

## 8. Euro Crises, the Productivity Slowdown and the EMU

Nauro F. Campos

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**Abstract:** *The objective of this chapter is to discuss the productivity implications of the financial and economic crises experienced by euro area economies since 2007. The argument is organised in three parts: the first discusses the euro crises and policy responses; the second focuses on the productivity slowdown; and the third examines productivity convergence in the European Economic and Monetary Union (EMU). Our main conclusion is that the currently available evidence suggests that the crises in the euro area neither caused the productivity slowdown nor the disruptions in convergence patterns. Although this may well be because it is 'still too early to tell,' the crises had a significant dampening effect: the productivity rebound that often follows recessions is yet to materialise thus raising severe concerns in terms of convergence, integration and welfare.*

**Keywords:** *productivity; Global Financial Crisis; euro crises; productivity slowdown; European Economic and Monetary Union*

### 8.1. Introduction

In the past 15 years, the world economy has experienced one of its most severe crises ever. The crisis started in the United States in 2007. It happened not only in the background of unprecedented financial deepening and financial globalisation, but also in light of the very rapid rise of Chinese imports into the United States and Europe (Autor *et al.*, 2016) and of the speedy diffusion of new manufacturing technologies (Acemoglu and Restrepo, 2020). The crisis that started in the United States was followed in 2010 by a sovereign debt crisis in Europe that shook the foundations of the European Economic and Monetary Union (EMU). In response to these crises, the euro zone has witnessed radical institutional innovations with a myriad of new structures put in place. Yet the crisis has left severe economic scars (productivity remains more than 10 percentage points below trend in the United States and in Europe) as well as important political scars, e.g. the rise of populism (Algan *et al.*, 2017).

The objective of this chapter is to discuss the productivity implications of the sequence of financial and economic crises experienced by euro area economies since 2007.

The argument in this chapter is organised in three parts: the first details the euro crises and the policy response (chiefly fiscal consolidation and structural reforms) to these crises over the

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post 2007 'long lost decade.' Our objective is to provide an up-to-date narrative of the crisis. A narrative that goes beyond the view that it was a localised series of events (first in the United States and then in Europe) that were basically independent of each other and yet that require similar solutions, namely improvements in financial regulation of private and public agents, respectively. This more recent narrative we summarise here stresses a context of deep financial integration and globalisation, of economic and political interdependence, and a need for coherent, massive and coordinated policy action that did not happen in a timely (nor synchronised) fashion nor was supported by a sufficient build-up of new institutions.

The second part focuses on the productivity slowdown in Europe and tries to establish three important facts. The first is that Europe has experienced a successful and sustained convergence to US levels from 1950 until 1995 over a range of productivity measures. Since 1995, Europe as a whole has experienced divergence with heterogeneity across countries in this respect. The second fact is that there has been a severe slowdown in productivity in Europe that seems to have taken place after the slowdown in productivity in the United States was first observed. Third, and most importantly, econometric evidence suggests that both the productivity slowdown in the United States and in Europe seem to have preceded the global financial crisis. In short, there seems to be little evidence supporting the view that the crises in the euro area caused the productivity slowdown.

The third part discusses productivity convergence developments in the EMU. We use the synchronisation of economic shocks framework to put forward evidence showing strong support for the endogenous optimal currency area hypothesis: the introduction of the euro accelerated the convergence process in the eurozone. Moreover, we find little evidence suggesting that neither the global financial crisis of 2007 nor the sovereign debt crisis of 2011 has significantly disrupted this convergence process.

Finally, there seems to be little evidence for a significant uptick in structural reforms adoption following the crises. Although this may be because it is 'still too early to tell,' the crises have had a significant dampening effect: the productivity rebound (or return to trend) that often follows recessions is yet to materialise in the euro area raising grave concerns for convergence, integration, and welfare.

## **8.2. The Crises in the Euro Area**

Once a crisis erupts, its resolution depends, inter alia of course, on a common understanding of its causes. The quicker agreement emerges, the shorter and less severe the crisis should turn out to be. Moreover, the quicker agreement spreads, the easier it is to identify the actors that drove

the crisis and the easier it should be to spread or distribute the costs of the recovery. Such agreed narratives have deep intellectual, economic, and political implications (Shiller, 2019).

In this light, it is not surprising that a simple and compelling narrative quickly emerged after the 2007 Global Financial Crisis (GFC). It is also not unexpected that this narrative would be vigorously promoted and perpetuated by politicians, special interest groups, and the media. It is even less surprising that this narrative will be revisited, updated, improved, and corrected over the long run by scholars and academics. What perhaps is unexpected is that this work towards a deeper understanding of what happened is already taking place and that a rather different narrative has already started to materialise.

The original narrative that emerged from the GFC should by now be familiar. It states that the crisis surely did not originate in Europe, but in the United States, and was basically caused by a lack of financial supervision. The crisis started with problems in the United States, more specifically in its subprime mortgage sector, which spread to other parts of the financial system culminating with the investment bank Lehman Brothers filing for bankruptcy. This led to a very sharp recession and an enormous and highly synchronised contraction in international trade. In this narrative, the potential solution suggests itself almost naturally: more rigorous banking supervision in the Anglo-Saxon financial systems (that is, the USA and UK) would be strongly called for. Indeed, in various EU capitals the prevailing view was that more robust supervisory practices in bank-based (not market-based) financial systems had to a large extent protected the euro area from the worst of the crisis.

The second part of this narrative centres on Europe. Sometime later, in 2010, the euro sovereign debt crisis started out with the disclosure, by the newly elected Greek government, that public debt was much higher than previously reported and in disregard of the euro area fiscal rules. This has led unsurprisingly to a sharp turn in confidence and a severe 'sudden stop' of capital flows mostly to the periphery of the eurozone. This led to yet another severe recession, one that substantially curtailed the recovery from the 2007-2008 crisis. The solution to these two crises could well be presented as similar: more and better supervision to private and public agents, respectively.

In short, the initial narrative was that the two crises started out in different places (United States and Greece) and could be understood to a large extent as basically independent of each other, yet more supervision was the response to both. Obviously, this is not to ignore financial factors that were important, among other reasons, because recessions following financial crises tend to be deeper (de Haan *et al.*, 2016). Our view here is that financial factors have been almost

exclusively the early focus and the more recent literature tries to extend and complement this emphasis.

Although the original narrative still resonates, academics have been hard at work. This has led to a revision to the point that a different and better substantiated narrative is emerging. This is mainly because of enormous progress on at least three different complementary areas of inquiry: theory, history, and econometrics.

Firstly, on the theoretical side, the prevailing macroeconomic framework at the time was inadequate because it was mostly centred on the assumption of frictionless financial markets. This has been abandoned and, as a consequence, a flurry of new models motivated by the crisis have emerged (e.g., Gertler and Gilchrist, 2018). Secondly, using a myriad of just recently disclosed documents, revised data, memoirs and accounts, the history of the crisis has been retold by bringing together these newly revised macroeconomic models, history, politics as well as its important geopolitical dimensions (e.g., Tooze, 2018). And thirdly, there has been an enormous amount of new econometric evidence that has shed new light on the received narrative and has contributed to its revision (cf., among others, Bordo and Meissner, 2016, Martin and Philippon, 2017, and Griffin, forthcoming). These three areas buttress a different, more nuanced, and richer explanation of the financial crisis.

The revised and up to date narrative is different. The crisis did obviously start in the United States. Yet the extent of financial integration and the size of the financial system have both reached levels that were unseen and, to a large extent, were not fully appreciated at the time. By 2007, the largest purchaser of US assets and the largest foreign lender to the United States was not China, but Europe (Adrian *et al.*, 2018). In this light, the crisis was never only financial. The degree of economic and financial interdependence would not allow it to be localised. It was to be a global economic crisis. It did turn out to be, in Ben Bernanke's words, 'the worst financial crisis in global history' even when compared to the Great Depression.

From the outset, the 2007 crisis was global: financial systems in continental Europe and in the anglo-saxon world (USA and UK) were extra-ordinarily large and interconnected. Hence its resolution could neither be gradual, modest nor one-sided; it had to be coordinated on a large scale. It was simplistic to ask only for more supervision if that was not from the beginning part of a substantial and concerted effort involving commensurate monetary and fiscal responses. Although leadership and coordination were evident in 2007, it was already in short supply in 2009.

There are many dimensions that can be used to show the development of the crises but we think maybe the unemployment series does a particularly good job. One important observation

is that, until the crisis, unemployment rates were not different in the euro area vis-à-vis the EU but these were very different (i.e., higher) compared to those in the United States or Japan. The percentage of unemployed workers was about 9% in Europe on average compared to about 5% in the United States. The crisis can be seen to start in the United States in 2007 when unemployment starts to increase. By the same token, the crisis seems to start in Europe a year later.

The second feature worth highlighting is the speed with which the crisis develops: the US unemployment rate increases very rapidly and reaches European levels (after the 1970s oil shocks, a rare occurrence indeed) by the second half of 2009. These numbers for Europe also increase but surely not as much as for the United States. The point here is that this crisis is usually depicted based on figures of bond spreads over time and here we argue that, on the real side, unemployment tells an equally compelling story.

The third important feature is that, still focusing on unemployment rates, the US recovery, albeit slow by historical standards, reaches pre-crisis levels by 2014-15, while the recovery in Europe turns out to be completely different. Firstly, because there is a second moment of the crisis in Europe which corresponds to the euro sovereign debt crisis of 2011-13. In other words, European unemployment does not decline after 2011, it actually increases to an even higher plateau. It peaks at about 12% in 2013 and only then starts to very slowly decline reaching pre-crisis levels only around 2019, in what turns out to be the last quarters before the COVID-19 pandemic. Needless to say, European-wide averages which conceal important differences both across and within countries.

A final important observation worth making is that, after 2011, the difference between the euro area and the overall EU unemployment rates seem to have increased and stabilised at around 1%, a difference that has lasted until today.

Yet these unemployment figures do not show how contrasting the responses to the crisis within the euro area were (Blanchard, 2018.) The recovery in US real GDP was not as deep in comparison to Europe and was relatively swift, where it took until 2013 to regain momentum, that is, to again rise above pre-crisis levels. Although the 2008 recession was deeper in Europe than in the United States, by 2011 economic activity in both was back to pre-crisis levels. For all country groupings, the actual levels turn out to be significantly below the pre-crisis trend and especially so after 2011 for the United States and 2013 for Europe.

Even more importantly, we observe a highly divergent behaviour of real GDP in the European periphery. The euro sovereign debt crisis turned out to be a major stress test for the EMU. Among other things, it turned into a recession for all euro area stressed countries, except

Ireland of course. For the EA15 (excluding Portugal, Italy, Greece, and Spain), the recovery has followed a similar pattern as in the United States and Japan, albeit all below trend. The focus on euro area sovereign debt sometimes makes one forget that the crisis had actually hit some of the periphery of Europe very hard already in 2008, with the experiences of Latvia and Hungary here worth noting (Blanchard *et al.*, 2013, Gyórfy, 2015).

These last two arguments suggest that the policy response to the 2007 crisis seem to have been rather effective, while the same cannot be said of the policy response to the sovereign debt crisis in 2011. Of course, these figures cannot reveal the full nature, extent, and circumstances in which the actual policy response took place. In the first moment, the reactions in the United States and China were swift and, when needed, involved the G20 and IMF. In the United States, the Fed put in place a diversified set of liquidity facilities for private banks as well as substantial central bank liquidity swap lines (Adrian *et al.*, 2018). In turn, China enacted in late 2008 a fiscal stimulus program of more than 12% of GDP (Bai *et al.*, 2016). The European response was very different.

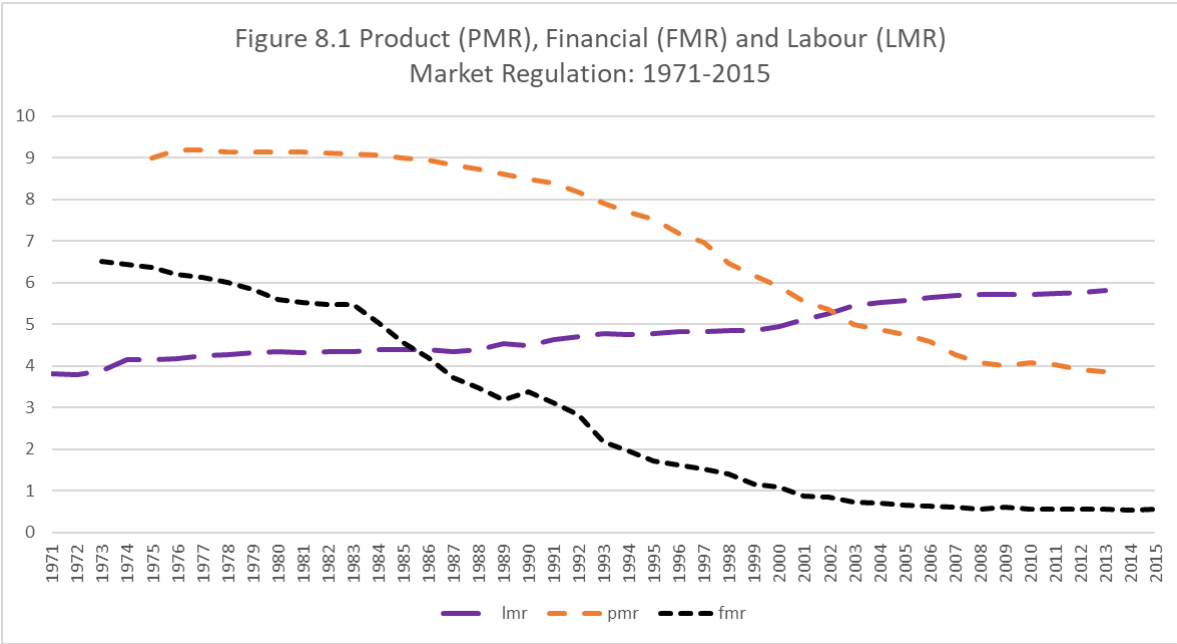
One view is that the insufficient recapitalisation of European banks links the subprime to the sovereign debt episodes as the lack of confidence spread and deepened thanks, inter alia, to the lack of a consistent response. According to Tooze (2018, p. 270): 'As the Germans and the French were determined to block talk of coordinated fiscal stimulus and there was something akin to a conspiracy of silence around the role that the Fed was playing in providing global liquidity, it was by the way of the IMF that Brown and Obama would deliver their expansive impulse.' Moreover, 'by comparison, despite the size of the EU's economy, Europe's fiscal response to the crisis was derisory, barely more than 10 percent on the most generous measure. It was a sign of things to come. The only Western fiscal stimulus that weighted seriously in the balance was that launched by the United States' (p. 275).

In Europe, what was about to come was a coordinated response to the crisis but one based chiefly on fiscal consolidation and structural reforms. Three caveats are in order: this is the first or initial response; there has been substantial institutional innovation since; and the response changed later. There have been of course, as part of this response, considerable institutional innovations in Europe: the crisis and the consensus about the need to improve financial supervision propelled de Larosière Group report and resulted in a new European-wide supervisory framework that would lead to the creation of important new agencies such as the European Stability Mechanism (Korhonen, 2018). There have also been significant subsequent changes in the European macroeconomic policy response to the crisis, in particular following Draghi's 'whatever it takes' and the ensuing changes in monetary stance (cf. Koijen *et al.*, 2021).

With these caveats in mind, there seems to be now an emerging consensus, at least among academic economists, that the crisis was deepened in Europe, and prolonged across the globe, because of a lack of initiative, urgency, and coordination that led to important policy mistakes, chiefly the turn to fiscal consolidation (or to 'austerity' according to Alesina *et al.*, 2015). The IMF, which played a large role in the resolution of the crisis in Europe, has conducted an initial evaluation of its response that supports this view (IMF, 2014). At the time, support for the idea of immediate fiscal consolidation can be traced to the debt brake constitutional amendment to the German constitution of late 2009, the misreporting of budgetary figures by Greece as well as to the influential research of Harvard economists Reinhart and Rogoff (2010). Our argument here is not that this is the only or the major cause of the crisis but that the austerity issue seems to be the one that experienced the greatest change in terms of understanding of what has so far occurred. Moreover, although there was an immediate realisation of the economic costs, the political costs turned out to be perhaps even larger (e.g. rise of populism across the EU and, more specifically, how it led to Brexit), although they only come to surface much later and their implications are still being felt today (Fetzer, 2019, Guiso *et al.*, 2021).

In addition to austerity, the other leg of the immediate European policy response to the crisis was the implementation of structural reforms. Figure 8.1 presents indices of the strictness or of the rigidity of regulations in the product markets (PMR), the labour markets (LMR), and the financial markets (FMR) from 1971 to 2015. Higher numbers indicate more rigidity. The figure shows that in both product and financial markets, there was significant deregulation, especially since the early 1980s. This contrasts with the trend in labour market reform where one observes regulation has increased or became more rigid over the same period. It is rather difficult to identify a breaking point in these series around 2008 or 2011 which implies that in the European policy response to the crisis most of the work was done by the fiscal consolidation leg, perhaps not by reforms. These need not to be independent. de Haan and Wiese (2022) study the relationship between structural reforms and fiscal stance and argue that 'that product market reforms mostly cause slightly negative growth. Labour market reforms hurt growth under restrictive and neutral fiscal policy but are conducive to economic growth if introduced during periods of expansionary fiscal policy.' Moreover, and providing a link with our argument in the next section, Cetto *et al.* (2016) review evidence that Europe's relatively poor productivity performance may be due to remaining labour and product market rigidities.

**Figure 8.1.** Structural reforms in OECD countries: 1971-2015



Source: Constructed using OECD data using the methodology developed and explained in Campos *et al.* (2020).

**8.3. The Productivity Slowdown**

This section presents the basic stylised facts surrounding the slowdown in total factor productivity that has been observed over the last twenty years or so. It makes three main points. The first is that, taking the United States as the technological frontier, Europe between 1950 and 1995 was able to catch-up in terms of output per worker and even more so when considering output per hour worked. Since 1995, we observe increasing divergence between Europe and the United States. Second, the onset of the productivity slowdown can be dated using modern structural break econometric techniques: such evidence overwhelmingly supports the view that the productivity slowdown precedes the global financial crisis. The third important point we make in this section is that, despite the fact that productivity slowed down before the crisis, it has stagnated after 2008 and is now more than 10% below trend.

Productivity matters. It is widely recognised that productivity is *the* key determinant of long-term prosperity (Jones, 2016). Productivity is normally defined as the ratio of the value of output (GDP) to inputs and is commonly understood as labour productivity (the value of output per worker or per hour worked) or as total- or multifactor productivity (Syverson, 2011, Comin *et al.*, 2020).



The first stylised fact about productivity we need to highlight is that, taking the United States as the technological frontier, Europe between 1950 and 1995 was able to catch-up in terms of output per worker and, even more clearly, when considering output per hour worked. Since 1995, however, we observe an increasing divergence in productivity levels between Europe and the US, as well as within Europe itself (Campos *et al.*, 2019).

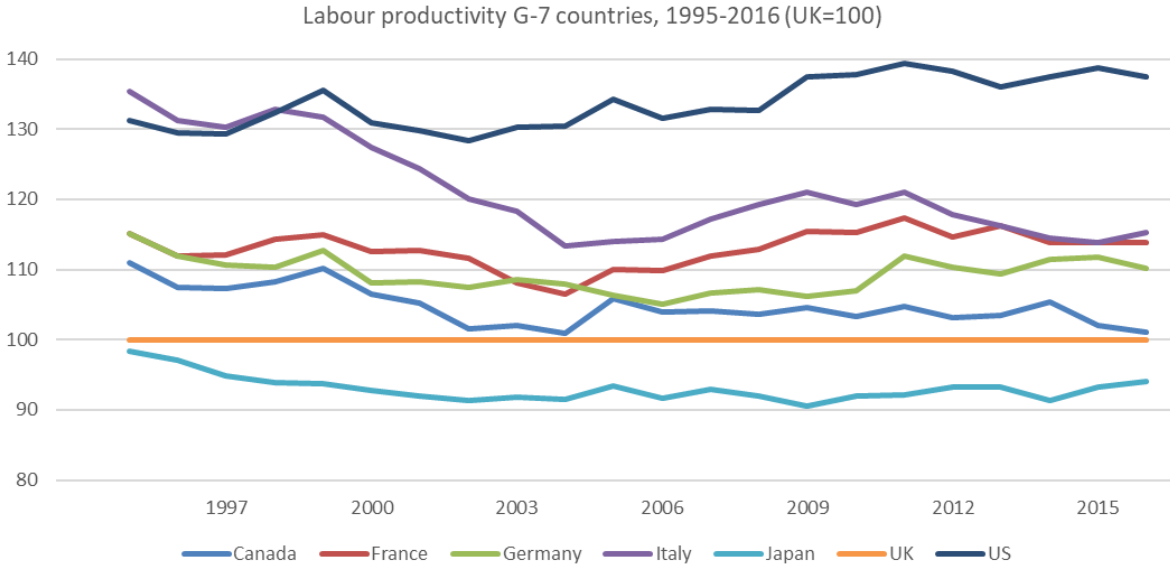
Van Ark *et al.* (2008) argue for three main phases in the evolution of Europe-US productivity differentials: the catch-up, the slowdown, and the left behind periods. The first covers Europe catching-up with the United States between 1950 and 1973. The second is the productivity slowdown in Europe and covers 1973 to 1995, at the end of which Europe closes the gap with the United States. The third is the period from 1995 until 2006, when the catch-up proved temporary and Europe started to fall behind. This has continued to this day. Two important qualifications are as follows. The first is that although this overall pattern is clear, it is much stronger for output per hour worked than for output per capita. The second is that there are important differences within Europe that should not be downplayed. Some countries and some industrial sectors have done much better than others at different points in time.

The second important stylised fact about productivity we need to highlight is that the outset of the productivity slowdown has been dated using modern structural break econometric techniques: the evidence overwhelmingly supports the view that the productivity slowdown *precedes* the global financial crisis. Fernald (2015) reports Bai-Perron multiple structural breaks evidence that indicates the existence of two main statistically significant breaks for US business sector labour productivity since 1973: a first one in the second quarter of 1997 that entails an acceleration of productivity growth and a second statistically significant structural break in the fourth quarter of 2003 that represents the beginning of the slowdown period. The exact break dates naturally depend on which data series is used (and to a lesser extent on the choice of structural break test), but what is important to highlight is that in all cases the estimated dates precede the global financial crisis, with confidence intervals typically excluding this event (Fernald 2015).

The third important point we need to make in this section is that despite the fact that productivity clearly started to slow down before the crisis, since 2008 it has stagnated and is now more than 10% below trend. Figure 8.2 shows that the productivity slowdown in advanced economies that seem to have started before the Global Financial Crisis is unmistakable, generalised and severe. A slowdown of this magnitude in the UK, which is the country for which the longest available historical data series are available (although of course a country not in the EMU), has been qualified as historically unprecedented (Crafts and Mills, 2020). The figure also

shows that these declines after 2009 in the United States and Germany (Italy and France) have been relatively smaller (larger).

**Figure 8.2.** The Productivity Slowdown in Advanced Countries



Source: Author’s calculations using the latest available data from the Office of National Statistics

**8.4. Convergence**

The crises in the euro area have brought to the fore the main shortcomings of its architecture. If one is searching for a measure of how widely recognised were the shortcomings of the euro area, one should look no further than Brussels’ plan for a Genuine Economic and Monetary Union (Begg, 2014), with the word ‘genuine’ doing the heavy lifting. Agreement on the need for a solution co-exists with apparently stark disagreement on the causes. One view is that ‘design flaws’ (De Grauwe, 2006) deepened imbalances, while another is that ‘policy mistakes’ (Sandbu, 2015) hindered convergence. Both views, however, rely upon ‘asymmetries’ (understood as different responses to shocks). The simple starting point of our argument in this section is that an increase in asymmetries in the distribution of output or productivity can be interpreted as divergence, while a decrease in asymmetries can be seen as convergence.

The main research question driving the scholarship on optimal currency areas (OCA) regards the costs and benefits of sharing a currency (Alesina and Barro, 2002). The main cost is the loss of monetary policy autonomy, while the main benefits are transaction costs and exchange rate uncertainty reductions, which may increase trade and competition. More recently, Chari *et al.*

(2020) argues that what they call 'credibility shocks' should also be considered as criteria, and (b) there should be more consideration about how OCA criteria may be inter-related (Glick and Rose, 2016). de Haan *et al.* (2022) provide a broad and up-to-date overview of this literature.

The seminal paper here remains Bayoumi and Eichengreen (1993). They establish the existence of a highly asymmetric core-periphery pattern in the run-up to the EMU. Using pre-eurozone data, they convincingly argue that there is a core (Germany, France, Belgium, Netherlands, and Denmark) where supply shocks are highly correlated, and a periphery (Greece, Ireland, Italy, Portugal, Spain, and the UK) where synchronisation is significantly lower. They correctly reason, in addition, that this pattern would undermine the Eurozone project if persistent.

Bayoumi and Eichengreen's (1993) methodology develops Blanchard and Quah's (1989) procedure for decomposing permanent and temporary shocks. Based on the standard aggregate demand-aggregate supply (AD-AS) model, supply shocks have permanent effects on output while demand shocks only have temporary effects. Both are assumed to have permanent albeit opposite effects on prices.

The vast literature that follows Bayoumi and Eichengreen (1993) relies on static binary classifications. Further, for tractability purposes (i.e. exactly identified models) supply-related restrictions are seldom imposed (De Haan *et al.*, 2008; 2022; Santos and Tenreyro, 2010).

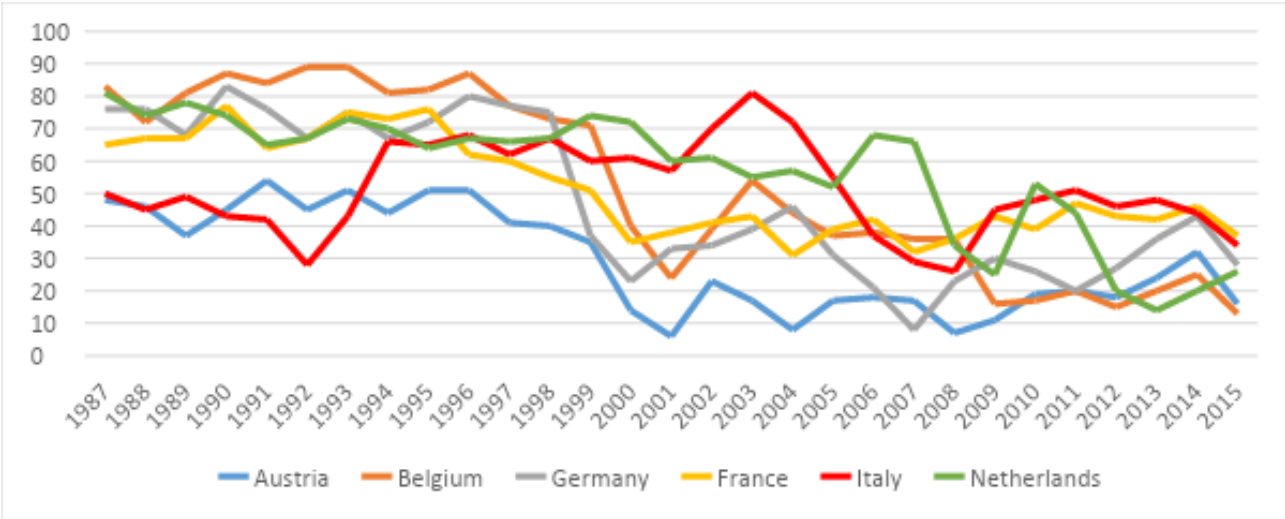
Campos and Macchiarelli (2016) modify the Bayoumi-Eichengreen framework by bringing in an additional restriction on the effect of supply shocks on output. They devise a test for this overidentifying restriction that yields the probability of a country being classified as core. Specifically, the lower (higher) the percentage of times the test supports rejection, the more a country is said to be part of the core or centre (periphery). As dispersion has decreased compared to the pre-Eurozone era, they conclude the core-periphery pattern has weakened after 1989. Another way of putting this is that the creation of the EMU had not, as feared, fostered divergence but instead instigated convergence among the member countries. Overall, the results support a re-interpretation of the core-periphery pattern: after Maastricht a new, smaller periphery emerges (Spain, Portugal, Ireland, and Greece) and its dynamics is systematically different from the rest.

In short, Bayoumi and Eichengreen (1993) is a seminal paper because, inter alia, it was one of the first to point out the risks of an entrenched core-periphery to the then nascent eurozone. Their influential diagnostics were based on data covering 25 years from 1963 to 1988. Using the same methodology, sample, and time window length, Campos and Macchiarelli (2016) revisit their results for 1989-2015. They ask whether the eurozone strengthened or weakened the core-periphery pattern and conclude for the latter.

Yet these results are based on a static framework. Campos and Macchiarelli (2021) put forward a dynamic framework to further study these asymmetries, generating a theory-based measure that is continuous and time-variant (i.e., it departs from static binary classifications of core and periphery). They estimate the probability of a country being classified as peripheral for a set of European countries yearly since 1989. Again, an increase in asymmetry is understood as divergence and a decrease as convergence.

Campos and Macchiarelli (2021) use this index to identify clusters and study convergence dynamics. As Figure 8.3 shows, the countries in the first cluster show a commonly sustained increase in the probability of being classified as core. Using the 50% cut-off point for convenience, the first three countries to enter the core are Germany, France, and Austria, all by 1999; which is the year the euro was introduced. Belgium joined the core in 2000, while Italy and Netherlands did so in 2005 and 2007, respectively. These results suggest the formation over time of an endogenous OCA (Frankel and Rose, 1998) as countries only start joining the core after the currency union is in place.

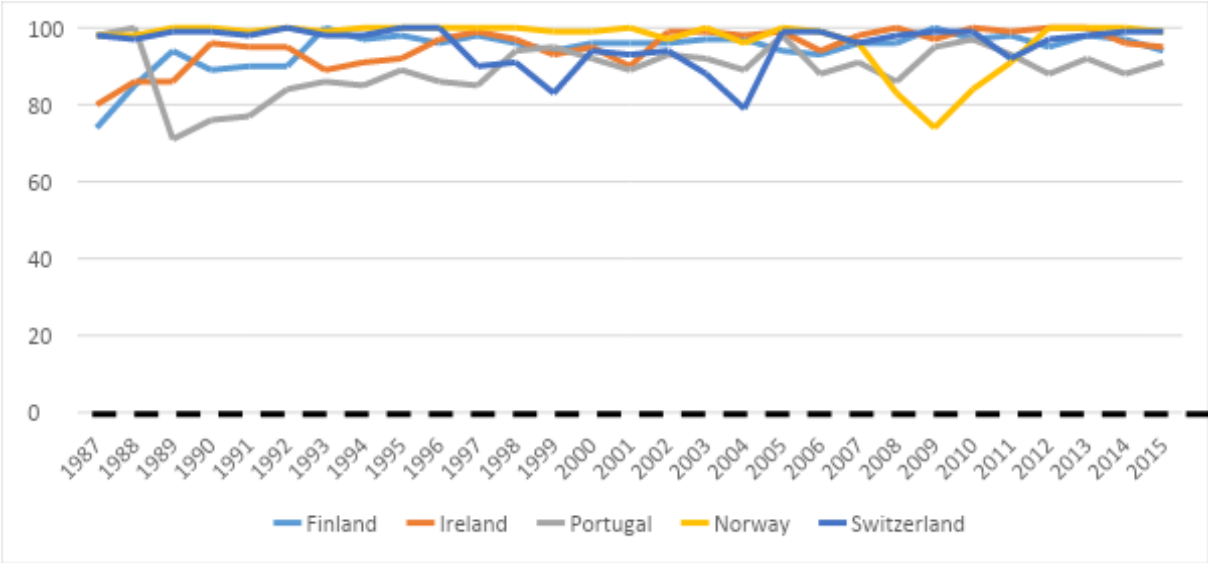
**Figure 8.3.** The formation of the eurozone core: 1987-2015



Source: Constructed using Campos and Macchiarelli (2021) data and methodology.

The second set of countries is shown in the Figure 8.4. As these countries have high levels of the index, they are identified as the periphery. Interestingly, notice that the series are trendless, reinforcing Bayoumi and Eichengreen’s (1993) early warnings about the EMU, specifically about the possibility of an entrenched periphery. Note that neither Norway nor Switzerland are members of the eurozone, although Portugal, Finland, and Ireland are.

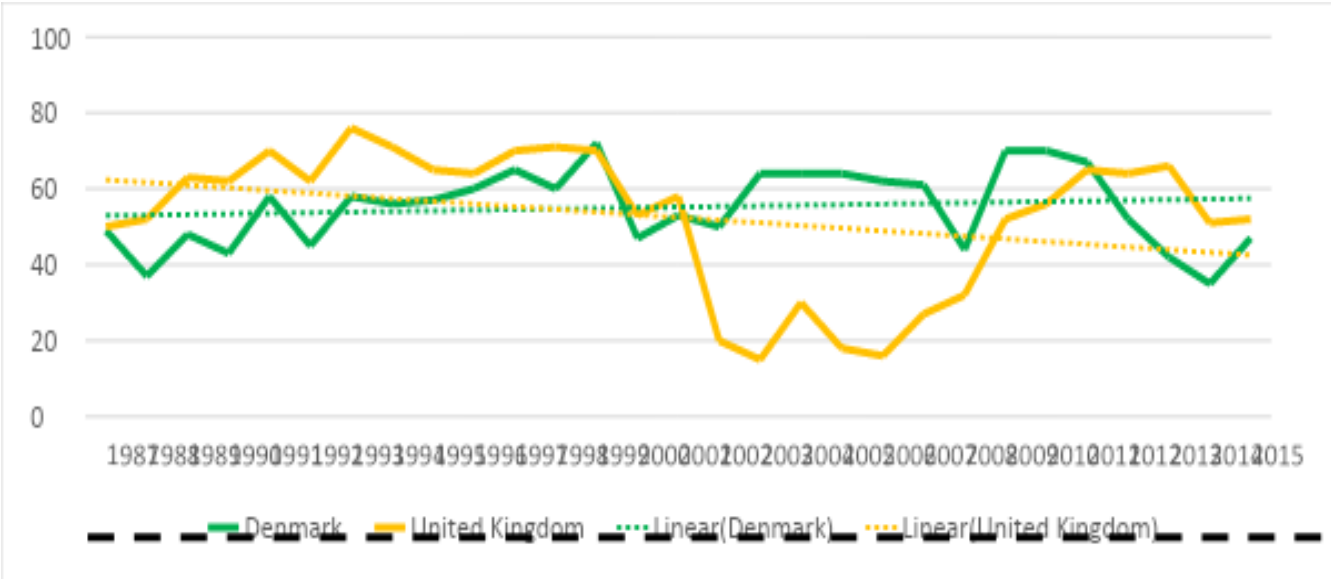
**Figure 8.4.** The persistence of the eurozone periphery: 1987-2015



Source: Constructed using Campos and Macchiarelli (2021) data and methodology.

This analysis also identifies an intermediary set of countries, some for which the index is ‘trendless’ and others for which it is not (‘trending’). In the former group, note figures for Denmark change little over time, while the opposite happens for the UK, where the high volatility means the UK moving in and out of the core (Figure 8.5).

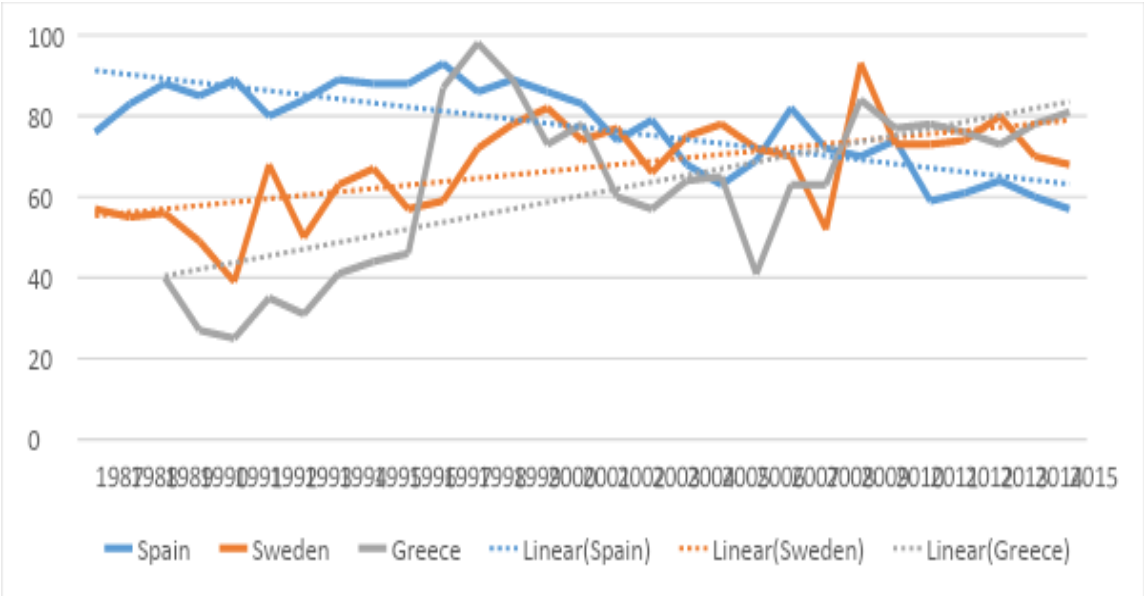
**Figure 8.5.** The intermittence of the eurozone centre ground: 1987-2015



Source: Constructed using Campos and Macchiarelli (2021) data and methodology.

Among the intermediary trending cases, Spain’s is flat until 1999 and starts to decline afterwards, moving towards the core (linear interpolation suggests it would join circa 2020) while Greece and Sweden move away from the core (Figure 8.6).

**Figure 8.6.** The joiners and leavers from the eurozone centre ground: 1987-2015



Source: Constructed using Campos and Macchiarelli (2021) data and methodology.

These results suggest that the core and periphery pattern in the EMU has changed considerably since 1989, both in terms of relative strengths and distances between main groups of countries but also in terms of the trajectories of individual countries. This analysis shows that the convergence process within the eurozone has indeed taken place, albeit with important qualifications. The next question is what factors can throw light on this behaviour over time and across countries?

In order to shed light on this behaviour across countries and over time, Campos and Macchiarelli (2021) draw from OCA theory (De Grauwe, 2018) and identify a set of candidate explanatory variables. One first group refers to explanatory variables on the fiscal side (Martin and Philippon, 2017): debt-to-GDP ratios and cyclically adjusted budget balances. The second covers external links, including euro area membership, foreign direct investment (FDI), real effective exchange rate, and trade openness (Rose, 2000). The third group of explanatory variables focuses on financial links, for instance they study corporate and government bond spreads, interbank interest rate spreads, average consumer loan interest rate spreads, and returns on equity differential (ECB, 2017; Spiegel, 2009). The fourth and last main group of explanatory variables we draw upon regards structural reforms, chiefly employment protection legislation (EPL) and product markets regulation (PMR).

The main findings in Campos and Macchiarelli (2021) are that euro membership and looser product market regulations make countries more likely to be classified as core. Their results suggest that a particularly strong role in explaining core-periphery dynamics for both membership in the eurozone and the strictness of product market regulation: euro membership is found to increase symmetry while a high degree of product market regulation decreases symmetry. The estimated effect of euro area membership implies as much as a 16 per cent points reduction in the probability of being classified as periphery. To further elaborate on the product market regulations result, they show trade openness and foreign direct investment help to 'import competition' and in so doing substitute for product market regulations. Imports (but not exports) are found to increase the probability of a country being classified as core.

The second important result is that the emergence of the GFC does not substantially affect the stability of these estimates. The crisis that started in 2007 and that affected Europe in full in the first half of the 2010s (the eurozone sovereign debt crisis) by its very nature generated a similar response across countries. The extent of symmetry increased rapidly so one may be justifiably concerned that this would affect the results. Campos and Macchiarelli (2021) carry out a simple test for assessing this idea, namely, whether splitting the sample in 2010 (or in 2007) substantially affects the baseline results. Their results show that their key results are robust with euro area membership and product market reforms (or imports) remaining the key factors.

## 8.5. Conclusions

The objective of this chapter was to bring together various elements that may be useful to understand the productivity implications of the crises in the euro area. One such element was an up-to-date interpretation of the crises themselves. Instead of focusing on the United States and insisting on banking supervision, the current narrative is richer, broader and more consequential. The period from 2007 to 2019, from the subprime crash to the COVID-19 pandemic, witnessed a sequence of deep inter-related crises: global, financial, economic, and political emergencies that required large, coordinated and considerate policy responses that came late and hence extended the crises. COVID-19 presents a chance to bookend this period and start anew with Next Generation EU, hopefully a sign of things to come.

The second element was productivity. This chapter tries to put together three relevant stylised facts. Namely, that Europe did catch-up with the United States albeit briefly and in 1995, that the productivity slowdown precedes the global financial crisis (econometric evidence suggests it started in 2003: Q4), and that at least since 2008 it has stagnated and is now more than 10% below trend.

The third important element or set of findings is that there seems to have been no effect of the crises on the pattern of the increasing convergence in the eurozone. If one puts aside for a moment the below trend performance of productivity, many effects of the crises are unexpectedly difficult to capture. Indeed, one sometimes has that Solow feeling: the crises seem to be everywhere except in the economic data. We saw above that Campos and Macchiarelli (2021) had difficulty supporting the notion that the crises affected or increased divergence in EMU. Fernald (2015) argues that the crises did not cause the productivity slowdown. Bordignon *et al.* (2021) argues that the crises have also not had a discernible effect in terms of institutional development. And Campos *et al.* (2022) show that the crises did not significantly affect the relationship between growth and employment in Europe.

The main conclusion we offer is that the current available evidence suggests that the crises in the euro area neither caused the productivity slowdown nor severe disruptions in convergence patterns. Moreover, there is little evidence for any substantial uptick in structural reforms adoption following the crises. Although this may well be because it is still too early to tell, the crises have had a significant dampening effect: the productivity rebound that often follows recessions is yet to materialise in the euro area raising grave concerns for convergence, integration, and welfare.

There are at least three possibilities for this lack of effect. One is severe heterogeneity: although the average effects are of zero change, for some countries (for some sectors and in some



time periods) there are extremely large and counterweighting effects. Two is measurement error and here we include the possibility that data series will be radically revised in the near future. Three is policy effectiveness: we have done just enough to avoid a major disaster, or another war. Future research would do well in pursuing these possibilities.

## References

Acemoglu, D., and Restrepo, P. (2020). Robots and jobs: Evidence from US labor markets. *Journal of Political Economy*, 128(6), 2188-2244.

Adrian, T., Kiff, J., and Shin, H. S. (2018). Liquidity, leverage, and regulation 10 years after the global financial crisis. *Annual Review of Financial Economics*, 10, 1-24.

Alesina, A and R. Barro (2002). Currency unions. *Quarterly Journal of Economics*, 117(2), 409-436.

Alesina, A., Barbiero, O., Favero, C., Giavazzi, F., and Paradisi, M. (2015). Austerity in 2009–13. *Economic Policy*, 30(83), 383-437.

Algan, Y., Guriev, S., Papaioannou, E., and Passari, E. (2017). The European trust crisis and the rise of populism. *Brookings Papers on Economic Activity*, 2017(2), 309-400.

Autor, D. H., Dorn, D., and Hanson, G. H. (2016). The China shock: Learning from labor-market adjustment to large changes in trade. *Annual Review of Economics*, 8, 205-240.

Bai, Chong-En, Hsieh, C. T., and Michael, S. Z. (2016). The long shadow of a fiscal expansion. *Brookings Papers on Economic Activity*, 47(2), 129-181.

Bayoumi, T. and B. Eichengreen (1993). Shocking aspects of European monetary integration. In: F. Torres and F. Giavazzi (Eds.), *Adjustment and Growth in the European Monetary Union*, Cambridge: Cambridge University Press.

Begg, I. (2014). Genuine economic and monetary union. In S. Durlauf and L. Blume (Eds.), *The New Palgrave Dictionary of Economics*, Palgrave Macmillan.

Bordo, M. and Meissner, C. M. (2016). Fiscal and financial crises. In: J. B. Taylor and H. Uhlig (Eds.), *Handbook of Macroeconomics* (Vol. 2, pp. 355-412). Elsevier.

Blanchard, O. (2018). Should we reject the natural rate hypothesis? *Journal of Economic Perspectives*, 32(1), 97-120.

Blanchard, O. J., Griffiths, M., and Gruss, B. (2013). Boom, bust, recovery: Forensics of the Latvia crisis. *Brookings Papers on Economic Activity*, 2013(2), 325-388.

Blanchard, O. and D. Quah (1989). The dynamic effects of aggregate demand and aggregate supply disturbances. *American Economic Review*, 79, 655–673.

Bordignon, M., Gatti, N., and Onorato, M. G. (2021). Getting closer or falling apart? Euro countries after the Euro crisis. University of Milan, Working Paper No. 105.

Campos, N., F. Coricelli and L. Moretti (2019). Institutional Integration and Economic Growth in Europe. *Journal of Monetary Economics*, 103(1), 88-104.

Campos, N., Eichenauer, V. and Sturm, J. E. (2020). Close encounters of the European kind: Economic integration, sectoral heterogeneity and structural reforms. *European Economic Review*, 129, 103511.

Campos, N. and C. Macchiarelli (2016). Core and Periphery in the European Monetary Union: Bayoumi-Eichengreen 25 Years Later. *Economics Letters*, 147(3), 127-130.

Campos, N. and C. Macchiarelli (2021). The Dynamics of Core and Periphery in the European Monetary Union: A New Approach. *Journal of International Money and Finance*, 112, 102325.

Campos, N., C. Macchiarelli and F. Mitropoulos (2022). Unemployment and Growth Before and After the Global Financial Crisis: New Evidence from Structural Okun Estimates. LSE LEQS Discussion Paper No. 175.

Cette, G., J. Fernald, and B. Mojon (2016). The pre-Great Recession slowdown in productivity. *European Economic Review* 88, 3-20.

Chari V., A. Dovis and P. Kehoe (2020). Rethinking optimal currency areas. *Journal of Monetary Economics*, 111, 80-94.

Comin, D.A., J. Q. Gonzalez, T. G. Schmitz and A. Trigari (2020). Measuring TFP: The role of profits, adjustment costs, and capacity utilization. NBER Working Paper No. 28008.

Crafts, N. and T. Mills (2020). Is the UK Productivity Slowdown Unprecedented? *National Institute Economic Review* 251, R47-R53.

De Grauwe, P. (2006). What have we learnt about monetary integration since the Maastricht Treaty? *Journal of Common Market Studies*, 44(4), 711-730.

De Grauwe, P. (2018), *The Economics of Monetary Unions*, Oxford: Oxford University Press.

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*, 22(2), 234-273.

de Haan, J., J. Hessel and N. Gilbert (2016). Reforming the architecture of EMU: Ensuring stability in Europe. In: H. Badinger and V. Nitsch (Eds.), *The Routledge Handbook of the Economics of European Integration*, Routledge, pp. 408-432.

de Haan, J., J. Jacobs and R. Zijm (2022). Coherence of output gaps in the euro area: The impact of the COVID-19 shock. CESifo Discussion Paper No. 9654.

de Haan, J., and R. Wiese (2022). The impact of product and labour market reform on growth: Evidence for OECD countries based on local projections. *Journal of Applied Econometrics*, forthcoming.

Farhi, E. and I. Werning (2015). Labor mobility in currency unions. MIT mimeo.

Fernald, J. G. (2015). Productivity and Potential Output before, during, and after the Great Recession. *NBER Macroeconomics Annual* 29(1), 1-51.

Fetzer, T. (2019). Did austerity cause Brexit? *American Economic Review*, 109(11), 3849-86.

Frankel, J. and A. Rose (1998). The endogeneity of the optimum currency area criteria. *Economic Journal*, 108(449), 1009-1025.

Gertler, M., and Gilchrist, S. (2018). What happened: Financial factors in the Great Recession. *Journal of Economic Perspectives*, 32(3), 3-30.

Glick, R. and A. Rose (2016). Currency unions and trade: A post-EMU reassessment. *European Economic Review*, 87, 78-91.

Griffin, J. (forthcoming). Ten Years of Evidence: Was Fraud a Force in the Financial Crisis? *Journal of Economic Literature*.

Guiso, L, Morelli, M. and T. Sonno (2021). The Financial Drivers of Populism in Europe. Bocconi University, Working Paper No. 166.

Gyórfy, D. (2015). Austerity and growth in Central and Eastern Europe: Understanding the link through contrasting crisis management in Hungary and Latvia. *Post-Communist Economies*, 27(2), 129-152.

IMF (2014), *IMF response to the financial and economic crisis*, International Monetary Fund, Independent Evaluation Office.

Jones, C. (2016). The Facts of Economic Growth. In J. Taylor and H. Uhlig (Eds.), *Handbook of Macroeconomics* (Vol. 2), Elsevier.

Koijen, R. S., Koulischer, F., Nguyen, B., and Yogo, M. (2021). Inspecting the mechanism of quantitative easing in the euro area. *Journal of Financial Economics*, 140(1), 1-20.

Korhonen, K (2018). An institutional innovation in the euro debt crisis: The ESM. In: Campos, N. and J. Sturm (Eds). *Bretton Woods, Brussels, and Beyond: Redesigning the Institutions of Europe*, CEPR Press.

Marimon, R. and T. Cooley (2018). The EMU after the euro crisis. VoxEU, <https://voxeu.org/article/emu-after-euro-crisis-insights-new-ebook>

Martin, P., and Philippon, T. (2017). Inspecting the mechanism: Leverage and the great recession in the eurozone. *American Economic Review*, 107(7), 1904-37.

Phillips, P, and D, Sul (2007). Transition Modelling and Econometric Convergence Tests'. *Econometrica* 75(6), 1771-1855.

Reinhart, C. and K. Rogoff (2010). Growth in a Time of Debt. *American Economic Review*, 100(2), 573-78.

Rose, A. K. (2000). One money, one market: the effect of common currencies on trade. *Economic Policy*, 15(30), 8-45.

Sandbu, M. (2015), *Europe's orphan: The future of the euro and the politics of debt*. Princeton University Press.

Silva, J., and S. Tenreyro (2010). Currency Unions in Prospect and Retrospect. *Annual Review of Economics*, 2(1), 51-74.

Shiller, R. J. (2019). *Narrative economics: How stories go viral and drive major economic events*. Princeton University Press.

Syverson, C. (2011). What Determines Productivity? *Journal of Economic Literature*, 49(2), 326-65.

Tooze, A. (2018). *Crashed: How a decade of financial crises changed the world*. Penguin.

Van Ark, B., O'Mahoney, M., and Timmer, M.P. (2008). The productivity gap between Europe and the United States: trends and causes. *Journal of Economic Perspectives*, 22(1), 25-44.