I. An overview of market-based adjustment in the euro area in the light of the crisis

The global and euro area debt crises have shown that the effect on individual economies of a common economic shock can be very different across the euro area. This has rekindled interest in the role of market-based adjustment processes in mitigating cyclical differences in the euro area. The objective of this special edition of the Quarterly Report on the Euro Area is to review the issue of shocks and adjustment in the light of the recent crisis. This overview chapter reviews the main findings of the report. It discusses the main features of the shocks that can have large asymmetric effects on individual Member States. The analysis distinguishes between the factors that leave an individual economy particularly exposed to shocks, and features of EMU's set up which may amplify the effects of certain shocks. This overview also summarises the main results of the three subsequent chapters which are devoted to the 'relative price mechanism,' the 'real interest rate mechanism' and the role of balance sheets in adjustment processes. The 'relative price mechanism' has been at work both before and since the global financial crisis. Member States in comparatively weaker cyclical positions have benefited from falls in relative costs and prices which helps to buttress their cyclical positions. However, the mechanism has been slow to kick-in since the global financial crisis and its stabilising function has been hampered by frictions in labour and financial markets. The current low level of inflation in the euro area also tends to exacerbate the nominal downward rigidities documented by the empirical literature on the euro area. The report also shows that financial fragmentation has exacerbated the destabilising effect of the 'real interest rate mechanism' and that balance sheet consolidation can substantially prolong adjustment processes. Policies can help mitigate risks of large asymmetric shocks in the euro area both by reducing Member States' exposure to shocks and by strengthening their adjustment capacity. The Banking Union, structural reforms and measures to address the debt legacy of the crisis all have a role to play. Action is needed in both debtor and creditor countries.

I.1. Introduction ([1])

Asymmetric shocks – i.e. shocks which originate in one Member State or common euro area shocks which affect national economies very differently – are a key policy concern in the euro area. Coping effectively with such shocks is a necessary condition for a smooth functioning of a monetary union. Going back to the Optimal Currency Area theory, the economic profession has a long tradition of analysing the types of asymmetric shocks that may buffet monetary unions and possible adjustment mechanisms.

Both before the launch of the euro and during its first decade of existence, much effort was directed towards understanding the specificities of the Economic and Monetary Union (EMU). ([2]) In contrast to most other monetary unions, risk-sharing mechanisms between euro area Member States are very limited. Contrary to a large federation like the US, EMU is not equipped with a central budget designed to cope with asymmetric shocks.

This feature explains the interest of economists and policy makers for the role that markets can play to absorb asymmetric shocks in the euro area. The issue was analysed extensively before and after the launch of the euro. It is now being reassessed in the light of the global financial crisis and, above all, the euro area debt crisis. In many Member States, fiscal policy is currently constrained by the crisis legacy of high public sector debt and can therefore not play fully its role as a shock absorber. Better understanding market-based adjustment is therefore particularly important in the current context.

Because they allow the private sector to share risks across regions or states, financial markets have a well-known stabilisation function in monetary unions in case of asymmetric shocks. Unfortunately, private risk sharing is much more limited in the euro area than in the US or in a federation like Germany. Empirical evidence shows that, until today, private risk sharing can smooth only a limited part of cyclical divergences between Member States during normal times and is particularly ineffective during times of severe

([1]) The section was prepared by Eric Ruscher.

([2]) For a comprehensive assessment of the functioning of EMU released on the verge of the Great Recession see: European Commission (2008), 'EMU@10 – Successes and challenges after 10 years of Economic and Monetary Union', *European Economy*, No. 2, DG ECFIN, European Commission.

recessions. ([3]) Financial markets have even played a risk-magnifying role in some Member States during the euro area debt crisis, particularly via the bank credit channel. Acknowledging this weakness, euro area policy makers have engaged or announced important reforms of EMU: the Banking Union (BU) and the Capital Market Union (CMU) are expected to enhance considerably the euro-area's private risk sharing capacity. ([4])

Risk sharing is not the only area where markets can help absorbing asymmetric shocks. The present report contributes to ongoing reassessment of market-based adjustment in EMU by focusing on three aspects: the *relative price mechanism,* the *real interest rate mechanism* and deleveraging.

In the euro area, changes in relative prices are an important way in which national economies can adjust to asymmetric shocks. Member States in a weaker cyclical position than the rest of the union tend to see their labour costs and prices fall relative to the rest of the union. The resulting improvement in the real effective exchange rate helps strengthen their cyclical position via its effect on exports and import substitution. This relative price mechanism is the main market-based stabilising mechanism in the face of asymmetric shocks and is analysed in depth in Chapter 2 of this QREA. ([5])

The *real interest rate mechanism* is a well-known impediment to the stabilisation function of the relative price mechanism. Changes in relative prices also affect real interest rates. A Member State experiencing a demand boom will see its inflation rate rise above the euro area average. With a common nominal interest rate throughout the euro area, higher inflation will bring a fall in real interest rates relative to the rest of the euro area, which will in turn magnify the original demand boost. This destabilising mechanism, also known as the 'Walters' critique', is the focus of Chapter 3. ([6])

Finally, Chapter 4 sheds some light on the role of balance sheets in adjustment. Balance sheets and deleveraging were largely absent from the pre-crisis debate on the functioning of EMU. The crisis has since highlighted the strong interactions between public or private balance sheets and growth. High levels of debt magnify the exposure to shocks and complicate the subsequent adjustment phase.

Against this background, the objective of the present chapter is to provide an overview of the analyses presented in the rest of the report and set them in the broader perspective of the types of asymmetric shocks that may hit the euro area economy. Drawing on the pre- and post-crisis experience, Section I.2 discusses the main features of asymmetric shocks in the euro area. It analyses how Member States' exposure to shocks depends on macroeconomic imbalances accumulated before shocks occur and highlights a number of euro area-specific shock magnifiers. Section I.3 reviews the various features of market-based adjustment in the euro area as presented in Chapters 2 to 4, stressing in particular the lessons learned since the global and euro area debt crises. Section I.4 concludes.

I.2. Shocks and amplifiers in the euro area

The euro area debt crisis: a typical example of asymmetric transmission of a common shock

An optimistic pre-crisis view was that the euro would lead to greater business cycle synchronisation among Member States as a result of rising trade and financial linkages, broad convergence in macroeconomic policies, and some convergence in economic structures. ([7])

Until the outbreak of the global financial crisis, this optimistic view seemed to be, at least partly, vindicated by the facts. Results of empirical studies

([3]) Furceri, D. and A. Zdzienicka (2013), 'The euro area crisis: Need for a supranational fiscal risk sharing mechanism?', *IMF Working Paper*, No. 198.

([4]) See in particular:
'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.
European Commission (2015), 'Action plan on building a capital markets union', Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of Regions, 30 Sept. 2015.

([5]) In the economic literature on EMU, the 'relative-price channel' is frequently called the 'competitiveness channel' but this may be a source of misunderstanding. In the media and policy debates, the word competitiveness is very loosely defined and can cover a range of issues, from relative costs and prices to product quality and productivity.

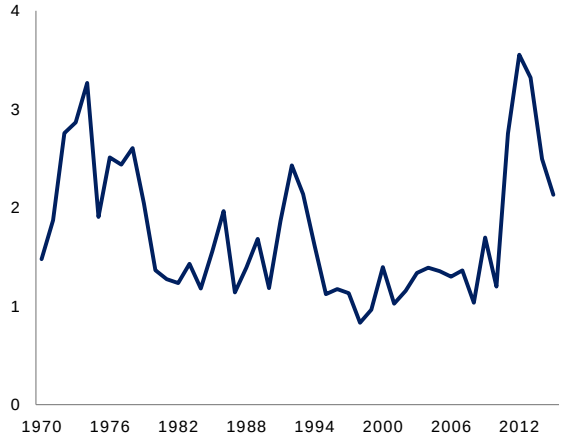
([6]) After Sir Alan Walters, an economic advisor to Margaret Thatcher who strongly opposed British membership of the Exchange Rate Mechanism.
Walters, A. (1990), 'Sterling in danger: the economic consequences of pegged exchange rates', Fontana Press, London.

([7]) This is the well-known argument of the endogeneity of the Optimal Currency Areas, pioneered by Frankel and Rose (1998).
Frankel, J. A. and A. K. Rose (1998), 'The endogeneity of the Optimum Currency Area criteria', *Economic Journal*, 108(449), pp. 1009–1025.

on the effect of the single currency on business cycle synchronisation were mixed but they generally pointed to a high level of synchronisation between Member States and, at least, a convergence trend in the 1990s, i.e. before the inception of the euro. ([8])

Graph I.1: **Cyclical synchronisation, euro area (1)**

(1970 – 2015, stand. dev. of output gaps in %)

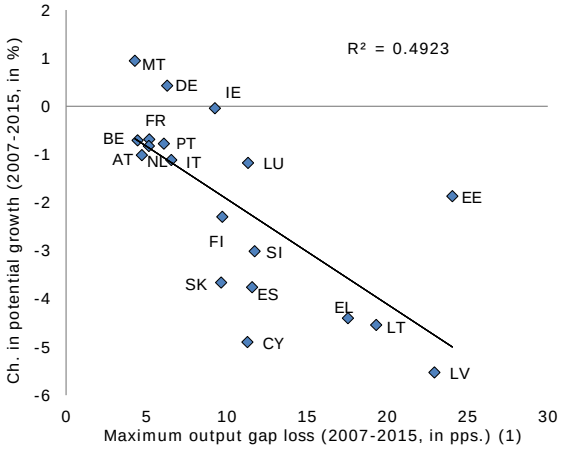


(1) Standard deviation of output gaps for 12 Member States: BE, DE, IE, EL, ES, IT, FR, LU, NL, AT, PT, FI. Output gap estimates are based on the European Commission production function methodology.
Source: AMECO, DG ECFIN calculations.

The relatively close alignment of business cycles prior to the crisis is confirmed by a simple measure of dispersion in output gaps among the 12 earliest members of the euro area (Graph I.1). Business cycles remained relatively closely aligned during the first phase of the global financial crisis, as Member States' economies reacted relatively similarly to the freezing of money markets and the collapse in global confidence and world trade.

Things changed radically when the global financial crisis morphed into the euro area debt crisis. Over 2011-2014, the dispersion of output gaps surged to levels last seen in the 1970s, reaching four-decade highs in 2012-2013. Since 2014, the dispersion of output gaps has come down significantly, but the dispersion of potential growth has increased. ([9]) Those Member States which incurred the biggest cyclical shock (as measured by the difference between the highest and the lowest output gap over the period 2007-2015) have also incurred the largest losses in potential growth since the beginning of the crisis (Graph I.2). This suggests that some of the cyclical differences brought by the euro area debt crisis have become entrenched. ([10]) ([11])

Graph I.2: **Losses in output gap and potential growth, euro area**



(1)The maximum output gap loss is calculated as the difference between the highest and lowest output gap over 2007-2015.
Source: AMECO, DG ECFIN calculations.

Overall, the euro area crisis has dashed pre-crisis hopes that trade and financial integration, combined with a convergence of macroeconomic policies would ensure a reasonably high degree of business cycle synchronisation in the euro area. Member States can be subject to powerful and persistent asymmetric shocks or to large asymmetries in the transmission of common shocks.

([8]) For a review of the pre-crisis empirical literature see de Haan, Inklaar and Jong-A-Ping (2008). Some studies identified a positive effect of the euro on business cycle synchronisation but a majority did not. These differences reflect differences in methodology but also difficulties in identifying the appropriate period as some of the benefits of the euro may have been front loaded in the 1990s.
de Haan, J., R. Inklaar and R. Jong-A-Pin (2008), 'Will business cycles in the euro area converge? A critical survey of empirical research', *Journal of Economic Surveys*, Vol. 22(2), pp. 234-273.

([9]) In 2015, the dispersion remained significantly above the 1995-2007 average. High dispersion was partly explained by a very low output gap in Greece but dispersion remained above this average when excluding Greece.

([10]) It should, however, be stressed that potential growth at the peak of the cycle was probably artificially boosted by the credit boom in some Member States.

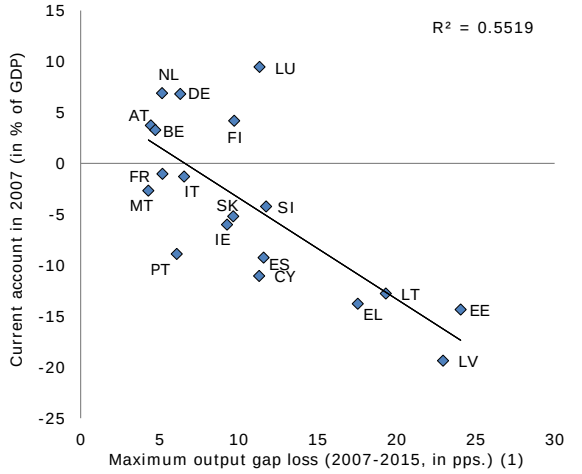
([11]) For a recent analysis of growth differences in the euro area see: Valdes, I. (2014), 'Growth differences in the euro area since the crisis', *Quarterly Report on the Euro Area*, Vol. 13, No. 2, pp. 7-20.

Imbalances accumulated before the crisis have led to large asymmetries in shock exposure

A broad narrative is now emerging from the economic literature on the causes of the euro area debt crisis and therefore of these asymmetries in the transmission of the global financial crisis. (12) The narrative, which is relatively consensual among academic economists if not among policy makers, involves both country-specific vulnerabilities and euro area-specific shock amplifiers.

Asymmetries in the impact of the global financial crisis across Member States reflect large differences in shock exposure among countries. In particular, external exposure (as measured by the current account or net foreign assets) is closely correlated with the cyclical shock incurred by Member States (Graph I.3). (13) The countries of the periphery or in the Baltics which had accumulated large current account deficits before the crisis also incurred the biggest cyclical shock in the crisis.

Graph I.3: **Losses in output gap and current account exposure, euro area**



(1)The maximum output gap loss is calculated as the differences between the highest and lowest output gap over 2007-2015.
Source: AMECO, DG ECFIN calculations.

The accumulation of external imbalances before the crisis in the periphery reflects first and foremost demand shocks in those countries. Excessive demand relative to production capacity fuelled price pressures, particularly in the non-tradable sector, weighing on price competitiveness and, thereby, further aggravating current account deficits. (14) The demand shocks can be explained by a range of factors, including reductions in risk premia (due to euro accession, financial liberalisation and a rise in global risk appetite), the real interest rate mechanism (see Section I.3) and over-optimistic growth expectations. (15)

Current account deficits are of course not a bad thing in themselves (especially for catching-up economies) but, in the case of the euro area periphery, their accumulation reflected a build-up of vulnerabilities for several reasons.

First, the capital inflows that financed the current account deficits were largely debt based, particularly short-term cross-border bank lending. (16) Debt financing makes the borrowers' balance sheets more fragile and exposed to cyclical shocks, particularly reversals in investors' sentiment.

Second, a large part of the capital inflows were used to support consumption or were invested in the non-tradable sector, limiting the debt repayment capacity. (17) There is also evidence of capital misallocation, as capital was not always channelled to the sectors with the highest returns. (18)

(12) See for instance (2015), 'The Eurozone crisis – A consensus view of the causes and a few possible solutions', *a VoxEU.org Book* edited by Baldwin, R. and F. Giavazzi, CEPR.

(13) The relationship between current account imbalances and the growth performance since the crisis also holds for non-euro area countries. See: Lane, P. R. and G. M. Milesi-Ferretti (2014), 'Global imbalances and external adjustment after the crisis', *IMF Working Paper*, WP/14/151.

(14) See, among others, Gaulier and Vicard (2012) who stress the importance of demand shocks relative to competitiveness losses in explaining current account imbalances in the euro area.
Gaulier, G. and V. Vicard (2012), 'Current account imbalances in the euro area: competitiveness or demand shock', Bank of France, *Quarterly Selection of Articles*, No. 27.

(15) See Kang and Shambaugh (2015) for a review of these drivers. The authors stress, in particular, the importance of drops in EU cross-border transfers. Lane and Phelps (2012) highlight the importance of expectations.
Kang, J. S. and J.C. Shambaugh (2015), 'The rise and fall of European current account deficits', *Economic Policy*, Sixty-first Panel Meeting, Bank of Latvia, Riga, 17-18 April 2015.
Lane, P. R. and B. Pels (2012), 'Current account imbalances in Europe', *Moneda y Credito*, Vol. 234, pp. 225-261.

(16) Lane, P. R. (2013), 'Capital flows in the euro area', *European Economy - Economic Papers*, No. 497, DG ECFIN, European Commission.
Baldwin and Giavazzi (2015), op. cit.

(17) Giavazzi, F. and L. Spaventa (2011), 'Why the current account matters in a monetary union', in *The euro area and the financial crisis*, edited by M. Beblavy, D. Cobham and L. Odor, Cambridge University Press, pp. 59-80.

(18) Balta, N. (2013), 'Catching up processes in the euro area', *Quarterly Report on the Euro Area*, Vol. 12, No. 1, pp. 7-18.

The accumulation of vulnerabilities is also closely related to the credit cycle. ([19]) The counterpart to the accumulation of external imbalances in the periphery was a rapid expansion of domestic credit and increased balance sheet vulnerability in the public sector and private sector. The associated deterioration of balance sheets was particularly acute in the public sector in Greece and in the private sector in Spain and Ireland (or in the Baltic countries before euro accession). Portugal experienced deterioration in both sectors.

The global and financial crisis has spawned a large and still expanding literature that documents the existence of financial cycles (as opposed to the traditional business cycle) best encapsulated by developments in house prices and private sector credit. ([20]) Peaks in financial cycles tend to be followed by deeper and longer recessions and more sluggish recoveries than standard business cycles, particularly when associated with financial and banking crises. ([21])

Finally, it is worth stressing that if the pre-crisis build-up of vulnerabilities in some Member States can be explained by a range of country-specific factors (e.g. shift in credit supply, over-optimistic growth expectations), it also reflects inappropriate policies both in the fiscal area and in terms of macro-prudential supervision. While Member States of the periphery failed to identify and correct the build-up of their own vulnerabilities, creditor countries also failed to identify the accumulation of credit risk linked to the cross-border lending activities of their own banking sectors.

Vulnerabilities and shock amplifiers can lead to sudden stops in capital flows

Although differences in Member States' exposure to shocks can go a long way in explaining recent cyclical divergences within the euro area, they fail to explain why the euro area debt crisis only occurred in the euro area. Several other advanced economies also entered the global financial crisis with significant vulnerabilities, notably weak private sector balance sheets, bloated housing sectors or large current account deficits. ([22]) Yet, with the notable exception of Iceland, these countries did not experience a debt crisis and no episodes of sudden stops in foreign private capital inflows.

Indeed, a hallmark of the euro area debt crisis has been a succession of episodes of abrupt reversal of inflows of foreign private capital into several Member States. ([23]) These sudden stops had much to do with investors pulling out of sovereign markets but they were also broader, affecting non-sovereign assets. Their effects were somewhat mitigated by the accumulation of liabilities in the Eurosystem's Target 2 interbank payment system and financial assistance programmes but the sudden stops nevertheless triggered rapid and painful closures of current account deficits. ([24])

The strong asymmetry in the transmission of the global financial crisis within the euro area and the related sudden stops in private capital flows, reflect the joint effect of vulnerabilities accumulated in pre-crisis years and of euro area-specific shock amplifiers. Two shock amplifiers have been particularly harmful: the harmful, self-reinforcing mutual dependence between banks and sovereigns and the existence of self-fulfilling equilibria.

The bank-sovereign feedback loop. In most Member States, bank balance sheets expanded very rapidly in the 1990s and the 2000s, reaching multiples of GDP on the eve of the global financial

([19]) Sy, M (2016), 'Overborrowing and balance of payment imbalances in a monetary union', *Review of International Economics*, forthcoming for African Development Bank Group, *Working Paper Series*, No. 228, October.

([20]) Standard references are: Borio, C. (2014), 'The financial cycle and macroeconomics: What have we learned from the crisis?', *Journal of Banking and Finance*, Vol. 45, pp. 182-198.
Claessens, S., M. A. Kose and M. E. Terones (2012), 'How do business and financial cycles interact?', *IMF Working Paper*, WP/11/88.

([21]) See for instance: Jorda, O., M. Schularick and A.M. Taylor (2013), 'When credit bites back', *Journal of Money, Credit and Banking*, Supplement to Vol. 45, No. 2, pp. 3-28, December.

([22]) The extent of these vulnerabilities was, however, on some counts less dramatic. For instance, the external imbalances were generally smaller.

([23]) Merler and Pisani-Ferry (2012) use the methodology developed by Calvo et al. (2004) to identify formally episodes of sudden stops in the euro area. For the period 2008-2011, they identify three distinct phases of sudden stops in 2008-2009 (EL, IE), Spring 2010 (EL, PT), end 2011 (IT, ES). The Baltic countries also experienced sudden stops before their euro adoption (Gros and Alcidi 2013).
Merler, F. and J. Pisani-Ferry (2012), 'Sudden stops in the euro area', *Review of Economics and Institutions*, Università di Perugia, Vol. 3(3).
Calvo, G. A., A. Izquierdo and L. F. Mejia (2004), 'On the empirics of sudden stops: the relevance of balance-sheet effects', *NBER Working Paper*, No. 10520.
Gros, D. and C. Alcidi (2013), 'Country adjustment to a "sudden stop": Does the euro make a difference?', *European Economy - Economic Papers*, No. 492, DG ECFIN, European Commission.

([24]) On the role of Target II and financial assistance programme in cushioning the sudden stops see: Loublier, A. (2015), 'Recent developments in cross-border capital flows in the euro area', *Quarterly Report on the Euro Area*, Vol. 14, No. 1, pp. 7-18.

crisis. Before the launch of the Banking Union, Member States were, implicitly or explicitly, the only lenders of last resort for their domestic banking sectors. Combined with extensive holdings of domestic sovereign bonds by banks, this paved the way for strong negative feedback loops between banks and sovereigns. ([25]) ([26])

Multiple equilibria. Some Member States have experienced large swings in sovereign spreads that are difficult to explain by changes in macroeconomic fundamentals. A number of economists have argued that this is suggestive of the existence of multiple equilibria, in which a deterioration in investor confidence about a country's sovereign sustainability can cause increases in interest expenditure and lower growth that may ultimately make the change in expectations self-fulfilling. ([27])

In theory, these two shock magnifiers could also have played out in other advanced economies with oversized sovereigns and weak banking sectors. In practice, they only occurred in some euro area Member States. This can be explained by two specific features of EMU:

- **Single currency** – As first analysed in de Grauwe (2011), Member States' governments issue debt in a currency that they don't control. ([28]) The loss of monetary policy (that could act as a lender of last resort) and of nominal exchange rate flexibility entails the loss of two critical shock absorbers in the event of a sovereign liquidity crisis.
- **A fragmented banking sector** – Obviously this is also true of members of a monetary union like the US, where neither the central government nor the Federal Reserve can act as lenders of last resort to individual States. But in euro area, the effect of the loss of the two shock absorbers is compounded by the fragmentation of the banking sector and the fact that Member States were, until the launch of Banking Union, the lenders of last resort for their own banking sectors. In the US, individual States are not responsible for local banks and their debt levels are generally much smaller than in the euro area. Moreover, the banking sector is much more integrated in the US than in the euro area. Overall, there is therefore little scope for feedback loops between banks and States in the US.

Reassessing the nature of asymmetric shocks in in light of the euro area debt crisis

The experience of the euro area debt crisis demonstrated the importance of imbalances and shock amplifiers in generating powerful asymmetric shocks in the euro area. Europe's Economic and Monetary Union has since been equipped with additional surveillance procedures to limit the build-up of new imbalances and with a number of mechanisms to mitigate the shock amplifiers described above (e.g. the European Stability Mechanism and the Banking Union). However, risks of large asymmetric shocks remain. Fully severing the bank-sovereign loop requires the establishment of a European deposit insurance scheme and reduced exposure of banks to their own sovereigns. Moreover, despite the rapid correction of current account deficits in the periphery, debt imbalances remain high in these countries (see Section I.4) and so does their exposure to shocks. In addition, there has been only limited overall convergence in economic structures across euro area Member States since the launch of the euro. This suggests that there are still risks of asymmetric shocks in the euro area.

The experience of the sovereign crisis also points to two features of asymmetric shocks that are worth highlighting: i) these shocks can have both demand and supply features and ii) they can propagate across Member States via contagion effects.

([25]) The feedback loop has been labelled the "deadly embrace" by Paul De Grauwe and the "doom loop" by Maurice Obstfeld.
De Grauwe, P. (2013), 'Design failures in the eurozone - Can they be fixed?' *European Economy - Economic Papers*, No. 491, DG ECFIN, European Commission.
Obstfeld, M. (2013), 'Finance at center stage: some lessons of the euro crisis', *European Economy - Economic Papers*, No. 493, DG ECFIN, European Commission.

([26]) Empirical evidence confirms the existence of the two-way interaction between banks and sovereigns in some euro area countries. See for instance:
Acharya, V. V., I. Drechsler and P. Schnabl (2014), 'A Pyrrhic victory? Bank bailouts and sovereign credit risk', *Journal of Finance*, Vol. 69, No. 6, December.

([27]) For a discussion of multiple equilibria and their policy implications see De Grauwe (2011) or Blanchard and al. (2013).
De Grauwe, P. (2011), 'The governance of a fragile Eurozone', *CEPS Working Document*, No. 346.
Blanchard, O., G. Dell'Ariccia and P. Mauro (2013), 'Rethinking macro policy II: Getting granular', *IMF Staff Discussion Note*, No. 13/03, April.

([28]) De Grauwe (2011), op. cit.

Asymmetric shocks can have both supply and demand effects. The sovereign crisis has blurred the traditional dividing line between supply and demand shocks. By shutting out foreign capital inflows the sovereign crisis has triggered sharp negative demand shocks in the Member States of the periphery. But it has also forced an adjustment of their bloated non-tradable sectors. The process has a strong supply dimension, as it requires a reallocation of capital and labour from the non-tradable to the tradable sector. ([29])

Cross-border contagion effects can magnify exposure to shocks. Empirical work on sudden stops in capital flows in the euro area shows that stops tend to occur in clusters of countries. ([30]) Sovereign yield data since the global financial crisis provide similar evidence of contagion in the form of clusters of sharp rises in yields in some Member States. There is also evidence that spreads in one Member State can be affected by news in other Member States. ([31]) Contagion can be explained by several factors including panic effects and 'wake-up calls'. The latter occur when investors reassess the fundamentals of one country in light of the experience of another. ([32]) Distinguishing between panic and 'wake-up calls' is not straightforward empirically but econometric evidence suggests that both factors were at work in the euro area during the sovereign crisis. ([33])

([29]) Demand booms are more easily associated with an over-extension of the non-tradable sector in a monetary union than in countries which control their monetary policy. In the latter, the demand boom will be cooled off by a monetary tightening which will affect both the tradable and non-tradable sector. In a monetary union, a country-specific demand shock will lead to an increase in wage inflation that will be more detrimental to the tradable sector because of its exposure to international competition. Activity will therefore tend to expand more in the non-tradable sector.

([30]) Merler and Pisani-Ferry (2012), op. cit..

([31]) For a review of financial spillovers in the euro area see:
D'Auria, F., S. Linden, D. Monteiro, J. in 't Veld and S. Zeugner (2014), 'Cross-border spillovers in the euro area', *Quarterly Report on the Euro Area*, Vol. 13, No.4, pp. 7-22.

([32]) For a discussion of the various forms of contagion see:
Forbes, K. (2013), 'The 'Big C': Identifying and mitigating contagion', *2012 Jackson Hole Symposium hosted by the Federal Reserve Bank of Kansas City*, pp. 23-87.

([33]) For example, Beirne and Fratscher (2013) report strong evidence of wake-up call effects in the euro area. By contrast, Saka et al. (2014) conclude that the announcement by the ECB of its OMT programme resulted in a substantial reduction of sovereign yield contagion, suggesting that panic effects were also present. The possibility of waves of panic is closely related to the existence of multiple equilibria.
Beirne, J., and M. Fratzscher (2013), 'The pricing of sovereign risk and contagion during the European sovereign debt crisis', *Journal of International Money and Finance*, Vol. 34, pp. 60–82.

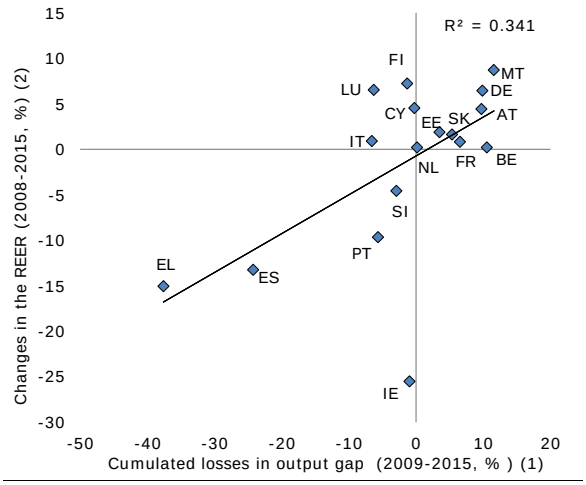
I.3. Market-based adjustment in the euro area

The previous section emphasised the importance of asymmetric shocks in the euro area. The current one assesses how Member States' economies respond to these shocks. It reviews evidence on market-based adjustment processes presented in Chapters 2 to 4. The *relative price mechanism*, the *real interest rate mechanism* and balance sheet adjustment are discussed in turn.

The relative price mechanism

The *relative price mechanism* has been at work in the euro area since the global financial crisis. Compared with their peak at the beginning of the crisis, the real effective exchange rates based on unit labour costs of the periphery have decreased by 10 to 25% depending on the country considered. The falls are, however, smaller when considering prices rather than unit labour costs.

Graph I.4: **Relative prices and output gap, euro area countries**



(1) Output gap estimates are based on the European Commission production function methodology.
(2) Real effective exchange rate based on unit labour costs relative to the rest of the euro area.
Source: AMECO, DG ECFIN calculations.

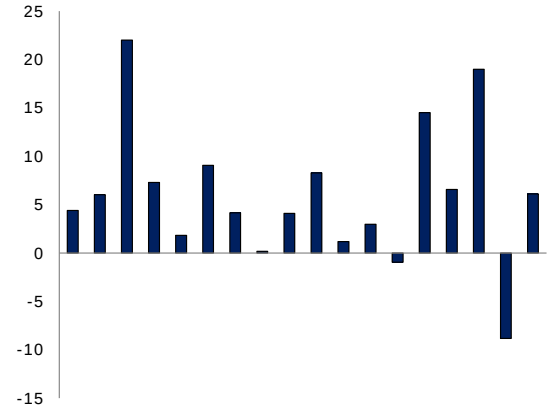
As shown in Graph I.4, there is a clear link between the output gap losses experienced since 2009 and the extent of the relative price (or relative cost) changes. Cyclical differences have been accompanied by a rebalancing of relative prices.

Saka, O., A.M. Fuertes and E. Kalotychou (2014), 'ECB policy and eurozone fragility: was de Grauwe right?', *CEPS Working Document*, No. 397.

To what extent has price rebalancing contributed to cyclical rebalancing? Many non-price factors can affect trade performance (degree of integration in world trade, product quality etc.) but it is clear that, with the exception of Greece, Member States of the periphery have benefited from solid gains in export markets shares in recent years (Graph I.5). The effect of relative prices on trade performance is also supported by a range of empirical studies that have estimated the elasticity of trade with respect to the real exchange rate. (34)

The econometric analysis presented in Chapter 2 further confirms that the relative price mechanism has been at work both before and since the global financial crisis. However, it suggests that the mechanism has been slow to kick-in during the early stage of the global financial crisis although it appears to have functioned more strongly as from the sovereign crisis. The econometric analysis also shows possible room for improvement in the effectiveness of the mechanism, as it identifies three impediments:

Graph I.5: **Export performance, euro area countries (1)**
(2010-2014, in pps.)



(1) Ratio of exports to import demand of main trading partners.
Source: AMECO.

First, despite the reforms put in place by some Member States in recent years, the operation of the relative price mechanism remains hindered by structural rigidities. In particular, labour market rigidities hamper both the response of prices to output gap differences and the speed of the adjustment.

Second, price rebalancing has been slowed by sharp rises in the non-cyclical component of unemployment in periphery Member States. The rises may reflect the existence of downward wages rigidities in a context of low inflation but also the challenges of reallocating workers from the non-tradable to the tradable sector. (35)

Third, there is some evidence that, since the crisis, financial frictions have slowed the price rebalancing process. More work is needed to understand the role of financial frictions but a possible explanation is that deleveraging firms may have taken advantage of lower wages to raise their mark-ups in order to accumulate savings to fix their balance sheets. (36)

Finally, and beyond the econometric results presented above, it is worth pointing out that impediments to the price rebalancing process have not been confined to the periphery. In Germany, for instance, wage developments have remained moderate despite a stronger cyclical position than in the periphery. Furthermore, the low level of inflation that has prevailed in the euro area in the more recent past has complicated price adjustment in the periphery by exacerbating the effect of downward rigidities. (37)

The real interest rate mechanism

As analysed in detail in Chapter 3 of this report, the *real interest rate mechanism* has been at work in the euro area, both before and since the crisis. (38)

(34) See for instance: European Commission (2014), 'Member State vulnerability to changes in the euro exchange rate', *Quarterly Report on the Euro Area*, Vol. 13, No.3, pp. 27-33.

(35) It is noteworthy that the non-cyclical component of unemployment has also increased in Ireland where the labour market is far more flexible than in the rest of the euro area.

(36) See for instance; Antoun de Almeida, L. (2015), 'Firms' balance sheets and sectoral inflation in the euro area during the financial crisis', *Economics Letters*, No. 135, pp. 31-33.

(37) In Europe, only very few workers experienced wage cuts before the crisis. For a survey evidence of nominal rigidities see for instance:
Babecky, J., P. Du Caju, T. Kosma, M. Lawless, J. Messina, and T. Room (2010), 'Downward nominal and real wage rigidity: survey evidence from European firms', *Scandinavian Journal of Economics*, Vol. 112, No. 4, pp. 884-910.

(38) Some pre-crisis studies have also documented the existence of a real interest rate channel in the US (see for instance Arnold and Kool 2004). However, if inflation differences do not seem to be much lower within the US than within the euro area, they tend to be more persistent in the latter (see for instance Angeloni and Ehrmann 2007). This suggests that the interest rate channel could be more potent in the euro area.

Inflation differentials have tended to be persistent during the two periods. Assuming that a significant proportion of economic agents form their inflation expectations on the basis of past inflation developments, such persistence opens the door to differences in real interest rates.

As shown by the econometric analysis in Chapter 3, an important lesson from the crisis is that the real interest rate channel is not only rooted in inflation differences but can also be driven by financial market fragmentation. As discussed in the previous section, Member States of the periphery have entered into price adjustment processes that have brought their inflation rates below the euro area average. The resulting rise in real interest rates has been magnified by an increase in nominal bank lending rates and tighter lending conditions in these countries due to financial fragmentation. A well-known cause of this fragmentation is the fears of redenomination risks that have gripped financial markets during the height of the euro area debt crisis. The fears have largely receded by now, notably in the wake of the ECB's OMT programme, and the differences in retail rates between the periphery and the rest of the euro area have narrowed again but they have not reverted to pre-crisis levels. This is because nominal lending rates are also determined by local economic factors. Two such local factors are worth stressing:

- As argued when discussing the bank-sovereign loop mentioned in Section I.2, changes in the credit risk of sovereigns can affect the balance sheets of banks and, thereby, their borrowing costs and lending policies.

- A deterioration of economic conditions can lead to a weakening of borrowers' balance sheets which will in turn push up banks' lending rates due to higher risk-premia (to cover the higher risk of borrower default).

The existence of these local determinants of bank lending rates magnifies the real interest rate channel but also sets the stage for two possible negative feedback loops where a deterioration of activity leads to a rise in lending rates that weakens activity further. The sovereign component of the feedback loop is the bank-sovereign loop already discussed in Section I.2 and should therefore be eliminated by the establishment of a full banking union. The second component of the loop, however, reflects the segmentation of the euro area's banking sector along national lines and can only be (partly) resolved by genuine cross-border banking integration. ([39])

Finally, the crisis has shown that real interest rates may have effects that go beyond the traditional cyclical dimension explored in Chapter 3. The central tenet of the real interest rate mechanism is that differences in real interest rates tend to magnify cyclical differences via their effect on spending. Some authors have identified an additional destabilising effect. To the extent that they contribute to a local boom, low real interest rates may also discourage policy makers from engaging in necessary structural reforms and may reduce incentives for private agents to adopt performance improving strategies. This 'super Walters' effect' broadens the effect of the real interest rate channel beyond the business cycle to structural growth. ([40])

The relative price vs real interest rate mechanisms

An important question for the stability of the euro area is whether the stabilisation effect of the relative price mechanism is stronger than the destabilising effect of the real interest rate mechanism. The conventional answer is that even if the real interest effect may dominate in the short-term, the relative price effect ultimately prevails because it strengthens continuously as long as inflation differentials persist.

Arnold, I. J. M. and C. J. M. Kool (2004), 'The role of inflation differentials in regional adjustment: Evidence from the US', *Credit and Capital Markets*, Vol. 37, pp. 67-85.
Angeloni, I. and M. Ehrmann (2007), 'Euro area inflation differentials', *The B.E. Journal of Macroeconomics*, Vol. 7, No. 1, pp. 1-34.

([39]) The loop is likely to be much weaker in the US where the banking sector is far more integrated.

([40]) The expression "super Walter effect" was coined by Buti and Turrini (2015). The authors, focusing on structural reforms, argue that a "super Walters' effect" operated during the first EMU decade, whereby not only cyclical positions, but also economic structures were driven by persistent real interest rate differences. Fernandez-Villaverde et al. (2013) analyse the inflows of capital into the periphery in pre-crisis years and how they reduce the incentives for policy makers to implement structural change and the private sector to monitor performance.
Buti, M. and A. Turrini (2015), 'Three waves of convergence. Can Eurozone countries start growing together again?', *EU VOX* 17 April.
Fernandez-Villaverde, J. L. Garicano and T. Santos (2013), 'Political credit cycles: the case of the Eurozone', *Journal of Economic Perspectives*, Vol. 27, No. 3, pp. 145-166.

This conclusion appears to be supported by empirical modelling exercises. Simulations with estimated or calibrated models suggest that the competitiveness channel tends to dominate, although the stabilisation process can be slow. ([41]) Model simulations also indicate that the relative price channel has a significant role to play in restoring internal balance in the periphery after the global financial crisis. ([42]) Some economists have identified modelling assumptions under which the 'real interest rate channel' may prevail even in the long run. ([43]) The conclusions of the above mentioned simulations, however, suggest that these assumptions are rarely fulfilled in existing empirical models.

Deleveraging: an important additional adjustment mechanism

Balance sheets and deleveraging were largely absent from the pre-crisis debate on the functioning of EMU. Wealth effects were generally estimated to be relatively low in European countries. Significant empirical and modelling work had been done on the interactions between housing and the business cycle but the balance sheet dimension of adjustment to asymmetric shocks in EMU remained relatively unexplored.

The crisis has since highlighted the importance of stock-flow interactions. Balance sheet consolidation in the private and the public sectors have been an important part of adjustment processes in the periphery since the global financial crisis (for the former) and the sovereign crisis (for the latter). In these countries, balance sheet developments amplified the pre-crisis boom in activity and were at the root of the sudden stops in capital inflows experienced during the crisis. They have also contributed to prolonging the adjustment period.

As analysed in detail in Chapter 4, the presence of deleveraging modifies the standard narrative of adjustment to shocks in at least three ways.

First, **adjusting to shocks takes much more time** when deleveraging is involved. For instance, the process of rebalancing current accounts flows in the periphery is by now well advanced with most of countries showing surpluses, sometimes sizeable ones. However, the reduction of external debt (stocks) has only hardly started. A similar observation applies to internal public and private sector debt levels. This has serious implications for growth, as protracted debt overhangs weigh on investment and increase exposure to shocks.

Second, there is a fundamental **asymmetry between economic agents with weak and strong balance sheets**. Lenders can force the former to reign in their spending but they cannot force the latter to spend more. This asymmetry has been strong in the euro area in recent years. Sudden stops in capital flows and rises in risk premia have forced agents in periphery countries to cut spending to consolidate their balance sheets, whereas domestic demand in surplus countries has remained chronically weak. As a result of the latter, export opportunities for the periphery countries have remained limited and the rebalancing of relative prices between the core and the periphery slow, making the adjustment processes in the periphery more protracted and painful. It has also led to a growing current account surplus for the euro area as a whole.

Finally, the failure to consolidate balance sheets as indicated by a **persistently high level of non-performing loans** (NPL) may also have important microeconomic consequences. An efficient adjustment to shocks requires the capacity to reallocate labour and capital resources rapidly across sectors (e.g. from the non-tradable to the tradable sector) or within sectors (e.g. from low to high performing firms). Persistently high levels of NPLs hamper the capacity of banks to support this reallocation process and lock in resources in high debt firms that are also frequently poor performers. Insolvency frameworks that facilitate the rapid resolution of non-viable private debt and the rehabilitation of viable firms are essential for an efficient adjustment process. This aspect was largely overlooked in the pre-crisis debate on adjustment in the euro area.

([41]) European Commission (2006), 'The EU economy: 2006 review', *European Economy*, No. 6, DG ECFIN, European Commission.
European Commission (2008), op. cit.

([42]) See for instance:
Angelini, E., A. Dieppe and B. Pierluigi (2013), 'Learning about wage and price mark-ups in euro area countries', *ECB Working Paper Series*, No. 1512, February.
Angelini, E. M. Ca' Zorzi and K. Forster (2014), 'External and macroeconomic adjustment in the larger euro area countries', *ECB Working Paper Series*, No. 1647, March.

([43]) Landmann, O. (2012), 'Rotating slumps in a monetary union', *Open Economies Review*, Vol. 23, pp. 303-317
Allsopp, C. and D. Vines (2008), 'Fiscal policy, intercountry adjustment and the real exchange rate', *European Economy - Economic Papers*, No. 344, DG ECFIN, European Commission.

I.4. Conclusion

This chapter has reviewed the issue of market based adjustment to asymmetric shocks in the euro area. The global and sovereign crises have triggered a rethink of the nature of the economic shocks that can affect the euro area and shown that business cycles can diverge sharply. Due to the imbalances accumulated during the first decade of the euro, some Member States have turned out to be much more exposed than others to the shift in investor risk appetite brought by the global financial crisis. Shock amplifiers particular to the euro area, such as the bank-sovereign feedback loop, and the resulting sudden stops in capital inflows have further magnified the asymmetric effect of the global financial crisis, pushing cyclical divergence to historical highs.

With the strengthening of macroeconomic surveillance, the establishment of the ESM and the launch of the Banking Union, significant measures have been taken in recent years to improve the functioning of Europe's Economic and Monetary Union. This should help reduce the occurrence of asymmetric shocks by reducing the differences of countries in their exposure to shocks and by mitigating the effect of the shock amplifiers. Nevertheless, 'stock' imbalances (as opposed to 'flow' imbalances) are receding only very slowly in the periphery. This means that some Member States will remain considerably more vulnerable than others to economic shocks for some time and that risks of strong asymmetric shocks will not fade rapidly.

Given the persistence of these risks, it is important to better understand the role of market-based stabilising forces. The present report contributes to this understanding by presenting new econometric analyses of the relative price and real interest rate mechanisms. It also discusses the critical role played by balance sheets in adjustment processes. These analyses show that the relative price mechanism has been at work before and since the beginning of the crisis. Its effect since the crisis appears to be stronger than it was before the crisis. However, the mechanism remains hindered by rigidities in labour markets and the slow speed of the reallocation processes across sectors and firms that are ongoing in the periphery. It has also been hampered by frictions in financial markets. In addition, financial fragmentation has reinforced the destabilising effect of the real interest rate mechanism by pushing up nominal interest rates in the periphery. Finally, the crisis has shown that balance sheet consolidation can substantially prolong adjustment processes and introduce an asymmetry between consolidating and non-consolidating countries, i.e. debtor and creditor countries. Weak domestic demand in the latter has contributed to make the adjustment processes in the former more protracted and painful.

The analysis also offers some signposts for policy design. First, reducing shock exposure is key and the Macroeconomic Imbalance Procedure has an important role to play in this respect. Second, a full Banking Union would reduce the fragmentation of the banking sector, notably by severing the sovereign bank loop and would therefore considerably mitigate the strength of the EMU-specific shock amplifiers. Third, structural policies can also contribute to improving market-based adjustment. There is evidence that labour market reforms can strengthen the stabilisation power of the relative price mechanism by reducing price persistence or by enhancing the response of prices to the output gap. Addressing the problem of non-performing loans would facilitate balance sheet adjustment processes. Improved macroeconomic conditions at the euro area level would facilitate adjustment, notably by allowing the euro area to move out of an environment of very low inflation. Last but not least, policies that strengthen domestic demand in surplus countries would also facilitate adjustment both directly, by increasing export opportunities in the periphery and, indirectly, by supporting euro area inflation. These policies could include the use of available fiscal space to boost public investment and structural reforms that boost non-tradable activity.