states following an asymmetric shock to output. The lines report the evolution of the regression estimates depending on the end date of the time series, starting with an end date in 1990. The goal is to evaluate how the different channels evolved since 1990. Table I.1 compares the three euro area samples with the US.

Cross-state risk sharing through net factor income remains the largest contributor to consumption smoothing following an asymmetric shock in the US. This channel includes risk sharing through cross-state property income such as retained earnings and income streams from cross-state ownership of shares, as well as smoothing through labour earnings by commuters across state borders. It is natural that these income streams are hampered during recessions. Graph II.4 shows two steep drops in its relative weight, which broadly correspond to the recessions in 2001 and 2008-9. ([21])

The estimates in Table I.1 show that there is a big difference between the role of cross-border net factor income among the euro area Member States and the US states. This comes as a result of the higher degree of labour mobility and deeper and more integrated capital markets in the US. Higher risk sharing through this channel is to be expected given the high annual interstate mobility and the high number of commuter workers across state border in the US. ([22]) Better capital market development in the US is also well documented: see Valiante (2016) ([23]) for evidence that Europe's capital markets are poorly functioning and underdeveloped compared to the US.

The relative share of fiscal redistribution across state borders in the US is lower than the shares of the private channels. For the full time series between 1964 and 2013 the relative weight of fiscal support in risk sharing is around 8.5 %. Risk sharing through this channel has been at its highest level since the start of the crisis as the federal government provided support to struggling states.

The role of cross-border public risk sharing in the euro area is smaller than in the US although the difference is less striking than for the cross-border private channels. The largest role for the public channel comes up when the sample of euro area countries includes only those that benefited from official support during the crisis years. This should come as no surprise given that the euro area does not have a common fiscal capacity to absorb shocks.

The importance of credit markets for cross-border risk sharing is more similar in the euro area and the US than the other channels. This includes borrowing by both the private and the public sector. The role of public sector borrowing in risk sharing is likely smaller than the one of the private sector while stabilisation through purely domestic means is not considered here. ([24]) The role of euro area credit markets in smoothing an asymmetric output shock is more similar to the one in the US in the pre-2004 euro area sample than in the other two euro area samples. This reflects a very high degree of financial deepening in the old Member States compared to those that joined recently. While encouraging at face value, this result also needs to take into account that pre-crisis cross-border financial flows in some of the old Member States turned out to be unsustainable as a result of insufficient risk management and supervision.

The overall proportion of an asymmetric shock that is not smoothed between the 50 US states is around 18 %, compared to more than 60 % among the euro area Member States. Given that the US is a federal country with a long history of fiscal redistribution and that it has well-developed capital markets with a large presence across state borders, it is to be expected that the euro area could achieve a higher degree of cross-border risk sharing once

([21]) Even though visually pronounced, these drops are small in absolute terms. Note the scale of the vertical axes on Graph II.4, again supporting the conclusion that the choice of a time period has a minor impact on the absolute value of the risk sharing coefficients, while keeping their relative proportion constant.

([22]) See Bonin et al (2008), op. cit.

([23]) Valiante, D. (2016), 'Europe's untapped capital market: rethinking integration after the great financial crisis', *CEPS Paperback*.

([24]) Some authors have separated this channel into saving and borrowing on the credit markets by *private entities* (households and non-financial corporations) and *public entities* (national and local governments). See for example Furceri and Zdzienicka (2013): they find that the role of public access to credit markets for cross-border risk sharing in the euro area is several times lower than the role of private saving/borrowing. That is to be expected given the provisions of the Stability and Growth Pact and the relative sizes of the private and public sectors.

changes to its institutional setup towards more integration come into being. ([25]) However, shock absorption through fiscal redistribution in a fully-fledged fiscal union such as the US is not more than around 8.5 % of the asymmetric shock (as measured by the rolling end date regressions), even though it has increased since the crisis.

Therefore, a much bigger part of cross-border risk sharing in the EMU could potentially come through private channels such as integrated capital markets, once the Capital Markets Union is in place.

I.5. Conclusion

The econometric results presented in this section point to the great potential for improvement in smoothing asymmetric shocks in the euro area. When comparing the amount of an asymmetric shock that remains unsmoothed by the private and public channels of cross-border risk sharing in the euro area and the US the importance of the recent initiatives to build a Capital Markets Union stand out. The significance of factor income flows, which include labour compensation and capital income generated across state borders in the US, could serve as a model for a euro area where capital markets play an important role in cushioning asymmetric shocks across borders. Also, the creation of the Single Supervisory Mechanism and other innovations in the regulatory environment in the euro area are likely to make risk sharing through credit markets more sustainable going forward.

Completion of the European Banking Union by establishing a European Deposit Insurance Scheme (EDIS) will also facilitate risk sharing among Member States. The EDIS is expected to increase the cross-border presence of euro area banks by ensuring consistent regulatory treatment regardless of country of operation and will offer protection against country-specific shocks. Completing the Banking Union will create conditions for more financial integration, which is expected to increase competition among banks, and thus lower intermediation costs and further increase cross-border risk sharing.

The importance of the public channel of cross-border risk sharing in the euro area, on the other hand, should be seen in contrast with its role in the US, a fully-fledged fiscal union, where fiscal redistribution among states has an important role. Even though the relative significance of this channel in the US has increased with the crisis, taxes, grants and fiscal transfers in the 50 states contribute relatively less to smoothing asymmetric shocks than the private channels. Therefore, policy efforts to achieve a higher degree of private cross-border risk sharing in the euro area, especially through capital markets and equity holdings, should remain the priority option.

([25]) The level of integration will probably not be of the same magnitude since it is unlikely that the union between euro area member states will soon be politically and institutionally the same as the one between the 50 US states.

Box I.1: Empirical methods to estimate relative weights of cross-border risk sharing channels

This box presents the econometric methodology used to estimate the relative importance of the different cross-border risk sharing channels after an asymmetric shock in the euro area and the US.

It is important to look at the balancing items in the primary and secondary distribution of income accounts and the use of income account in the European System of National Accounts 2010 (ESA 2010) in order to review the necessary variables for the estimation process. Data for Belgium for 2014 can be used as an illustration to arrive at the required several balancing items. ([1]) One channel of risk sharing is the difference between gross domestic product (GDP) and gross national income (GNI) – risk sharing through net international factor income. The bigger this difference and the lower its correlation over time with GDP, the more risk sharing there is through net international factor income. In order to come up with this difference — EUR 6.038 billion in this example — one has to add the net of several items. For example, there is a difference of EUR 5.715 billion between compensation of employees paid by employers in Belgium, including to workers who take their earnings abroad where they are domiciled and compensation of employees received by workers in Belgium including by workers who work in other countries but bring their earnings back to Belgium where they are domiciled. This is a net positive inflow of income from a Belgian perspective. Other items that are treated in the same way are production taxes paid (collected) by firms (governments) and subsidies on production earned (distributed) by firms (governments). Any cross-border net inflow here will be due to fewer of these taxes paid by Belgian firms abroad compared to foreign firms in Belgium and more of these subsidies earned by Belgian firms abroad compared to foreign firms in Belgium. Finally, property income, which includes interest, for example on debt securities, equity dividends, reinvested earnings and some other items, is treated in the same way. For example a net inflow occurs if Belgian citizens receive more dividends from foreign companies than foreigners from Belgian companies.

Another channel of risk sharing is through cross-border fiscal redistribution. This makes the difference between GNI and gross disposable income (GDI). Here, a net inflow in Belgium will occur if social transfers received by Belgian persons and entities from foreign sources outweigh the transfers received by foreigners in Belgium. The same will happen if income and wealth taxes paid by foreigners in Belgium are higher than income and wealth taxes paid by Belgians abroad.

Finally, the difference between GDI and consumption is gross savings through which consumption can be smoothed. Borrowings and savings are channelled through domestic and foreign financial intermediaries.

At the state level in the US, some of these balancing items are not available. Specifically, state national income and state disposable income are constructed using the method in the Appendix in Asdrubali et. al (1996). ([2])

Asdrubali et. al (1996) propose a series of regressions of these balancing items to estimate the relative importance of each of the risk sharing channels. Starting from the identity: $GDP = \frac{GDP}{GNI} \cdot \frac{GNI}{GDI} \cdot \frac{GDI}{C} \cdot C$ it is easy to show that a relationship $1 = \beta_{fi} + \beta_{tr} + \beta_s + \beta_u$ exists where the beta terms are the estimates of the regression coefficients in:

$$\Delta logGDP_t^i - \Delta logGNI_t^i = \mu_{fi,t} + \beta_{fi} \cdot \Delta logGDP_t^i + u_{fi,t}^i$$

$$\Delta logGNI_t^i - \Delta logGDI_t^i = \mu_{tr,t} + \beta_{tr} \cdot \Delta logGDP_t^i + u_{tr,t}^i$$

$$\Delta logGDI_t^i - \Delta logC_t^i = \mu_{s,t} + \beta_s \cdot \Delta logGDP_t^i + u_{s,t}^i$$

$$\Delta logC_t^i = \mu_{u,t} + \beta_u \cdot \Delta logGDP_t^i + u_{u,t}^i$$

The beta terms are interpreted as the relative weights of cross-border risk sharing due to net factor income, fiscal transfers, savings and borrowings on credit markets. The last beta coefficient shows the amount of an asymmetric shock that remains unsmoothed. The panel regressions include time fixed effects μ and error terms u.

(Continued on the next page)

Box (continued)

There are three sets of panels for the euro area: EA19, except Malta, Cyprus, Luxembourg, Lithuania, Austria and Greece; EA12 except Luxembourg, Austria and Greece; and a set of euro area core and periphery countries (Germany, Spain, Ireland, Netherlands and Portugal). The choice of euro area countries is partly based on data availability in the European System of Accounts 2010 and partly on the option to have a sample that excludes new Member States, to be able to measure legacy effects from the closer integration even before the EMU and to have a sample of countries in the EA12 core and periphery, which are likely to experience more asymmetries. The US sample includes the 50 US states.

The time period chosen for the US is between 1964 and a rolling end date from 1990 until 2013. For the three different sets of euro area countries the time period is between 1999 and 2015. The time periods are chosen based on data availability, while for the US it extends the period in Asdrubali et al. (1996).

The regressions are estimated with 2-step generalised least squares (GLS), correcting for heteroscedasticity and cross-sectional correlation in the case of the euro area and ordinary least squares (OLS) with panel-corrected standard errors in the case of the US. The latter method is better suited for panels with larger cross-sections while the former method is better in the opposite case. ([3]) Both estimations include a common AR1 autocorrelation structure within panels. The first differences in the quarterly euro area data are in terms of the same quarter of the preceding year. The euro area regressions also include a further breakdown of *GNI* into one corrected only for cross-border labour compensation and one for the other elements of net factor income.

Econometric results are in the table below. All estimates marked with *** are statistically significant at the 99 % confidence level. Z-statistics are in parentheses.

Table 1: **Regression results**

	(1)	(2)	(3)	(4)
Risk sharing through:	2-step GLS	2-step GLS	2-step GLS	PC-OLS
cross-border factor income	0.0552***	0.0199***	0.0343***	0.4476***
	(7.22)	(3.16)	(5.68)	(11.98)
of which cross-border labour compensation	0.0024***	-0.0015***	-0.0012***	
	(2.81)	(-4.14)	(-2.82)	
cross-border fiscal transfers	-0.0007	0.0156***	0.0257***	0.0832***
	(-0.39)	(8.47)	(7.61)	(8.03)
credit markets	0.1815***	0.2459***	0.1800***	0.2668***
	(17.38)	(8.31)	(4.78)	(5.08)
unsmoothed	0.7574***	0.6171***	0.6312***	0.1760***
	(378.4)	(25.05)	(18.38)	(5.05)
Countries	Full panel - 13 countries: BE, DE, EE, ES, FI, FR, IE, IT, LV, NL, PT, SK, SL	Old member states - 9 countries: BE, DE, ES, FI, FR, IE, IT, NL, PT	Core vs. periphery - 5 countries: DE, ES, IE, NL, PT	50 US states
Period	2000Q4-2015Q4	2000Q4-2015Q4	2000Q4-2015Q4	1964-2013
No of observations	793	549	305	2500

Source: US Bureau of Economic Analysis (BEA), US Office of Management and Budget (OMB), US Bureau of Labour Statistics (BLS), US Census Bureau Eurostat, DG ECFIN calculations.

([1]) For more information see Box 2 in 'Cross-border risk sharing: has it increased in the euro area?' in QREA, Vol. 6, No3 (2007).
([2]) Asdrubali F., B. Sorensen and O. Yosha (1996), 'Channels of interstate risk sharing: United States 1963-1990', *The Quarterly Journal of Economics*, November.
([3]) These are standard econometric approaches in estimating cross-border risk sharing. For a short discussion on the econometrics of cross-border risk sharing see Hepp, R. and J. von Hagen (2013), 'Interstate risk sharing in Germany: 1970—2006' Oxford Economic Papers, Vol. 65, No1, pps. 1-24.

II. Financial channels and economic activity in the euro area

This section discusses the nexus between financial and macroeconomic developments in the euro area. It draws on key lessons from the literature and provides stylised facts on the main transmission channels through which financial developments have affected real economic activity since the crisis. Macro-financial linkages are investigated from an empirical perspective for the euro area as a whole by looking at four key channels: i) the interest rate channel; ii) the borrower balance sheet channel; iii) the bank balance sheet channel; and iv) the uncertainty channel.

Overall, the results suggest that financial variables have significant impact on macroeconomic developments but also that the transmission seems to have changed since the crisis. Notably, the interest rate channel has helped the modest recovery since 2014 by supporting both private and public consumption. The positive boost given to favourable financing conditions in 2015 has been somewhat compensating the adverse effects of the borrower balance sheet channel. The bank balance sheet channel and the uncertainty channel play a particularly important role in capturing the weakness in the current rebound in investment. ([26])

II.1. Introduction

Since the global economic and financial crisis, the linkages between macroeconomic and financial developments have been on the frontline of both research and policy making. The massive dislocations observed during the crisis have forged a broad consensus that shocks originating in the financial sector can have profound effects on real economic activity and vice versa. While the effect of macroeconomic developments on financial conditions is rather straightforward, ([27]) the effect of financial developments on the macroeconomy is more complex and was (until recently) largely omitted in mainstream macroeconomic thinking. The interest rate was the only financial variable included in standard macroeconomic models and only to the extent that it was assumed to influence the decisions of economic agents, while no genuine role was assigned to the financial sector itself. In reality, financial intermediation is subject to numerous *frictions* that can affect macroeconomic developments via diverse *transmission channels*. Given the decisive role of bank credit in financing the euro area economy, shocks originating in the banking sector are of crucial importance.

This section looks at macro-financial linkages in the euro area to shed light on how financial developments may have contributed to disappointing macroeconomic performance in the recent past. The methodology employed for this purpose is a large-scale Bayesian Vector Autoregression (VAR) that encompasses a wide set of macroeconomic and financial variables. ([28])

Subsection I.2 discusses the importance of the financial system for the real economy and briefly reviews the relevant economic literature. Subsection I.3 describes the main transmission channels from financial markets to the real economy and defines specific variables that could be used to capture these transmission channels in the euro area. Subsection I.4 presents the results of the empirical analysis particularly some stylised facts on the co-movement between financial variables and economic activity since the crisis.

II.2. The financial system and the real economy

Market frictions are normally understood as a wide range of different bottlenecks that do not allow markets to efficiently clear demand and supply. *Financial frictions* are impediments to the smooth functioning of the financial market that do not allow funds to be channelled effectively from creditors to borrowers. Therefore, they play an important role in the way the financial system affects the real economy. Moreover, the presence of frictions during periods of financial turmoil undermines the effectiveness of monetary policy

([26]) This section was prepared by Narcissa Balta and Bořek Vašíček.

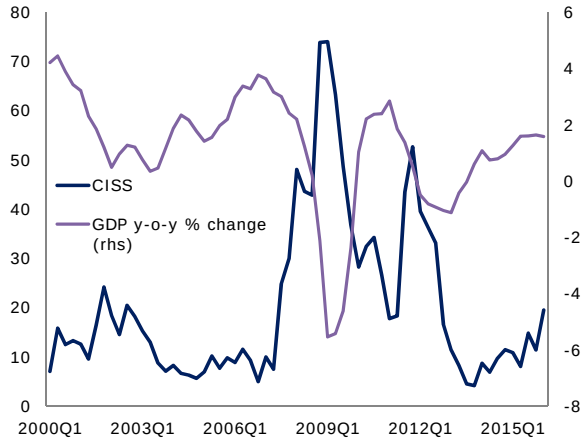
([27]) Jacobson, T., J. Linde and K. Roszbach (2005), 'Exploring interactions between real activity and the financial stance', *Journal of Financial Stability*, Vol. 1, No. 3, pp. 308–41.

([28]) Bańbura, M., D. Giannone and M. Lenza (2015), 'Conditional forecasts and scenario analysis with vector autoregressions for large cross-sections', *International Journal of Forecasting*, Vol. 31, Issue 3, pp. 739–756.

transmission and financial sector stability, which via *feedback effects* can have a detrimental impact on macroeconomic developments. For instance, hikes in bank funding costs when money markets stop functioning are likely to be transmitted to the lending rates applied to consumers, which in turn can have a significant drag on both investment and consumption. Also, financial frictions increase the likelihood of financial shocks occurring both from the demand and the supply side.

Financial shocks are usually deemed to be very persistent and have amplification effects, in the sense that even small shocks can produce large and long-lasting effects. ([29]) Graph II.1 shows a clear negative correlation between GDP growth and financial distress in the euro area, as measured by the Composite Indicator of Systemic Stress (CISS). ([30])

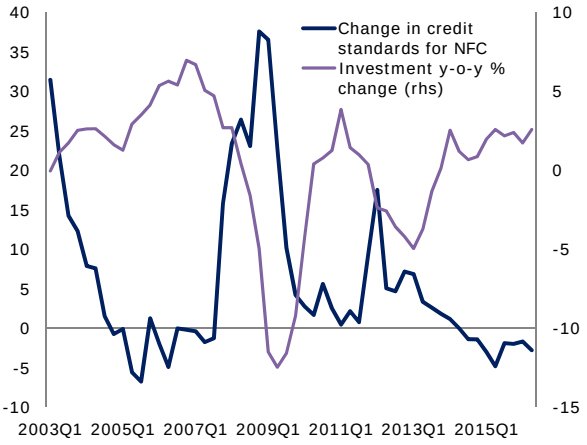
Graph II.1: **Real GDP growth vs. Composite indicators of systemic stress**
(2000Q1-2016Q1)



Source: ECB, Eurostat.

Since the key role of the financial sector consists in funding economic activity, *new credit* is the main channel of transmission between the financial sector and the macroeconomy. Financial shocks occurring on the demand side are usually triggered by an impairment of borrowers' balance sheets, which in turn undermines their creditworthiness and their capacity to invest and consume. Financial shocks occurring on the supply side (i.e. those that originate from within the financial sector) normally manifest themselves through tightening of credit conditions and/or credit rationing which, again, impact real economic activity via the investment behaviour of households and non-financial corporations. Graph II.2 shows the negative correlation between credit standards for firms and real investment. ([31])

Graph II.2: **Investment growth vs. credit standards for NFC**
(2003Q1-2016Q1)



Source: ECB BLS, Eurostat.

Financial frictions have been fully embedded into macroeconomic models only recently

The neglect of financial sector effects in traditional macroeconomic thinking has its foundation in the famous Modigliani-Miller theorem. ([32]) The theorem argues that the way a firm finances its investment (via debt or via equity) has no effect on its value and thus that their investment decisions are driven primarily by macroeconomic conditions (namely, the real interest rate) rather than financial market developments. However, the validity of the theorem hinges on a set of very restrictive assumptions such as perfect information, equal tax treatment for debt and equity etc., which are generally not met in practice. ([33]) Financial

([29]) Brunnermeier, M. K., T. Eisenbach and Y. Sannikov (2012), 'Macroeconomics with financial frictions: A survey', *National Bureau of Economic Research Working Paper*, No. 18102.

([30]) The CISS measures contemporaneous stress in the financial system. It is an aggregate of five market-specific sub-indices. More weight is put when stress prevails in several market segments at the same time, thus tracking financial stress of systemic nature. Holló, D., M. Kremer and M. Duca (2012), 'CISS-a composite indicator of systemic stress in the financial system', *European Central Bank Working Paper*, No. (No. 1426).

([31]) Credit standards are measured by the backward looking three months index from ECB Bank Lending Survey (BLS).

([32]) Modiglini, F. and M. Miller (1958), 'The cost of capital, corporation finance and the theory of investment', *The American Economic Review*, Vol. 48, No. 3, pp. 261-297.

([33]) Morley, J. (2016), 'Macro-finance linkages', *Journal of Economic Surveys*, forthcoming.

intermediation typically involves asymmetry of information between borrowers and lenders and potentially costly verification of the borrower's financial situation. ([34])

The first attempts to include financial frictions in macroeconomic models were based on the insight that the cost of external financing very much depends on the borrowers' net worth ([35]) and/or the market value of their collateral. ([36]) In fact, changes in asset prices turn out to be a crucial determinant of both the cost of external financing and the value of collateral. Moreover, a relatively small shock can have a major effect on economic activity through the so-called "financial accelerator", whereby negative feedback loops between lower assets prices, restricted access to credit and lower consumption and investment, significantly amplify and prolong the impact on the real economy. ([37]) Real estate, which is a typical asset used as collateral by both households and firms establishes a tight link between the housing market and the economy as a whole. ([38])

While the original theoretical contributions did not explicitly model financial intermediaries (assuming direct lending from investors to borrowers), the inclusion of financial intermediaries (i.e. the banking sector) implies that financial frictions can appear also on the lenders' side. ([39]) Specifically, financial intermediaries can become balance sheet constrained in times of economic and financial stress, which affects their funding costs. Such shocks to the lenders' side are usually mitigated by central bank intermediation during crisis times. ([40])

Despite intensive efforts in recent years, the financial sector is still not fully established as a consolidated part of conventional macroeconomic models. Structural models augmented by a banking sector and financial markets ([41]) typically find that financial factors, such as bank liquidity constraints, are indeed the main drivers of economic fluctuations in both the US and the euro area and that they were the main shock propagator during the global financial crisis. ([42])

Empirical evidence on macro-financial linkages

There is now a wide consensus that financial cycles are crucial for understanding business cycle fluctuations. ([43]) Numerous empirical studies evaluate the effects of financial shocks on macroeconomic fluctuations. Importantly, financial factors can both reinforce the transmission of other shocks and be a source of disturbance in their own right.

Credit appears to be one of the most studied financial variables in empirical studies due to its established regularities in terms of boom-and-bust behaviour and its link to financial crises and economic downturns. ([44]) Credit spreads play an important role for capital markets-based systems like the US economy. For example, corporate bond spreads usually increase disproportionately during periods of financial stress (so-called excess bond premiums), which in turn causes economic activity to contract. ([45]) In the euro area, where external financing is mostly bank based, a crucial role is played by bank lending rates and bank lending volumes. Credit supply shocks have been identified

([34]) Carlstrom, C. T. and T. S. Fuerst (1997), 'Agency costs, net worth, and business fluctuations: A computable general equilibrium analysis', *The American Economic Review*, Vol. 87, No. 5, pp. 893-910.

([35]) Bernanke, B. and M. Gertler (1989), 'Agency costs, net worth, and business fluctuations', *The American Economic Review*, Vol. 79, No. 1, pp. 14-31.

([36]) Kiyotaki, N. and J. Moore (1997), 'Credit cycles', *Journal of Political Economy*, Vol. 105, Issue 2, pp. 211-248.

([37]) Bernanke, B. S., M. Gertler and S. Gilchrist (1999), 'The financial accelerator in a quantitative business cycle framework', *Handbook of Macroeconomics*, Vol. 1, Part C, pp. 1341-1393.

([38]) Iacoviello, M. and S. Neri (2010), 'Housing market spillovers: evidence from an estimated DSGE model', *American Economic Journal: Macroeconomics*, Vol. 2, No. 2, pp. 125-164.

([39]) Gertler, M. and N. Kiyotaki (2010), 'Financial intermediation and credit policy in business cycle analysis', *Handbook of Monetary Economics*, Vol. 3, Issue 3, pp. 547-599.

([40]) Gertler, M. and P. Karadi (2011), 'A model of unconventional monetary policy', *Journal of Monetary Economics*, Vol. 58, Issue 1, pp. 17-34.

([41]) Christiano, L. J., R. Motto and M. Rostagno (2010), 'Financial factors in economic fluctuations', *European Central Bank Working Paper*, No. 1192.

([42]) Gerke et al. (2013) and Wieland et al. (2015) provide detailed comparison exercise for different macrofinancial models.
Gerke, R., M. Jonsson, M. Kliem, M. Kolasa, P. Lafourcade, A. Locarno, K. Makarski and P. McAdam (2013), 'Assessing macro-financial linkages: A model comparison exercise', *Economic Modelling*, Vol. 31, pp. 253-264.
Wieland, V., E. Afanasyeva, M. Kuete and J. Yoo (2015), 'New methods for macro-financial model comparison and policy analysis', mimeo.

([43]) Borio, C. (2012), 'The financial cycle and macroeconomics: what have we learnt?', *Bank for International Settlements Working Papers*, No. 395.

([44]) Balke, N. S. (2000), 'Credit and economic activity: credit regimes and nonlinear propagation of shocks', *Review of Economics and Statistics*, Vol. 82, No. 2, 344-349.

([45]) Gilchrist, S. and E. Zakrajšek (2012), 'Credit spreads and business cycle fluctuations', *The American Economic Review*, Vol. 102, No. 4, pp. 1692-1720.

as important determinants of the increase in lending rates and the decline in lending volumes during the recent crisis. ([46]) Bank lending represents the main transmission mechanism in the euro area.

The evidence available indicates that the impact of financial shocks on the macroeconomy is 'state dependent,' i.e. the response of economic activity, inflation and credit to financial shocks is stronger during periods of stress. This is well documented for both the euro area and the US. ([47]) Moreover, during periods of high systemic stress, financial shocks tend to have both a larger magnitude and a greater impact on real activity. ([48]) Notably, a single indicator of systemic stress, such as the CISS for the euro area, has been found to explain a significant part of macroeconomic developments, especially due to episodes of elevated systemic stress such as the global financial crisis and the euro area debt crisis. ([49])

While studies on financial and business cycle have been popular for some time, there has been much less investigation into macro-financial linkages between countries. Existing evidence indicates that such linkages exist but their intensity varies both across time and across countries. Specifically, it has been documented that the observed heterogeneity is mainly due to country-specific characteristics, which lead to international spillovers having a differentiated impact across countries. ([50]) Such heterogeneity seems also to be present within the euro area.

([46]) Moccero, D. N., M. D. Pariès and L. Maurin (2014), 'Financial Conditions Index and identification of Credit Supply Shocks for the Euro Area', *International Finance*, Vol. 17, Issue 3, pp. 297-321.

([47]) Hubrich, K. and R. J. Tetlow (2015), 'Financial stress and economic dynamics: the transmission of crises', *Journal of Monetary Economics*, Vol. 70, pp. 100-115.
Prieto, E., S. Eickmeier and M. Marcellino (2016), 'Time variation in macro-financial linkages', *Journal of Applied Econometrics*, forthcoming.
Silvestrini, A. and A. Zaghini (2015), 'Financial shocks and the real economy in a nonlinear world: a survey of the theoretical and empirical literature', *Journal of Policy Modeling*, Vol. 37, pp. 915–929.

([48]) Hartmann, P., K. Hubrich, M. Kremer and R. J. Tetlow (2015), 'Melting down: Systemic financial instability and the macroeconomy', mimeo.

([49]) Kremer, M. (2015), 'Macroeconomic effects of financial stress and the role of monetary policy: a VAR analysis for the euro area', *International Economics and Economic Policy*, Vol. 13, Issue 1, pp. 1-34.

([50]) Ciccarelli, M., E. Ortega and M. T. Valderrama (2016), 'Commonalities and cross-country spillovers in macroeconomic-financial linkages', *The BE Journal of Macroeconomics*, Vol. 16, Issue 1, pp. 231-275.

II.3. Transmission channels from financial to macro developments

In spite of the broad consensus about the existence of macro-financial linkages, the identification of *the transmission channels* is still a subject of debate. There are different ways to classify the channels through which the financial sector might affect macroeconomic developments. The important distinction applied in this section is whether the linkages are related to the balance sheets of borrowers or lenders. At the same time, the financial channels are also closely related to monetary transmission, which affects their functioning. ([51]) This subsection aims to better define the individual transmission channels in the euro area.

The **interest rate channel** illustrates how money market rates affect the overall financing costs of the banking sector, the price of credit and, consequently, consumption and investment decisions. This channel is closely related to monetary policy decisions, as they directly affect the funding costs of banks. Moreover, at the zero lower bound, when the central bank uses other instruments besides short-term interest rates to conduct monetary policy, this channel is more complex and difficult to assess.

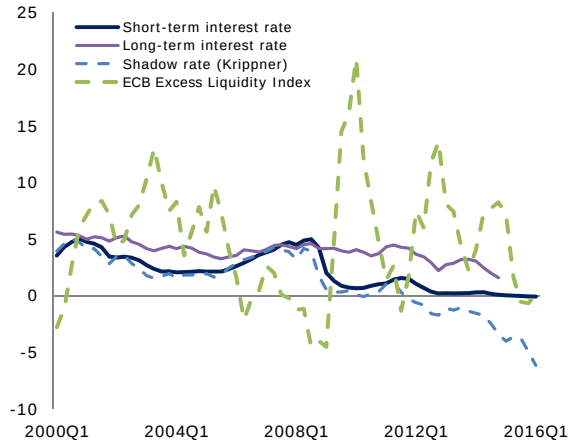
Thus, in the analysis below, the interest rate channel will be captured by variables that are affected by monetary policy decisions (Graph II.3). In the euro area, the most frequently used indicator, directly affected by the ECB's policy rates, is the *short-term interbank interest rate* (EONIA). While the effect of monetary policy actions on short-term rates is rather quick, there is also a delayed effect on long-term interest rates. The *long-term rates* are of specific relevance in the current time as short-term rates are at the zero lower bound and monetary policy aims to affect long rates directly. While long-term rates are commonly defined by the yield on respective sovereign bonds, in the euro area, this applies to a pool of euro area sovereigns. As the yields diverge across sovereigns since the global financial crisis, long-term rates in the euro area have become disconnected from short-term rates. Since the ECB has employed diverse unconventional measures that affect the

([51]) See for instance, Basel Committee on Banking Supervision (2011): 'The transmission channels between the financial and real sectors: a critical survey of the literature', *BCBS Working Paper*, No. 18.

financial system, additional measures need to be used to track their effect, namely *the shadow rate*, which is a factor model-based estimate of the short-term interest rate unconstrained by the ZLB. ([52]) Likewise, the *excess liquidity* defined as the liquidity held by the euro area banking sector in excess of the aggregate needs arising from minimum reserve requirements and autonomous factors, is another quantitative-based indicator of the monetary policy stance, as it is driven by the ECB's refinancing operations.

Graph II.3 shows the dynamics of the variables described above in the period Q1-1996 - Q1-2016, which suggest that monetary conditions have been very supportive in recent years. While short-term interest rates attained the ZLB, monetary easing through unconventional measures is reflected in a significant decline in the shadow rate as well as long-term rates.

Graph II.3: **Interest rate channel**
(2000Q1-2016Q1, %)

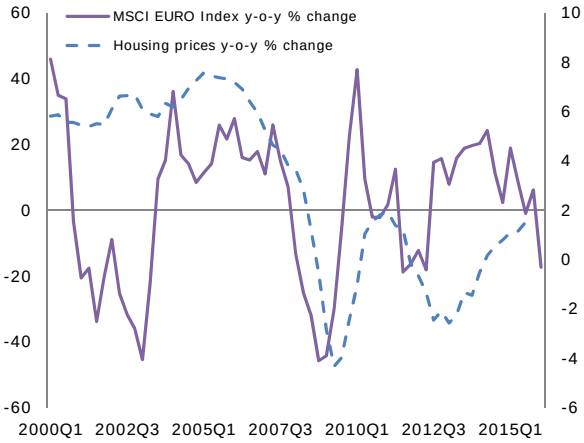


Source: Eurostat, Bloomberg, Reserve Bank of New Zealand.

The **borrower balance sheet channel** reflects the fact that it is the net worth of borrowers that determines the external finance premium, i.e. the opportunity cost of borrowing over using internal savings. In other words, it is the value of borrowers' collateral that affects their credit conditions. As indicated above, fluctuations in asset prices can affect the ability of non-financial corporations and households to borrow, and thus their investment and spending decisions. While monetary policy commonly does not target asset prices, its actions can affect the valuation of assets used as collateral, which affects the credit available for investment and consumption spending. ([53]) Whereas the previous discussion focuses on the demand side of credit, the borrower balance sheet channel affects also the supply of credit. Namely, weak borrower balance sheets might induce credit rationing by the lenders, and affect overall credit conditions.

The borrower balance sheet channel can be captured mainly by variables that reflect the risks related to the balance sheets of firms and households as borrowers from the banking sector or from capital markets. While there are no readily available direct measures of the quality of private balance sheets comparable across countries, asset prices can be considered as indicative of their quality, as they give the value of collateral for loans and of equity. Therefore, *house prices* and *stock prices* are generally used in the analysis to track this channel.

Graph II.4: **Borrower balance sheet channel**
(2000Q1-2016Q1)



Source: Bloomberg, BIS.

Graph II.4 suggests that developments in house prices and stock prices have been quite

([52]) There different shadow rates available; all being subject of significant model uncertainty. The shadow rate used is based on Krippner (2012) and available from the Reserve Bank of New Zealand website.
Krippner, L. (2012), 'Measuring the stance of monetary policy in zero lower bound environments', *Economics Letters*, Vol. 118, Issue 1, pp. 135–138.

([53]) There is empirical evidence, especially for the US, stressing the importance of asset prices and different credit spreads as leading indicator of economic activity, e.g. Stock and Watson (2003). Stock, J. H. and M. W. Watson (2003), 'Forecasting output and inflation: the role of asset prices', *Journal of Economic Literature*, Vol. 41, No. 3, pp. 788-829.

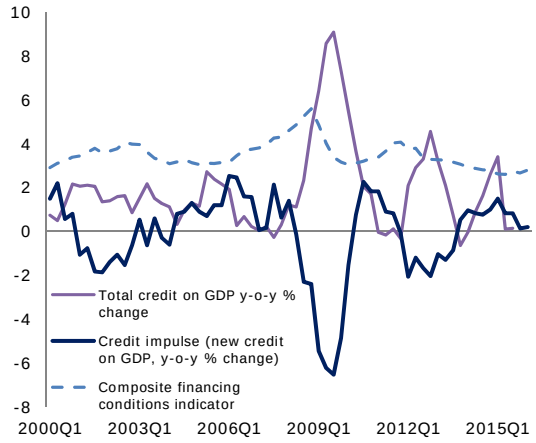
disconnected in recent years. Specifically, while house prices only started to recover in 2014, stock prices peaked in early 2015 and experienced a downward correction since then.

The **bank balance sheet channel** relates to the fact that how much a bank lends depends on its own balance sheet and the different risks involved in its business model. External developments (including monetary policy actions, but also longer-term factors such as financial regulation and innovations in the banking sector) may affect bank liabilities (the supply of loanable funds and also bank funding costs), and in turn, assets (supply of credit, and the lending cost). ([54]) Bank lending is determined by banks' business models; it usually increases with the increase in leverage in the economy, while deleveraging episodes may significantly hamper lending activities. This makes leverage highly pro-cyclical. ([55]) Importantly, the impact of bank balance sheets on the real economy can be more pronounced in the euro area than in capital-market based systems as alternative forms of financing are relatively undeveloped.

The bank balance sheet channel can thus be illustrated by variables such as banking leverage, the stock of non-performing loans, banks' funding costs, or the price of Credit Default Swaps (CDS). However, reliable data for the euro area are relatively short, available only for the period since the beginning of the crisis. Indeed, the lack of knowledge about the quality of bank balance sheets was an important aspect of the euro area financial crisis and a reason for the implementation of the Asset Quality Review (AQR) by the ECB in 2014. Therefore, for the analysis in this section, measures which directly track the supply of credit have been used instead. ([56]) Namely, the flow of credit as measured by the *credit impulse* (i.e. the change in new credit granted by the banking sector as a percentage of GDP), the stock of credit on banks' balance sheet as measured by *total economy credit as a percentage of GDP,* and the price of credit, as measured by *the Composite Financing Conditions Indicator (CFCI)* for non-financial corporations, which (assuming a constant mark-up) proxies bank funding costs. ([57])

Graph II.5 shows that there is a negative correlation between the credit impulse and credit as a percentage of GDP. Thus, during downturns the flow of new credit declines, while the ratio of credit to GDP increases due to the collapse of GDP. The credit impulse indicator shows that the supply of new credit has been fairly limited since the onset of the global financial crisis. The *CFCI* tracks the ECB policy rates rather closely with the exception of the euro area sovereign debt crisis episode (2011-2012), when financing costs increased due to idiosyncratic increases in some Member States, reflecting financial market fragmentation.

Graph II.5: **Bank balance sheet channel**
(2000Q1-2016Q1)



Source: Capital Economics, BIS, DG ECFIN.

While the previous channels are related to the quality of balance sheets either on the borrower or the lender side, some shocks can originate in the overall financial system. Examples are liquidity shocks or confidence shocks. These shocks work both via the balance sheets but also by directly altering agents' decisions through precautionary motives affecting both investment and consumption behaviour. These mechanisms are defined as the **uncertainty channel**. ([58])

([54]) Bernanke, B. and A. Blinder (1988), 'Credit, money, and aggregate demand', *the American Economic Review*, Vol.78, No. 2, pp. 435–439.

([55]) Adrian, T. and H. S. Shin (2010), 'Liquidity and leverage', *Journal of Financial Intermediation*, Vol. 19, Issue 3, pp. 418-437.

([56]) In practice, the lending volumes and rates can be affected both by supply and demand side.

([57]) For more details on CFCI calculations, see European Commission (2013), "Drivers of diverging financing conditions across Member States", *Quarterly Report on the Euro Area*, Vol.12, No.1.

([58]) Bloom (2009) point to uncertainty shocks (that might be related but also unrelated to the financial system) as a crucial driver of economic dynamics. Recently, Caldara et al. (2016) argue for the needs to distinguish uncertainty shocks from financial shocks, while both of them are important source of macroeconomic

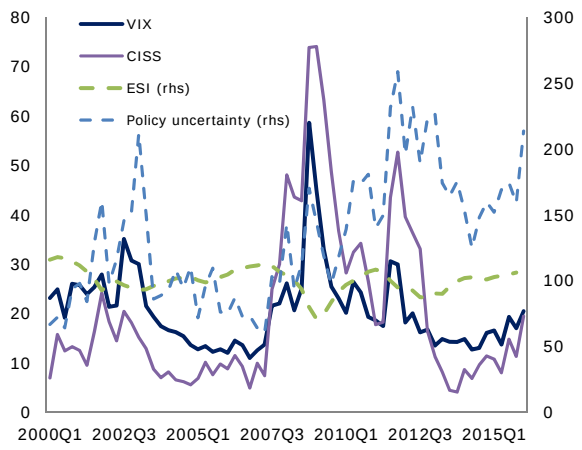
The uncertainty channel is captured by variables reflecting the different types of uncertainty that can affect the economy. One type is commonly related to increased volatility in financial markets. Given a high degree of global interconnectedness, the euro area economy can be affected by uncertainty related to global financial developments, which is usually measured by *the implied volatility of S&P 500 index options (VIX)*. ([59]) The euro area specific stress in the financial system is measured through the ECB's *Composite Indicator of Systemic Stress (CISS)*.

Another type of uncertainty is linked to swings in business and consumer confidence. Variations in the confidence of euro area households and non-financial firms are illustrated through the European Commission' confidence indicator, the *Economic Sentiment Indicator* (ESI), which is based on data collected through business and consumer surveys. However, the indicator exhibits a very high contemporaneous correlation with actual GDP growth, indicating that its dynamics are likely to reflect very accurately economic conditions rather than information related to exogenous changes in confidence.

Finally, unexpected outcomes of economic policy decisions can lead to policy uncertainty, which in turn can have adverse effects on the savings and investment behaviour of firms and households. *Policy uncertainty* is illustrated through an indicator based on newspaper coverage of uncertainty-generating events. ([60])

Graph II.6 indicates that there is an apparent co-movement among these indicators, even if they measure different types of uncertainty. While economic sentiment has been gradually improving and uncertainty related to financial markets has eased, the policy uncertainty affecting the euro area is still relatively high.

Graph II.6: **Uncertainty channel**
(2000Q1-2016Q1)



Source: Chicago Board of Exchange, ECB, www.policyuncertainty.org.

II.4. Financial developments and economic activity

This sub-section provides stylised facts on the transmission channels defined above and show whether and how financial developments have affected the real side of the euro area economy since the crisis (namely consumption, investment, unemployment and long-term interest rates).

While financial variables are available in real time, macroeconomic variables are normally released with lags. Therefore, conditioning macroeconomic forecasts on observed financial developments (i.e. a projection of macro variables on the observed paths of financial variables) can improve forecasts, as more informative data are taken into account. Several empirical studies have shown that financial variables can improve macroeconomic forecasts. ([61])

The methodology underlying this this section is a large-scale Bayesian VAR with 35 macroeconomic

fluctuations separately; the Great Recession was likely outcome of the toxic interaction between the two.
Bloom, N. (2009), 'The impact of uncertainty shocks', *Econometrica*, Vol. 77, Issue 3, pp. 623-685.
Caldara, D., C. Fuentes-Albero, S. Gilchrist and E. Zakrajšek (2014), 'The macroeconomic impact of financial and uncertainty shocks', *European Economic Review*, forthcoming

([59]) The VIX is calculated by the Chicago Board Options Exchange (CBOE).

([60]) Baker, S. R., N. Bloom and S. J. Davis (2015), 'Measuring economic policy uncertainty', *National Bureau of Economic Research Working Paper*, No. 21633. Data source: www.policyuncertainty.com.

([61]) Stock and Watson (2003) provide a seminar contribution on the role of financial variables, namely asset prices, for GDP and inflation forecast concluding that different financial variables allow macroeconomic forecasting in different times. Espinosa et al. (2012) document using standard VAR approach that financial variables improve GDP forecast for the euro area, especially in the real time when numerous financial variables are available ahead of the macroeconomic releases.
Stock, J. H. and M. W. Watson (2003), 'Forecasting output and inflation: the role of asset prices', *Journal of Economic Literature*, Vol. 41, No. 3, pp. 788-829.
Espinoza, R., F. Fornari and M. J. Lombardi (2012), 'The role of financial variables in predicting economic activity', *Journal of Forecasting*, Vol. 31, No. 1, pp. 15-46.

and financial variables. ([62]) The model is estimated for the sub-period Q1-2000 - Q4-2011 which covers both normal and crisis times, but does not include some of the most important unconventional monetary policy measures. Given the estimated past correlations, a counterfactual path for the macroeconomic and financial variables (i.e. a distribution of conditional forecasts) can be obtained for the entire period, Q1-2000 - Q4-2015, conditional on observed real GDP and inflation, in the baseline case. The deviations of the observed developments of financial variables from this counterfactual path can be interpreted as evidence of instability in the relationship between financial variables and economic activity (as measured by GDP growth and inflation) since the crisis.

Subsequently, the conditional set from the baseline case (including only real GDP and inflation) is extended by financial and uncertainty variables corresponding to each transmission channel described above. ([63])

Some recent developments are puzzling

Graph II.7 shows the counterfactual paths of the main GDP components, producer prices, the unemployment rate and the long-term interest rate conditional on observed economic activity (real GDP and inflation). It also shows the conditional forecasts for the balance sheet variables of households and firms, when only real GDP and inflation are taken into account in the conditioning set.

The results suggest that private consumption was unusually low during the period of the euro area debt crisis and deleveraging (2012-2013), while it overshot during the recent recovery (from 2014 onward). Investment behaved in line with historical correlations during both downturn episodes (2008-2009 and 2012-2013) and was weak during the deleveraging phase because overall output growth was weak. However, its recent recovery (since 2014) has been more subdued than what the pace of economic activity would have predicted; the observed investment path is positioned on the lower tail of the distribution of conditional forecasts). ([64])

Large deleveraging pressures in the public sector have led to a significant decline in the euro area aggregate government consumption over the period 2011-2012. However, this decline had almost been reversed by the end of 2014, with public consumption starting to overshoot from 2015 onwards (relative to its counterfactual path obtained through conditioning on output growth), reflecting the aggregate euro area fiscal stance, which started to turn mildly expansionary.

Moreover, the results show that several variables capturing price and balance sheet developments are still at odds with historical patterns. In particular, producer prices, house prices, long-term interest rates and loans to firms and households undershoot the distribution of the conditional forecasts. On one side, this underlines that the recent recovery is characterized by a historically low inflation environment and loose monetary conditions pushing the long-term rates down. On the other side, the ongoing balance sheet adjustment is translating into very weak credit dynamics due to unprecedented deleveraging pressures.

Graph II.8. illustrates the zero lower bound constraint on monetary policy rates and the subsequent break in the correlation of economic activity with the two measures of monetary policy

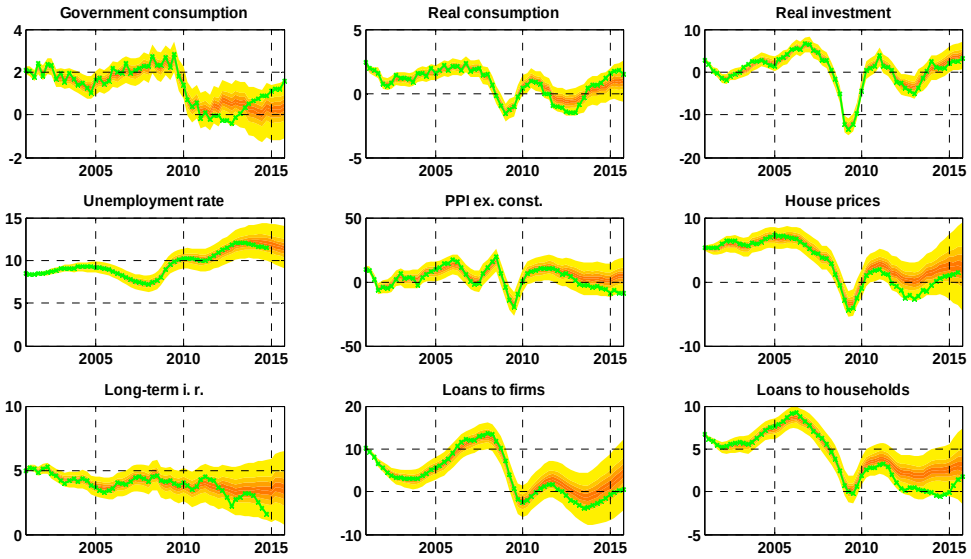
([62]) Alternative strand of literature using rich set of data in order to nowcast or forecast employs dynamic factors models where data dimension is reduced in a first step by factor estimation, with common factors being consequently used in the forecasting exercize, see e.g. Giannone et al. (2008). Bellego and Ferrara (2012) find using factor-augmented probit model that financial variables allow tracking better recession periods in the euro area (in the pre-crisis period) with optimal lead of financial variables over recession of around one year.
Giannone, D., L. Reichlin, L. and D. Small (2008), 'Nowcasting: the real-time informational content of macroeconomic data', *Journal of Monetary Economics*, Vol. 55, Issue, 4, pp. 665–676.
Bellégo, C. and L. Ferrara (2012), 'Macro-financial linkages and business cycles: A factor-augmented probit approach', *Economic Modelling*, Vol. 29, pp. 1793-1797.

([63]) For more details on the methodology see Box IV.1 in European Commission (2015), 'Investment dynamics in the euro area since the crisis', *Quarterly Report on the Euro Area*, Vol. 14, No 1, pp. 35-43.
Bańbura, M., D. Giannone and M. Lenza (2015), 'Conditional forecasts and scenario analysis with vector autoregressions for large cross-sections', *International Journal of Forecasting*, Vol. 31, Issue 3, pp. 739–756.

([64]) There is some relative instability in the estimated correlations over the sample period, notably pre-crisis vs crisis years. However, it does not significantly affect the result on the unusual weakness in investment recovery since 2014. The article 'Investment dynamics in the euro area since the crisis', *Quarterly Report on the Euro Area*, Vol. 14, No 1, pp. 35-43, found that estimating the past correlations only with the sample for the pre-crisis period, the amplitude of the investment fall during the first downturn (2008-2009) would also be slightly underestimated by the conditional forecasts.

Graph II.7: **Conditional forecasts based on real GDP and inflation (1)**
(2000Q1-2015Q4, y-o-y % growth)

Misalignments of financial and real variables with output growth since the crisis



(1) Shades of orange: distribution of the conditional forecasts in the BVAR in levels, excluding the lower and higher 5% quantiles. Green line: actual values. The variables are all reported in terms of annual percentage changes, except for the unemployment rate and the long-term interest rate, which are in levels. Conditioning assumptions: real GDP and HICP.
Source: DG ECFIN, MATLAB codes replication files of the methodological paper (Banbura et al., 2015).

rates since 2012. Among all variables, the consumer and business confidence indicator (ESI) comes out as having the strongest contemporaneous correlation with economic activity during the crisis.

In the consecutive analysis, the conditioning dataset (including only real GDP and inflation in the baseline) is augmented by financial variables corresponding to each transmission channel.

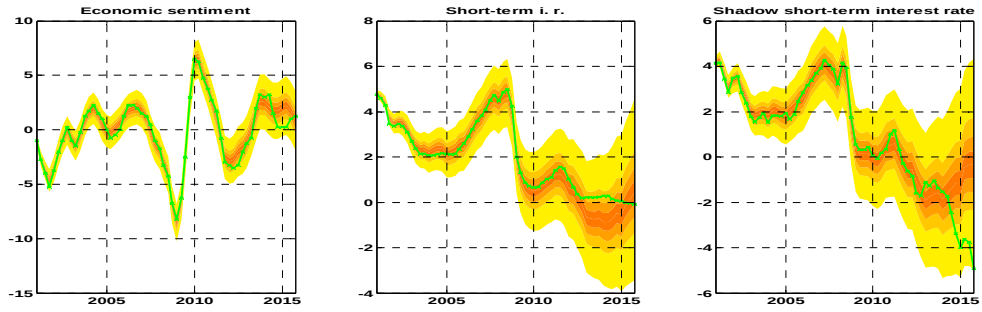
… different channels play an important role at different stages since the crisis

The interest rate channel (Graph II.9., upper panel) seems to better account for the pattern of consumption during the recent recovery (compared to the baseline). This channel, which reflects mainly monetary conditions, suggests that monetary easing implemented since 2014 by means of additional unconventional measures (namely the targeted long-term refinancing operations (TLTRO), the asset-backed securities purchasing program (ABSPP) and the forthcoming public securities purchase program (PSPP)), have translated into a further decline in the long-term interest rate and the shadow policy rate. It also reflects an increase in excess liquidity, which has had a very benign effect on the recent recovery. However, producer prices developments (PPI) still appear unusually subdued. Likewise, including information capturing the interest rate channel does not help explain the dismal performance of consumption during the deleveraging phase (2012-2013) or the persistent weakness of credit dynamics. Therefore, these developments seem to be determined also by drivers other than monetary conditions.

The **borrowers balance sheet channel** (Graph II.9., lower panel) captures in turn the exceptional deleveraging developments of 2012/2013 but clearly underestimates the pace of the recent recovery. This finding suggests that strained balance sheets of households and firms represented the main weight on the recovery at the time of euro area sovereign debt crisis. However, whereas a mild recovery started in the euro area in 2014, private

Graph II.8.: **Conditional forecasts based on real GDP and inflation (1)**
(2000Q1-2015Q4, y-o-y % growth)

Business and consumer confidence and short-term interest rates



(1) Shades of orange: distribution of the conditional forecasts in the BVAR in levels, excluding the lower and higher 5% quantiles. Green line: actual values. The variables are all reported in terms of annual percentage changes, except for the unemployment rate and the long-term interest rate, which are in levels. Conditioning assumptions: real GDP and HICP.
Source: DG ECFIN, MATLAB codes replication files of the methodological paper (Banbura et al., 2015).

balance sheets still did not improve much. In fact, when the borrower balance sheet channel is taken into account, observed consumption overshoots the conditional forecast even by a higher margin than in the baseline scenario and real investment seems to be on the upper side as well. This suggests that the borrower balance sheet channel should have led to more subdued dynamics of both consumption and investment than what has been observed in 2014 and 2015, indicating that other channels have been somewhat compensating the adverse effects of this channel.

The **bank balance sheet channel** (Graph II.10., upper panel) improves the forecast of investment since 2014 and reduces the uncertainty around the median for some variables such as consumption, unemployment and long-term interest rate. The good fit of investment dynamics indicates a strong correlation of investment with total economy credit developments both in terms of flows and stocks.

Interestingly, the bank balance sheet information, namely the total economy credit as percentage of GDP (including credit to public sector), the private sector credit impulse and the price of credit for the private sector, cannot capture the weak observed dynamics of outstanding loans to firms and households. This shows that the private deleveraging process has been much stronger than the public sector deleveraging, making private credit developments disconnected from GDP growth. ([65]) Therefore, while the recovery in real activity has been rather weak, the private credit dynamics have been even weaker. Furthermore, the modest recovery does not facilitate passive deleveraging (a decrease in the relative debt burden due to a growing economy, i.e. denominator effect) and feeds the active deleveraging (a decrease of absolute level of debt, i.e. nominator effect).

Finally, the current long-term interest rate seems very low even when the financing costs for non-financial corporations (which also attained historical minima) are taken into account. This underlines the importance of the ECB's measures that imply very easy financing conditions in the foreseeable future.

Last but not least, the **uncertainty channel** (Graph II.10.) seems to improve the conditional forecast over the baseline in the same spirit as the bank balance sheet channel. For example, there is a good fit of investment, indicating a strong correlation of investment with confidence and financial stress measures. Equally, the rebound in private consumption seems to be well captured by the uncertainty channel, indicating that the recent decrease in financial markets stress has also been an important driver for consumption. However, in general, the uncertainty channel is likely to be implicitly included in the bank balance sheet

([65]) GDP is a denominator of the credit indicators in bank balance sheet channel.

channel. For example, in periods of high uncertainty, bank funding costs increase (bank balance sheet channel) and firms with weaker balance sheets cannot obtain credit for new loans (borrower balance sheet channel).

Overall, the findings above suggest that while there is clear evidence of the transmission of monetary policy measures on financial variables and from financial variables to consumer lending rates, the evidence on the effects on real activity is more complex, with different channels playing an important role at different stages of the crisis. The interest rate channel has helped the modest recovery since 2014 by supporting both public and private consumption growth and by partially compensating the balance sheet channel for both borrowers and banks. The results in Graph II.9. (lower panel) can be interpreted as showing that in the absence of massive monetary easing, given the high level of debt in the economy and the wealth effects associated with house and asset prices decreases, both private and public consumption growth could have been much more subdued than what it is currently observed.

Graph II.10. (both panels) illustrate the importance of the bank balance sheet and the uncertainty channel for capturing investment dynamics. Weak investment growth is well captured both by credit developments as captured through the bank balance sheet channel and confidence effects through the uncertainty channel. Real economic activity, as measured by GDP growth, while playing an important role, does not seem to fully explain the subdued growth in investment since 2014 (Graph II.7.).

II.5. Conclusions

The section discusses the nexus between financial and macroeconomic developments, drawing some lessons from the literature and providing some stylised facts on the main transmission channels through which financial developments have affected real economic activity since the crisis.

While there is clear evidence of the transmission of monetary policy measures on financial variables and from financial variables to consumer lending rates, the evidence on the effects on real activity is more complex, with different channels playing an important role at different stages of the crisis.

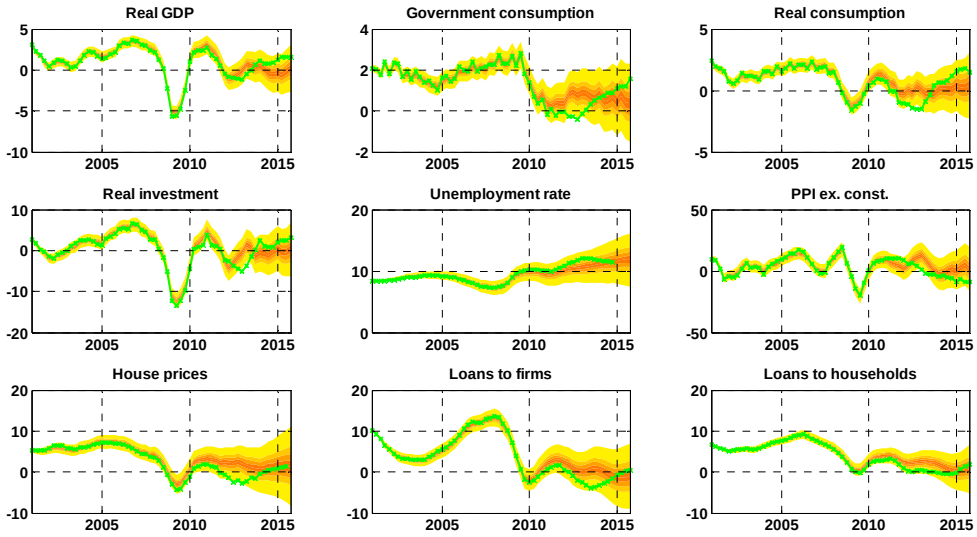
The state of private balance sheets seems to have significantly contributed to the poor performance of consumption during the euro area debt crisis and high debt levels still weigh on growth. However, given the still high level of debt, the current mild recovery should be seen as a rather positive outcome. The analysis suggests that easy monetary conditions seem to represent an important driver of the current recovery. Another driver seems to be the balance sheets of banks, which have gradually improved and allow better transmission of easy monetary conditions to the lending rates.

Given the still high levels of debt in the economy and the wealth and confidence effects associated with house and asset prices corrections, both private and public consumption growth could have been much more subdued than what it is currently observed, were it not for the exceptional easing of monetary conditions.

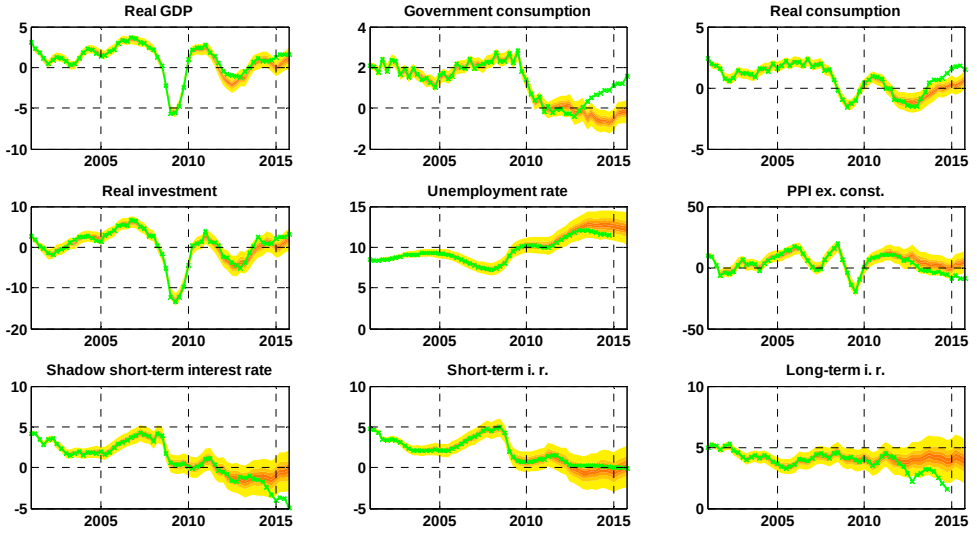
Unfortunately, the recovery is still not strong enough to facilitate the deleveraging process. The stock of debt and the ongoing deleveraging combined with adverse confidence effects still represent major impediments for a stronger recovery in investment. Consequently, there is a need to implement policy measures that allow dealing effectively with the debt overhang, notably, an effective framework for non-performing loans resolution.

Graph II.9: **Conditional forecasts based on variables capturing the interest rate channel and borrower balance sheet channel (1)**
(2000Q1-2015Q4, y-o-y % growth)

Interest rate channel



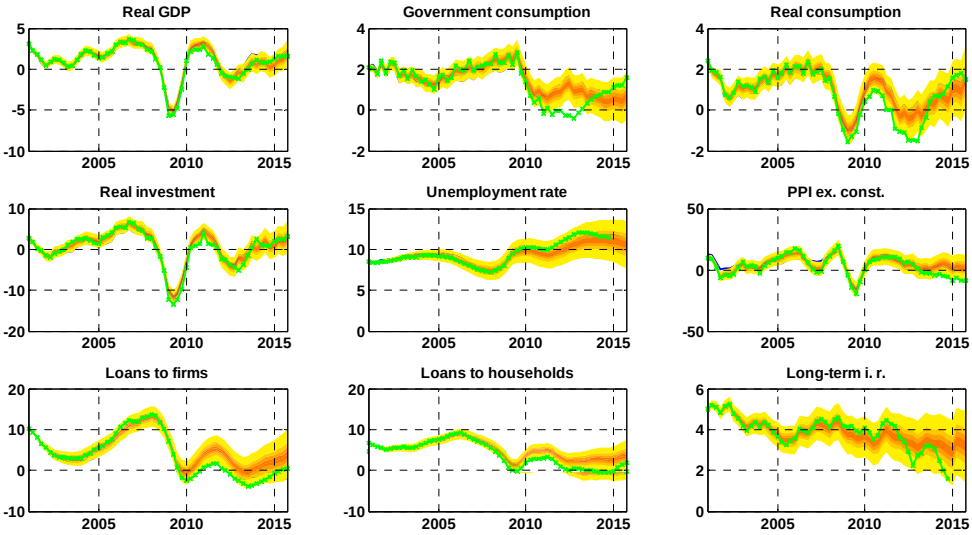
Borrower balance sheet channel



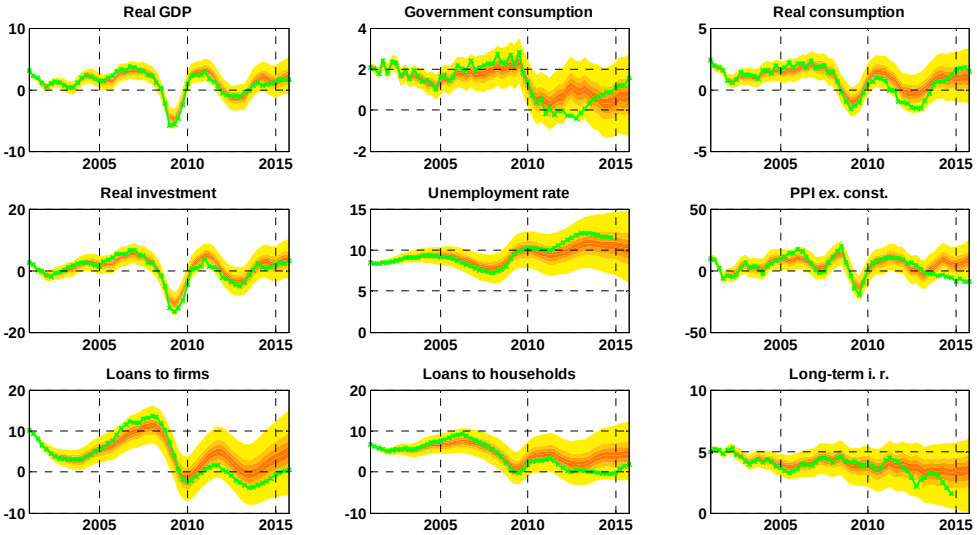
(1) Shades of orange: distribution of the conditional forecasts in the BVAR in levels, excluding the lower and higher 5% quantiles. Green line: actual values. The variables are all reported in terms of annual percentage changes, except for the unemployment rate and the long-term interest rate, which are in levels. Conditioning assumptions interest rate channel: ESI, HICP, the short-term interest rate, the long-term interest rate, the shadow interest rate, and the ECB excess liquidity measure. Conditioning assumptions borrower balance sheet channel: ESI, HICP, house prices, stock prices, and outstanding loans to households and firms. Due to the high contemporaneous correlation between real GDP growth and the ESI indicator, the ESI indicator contains the same forecasting information as real GDP. ESI indicator is used in the conditioning set instead of real GDP variable in order to also illustrate conditional forecasts for real GDP.
Source: DG ECFIN, MATLAB codes replication files of the methodological paper (Banbura et al.,2015).

Graph II.10: **Conditional forecasts based on variables capturing the bank balance sheet channel and uncertainty channel (1)**
(2000Q1-2015Q4, y-o-y % growth)

Bank balance sheet channel



Uncertainty channel



(1) Shades of orange: distribution of the conditional forecasts in the BVAR in levels, excluding the lower and higher 5% quantiles. Solid black line: point estimate of the conditional forecasts in the BVAR in differences, which is computed as the median of the distribution of the conditional forecasts in this model. Green line with crosses: actual values. The variables are all reported in terms of annual percentage changes, except for the unemployment rate and the long-term interest rate, which are in levels. Conditioning assumptions for the bank balance sheet channel: ESI, HICP, the credit impulse, the private credit volumes (debt-to-GDP ratio), and bank lending rates for households and firms (CFCI). Conditioning assumptions uncertainty channel: ESI, HICP, the policy uncertainty indicator, the CISS and the VIX. Due to the high contemporaneous correlation between real GDP growth and the ESI indicator, the ESI indicator contains the same forecasting information as real GDP. ESI indicator is used in the conditioning set instead of real GDP variable in order to also illustrate conditional forecasts for real GDP.

Source: DG ECFIN, MATLAB codes replication files of the methodological paper (Banbura et al., 2015).

III. Confidence spillovers in the euro area

In recent years, there has been close co-movement between consumer confidence and private consumption in the euro area. During the crisis, in particular, consumer confidence was identified by many commentators as a driving factor in its persistence as expectations about a sustainable path of economic growth were adjusted significantly. In view of the unprecedented extent of the crisis, the question of whether and to what extent changes in consumer confidence in one country could spill over to other countries was also raised. This section discusses the relationship between consumer confidence and consumption, and reviews the evidence of consumer confidence spillovers between euro area countries. We conclude that there is some evidence to suggest that confidence shocks are transmitted between countries. This conclusion is corroborated by results from the estimation of a Global Vector Autoregressive (GVAR) model for a number of euro area countries. ([66])

III.1. Introduction

During the recent crisis, euro area private consumption fell substantially. This was accompanied by a sharp decline in consumer confidence, which many observers have identified as a key factor contributing to the persistence of the slowdown. In fact, the onset of the crisis coincided with an abrupt unwinding of imbalances, that is, of economic trends that turned out to be unsustainable and which led to a significant adjustment of expectations. Both consumption growth rates and confidence levels have been improving since the start of 2013.

There is some (mixed) evidence to suggest that fluctuations in consumer confidence affect the dynamics of private consumption. ([67]) On the basis of this assumption, and taking into account the unprecedented extent of the most recent crisis, it is important to determine whether and to what extent confidence shocks spill over between countries. This is particularly relevant in relation to the euro area where close trade and financial links and common institutional features can lead to the rapid propagation of shocks. In addition, confidence spillovers can be an important aspect to consider when discussing how to improve macroeconomic policymaking in a common currency area.

This section reviews the evidence on the link between consumer confidence and private consumption and on cross-border confidence spillovers, and presents some analysis of the transmission of confidence shocks across the euro area. It is a follow-up to analysis discussed in previous issues of the Quarterly Report on the Euro Area (QREA). ([68])

III.2. Recent trends in consumer confidence and private consumption in the euro area

Graph III.1 shows the evolution over the period 1995Q2-2016Q1 of euro area real private consumption and consumer confidence. The latter is measured by the Consumer Confidence Indicator constructed by the European Commission as part of the Joint Harmonised EU Programme of Business and Consumer Surveys (BCS). ([69])

There is close co-movement between the two variables. Both real consumption growth and consumer confidence showed the greatest deterioration in the first quarter of 2009 and during the sovereign debt crisis. They have been on a recovery path since early 2013, with consumer confidence reaching levels above the euro area long-term average since the first quarter of 2014.

The relationship between consumer confidence and private consumption is much debated in the literature. From a theoretical perspective, there are two main competing theories. One view is that confidence indicators can help predict the dynamics of consumption as they convey information about future economic conditions. Another theory is that the link between the two variables can be interpreted in terms of 'animal

([66]) This section was prepared by Francesca D'Auria.

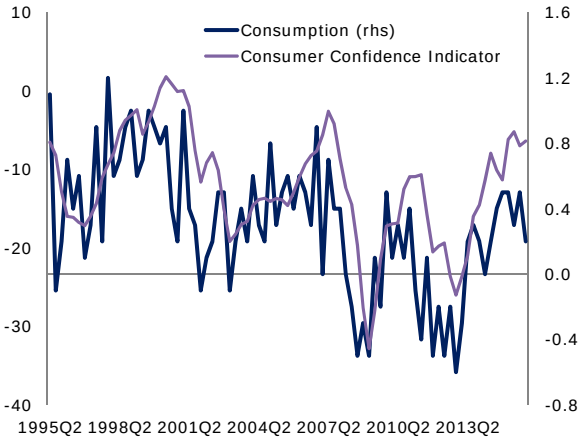
([67]) See, for a discussion, Ludvigson, S.C., 2004, 'Consumer confidence and consumer spending', *Journal of Economic Perspectives*, Vol. 18(2), pp. 29-50.

([68]) D'Auria, F., 'Cross-border spillovers in confidence', *Quarterly Report on the Euro Area,* (2013), Vol. 12(3), pp.26-30.
D'Auria, F., S. Linden, D. Monteiro, J. in 't Veld and S. Zeugner 'Cross-border spillovers in the euro area', *Quarterly Report on the Euro Area*, (2014), Vol. 13(4), pp.7-22.

([69]) See European Commission (2016), 'A user guide to the Joint Harmonised EU Programme of Business and Consumer Surveys' for details on the construction of the indicators.

spirits', as confidence indicators capture fluctuations in beliefs which in turn affect consumption. ([70]) In both cases, the essence of confidence indicators is to gauge expectations – irrespective of how they are formed – about the future course of the economy, which then have a knock-on effect on current consumer behaviour.

Graph III.1: **Confidence and private consumption, euro area**
(1995Q2-2016Q1, q-o-q % change)



Source: Eurostat and DG ECFIN calculations based on EU Business and Consumer Surveys.

Several studies test empirically the link between consumer confidence and private consumption. A number of them find evidence in support of a strong correlation between consumer confidence and consumption. ([71])

However, as confidence and consumption are, to a large extent, determined by the same factors, other studies try to assess whether confidence indicators carry information beyond economic fundamentals. The evidence on this issue is mixed, although several studies conclude that confidence indicators play a significant role. There is some evidence to suggest that, while part of the information conveyed by confidence indicators is also captured by other variables (e.g. past consumption, income and interest rates), confidence measures have an additional predictive power for the future path of consumer spending. ([72]) Moreover, some papers find that confidence indicators have a stronger predictive power during periods of large economic fluctuations. ([73])

III.3. The existing evidence on confidence spillovers

On the assumption that a causal relationship between consumer confidence and private consumption exists, it is important to determine whether and to what extent changes in consumer confidence in one country affect confidence (and thus consumption) in others.

There is some evidence to support the existence of confidence spillovers. This pertains both to confidence shocks originating in the US and being transmitted to the euro area, and shocks which occur in one euro area country and spill over to other euro area countries.

Several studies provide evidence of a transmission channel of confidence shock to foreign confidence. In particular, evidence for G7 countries and Spain would suggest that variations in confidence generally spill over from large countries to smaller ones. ([74]) Some studies support the idea that confidence shocks originating in US are transmitted to the euro area, but not the other way round, i.e. shocks to euro area confidence do not affect confidence in the US. ([75]) Other studies show a transmission channel for confidence shocks

([70]) See Barsky and Sims (2012) for a discussion of the different theoretical approaches to the role of confidence: Barsky, R. B. and E.R. Sims (2012), 'Information, animal spirits, and the meaning of innovations in consumer confidence', *American Economic Review*, 102(4), pp. 1343-1377.

([71]) See, for example, Carroll, C., J. Fuhrer and D. Wilcox (1994), 'Does consumer sentiment forecast household spending? If so, why?', *American Economic Review*, Vol. 84, pp. 1397-1408.

([72]) Some authors, e.g. Ludvigson (2004), Souleles (2004) and Lahiri, Monokroussos and Zhao (2016), conclude that including confidence indicators can reduce forecasting errors when predicting the dynamics of consumption, while others reach the opposite conclusion (e.g. Claveria, Pons and Ramos, 2007):
Ludvigson, S. (2004), 'Consumer confidence and consumer spending', *Journal of Economic Perspectives,* Vol. 18(2), pp. 29-50.
Souleles, N.S. (2004), 'Expectations, heterogenous forecast errors, and consumption: Micro evidence from the Michigan Consumer Sentiment Surveys', *Journal of Money, Credit and Banking*, Vol. 36, pp. 39-72.
Lahiri, K., G. Monokroussos and Y. Zhao (2016), 'Forecasting consumption: the role of consumer confidence in real time with many predictors', *Journal of Applied Econometrics*, forthcoming.
Claveria, O., E. Pons and R. Ramos (2007), 'Business and consumer expectations and macroeconomic forecasts', *International Journal of Forecasting*, Vol. 23, pp.47-69.

([73]) For example, Howrey, E. (2001), 'The predictive power of the index of consumer sentiment', *Brookings Papers on Economic Activity,* Vol. 1, pp. 175-216.

([74]) Fei, S. (2011), 'The confidence channel for the transmission of shocks', *Banque de France Working Paper,* No 314.

([75]) Dées, S. and P. Soares-Brinca (2013), 'Consumer confidence as a predictor of consumption spending: Evidence for the United States and the Euro Area', *International Economics*, Vol. 134, pp. 1-14.

Box III.1: A GVAR model to assess confidence spillovers

The Global Vector Autoregressive (GVAR) methodology, developed by Pesaran, Schuermann and Weiner (2004) ([1]), combines individual vector error-correcting models where domestic variables are linked to country-specific foreign variables. The latter combine the domestic variables using international trade, financial or other relevant weights for each country. This approach allows the analysis of interdependence across different economies, providing a solution to the 'curse of dimensionality' (e.g. the high number of parameters as the dimension of the model increases) in global modelling.

For a set of countries i=0, 1, 2, …, N, the individual VARX(p_i, q_i) models take the following form:

$$x_{it} = \Phi_{i1} x_{i,t-1} + ... + \Phi_{ip} x_{i,t-p_i} + \Lambda_{i0} x_{it}^{*} + \Lambda_{i1} x_{i,t-1}^{*} + ... + \Lambda_{iq_i} x_{i,t-q_i}^{*} + u_{it}$$

where x_{it} is a vector of k_i x 1 vector of domestic variables, x_{it}^{*} a k_i^{*} x 1 vector of foreign variables and:

$$x_{it}^{*} = \sum_{j=0}^{N} \omega_{ij} x_{jt}, \omega_{ii} = 0$$

where ωij, j=0,1,…,N is a set of weights such that $\sum_{j=0}^{N} \omega_{ij} = 1$. The foreign variables x_{it}^{*} are therefore a weighted average of domestic variables for all countries included in the model. The weights can be different in nature but are typically constructed using trade or capital flows data. The GVAR model is then solved for the 'world' (i.e. all countries included in the model) as a whole, considering all variables as endogenous to the system.

The GVAR model has been applied to a variety of issues. These include: forecasting (e.g. Pesaran, Schuermann, and Smith, 2009); credit risk (e.g. Pesaran, Schuermann and Treutler, 2007); oil price shocks (e.g. Galesi and Lombardi, 2009); global imbalances (e.g. Bussière, Chudik, and Sestieri, 2012); business cycle synchronisation (e.g. Dreger and Zhang, 2013); the impact of EU membership (e.g. Pesaran, Smith, and Smith, 2007); the international effects of fiscal policy shocks (e.g. Favero, Giavazzi, and Perego, 2011). ([2]) Chudik and Pesaran (2014) provide a detailed review of these and other recent applications. ([3])

In this section, this approach is used to analyse the transmission of country-specific and global consumer confidence shocks in a model which includes eight euro area countries (Austria, Belgium, Finland, France, Germany, Italy, the Netherlands and Spain) using quarterly data over the period 1996Q2-2013Q1. The model is solved using the GVAR Toolbox developed by Smith and Galesi (2014). ([4])

([1]) Pesaran, M.H., Schuermann, T., and Weiner, S. M., (2004), 'Modelling regional interdependencies using a global error-correcting model', *Journal of Business and Economic Statistics*, Vol. 22, pp. 129-162.

([2]) Pesaran, M. H., Schuermann, T., and Smith, L.V., (2009), 'Forecasting economic and financial variables with global VARs', *International Journal of Forecasting*, Vol. 25(4), pp. 642-675. Pesaran, M.H., Schuermann, T. and Treutler, B.-J. (2007), 'Global business cycles and credit risk', in The Risks of Financial Institutions, NBER Chapters, pp. 419-474. Bussière, M., Chudik, A. and Sestieri, G. (2012), 'Modelling global trade flows: results from a GVAR model', Globalization and Monetary Policy Institute Working Paper 119, Federal Reserve Bank of Dallas. Dreger, C. and Zhang, Y. (2013), 'Does the economic integration of China affect growth and inflation in industrial countries?', FIW Working Paper series 116, FIW. Pesaran, M. H., Smith, L. V. and Smith, R. P., (2007), 'What if the UK or Sweden had joined the euro in 1999? An empirical evaluation using a Global VAR', *International Journal of Finance and Economics*, Vol. 12(1), pp. 55-87. Favero, C., Giavazzi, F. and Perego, F., (2011), 'Country heterogeneity and the international evidence on the effects of fiscal policy', IMF Economic Review 59(4), 652-682.

([3]) Chudik A. and Pesaran, M.H., (2014), 'Theory and Practice of GVAR Modeling', Federal Reserve Bank of Dallas Globalization and Monetary Policy Institute, Working Paper No. 180.

([4]) Smith, L.V. and Galesi, A. (2014). GVAR Toolbox 2.0, available at https://sites.google.com/site/gvarmodelling/gvar-toolbox.

(Continued on the next page)

Box (continued)

by the European Commission. Consumption and GDP enter the model in log differences, while the other variables are in levels. Some of the results are discussed in the main text.

between the US, the euro area as a whole and four EU countries taken individually. ([76])

In addition, the role of consumer confidence spillovers in the euro area was assessed in a previous issue of the QREA. ([77]) Consumption and confidence regressions were carried out for a panel of euro area countries over the period 1999-2012. The findings support the existence of confidence spillovers between euro area countries.

III.4. Confidence spillovers across the euro area

Table III.1 shows simple correlations between the confidence indicators of eight euro area countries over the period 1995Q4-2016Q1. ([78])The strength of the link between consumer confidence indicators across Member States is variable, and, in most cases, is larger between neighbouring countries and between countries sharing similar macroeconomic environments. ([79])

Table III.1: **Consumer Confidence Indicator — Correlation Matrix**
(1995Q4-2016Q1)

	AT	BE	FI	FR	IT	DE	NL	ES
AT	1.00	0.69	0.69	0.74	0.13(1)	0.54	0.43	0.22
BE	0.69	1.00	0.67	0.88	0.55	0.57	0.68	0.66
FI	0.69	0.67	1.00	0.68	0.39	0.28	0.75	0.55
FR	0.74	0.88	0.68	1.00	0.46	0.55	0.66	0.60
IT	0.13(1)	0.55	0.39	0.46	1.00	0.04(1)	0.63	0.81
DE	0.54	0.57	0.28	0.55	0.04(1)	1.00	0.33	0.23
NL	0.43	0.68	0.75	0.66	0.63	0.33	1.00	0.73
ES	0.22	0.66	0.55	0.60	0.81	0.23	0.73	1.00

(1) Not statistically significant at conventional levels.
Source: DG ECFIN calculations based on EU Business and Consumer Surveys.

The strength of the correlation also varies considerably over time. Table III.2 displays correlations between consumer confidence indicators in the same euro area countries over the period 2008Q1-2012Q4. During the crisis period, the link between consumer confidence indicators is significantly tighter.

Table III.2: **Consumer Confidence Indicator — Correlation Matrix**
(2008Q1-2012Q4)

	AT	BE	FI	FR	IT	DE	NL	ES
AT	1.00	0.93	0.90	0.88	0.36(1)	0.79	0.86	0.63
BE	0.93	1.00	0.81	0.80	0.34(1)	0.80	0.81	0.71
FI	0.90	0.81	1.00	0.83	0.58	0.52	0.81	0.66
FR	0.88	0.80	0.83	1.00	0.30(1)	0.66	0.74	0.61
IT	0.36(1)	0.34(1)	0.58	0.30(1)	1.00	-0.16(1)	0.65	0.38
DE	0.79	0.80	0.52	0.66	-0.16(1)	1.00	0.50	0.48
NL	0.86	0.81	0.81	0.74	0.65	0.5	1.00	0.50
ES	0.63	0.71	0.66	0.61	0.38	0.48	0.50	1.00

(1) Not statistically significant at conventional levels.
Source: DG ECFIN calculations based on EU Business and Consumer Surveys.

The presence of a correlation between confidence indicators may point to the existence of confidence spillover effects between countries, but also be indicative of strong business cycle synchronisation. To shed light on the nature of these correlations, this section discusses confidence spillovers in the euro area on the basis of the findings from the estimation of a Global Vector Autoregressive (GVAR) model which includes data for eight euro area countries over the period 1996Q2-2013Q1. Box III.1 describes the model in more detail.

The model includes observations on consumption, GDP, the unemployment rate, a short-term interest rate and consumer confidence. The latter is measured by the BCS Consumer Confidence Indicator, which is an arithmetic average of the balances of the answers to questions on the financial situation of households, the general economic situation, unemployment expectations and savings over the next 12 months. It is therefore taken as a proxy for consumers' expectations about their future economic situation.

The results seem to support the existence of consumer confidence spillovers across the euro area. As an illustration, Graph III.2 reports impulse

([76]) Dées, S. and J. Guntner (2014), 'The international dimension of confidence shock', *ECB Working Paper*, No 1669.
([77]) Op. cit. D'Auria, F. (2013).
([78]) The very low and non-statistically significant correlation of the Italian confidence indicator with the confidence indicators of a number of other euro area countries is somewhat puzzling and there is a need for further investigation into the reasons behind it.
([79]) The strong correlation between confidence indicators in countries sharing similar economic conditions can be indicative of larger confidence spillovers between them, but can also be a reflection of the strong correlation between their economic fundamentals.

response functions of consumer confidence in the euro area countries included in the GVAR model to a positive shock to consumer confidence in Germany over 24 quarters. ([80])

The largest effect appears to be in smaller neighbouring countries (Austria, Belgium and the Netherlands). The response of consumer confidence is also relatively large in Finland, France and Spain. On the other hand, spillovers to consumer confidence in Italy are very small and become negative after six quarters. This is not a surprise given the statistically insignificant correlation between German and Italian consumer confidence emerging from the data reported in Table III.1. The peak response occurs in the second or third quarter.

Similar results, although of a smaller magnitude, were obtained for the other euro area countries included in the model. Confidence spillovers appear to be larger across countries with stronger geographical and trade links. Overall, the evidence from the estimation of the model supports the existence of a transmission channel for consumer confidence shocks across the euro area. However, the effects of confidence shocks on foreign consumption are, in most cases, not statistically significant, suggesting that the transmission channel is to foreign confidence rather than directly to foreign economic activity. ([81])

These results suggest that confidence shocks play a role in the international business cycle and that there are close interlinkages between confidence indicators across euro area countries. This evidence supports the need for coordinated policy action able to boost confidence across euro area countries.

III.5. Conclusions

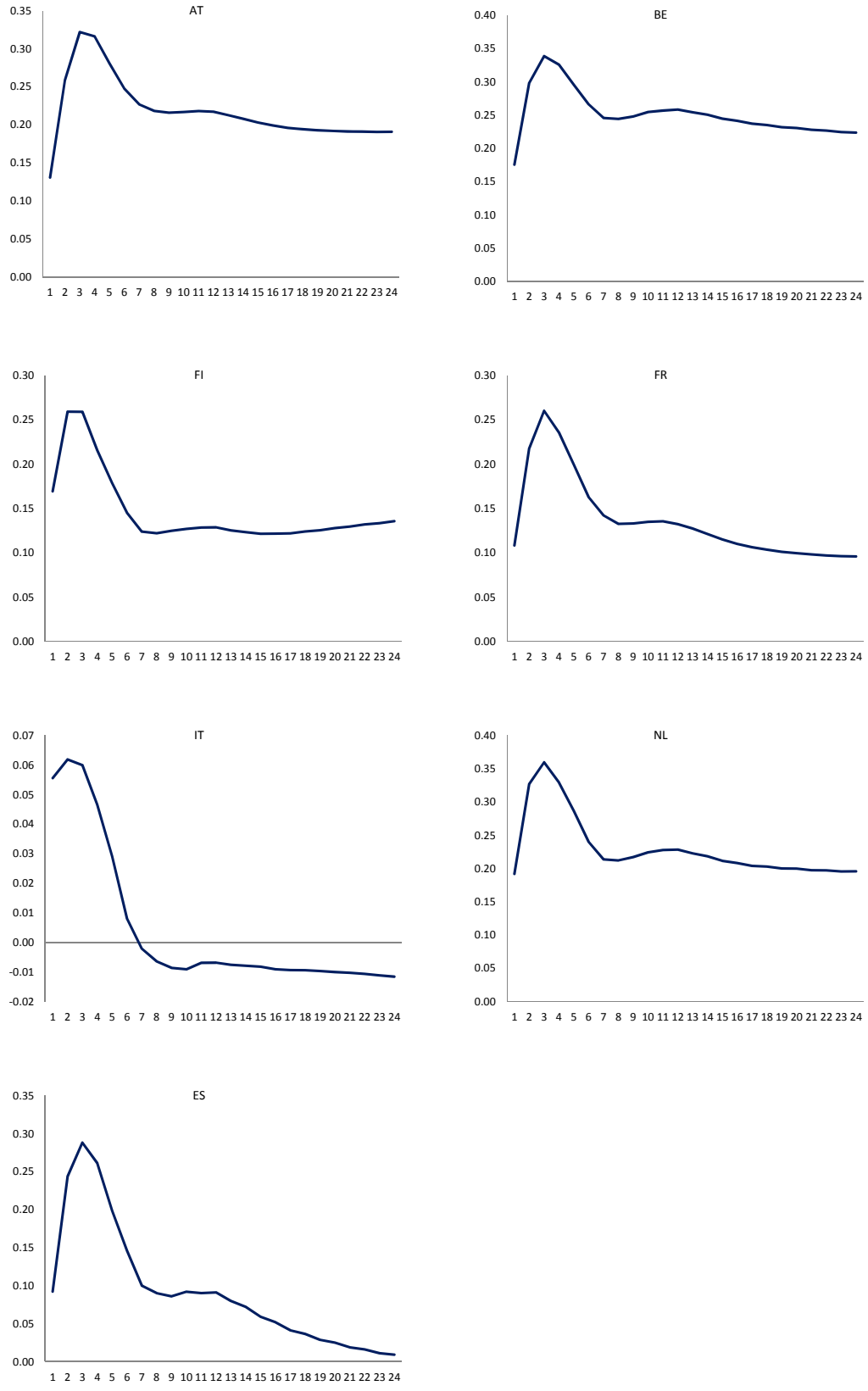
In recent years, the dynamics of euro area consumer confidence and real private consumption have been very closely related. Moreover, consumer confidence indicators across the euro area appear to be strongly correlated. The strength of the correlation was considerably greater during the crisis period.

The evidence of a link between real consumption and consumer confidence is mixed, but several studies are supportive of consumer confidence playing a role in determining consumption. In addition, there is evidence to suggest that shocks to consumer confidence in euro area countries affect confidence in other euro area Member States. This is also borne out by results obtained from the estimation of a Global Vector Autoregressive (GVAR) model for eight euro area countries.

([80]) A caveat must be made about the difficulty of identifying truly exogenous confidence shocks, owing to the fact that confidence indicators are largely driven by the same factors which determine consumption.

([81]) Similar conclusions are reached by op. cit. Dées and Soares-Brinca (2013) and Dées and Guntner (2014).

Graph III.2: **Impulse response functions of foreign confidence to a one standard error confidence shock in Germany**



Source: DG ECFIN.

Editors: Jose Eduardo Leandro and Martin Larch

Coordination: Plamen Nikolov

Statistical and layout assistance: Christos Zavos

Comments on the report would be gratefully received and should be sent to:

Jose Eduardo Leandro
Director – Policy, strategy, coordination and communication
Directorate-General for Economic and Financial Affairs
Office CHAR 15/66

B-1049 Brussels

Email: jose.leandro@ec.europa.eu

or

Martin Larch
Head of Unit – EMU deepening and macroeconomy of the euro area
Directorate-General for Economic and Financial Affairs
Office CHAR 15/56

B-1049 Brussels

Email: martin.larch@ec.europa.eu

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