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What's so special about specialization in the euro area?

Early evidence of changing economic structures

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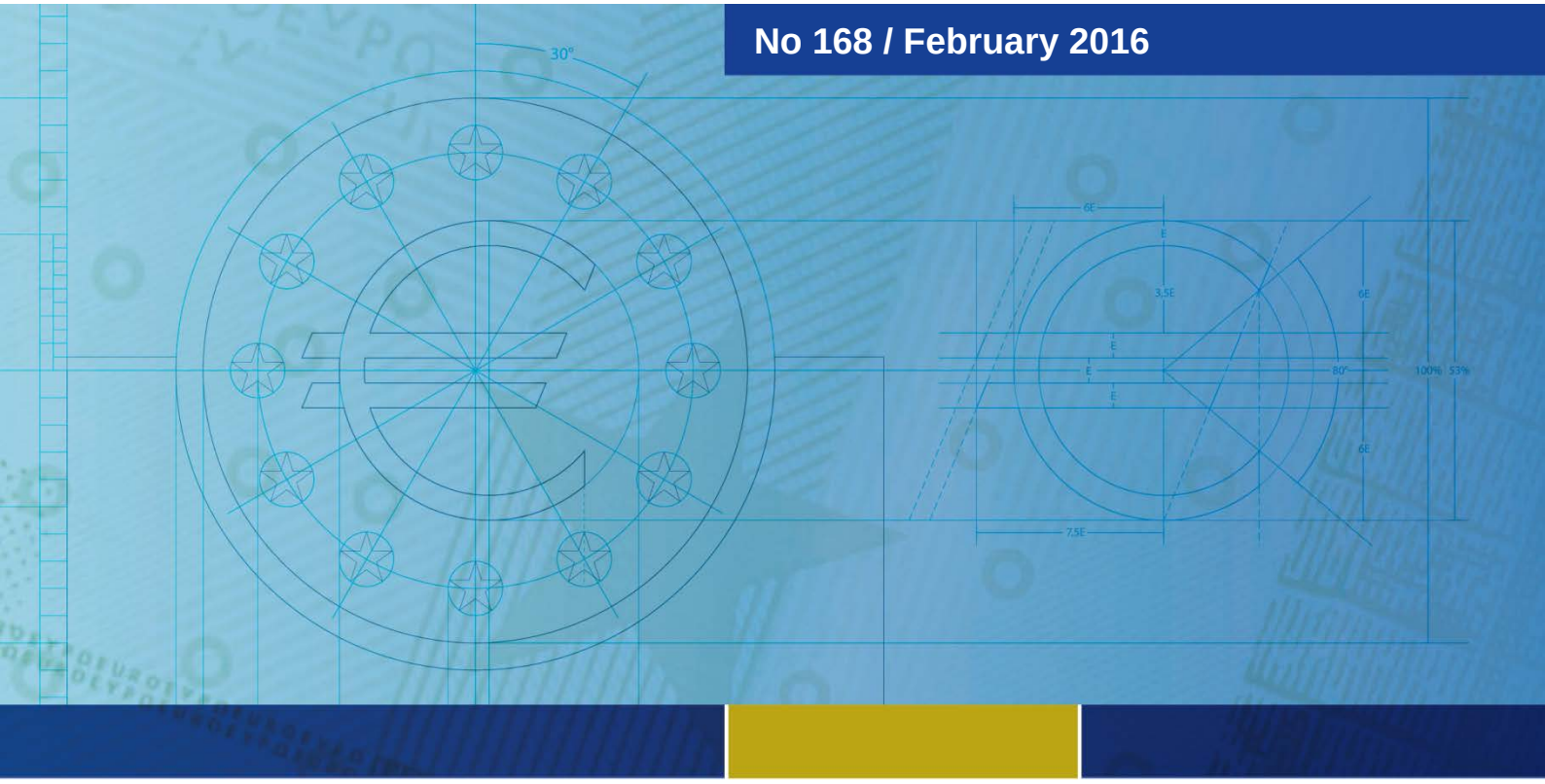


Contents

Abstract

Euro area countries exhibited modest convergence prior to the financial crisis and diverged thereafter. Such divergence has been examined from many angles, and various narratives of the crisis have developed. Surprisingly, the gradual transformation of the economic structures of euro area countries over the last 15-20 years has, however, received less attention. This paper brings together several strands of evidence - both macro and micro - on such economic transformation. It makes three contributions. First, profound changes are found in the allocation of countries' resources across sectors as had been predicted prior to the launch of the euro. In some cases, transformation precedes the launch of the euro, such as the industrial sector, and might reflect different comparative advantages. Such specialisation is not problematic, and is generally accompanied by diverse risk sharing channels. Yet, the second contribution of this paper is to show instead that in some euro area countries productive resources were misallocated to less efficient and lower productivity sectors. In order to distinguish between good and bad specialisation, a firm-based database is examined. The third contribution shows that frictions play an important role in preventing the shift of resources towards more productive firms and thus reduce the potential growth of some countries. This might then explain in part the modest convergence and then divergence of euro area countries.

JEL codes: E01, F45, J21 and O47

Keywords: euro area, convergence, specialisation, productivity, risk-sharing

Non-technical summary

Euro area countries exhibited modest convergence before the financial crisis and diverged thereafter. This divergence has been examined from many angles, and diverse narratives of the crisis have developed. Surprisingly, the gradual transformation of the economic structures of euro area countries over the last 15-20 years has received less attention. Yet opposite predictions preceded the launch of the euro. There were optimistic views expecting further convergence and steady integration, sceptical assessments about the viability of the euro area, critical warnings about inexorable divergence across euro area countries, and agnostic predictions about countries specialising along their comparative advantages. Some predictions were proven wrong, but some help explaining some initial findings of this paper.

This paper brings together several strands of evidence – both macro and micro – about such economic transformation. Three contributions are put forward. The first contribution is to show changes in the allocation of countries' resources across sectors. This inference is based on changes in Gross Value Added shares. In some cases, transformation precedes the launch of the euro, as in the case of the industrial sector, agriculture and ICT. Overall, this might reflect different comparative advantages and was predicted to happen before the launch of the euro. Conversely, in some other sectors, such as construction, as well as the financial sector and real estate, excesses in some countries appeared after the launch of the euro (as explained by various narratives of the crisis).

Given the large number of developments unfolding, a Krugman Specialisation Index (KSI) score is calculated to gauge summary measures of how countries may become more differentiated: there is clear evidence of rising specialisation across euro area countries. This specialisation process can be the result of countries exploiting their comparative advantages, in which case it is not problematic as it is generally accompanied by various risk sharing channels. However, in some other cases specialisation might result from inefficiencies in the allocation of productive resources. Most importantly, the paper establishes that specialisation is highest in the case of manufacturing and substantially lower in the case of market based services. This is an important distinction because the overall degree of country specialisation is then conditional upon the increasing share of service in the economy.

The second contribution of the paper is the presentation of evidence that in some countries productive resources are misallocated to less-efficient and lower-productivity sectors. Hence there needs to be a distinction between good and bad specialisation. Therefore, the paper turns to the new CompNet database that provides some firm-level data for a few countries in order to look at changes in resource allocation. There is clear evidence that the euro area countries in the sample allocate their resources differently across manufacturing firms. Moreover, such allocation took different paths across countries and over time. For example, in

Austria and Germany there was a reallocation of labour towards the highest percentile of productive firms: this, in turn, might have sustained resilience in employment levels even during the crisis. Conversely, aggregate labour productivity in Italy and Portugal may lag behind partly because inputs were not allocated efficiently across manufacturing firms. The net effects of financial integration on specialisation, and shock absorption are more complex to decipher.

The third contribution of the paper consists of the finding that in some countries, frictions play an important role in preventing the shift of resources towards highly productive firms, thus reducing their overall labour productivity (and possibly potential growth). This might help explaining a part of the modest convergence and then recent divergence of euro area countries. The shift-share analysis makes it possible to investigate which sectors might be driving countries' productivity developments, and whether or not labour is employed in sectors where it is most productive. There is instead evidence that a combination of inertia, structural rigidities and frictions, might be holding back – at least for now - some euro area countries.

Last, the incipient evidence of changing economic structures of euro area economies should not be judged in isolation. Instead, it should be further researched from complementary perspectives, such as:

Vis-à-vis the "financial repair" of capital markets. What was the role of financial frictions and financial fragmentation during the crisis? The vast risk-sharing & income insurance literature suggests it might be indispensable to strengthen ex-ante as well as ex-post risk-sharing channels. How could the capital market union support good specialisation?;

Vis-à-vis the New Trade Theory/Economic Geography suggesting that the role of "borders" should be examined more closely. Interestingly, Krugman and Venables (1996) postulate that a "polycentric geography is also sustainable";

Vis-à-vis the new governance and the unravelling of the factors that contributed to the crisis; and

Ultimately, vis-à-vis the degree of business cycle synchronisation across euro area countries. Some see it as a meta-OCA property that needs to be satisfied over long periods after the effects of the crisis have been absorbed and economies have adjusted and become more resilient.

1 Introduction

Over the last eight years, the euro area has confronted a changing crisis. It all started with the Financial Turmoil, followed by Lehman's Bankruptcy, the Global Financial Crisis and the Great Recession. This sequence of crises exacerbated the fiscal, macro and financial imbalances which were already accumulating in several euro area countries. Flaws in "EMU's architecture" were exposed, the failure of market discipline emerged, and euro area economies started diverging.

Several explanations for the crisis have been put forward, including the "competitiveness narrative" (Sinn and Valentinyi (2013)), the "fiscal narrative" (Schuknecht et al (2011) and Sinn (2012)) and the "banking narrative" (Constâncio (2013) and Chen, et al (2012)).[1] EMU's governance could not prevent – and in part, it has been argued, endogenously fuelled – the accumulation of public and private debt in several countries. Then, when the sovereign crisis erupted in 2010, neither a crisis management framework nor financial backstops were in place for sovereigns or banks to contain the propagation of the shocks. This "institutional narrative" of the crisis is discussed in Dorrucci et al (2015). These narratives have been widely examined, both jointly and in isolation. Each aids understanding of how the euro area came so close to breaking up, which is the ultimate form of divergence.

Yet despite the richness of these explanations, could something important still be missing? Yes, and the transformation of economic structures of euro area countries over the last 15-20 years comes to mind. The goal of this paper is to collect evidence about such transformation, set it in the context of the vast literature that preceded the launch of the euro and assemble a toolkit to examine several early predictions. There are various limitations in this undertaking. The time series are short and have breaks.[2] The Euro area has been in crisis mode since 2007 and is not out of it yet. Moreover, several countries are just completing their adjustment programmes. EU/euro area governance is being transformed to address several flaws. Given these limitations, what can this paper deliver?

This paper makes three contributions. First, it brings together several predictions that preceded the launch of the euro. There were optimistic views, sceptical assessments, critical warnings and agnostic predictions about countries specialising according to their comparative advantages. Some predictions help explain the diverse initial findings. The paper's second contribution is to look at the changes in economic structures of euro area countries using a variety of macroeconomic statistics, but also a new set of firm-level data which has recently become available thanks to the Competitiveness Research Network (CompNet). The paper's third

1 Moreover, households, and to a lesser extent firms, took advantage of cheap and abundant liquidity (Fernández-Villaverde et al. (2013)). When the euro area crisis hit, stressed euro area countries experienced "*sudden stops*" and there was financial fragmentation (Camba-Mendez, et al (2015)). A "doom loop" ensued (Schaumbaugh (2012)).

2 *How short?* At an ECB conference Andy Rose postulated that it may take about 30 years to see the euro's full effects.

contribution is to distinguish between developments that started prior to the launch of the euro and those that took place afterwards and flag areas for further research.

The paper is organised as follows. Section 2 sets the context by reviewing the various predictions before the launch of the euro. This will help explain some of the later findings. In order to assess the foresight of some predictions, Section 3 presents evidence about per-capita income before and after the launch of the euro. This indicates some convergence prior to the launch of the euro and definitely divergence thereafter. What might be driving such divergence? To find some clues, per-capita income is broken down into changes in labour productivity, employment, participation and working age ratios. Different dynamics in labour productivity explain a large part of income divergence. But what do countries do and how is their labour employed? Section 4 presents a macro-perspective of the changes in the economic structures of euro area countries. This is based on an analysis of changes in Gross Value Added shares. The economic transformation that emerges is significant for several sectors, such as Industries, Construction and the Public Sector. In the case of Industry, the transformation started well before the launch of the euro. However, in some other sectors, such as Construction, and in some countries, excesses appeared after the launch of the euro (the above crisis narratives explain the underlying reasons). Given the large number of developments unfolding across so many sectors and over time, Section 5 applies the Krugman Specialisation Index (KSI) to gauge summary measures of how countries may become more differentiated: there is evidence of rising specialisation across euro area countries. This specialisation process can either be the result of countries exploiting their comparative advantages, of industry concentrating or even relocating outside the euro area, or of inefficiencies in the allocation of productive resources, or a combination of these and other factors. Yet there is only so much that macro-evidence can show in this case. Section 6, therefore, takes advantage of the new CompNet database of firm-level data to look at changes in resource allocation. It asks whether workers move to firms in which their productivity is highest: in some countries they do not. Section 7 carries out a shift-share analysis to investigate which sectors might be driving countries' productivity developments; whether some sectors in a specific country are more productive than in another; and whether labour is employed in sectors where it is most productive. The evidence points to inefficiencies and the misallocation of resources in several euro area countries. Section 8 draws some preliminary final remarks and lists various ways forward for research in this area.

The paper focuses on the 12 initial members of the euro area – Austria, Belgium, Germany, Greece, France, Finland, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain – as these countries are the most likely to be fully impacted by the EMU project, the preparation for the single currency and its launch in 1999 (and physical introduction in 2002). CompNet data is available only for a few countries and Austria, Germany, Portugal and Italy are selected for a few comparisons. The evidence compiled is rapidly evolving and still somewhat fragmented. Other pitfalls and caveats are listed along the way. Thus this paper makes an attempt to bring together several strands of literature on the effects of the euro.

2 EMU-optimists vs EMU-pessimists

What did many academics and experts think about the EMU project when plans were put forward at the end of the 1980s? What did they expect from the euro? Before the launch of the new single currency in 1999, there were diverse opinions concerning the future of the euro area and the prospect for further convergence. At the risk of oversimplifying, they might be summarised as follows.

2.1 EMU-optimism

The consensus view of optimists was that economic and monetary integration – and the new single currency, the euro – would foster deeper links and convergence. This view evolved over time. Initially, the "One Market, One Money" report assumed that the euro would complement the EU Single Market (Emerson Report (1992)) and prevent disruptive competitive devaluations. The euro was also expected to enhance price transparency, discourage price discrimination, promote intra-euro area trade in goods and services, and support economic and financial integration and hence overall convergence.

Some saw the euro as the "cherry on the pie", i.e. the single market pie. Coe and Helpmann (1995) noted instead that integration facilitates "technology spillover", which fosters more similar supply sides, thus supporting symmetry of output fluctuations. McCallum (1995) noted that a single currency facilitates cross-country foreign direct investment (FDI), builds long-term relationships, supports economic and financial integration and fosters business cycle synchronisation.

Some years later, the literature on "One Money, One Market" changed the perspective about the effects of monetary integration and postulated that the euro lowers trading costs and removes an important trade barrier, i.e. national currencies and the exchange rate risk. It was argued this would steadily catalyse further economic integration and not just complement the Single Market. This would, in turn, stimulate further convergence among euro area countries (Gaspar and Mongelli (2003)).[3] Convergence might even happen endogenously as in the "OCA Endogeneity" line of contributions. Thus the euro area may turn into an optimum currency area (OCA) after the launch of monetary integration even if it wasn't an OCA before, or "countries which join EMU, no matter what their motivation may be, may satisfy OCA properties ex-post even if they do not ex-ante!" (Frankel and Rose 1997).

[3] Today we know that the euro has been accompanied by more reciprocal trade between euro area countries, (and with no "fortress Europe"). Estimates on the higher degree of openness range from a few percentage points to a more significant increase in intra-euro area trade.

In any case, greater overall integration, more synchronised demand shocks and further convergence were expected by EMU-optimists.[4]

2.2 EMU-scepticism and selected criticisms

Yet there were various dissenters. In fact, EMU-scepticism was born with EMU and the euro. A large number of US-based academics, including Paul Krugman and Martin Feldstein, were doubtful that the euro area could function as a viable economic and monetary union: it may even lead to war amongst its member countries, added Feldstein (1999). In their view, euro area countries, as a group, failed the Optimum Currency Area tests. [5] For example, the euro area shows little labour mobility, shares no supranational fiscal arrangement comparable to the US Federal Budget (which can buffer asymmetric economic shocks hitting US states) and has no political union.

There is also the Walter Critique. With a unified money and bond market, upon the launch of the euro, nominal interest rates were equalised. Mechanically, therefore, real interest rates were lower when inflation was higher and were expected to remain so. This observation is encapsulated in the critique that is named after Sir Richard Walter. The critique held that the effects of the common monetary policy would be more expansionary in euro area countries with high inflation rates and more contractionary in countries with low ones. As a result, growing disequilibria may occur, with inflation rising where it started higher and declining where it started lower. However, this was not seen to be happening (Mongelli and Wyplosz (2009)). With a fixed exchange rate, higher inflation also means an appreciating exchange rate, which caused competitiveness to deteriorate and reduced demand. Thus any expansionary effects of low real interest rates were partly offset by the contractionary effects of an appreciating real exchange rate.

2.3 Various predictions concerning a country's "specialisation"

"Specialisation" is about the emergence of endogenous patterns altering economic structures of euro area countries. Individual euro area countries producing a wide range of products and services 15-20 years ago, would, over time, concentrate on fewer activities and their economies would become more dissimilar from each other (which is another OCA property). This might subject euro area countries to increasingly idiosyncratic shocks. Their incomes could become less correlated and

4 Consequently, the boundaries of new currency unions could be more widely drawn in the expectation that trade integration and income correlation would increase once currency union is created. For some qualifications see Wyplosz (2006), and Mongelli and Wyplosz (2009). More recently, these early findings were completely overturned when Glick and Rose (2015) re-ran a new set of gravity models using a dataset including the euro and found no significant effect of currency union on trade.

5 For a survey of early EMU scepticism, see "*It Can't Happen, It's a Bad Idea, It Won't Last: U.S. Economists on the EMU and the Euro, 1989-2002*" by Jonung and Drea (2010).

there might even be persistent divergence. However, divergence is not a necessary outcome if there are compensating risk-sharing channels.

Two complementary channels might foster specialisation: the New Trade Theory and income insurance. In the New Trade Theory, Paul Krugman and Anthony Venables argue that the removal of an important trade barrier, i.e. legacy currencies, encourages economies to specialise in a limited variety of productions in order to take advantage of economies of scale. This might not necessarily follow differences in their endowments as postulated in the neoclassical theory (Krugman and Venables (1996)). Industrial agglomeration and likely industry concentration follow. The end result would be that euro area countries become more specialised and might exhibit persistently diverging economic patterns.

Another channel fostering specialisation might also be at work: income insurance. Kalemli-Ozcan, Sørensen, Yosha (2003) argued that higher financial integration strengthens risk-sharing opportunities. This makes specialisation in production more attractive, generating less symmetric macroeconomic fluctuations. Members of a currency union would then become less diversified and more vulnerable to asymmetric shocks. Correspondingly, their incomes will become less correlated. Kalemli-Ozcan, Sørensen and Yosha (2003) provide empirical evidence that financial integration enhances specialisation in production, based on US data.

2.4 About various EMU criticisms

Other EMU-critical academics, such as Berry Eichengreen, Maurice Obstfeld, Kenneth Rogoff, Michael Bordo and Paul Garber, were somewhat more nuanced. They pointed to specific flaws in EMU's institutional framework, such as the lack of a lender of last resort for banks and/or sovereigns, centralised decision-making or a single banking supervisory body. Chris Sims (1999) asked whether EMU's institutions were equipped to deal with "stress". He observed that "…fiscal institutions as yet unspecified will have to arise or be invented in order for EMU to be a long-term success".

Another group of critics, both in the US and Europe, feels that economic and monetary union is not viable without a greater degree of political union. In the view of these critics, EMU's political economy was born weak and would need strengthening (which is happening today with various institutional reforms). In the meantime, the implication of these combined criticisms is that the euro area would not have ready backstops or political procedures to tackle and contain idiosyncratic shocks.

2.5 The things we trade: is it intra or extra, or is it services?

Firdmuc (2004) makes a case that intra-industry trade has risen the most among euro area countries thus far. Ceteris paribus, this increases the symmetry of business cycles. Melitz (2004) postulates that EMU would promote higher intra-industry trade, reduce national specialisation and increase the symmetry of business

cycles. Fontagné and Freudenberg (1999) also find that the elimination of exchange rate variability has fostered product differentiation in European trade, i.e. intra-industry trade is occurring more in horizontally-differentiated goods (two-way trade in varieties) than in vertically-differentiated goods (two-way trade in qualities). On the other hand, inter-industry trade would do the opposite. Fontagne and Freudenberg (1999) also argue that even if agglomeration and inter-industry trade occurs in some industries, this tendency might be counteracted by more intra-industry trade overall, i.e. trade in diversity.

There is one consideration supporting the view that economic integration may not, after all, lead to full country specialisation and increased asymmetric shocks within monetary union. This has to do with the rising importance of services. Economies of scale do not seem to matter as much for services as for industrial activities. As a result, economic integration does not lead to regional concentration of services in the way it does with industries. As services become increasingly important, and today they account for about 70 percent or more of GDP in many EU countries, the trend towards the regional concentration of economic activities may stop even if economic integration moves forward.

2.6 Takeaways from EMU/euro predictions

Plans for EMU and the subsequent launch of the euro aroused great interest and stimulated a wide range of research contributions. With hindsight, the various criticisms of EMU's architecture are being addressed by a slew of institutional reforms since the onset of the crisis, such as the Fiscal Compact, the Macroeconomic Imbalances Procedures (MIP), the setting up of the Single Supervisory Mechanisms (banking union). There is also a drive towards four types of unions, i.e. economic, capital market, fiscal and political union. The issues of countries' specialisations and convergence versus divergence, are instead an empirical matter and are discussed in the rest of this paper, bearing in mind that it may take a long time to see the full effects of the euro.

3 Macro evidence (I): convergence versus divergence

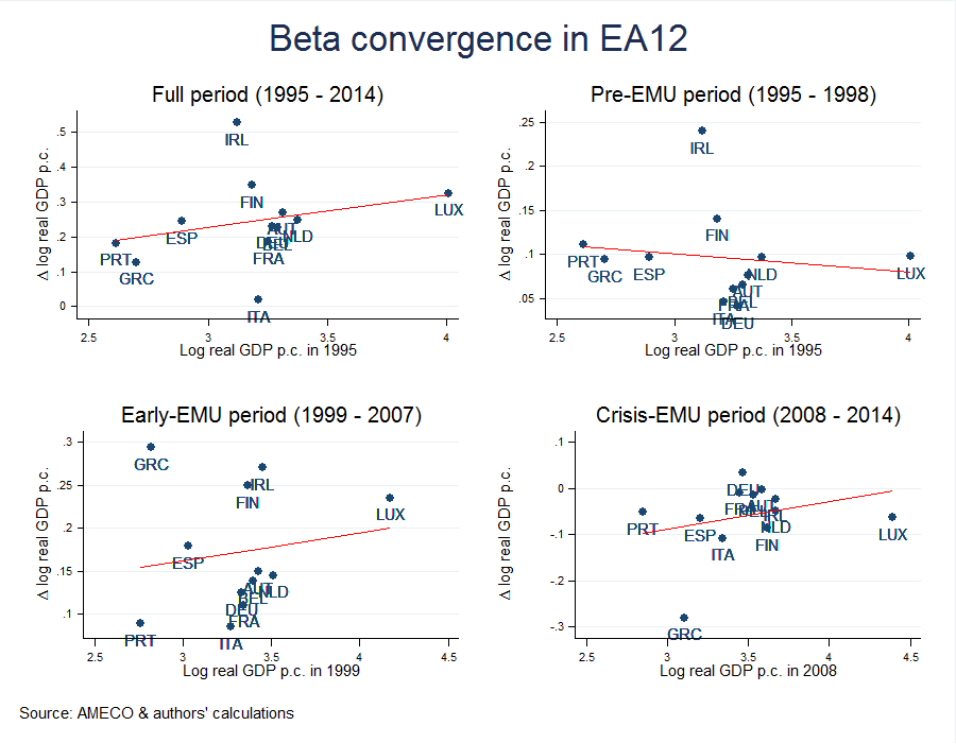
This section provides an initial look at changes in per-capita income across euro area countries. Which drivers can help explain the initial modest euro area convergence and the subsequent divergence in recent years?

3.1 Has there been income convergence?

A good starting point is to look at the convergence between euro area countries. Did countries with an initially lower level of income (measured by the log of real per-capita GDP in 1995) experience higher per-capita growth in GDP? The sample period is split into three segments: the first pre-euro period runs from 1995 to 1998, the second period covers the early years of monetary union from 1999 until 2007, and the last period encompasses the years after the start of the global financial crisis in 2008 until 2014. Hence, a distinction is made between convergence/divergence that might have taken place before the launch of the euro, after the launch of the euro, and during the crisis period.

Figure 3.1 shows the evidence of income convergence or divergence for the paper's sample of 12 Euro area countries. When the entire time period between 1995 and the latest included data (as of 2014) is considered, there is no evidence of income convergence. On the contrary, the pre-euro period shows some weak evidence of beta convergence with a positive coefficient β. Dispersion is high though. One can clearly identify a cluster of middle income countries (as of 1995) which experienced relatively low income growth over the pre-EMU period. Further, both the country with the highest initial income (Luxembourg) and the countries with the lowest initial income in 1995 (Portugal, Greece and Spain) experienced similar rates of per-capita GDP growth. Ireland is an outlier with the highest per-capita income growth over the period analysed. In addition, it becomes evident that income in Italy grew at a lower rate than in countries that had comparable income levels in 1995. In fact, real per-capita income in Italy was almost the same in 2014 as in 1995. This warrants further investigation later in the paper.

Figure 3.1
Income convergence/divergence in the Euro Area



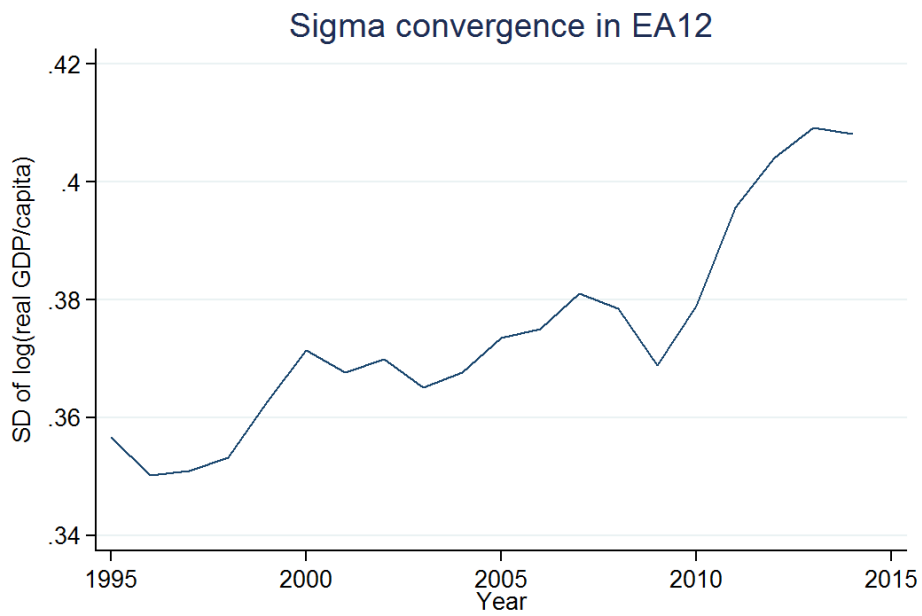
Source: AMECO & authors' calculations

Income growth continued after the launch of the euro. However, countries that experienced the lowest income growth prior to EMU, such as Germany or Italy, were still growing slowly. Ireland was, again, an outlier with continuing strong growth, as were Finland and Greece. The previously-identified cluster of middle- to high-income countries can still be clearly identified, so that any attempt to fit a linear model will be driven by countries that are "scattered" around this grouping of countries. There is no evidence of beta convergence during the early EMU period; on the contrary, a linear regression model would show an increasing slope indicating that high income countries grew faster during this period. This should however be regarded as weak inference on divergence only, as it is driven by the performance of Luxembourg and others.

During the crisis period from 2008 to 2014, the picture shows divergence of per-capita income within the Euro Area 12, but this time the EA12 countries are grouped relatively close together with one notable exception, which is again Greece. Log real per-capita GDP declined for almost all countries in this period. However, the decline was most pronounced in Greece, wiping out previous gains. Although the boom-bust experience of Greece stands out (Ireland recovered somewhat in the most recent years), per-capita income actually declined in various euro area countries and over a

protracted period. Such declines were considerable in the cases of Portugal and Italy. Only Germany posted positive growth.[6]

Figure 3.2
Income dispersion



Source: AMECO & authors' calculations

What is also apparent in Figure 3.2 is that after an initial decline in the standard deviation of real per-capita GDP at the beginning of the sample period, dispersion increased to 0.38 by the end of the second sub-period in 2007. During the financial crisis, income differences decreased for about two years, - probably because economic activity and income declined across the board - after which the standard deviation increased again to above 0.40 towards the end of the sample. Income dispersion within the EA 12 is higher than at the beginning of the sample period, contradicting the hypothesis of sigma convergence.

What is happening? Prima facie, this evidence seems to back the view of various EMU critics that EMU would stimulate divergence among euro area countries. However, this evidence is not statistically robust, but is just indicative. To shed some light on the matter, the rest of this section breaks down the main drivers of per-capita income across the euro area over long periods of time. The search for clues starts by breaking down per-capita GDP growth.

6 There is, however, some early evidence of income convergence if all EU 27 countries are included, i.e. when the faster-growing new EU members are added. See Economic Bulletin July 2015 (ECB (2015)).

3.2 Breaking down per-capita GDP growth

The trend in per-capita GDP growth discussed in the previous section can be broken down statistically into four main components: the output of those employed (labour productivity), the number of people with a job (employment rate), the share of people that actually opted to be in the labour market and would like to work (participation rate) and the total share of people that might be eligible to work if they wanted to (working age ratio).[7]

$$\frac{GDP}{population} = \frac{GDP}{employment} \cdot \frac{employment}{labour\ force} \cdot \frac{labour\ force}{population^{working\ age}} \cdot \frac{population^{working\ age}}{population}$$

$$GDP\ per\ capita = labour\ productivity \cdot employment\ rate \cdot participation\ rate \cdot working\ age\ ratio$$

Of these four components, labour productivity carries the largest weight and is the one focused on in the rest of this paper (see **Table 3.1** below). Changes in employment rates, participation rates and working age ratios are treated as exogenous and are beyond the scope of this paper. In all euro area countries, annual per-capita GDP growth is positive in the first two sub-periods. Euro area countries grew by about 3.2% per year on an unweighted basis during 1995-98, and by about 1.9% during 1999-2007, i.e. growth slowed somewhat in the first nine years after the introduction of the euro, but still remained at historical averages. Yearly gains in labour productivity account respectively for 1.7% during 1995-98 (explaining more than half of annual income growth) and for about 1.1% during 1999-2007 (explaining a slightly higher share of annual income growth). During 2008-2014, per-capita GDP growth shrank on average by 0.7% per year, whereas labour productivity still grew, if only by 0.1%.

Thus, notwithstanding the decline in income growth, labour productivity plays a relatively more substantial role in the "convergence versus divergence" debate. Differences across countries are substantial as euro area countries that underwent IMF/EU/ECB adjustment programmes outgrew all others upon the launch of the euro during 1999-2007 (with the exception of Portugal). Italy is an underperformer in both sub-periods, accounting for the smallest growth in labour productivity during 1995-2007.

[7] Economic growth is a combination of various additional factors such as demographics, capital endowment, human capital, natural resources, comparative advantages, a trained labour force that is able to work, and so on. Several of these factors are beyond the scope of this paper.

Table 3.1

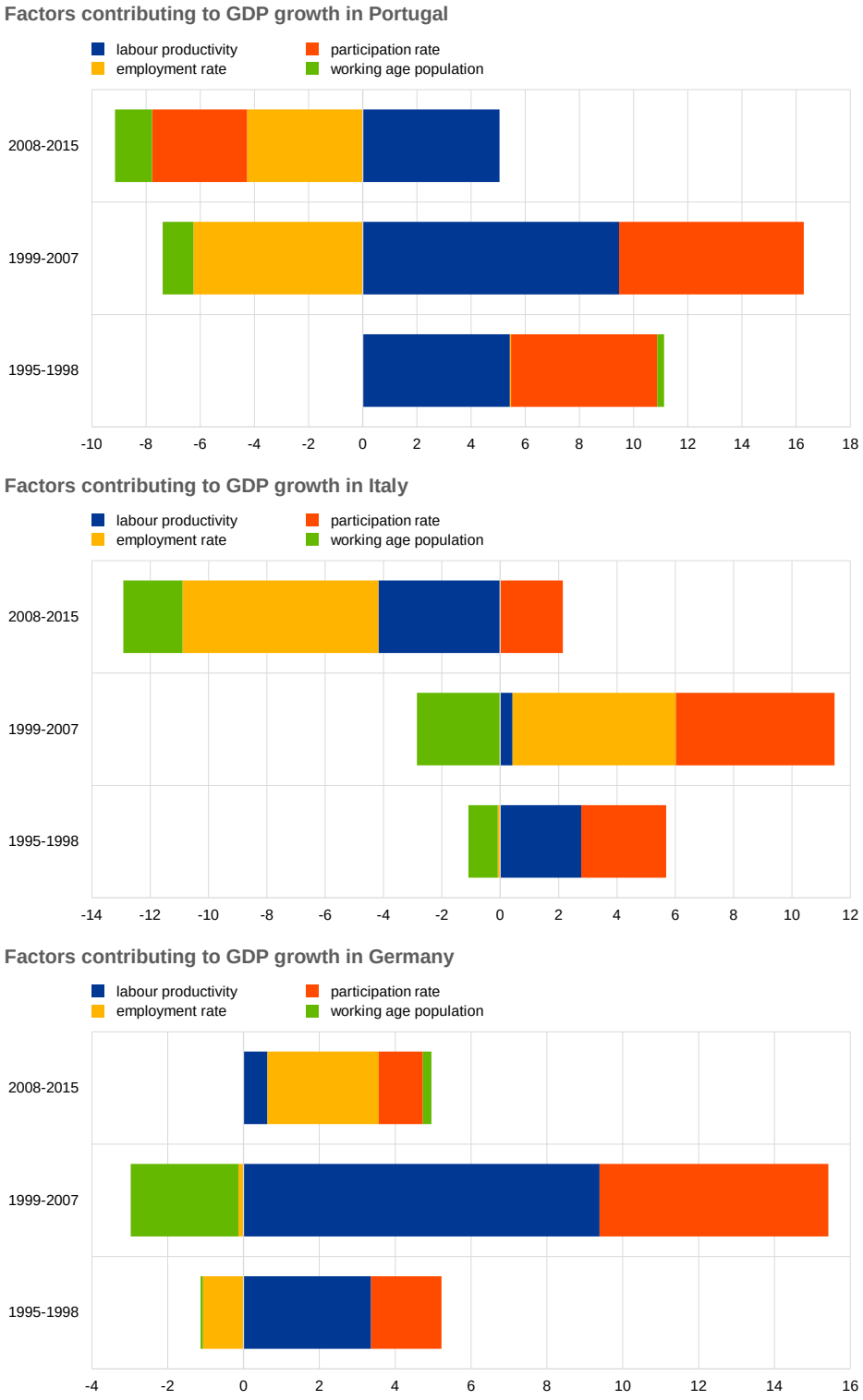
Decomposition of GDP growth

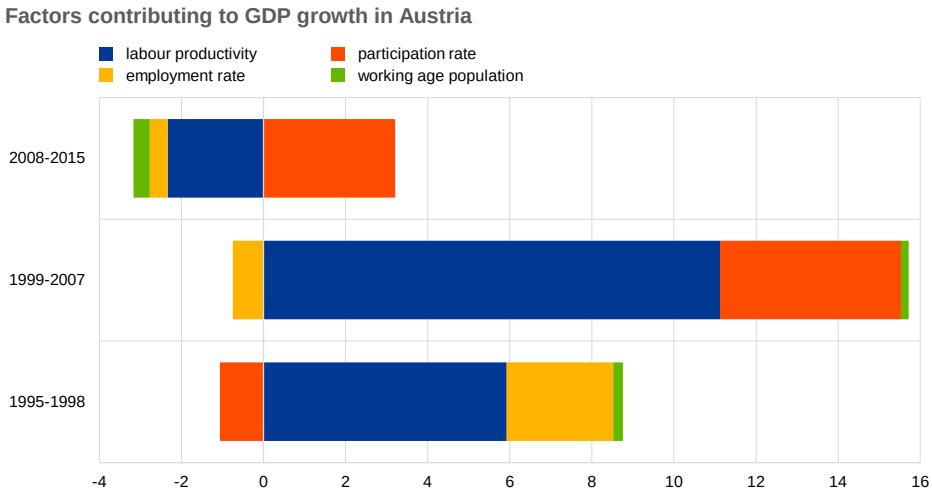
	% growth of	1995-1998	1999-2007	2008-2015		
					2008-2012	2013-2015
DE	gpd/ capita=	4.1	12.4	5.0	2.3	2.7
	labour productivity	3.4	9.4	0.6	-0.7	1.8
	+ employment rate	-1.1	-0.1	2.9	1.9	0.9
	+ participation rate	1.9	6.0	1.2	1.1	0.0
	+ working age ratio	-0.1	-2.8	0.2	0.1	0.0
FR	gpd/ capita=	6.1	11.1	-0.2	-0.6	0.5
	labour productivity	4.1	9.0	2.9	1.6	0.8
	+ employment rate	-0.2	1.8	-3.2	-2.6	0.0
	+ participation rate	2.4	0.3	3.2	1.9	0.7
	+ working age ratio	-0.1	0.0	-3.1	-1.5	-0.9
BE	gpd/ capita=	6.5	13.8	-1.3	-2.3	1.2
	labour productivity	4.5	9.4	1.3	-0.6	1.3
	+ employment rate	0.6	0.4	-1.6	-0.2	0.0
	+ participation rate	2.0	3.5	0.8	-0.7	0.6
	+ working age ratio	-0.6	0.5	-1.8	-0.8	-0.7
NL	gpd/ capita=	9.7	14.5	-3.4	-4.1	1.7
	labour productivity	3.8	9.7	1.4	-1.1	1.9
	+ employment rate	2.2	-2.1	-3.4	-1.5	0.1
	+ participation rate	4.1	7.7	1.6	0.1	0.4
	+ working age ratio	-0.5	-0.8	-2.9	-1.6	-0.7
LU	gpd/ capita=	9.7	23.5	-4.8	-6.4	1.9
	labour productivity	3.6	5.6	-4.6	-6.2	1.6
	+ employment rate	6.0	13.2	-0.3	-0.3	0.5
	+ participation rate	1.0	3.3	-1.3	-1.3	0.1
	+ working age ratio	-0.9	1.3	1.3	1.5	-0.3
IT	gpd/ capita=	4.6	8.6	-10.8	-8.0	-0.6
	labour productivity	2.8	0.4	-4.2	-3.8	-0.4
	+ employment rate	-0.1	5.6	-6.7	-4.3	-0.6
	+ participation rate	2.9	5.4	2.1	1.2	1.1
	+ working age ratio	-1.0	-2.9	-2.0	-1.0	-0.6
IE	gpd/ capita=	24.3	27.1	0.5	-6.6	7.1
	labour productivity	10.0	15.2	13	10.2	4.9
	+ employment rate	5.9	0.2	-2.3	-8.3	3.3
	+ participation rate	5.6	8.4	-4.3	-4.9	0.3
	+ working age ratio	2.8	3.4	-5.9	-3.6	-1.4
GR	gpd/ capita=	9.4	29.4	-27.1	-25.3	1.6
	labour productivity	7.9	21.0	-7.6	-7.6	0.0
	+ employment rate	-4.0	3.6	-20.1	-19.0	2.5
	+ participation rate	4.9	6.5	3.1	3.2	-0.8
	+ working age ratio	0.5	-1.7	-2.4	-2.0	-0.1
ES	gpd/ capita=	9.6	17.2	-4.5	-8.1	4.6
	labour productivity	1.1	0.5	9.7	8.2	0.0
	+ employment rate	4.3	1.4	-12.8	-16.2	5.0
	+ participation rate	3.8	14.5	2.5	2.0	0.5
	+ working age ratio	0.4	0.8	-3.7	-2.1	-0.9
PT	gpd/ capita=	11.1	8.9	-4.1	-6.7	3.7
	labour productivity	5.4	9.5	5.1	3.2	0.5
	+ employment rate	0.0	-6.2	-4.3	-6.7	3.4
	+ participation rate	5.4	6.8	-3.5	-2.2	-0.3
	+ working age ratio	0.2	-1.1	-1.4	-1.1	0.1
AT	gpd/ capita=	7.7	15.0	0.0	0.6	-0.2
	labour productivity	5.9	11.1	-2.3	-1.5	-0.4
	+ employment rate	2.6	-0.8	-0.4	0.2	-0.2
	+ participation rate	-1.1	4.4	3.2	1.7	0.7
	+ working age ratio	0.2	0.2	-0.4	0.1	-0.3
FI	gpd/ capita=	14.1	24.9	-8.9	-6.5	-0.7
	labour productivity	8.3	16.5	-3.1	-3.6	0.4
	+ employment rate	5.6	6.3	-2.0	-0.5	-1.0
	+ participation rate	0.1	2.7	1.0	-0.1	1.6
	+ working age ratio	0.0	-0.5	-4.8	-2.2	-1.7

The picture has changed since the start of the global financial crisis in 2008 and then the euro area crisis in 2010. Growth in per-capita income slowed or reversed in all countries with the exception of Germany and Austria. In formerly stressed euro area countries – Greece, Ireland, Portugal, Spain and Italy – income contracted by over 2% per year on an unweighted basis during 2008-2012. In most countries, income growth has rebounded in the last three years with a few exceptions. Figure 3.3 again highlights the importance of labour productivity (shown in red) and labour market conditions for per- capita income growth. Due to space considerations, this section focuses on Portugal, Italy, Germany and Austria. These four countries will also be followed in the next sections for other indicators.

Figure 3.3

Examples of GDP growth breakdowns





3.3 Takeaways from income divergence and growth drivers

This section makes two points. The first is that there is evidence of income divergence across euro area countries: in fact, divergence has been rising – on an irregular path – since the launch of the euro. It retrenched somewhat during the Great Recession, but picked up during the euro area crisis. Per-capita income actually fell back in various stressed countries. In the meantime, income also rebounded in Ireland, Spain and Portugal. The second point is that changes in income are mainly driven by changes in labour productivity, which also vary by wide margins and develop unevenly across countries. Yet this analysis has limitations in explaining what is happening at the level of economic structures. In order to dig deeper in search of the root causes of euro area divergence, the paper turns to the analysis of sectoral specialisation of euro area countries.

4 Macro evidence (II): sectoral specialisation in the euro area

This section focuses on Gross Value Added (GVA) shares along the main sectors of the economy. GVA shares measure the contribution to the economy of each sector and total the Gross Domestic Product (GDP).[8] Changes in GVA shares growth provide an initial indication of the extent of change in economic structures. The section also plots the sub-sectors of manufacturing as a share of industrial Gross Value Added and discusses the possible explanations and implications of the main findings.

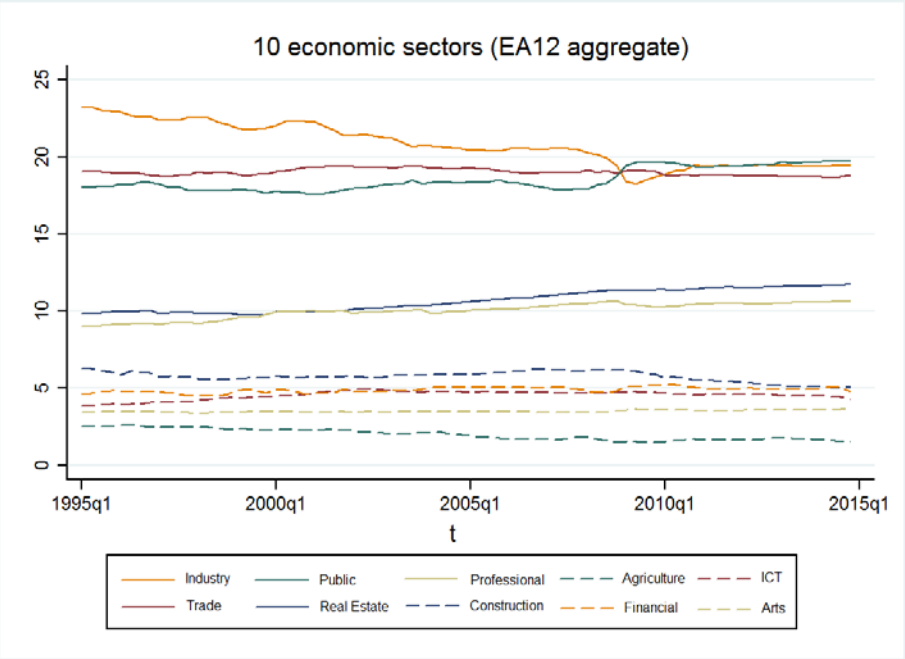
4.1 Slow but steady changes in euro area Gross Value Added shares

Changes in GVA shares of the euro area as a whole were rather gradual. Figure 4.1 depicts the share of the ten sectors out of total gross value added (GVA). These are: Industry, Construction, IT, Professional, Agriculture, Public Sector, Financial Sector, Real Estate, Trade and Arts. While the weights of the Wholesale and Retail Sale Sector, as well as the Real Estate sector, did not change significantly over time, the size of the other sectors clearly varied over the period 1995-2014. The Professional, Scientific and Technical Activities and ICT (Information and Communication Technology) sectors steadily increased in size. The ICT sector, in particular, increased over time, growing from 3% in 1995 to almost 6% in 2014. Construction and the Financial Sector grew until the onset of the crisis but retrenched somewhat in the aftermath, in recent years. In addition, the industrial and public sectors were clearly affected by the crisis, even though the effect appears to work in opposite directions. Until the crisis, the size of the industrial sector steadily declined to around 20% of total GVA.

[8] Technically, the sum of GVA shares at current basic prices, plus taxes on goods and services, less subsidies on goods and services provides a measure of GDP at current market prices.

Figure 4.1

Share of economic sectors in total GVA (as a percentage), 1995-2014



Source: Eurostat Data is adjusted seasonally and by working days

During the crisis, the share of industrial output initially fell relative to total GVA and, despite a small bounce back, has still not returned to the pre-crisis level. The average share of Industry in gross value added in the EA12 declined from over 23% in 1995 to around 19% in 2014. Yet, interestingly, the share seems to have stabilised in early 2011. Might the crisis have triggered changes that buck the declining trend? To stabilise the economy, the Public Sector share increased during the crisis and has stabilised at this high level. Construction showed a slow decline at the beginning of the sample period, and a more pronounced fall after the onset of the crisis in 2007. There is no discontinuity around the time of the launch of the euro or the early years of the single currency, i.e. until 2007.

4.2 Changes in sectoral GVA shares across euro area countries

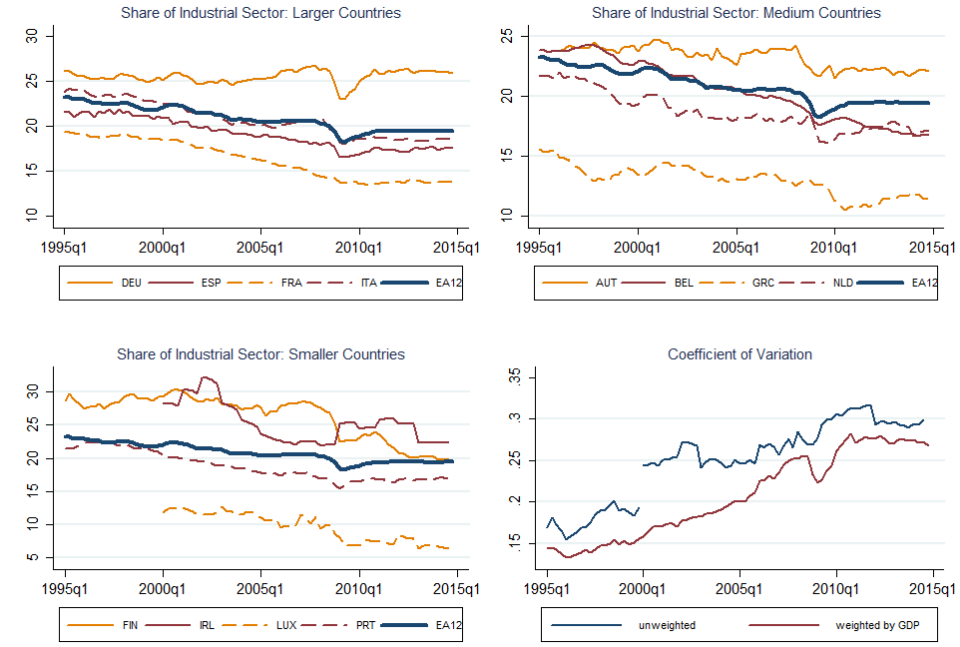
This section looks at the trends in some specific sectors over the sample period, starting with the Industrial sector (Figure 3.2). The only countries that did not experience a decline in Industry shares before the crisis were Germany and Austria, while Finland experienced a modest fall. During the Global Financial Crisis and Great Recession, i.e. between 2008 and 2010/11, Industry's share experienced a sharp decline. A partial rebound took place after 2012 followed by stabilisation thereafter: a look at the euro area as a whole might reveal a trend reversal. Yet there are national stories. Whereas most countries' shares had recovered or at least stabilised by 2011, they continued to decline in Finland, Belgium and Luxembourg. When the entire sample period is taken into account, from 1995 up to 2014, Finland

suffered the most severe decline in overall industry (8.5%), followed by Belgium (7.1%) and Ireland (5.8%). Austria, Germany, Ireland and Finland (until recently) managed to maintain a high industry share. Other countries, such as Belgium, the Netherlands, France, Spain, Greece, Portugal and Luxembourg saw their industrial sector decline. The coefficient of variation shows that dispersion of industry shares in GVA was low before the Euro introduction, but started to increase afterwards.

Figure 4.2

GVA shares of industrial sector for the euro area (as a percentage), 1995-2014

Chart information



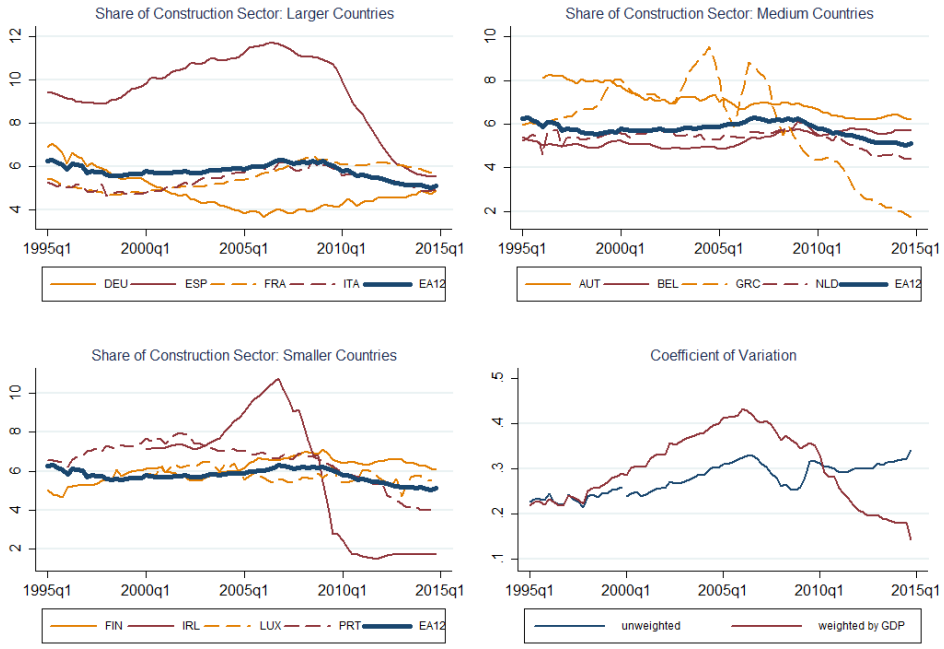
Note: The figure compares the industrial sector's share of total GVA for the EA12 as a whole with the shares of the individual member states (upper panels and lower left panel). The lower right panel shows the coefficient of variation for this sector using data for the founding members of the euro area (for Ireland and Luxembourg the data start in 2000q1). The weighted coefficient of variation is calculated by taking the GDP of member states into account.

Figure 4.3 illustrates the importance of the construction sector for the EA12 countries. Its share of total GVA was well above average in Ireland, Portugal, Austria, and roughly twice the EA average in Spain. While its importance started to decline in the early 2000s for Portugal and Austria, the bubbles in both the Spanish and Irish construction sectors continued to grow until the financial crisis. At this point, both countries experienced a rapid drop in construction GVA, of 5% to 6% respectively. Conversely, over the past decade, Germany was the EA12 country with the lowest share of construction in GVA (ranging from 4% to 4.5%), a level that is

now only undercut by Ireland and Greece. The variation in construction shares increased during the early EMU period, but dropped with the crisis.[9]

Fiigure 4.3

GVA share of Construction (as a percentage), 1995-2014



As seen in Figure 4.4, the Financial Sector is overwhelmingly important in Luxembourg, accounting for about 25% of economic activity, whereas the GVA share of this sector is considerably lower in all other countries. The Dutch financial sector's importance increased throughout the crisis, as did the sector's shares in Belgium and Italy.

9 The opposite picture arises when we examine the sale and rental of properties as captured by the Real Estate Sector share in GVA (see annex). Spain, Portugal and Ireland had lower shares than the other EA countries. An above-average increase in the importance of this sector can be noted in Greece. Extreme developments in Greece and Ireland also drive the increasing coefficients of variation.

Figure 4.4

GVA share of Financial Sector (as a percentage), 1995-2014

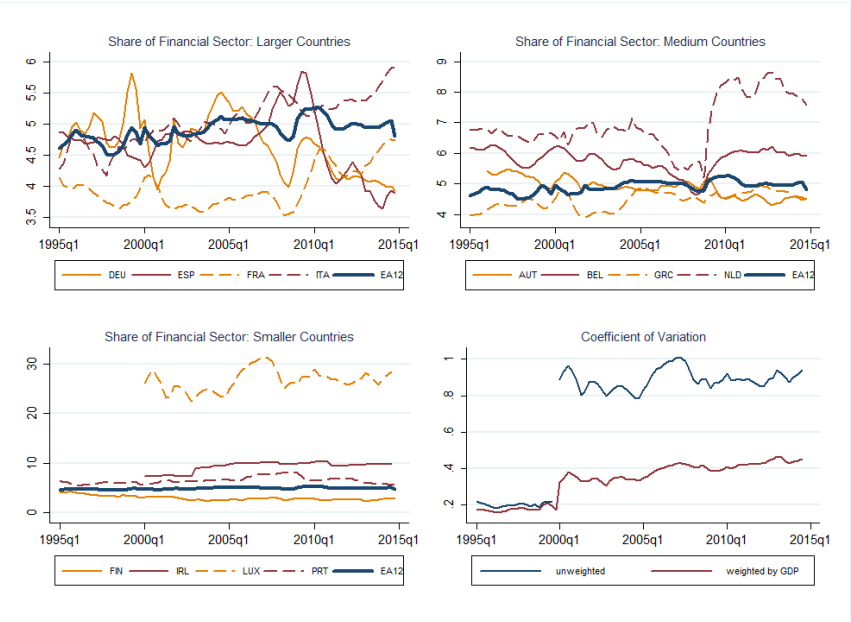
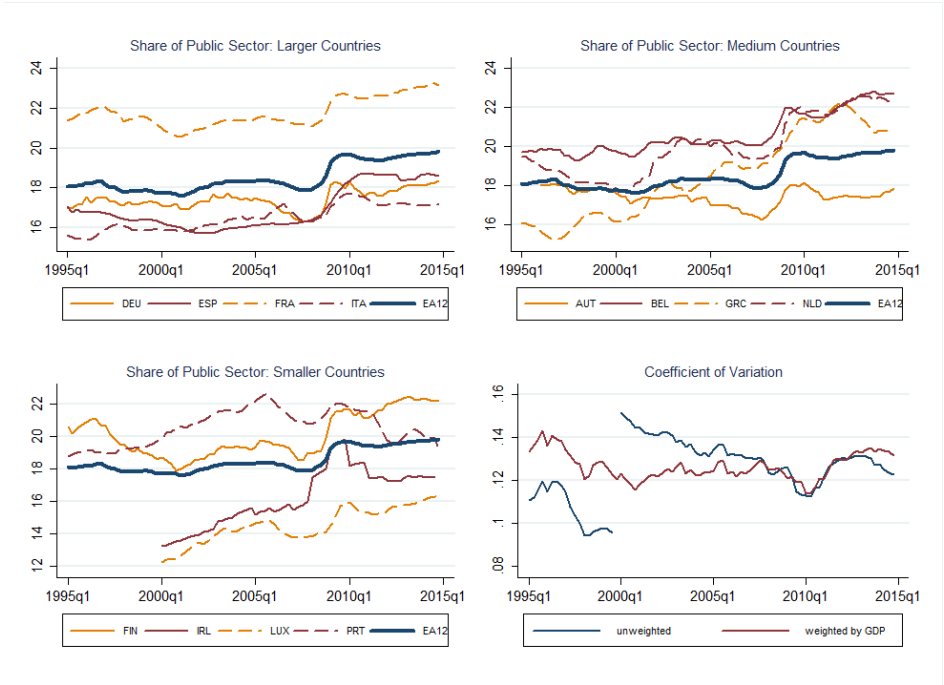


Figure 4.5

GVA share of Public Sector (as a percentage), 1995-2014



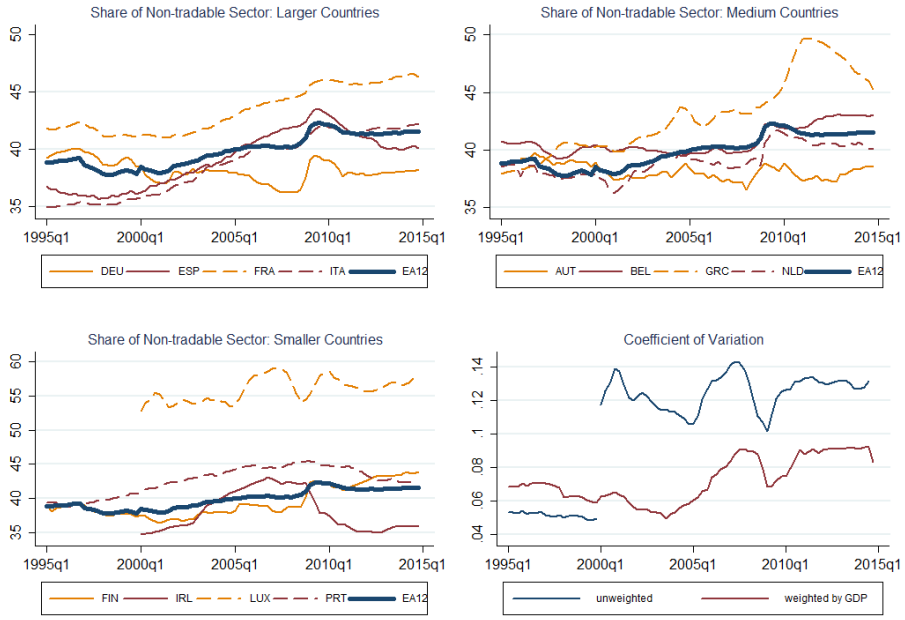
Prior to the crisis, the importance of the Public Sector remained generally stable hovering around 18% (see **Figure 4.5**). The exceptions were the Netherlands and Portugal where public sector shares increased before 2008. During the crisis, the

share of the public sector leapt to, and now hovers around 20%. Thus, on average, its share is now substantially higher than 20 years ago.

4.3 Aggregation of sectors into tradable and non-tradable

Were there different patterns across tradable versus non-tradable sectors in GVA? The ten economic sectors are roughly divided according to whether or not the sectors can mainly be regarded as tradable[10] (see **Figure 4.6**). Following conventional practice, Construction, Financial and Real Estate services, as well as Public Administration are classified as non-tradable. Admittedly, classifying entire sectors as either tradable or non-tradable is a very crude measure that should be revisited. The share of non-tradables was on the rise even before the crisis, notably in France, Greece, Spain, Italy and Portugal. The high share of non-tradables in Luxembourg is clearly driven by the important role played by the financial sector in the country (and thus due to this paper's classification of sectors). Figure 4.7 shows the aggregation of GVA sectors that can be classified as market services, confirming the increasing role of services in euro area economies.

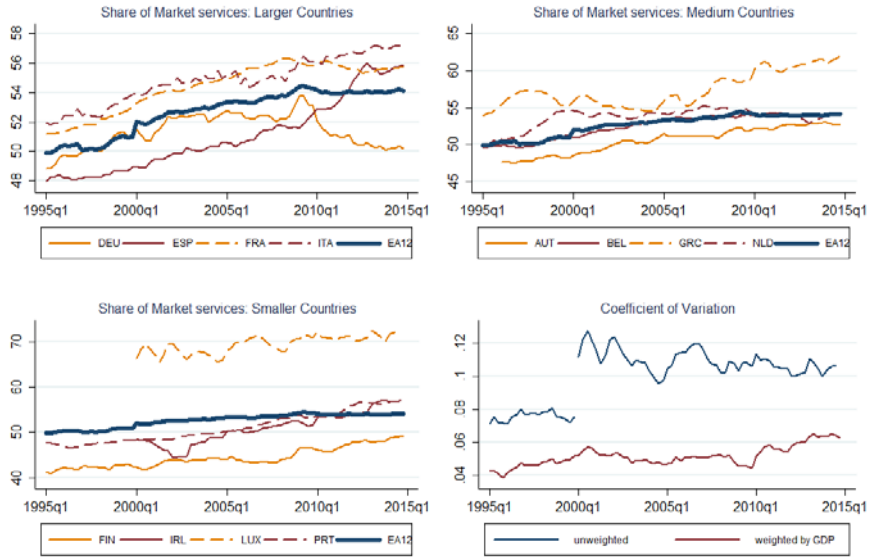
Figure 4.6
GVA share of Tradable and Non-Tradable sectors



[10] We regard Construction, Financial and Real Estate services, as well as Public Administration as non-tradable. Classifying an entire sector as either tradable or non-tradable is a very crude measure.

Figure 4.7
GVA share of Market services

Chart information



Note: Market services include NACE sectors G to N and R to U: Wholesale and retail trade, ICT, Financial, Real estate, and Professional and technical services, Arts.

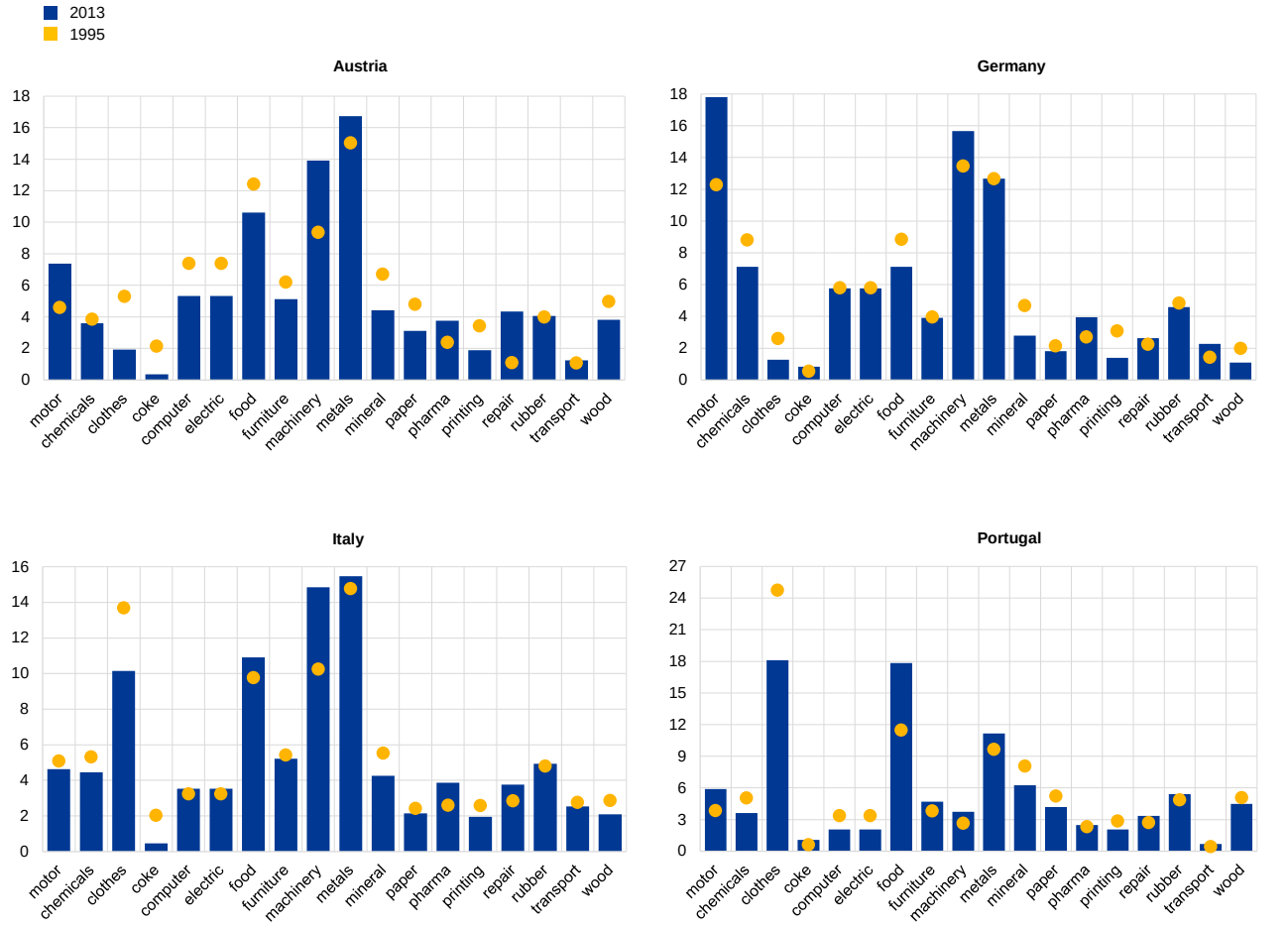
4.4 A deeper look at sub-industrial sectors

What are the main industries across euro area countries? This section provides a comparison of the GVA shares of 18 sub-sectors of manufacturing for a few sample countries from 1995 until the present, depending on the latest available data (see **Figure 4.7**).

Figure 4.7

Sub-sectors of manufacturing

(as a percentage of total manufacturing (GVA))



In 1995, industries in Austria were relatively specialised in the manufacturing of food and beverages, and metal. Over the past 20 years, machinery and metal production became even more important in terms of GVA shares of total manufacturing. The German manufacturing sector looked rather similar in 1995, with high GVA shares of machinery and metal, but also of motor vehicles and chemical products. While the automotive and machinery sub-sectors have become relatively more important, the metal industry has remained comparatively flat, while food production and chemical production have declined.

Clothing has always played in important role in the Italian and Portuguese economies and while still important, the share of clothing in GVA has declined in recent years. Note that the bulk of clothing manufacturing has shifted to Asia in recent decades. Machinery and food processing have become relatively more important in Italy. The Portuguese manufacturing sector has drastically increased its reliance on food production and also increased its metal and motor industries somewhat.

4.5 Takeaways from sectoral specialisation in the euro area

There is evidence that the economic structures of euro area countries have changed substantially over the last 20 years. Specialisation has increased, albeit at different rates, across countries and sectors. For some sectors, these changes preceded the launch of the euro – as in the case of Industry – a sign that the single currency is not the only force reshaping economies. The financial crisis was, however, a disruptive event which affected some sectors more than others, e.g. Construction, Real Estate and the Public Sector. Industry, which was on a slow declining path, was also heavily impacted by the Global Financial Crisis and very likely the decline in global trade during the Great Recession. Eventually, Industry recovered some ground in the most recent period, but remains below pre-crisis levels. There might be modest evidence that the prolonged crisis might have bucked the declining trend, but it is too early to tell.

The cross-country evidence is also striking. To start with, there is a high level of heterogeneity across euro area countries. In other words, euro area countries have very different economic structures (which in and by itself is advantageous with high trade integration). Overall, such heterogeneity seems to be increasing over time in many, but not all, sectors. Dispersion is substantially higher at the end of the sample period in the case of Industry and Real Estate, while for Construction, dispersion increases until the crisis and then declines – a sort of return to some long-term average. In order to bring together such a broad range of data and information, Section 5 turns to an established index of country specialisation.

5 Macro evidence (III): country specialisation and structural deviation indices

Specialisation indices measure similarities between countries' production structures by comparing the importance of individual economic sectors in one country with the importance of the same sectors in another country or reference group. Specialisation indices, therefore, measure a relative degree of specialisation, as pointed out by van Riet et al. (2004)

5.1 The Krugman Specialisation Index (KSI)

The Krugman Specialisation Index (KSI) is a widely-used specialisation measure. It can be seen as a relative specialisation compared to one other country or to a reference group, i.e. the EA12 in this case. The Krugman Specialisation Index is defined as follows:

$$KSI_k = \sum_i \left| s_k^i - \overline{s^i} \right|$$

where s_k^i is the GVA share of sector i of country k and $\overline{s^i}$ is the GVA share of sector i of the reference group. It measures the absolute distance between a sector's relative importance between k and the reference group, and then sums all sectors to generate an index.

Since KSI is a relative specialisation measure, the choice of the reference group is important. Thus a country which is specialised in the same industries as the reference group will obtain a lower KSI value in comparison to a country with a rather homogeneous structure but one that is different from that of the reference group. In Table 5.1 below, it can be seen that the country with the most similar production structure to EA12, as represented by a low index value, is Italy.

Table 5.1

Krugman Specialization Index (KSI) with respect to EA12 weighted average

Country	1995q4	1999q4	2008q4	2014q4	Mean	Standard deviation
AUT	14.15	15.60	16.10	15.15	15.25	0.83
BEL	9.47	9.63	12.58	16.73	12.10	3.40
DEU	11.12	11.37	15.26	15.06	13.20	2.26
FIN	19.34	18.76	17.89	14.42	17.60	2.20
FRA	15.08	13.92	15.54	14.38	14.73	0.72
NLD	13.33	13.69	12.24	20.31	14.89	3.66
LUX		47.50	45.03	50.55	47.69	2.76
IRL		28.81	22.48	31.85	27.71	4.78
PRT	17.42	18.41	21.48	18.85	19.04	1.73
ITA	10.76	8.53	7.36	11.54	9.55	1.94
GRC	32.08	31.98	26.47	37.01	31.88	4.30
ESP	23.14	22.42	18.32	15.61	19.87	3.55

Note: Due to data limitations, AUT's starting date is 1996q4 while LUX & IRL's first observation is at 2000q1 and last at 2014q3.

Another observation is that KSI dispersion for Austria and France is very low, indicating that both countries – although more specialised compared to EA12 – have a relatively stable production structure. The countries with the more "volatile" production structures according to this measure are Ireland, Greece, the Netherlands, Spain and Belgium, with Ireland and Greece also being two of the most specialised countries compared to EA12 (see **Figure 5.1**).

Figure 5.1

KSI for 10 economic sectors relative to EA12

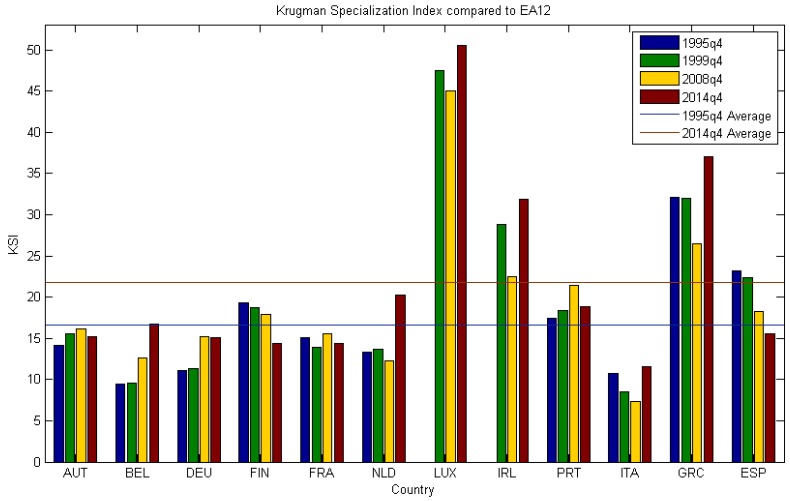


Figure 5.1 shows the components of the Krugman Specialisation Index (KSI) of each country compared to the EA12 weighted average, in four different snapshots: before the launch of the common currency; just after its launch; at the beginning of the financial crisis (nine years after the launch of the euro); and at the most recent point in time (subject to data availability). The horizontal thin blue line reports the

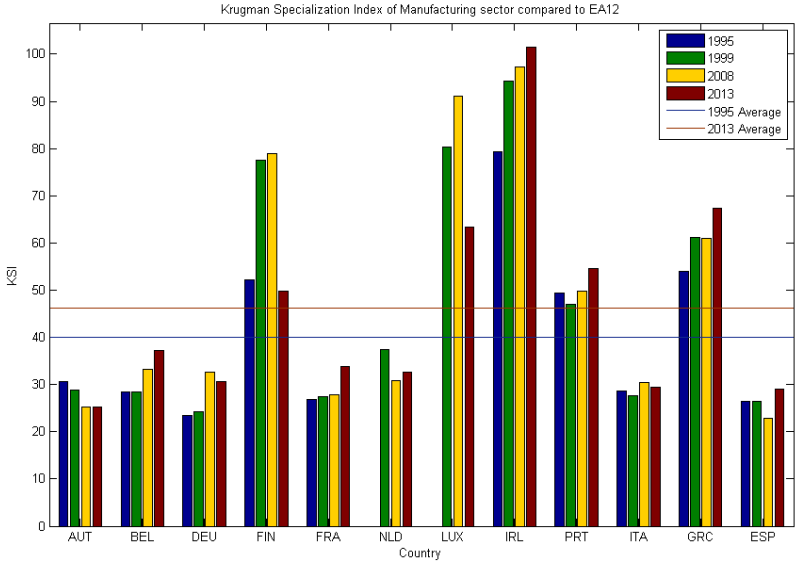
unweighted average specialisation in 1995 versus 2014 (thin red line): there is an increase but the results are mixed. One group of countries became more specialised compared to EA12, e.g. Austria, Belgium, Germany and Portugal, while another group, which consists of Finland, the Netherlands, Luxembourg, Ireland, Italy, Greece and Spain, is gradually moving towards EA12's structure.

In most cases this pattern holds until 2008, when the financial crisis – and after a while, the sovereign debt crises – seem to reverse the previous process. Some exceptions are Belgium, which continues to become more specialised and Spain, which continues to converge towards EA12's structure. France is also a notable exception, which seems to maintain a constant level of specialisation. The country that is closest to the EA12's structure is Italy, while Luxembourg, Ireland and Greece are relatively more specialised. For Luxembourg, this is mainly from the financial and industrial sector, for Ireland from the ICT sector and for Greece from a combination of the agriculture, construction, real estate, trade and industrial sectors.

5.2 Manufacturing is relatively more specialised

Where is most specialisation taking place? Figure 5.2 presents the KSI of the manufacturing sector within each EA12 country compared to the respective weighted EA12 average. The countries with the highest degree of specialisation are Ireland, Greece, Luxembourg, Portugal and Finland. Not surprisingly, Ireland, Greece and Portugal have become more specialised in the manufacturing sector over time. The rest of the countries show a KSI fluctuating between 25 to 30 over the years with small variations from period to period. Another interesting observation is that since the onset of the 2008 crisis, Finland and Luxembourg's manufacturing structures, which became more specialised in the early years of the Euro, moved towards the EA12 average, reaching slightly below the 1995 levels in the case of Finland.

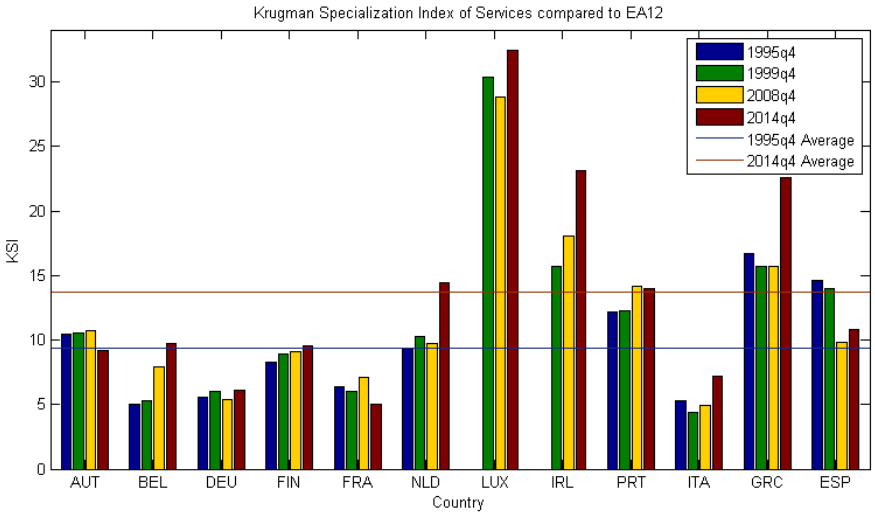
Figure 5.2
KSI in the Manufacturing sector (C) relative to EA12



What stands out is that the degree of specialisation in the manufacturing sector is more than double the average for the economy as a whole. Moreover, larger countries show lower specialisation overall.

The KSI in the Market Services sector, however, reveals a much lower degree of specialisation (see **Figure 5.3**). The countries with the closest structure to EA12 in 1995 were the Netherlands, Austria and Finland. In 2014, however, only the Netherlands and Portugal have specialisation indices close to the average. The KSI for Greece deviates from the average specialisation index by a value of 8-9 in 1995 and 2014. Also, Ireland and Luxembourg have GVA shares of Market Services that clearly deviate from the EA12 average, dramatically increasing over time. The reason behind this pattern of increasing specialisation is that the services sector of each country is dominated by few diverse sub-sectors. However, France, Austria, and particularly Spain, show an overall decline in market services specialisation.

Figure 5.3
KSI in the Market Services sector relative to EA12



5.3 Takeaways from the macro-evidence on sectoral specialisation

All in all, there is evidence of increasing country specialisation across most countries. This process had already started before the launch of the euro and continued thereafter. A discontinuity was brought about by the crisis. The implications of specialisation can be quite important and they are not all necessarily negative. It was to be expected that further economic integration in the EU, i.e. the Single Market, would have been accompanied by increasing country specialisation to take advantage of trade opportunities and comparative advantages. The launch of the euro removed a big barrier to trade – legacy currencies – further increasing the incentives to pursue comparative advantages, i.e. along the lines discussed in Section 2.

In any case, what might explain such developments? Several deep structural forces are also in motion, and have been for a long time. Such forces are also shaping euro area economies. In fact, the launch of the euro has reduced trading costs both directly and indirectly, e.g. by removing exchange rate risks and the cost of currency hedging. Information costs were also reduced. The euro has heralded the removal of a “border” and its impact is similar to narrowing distances and changing the incentive structure of agents.

Should this raise concerns? Obviously the implications for the euro area are profound, particularly because of the other EMU/euro criticisms, i.e. low labour mobility vis-à-vis high capital mobility and a strong Single Market, and the lack of a European federal budget. All in all, the evidence on sectoral specialisation does not seem sufficient to explain the divergence process laid out in Section 2. The

reshuffling of economic and financial activities that seems to be emerging is not enough to explain the dramatic decline in income in stressed euro area countries.

6 Micro evidence (III): resource allocation and labour productivity across countries

Not all specialisation processes are the same. The previous sections hinted that euro area countries might be changing their allocation of resources across sectors over time, i.e. there might be specialisation as predicted by the New Trade Theory and the "Income Insurance" literature. At the same time, there is also evidence of substantial heterogeneity in labour productivity. Could aggregate productivity lag behind in some countries partly because inputs are not allocated efficiently across firms or across industries? To find some clues, the paper now examines some evidence about firm-level & country-specific labour productivity from the Competitiveness Research Network (CompNet) database. CompNet data reveals a considerable dispersion of labour productivity across firms and euro area countries.

6.1 With a little help from CompNet

CompNet has created a new EU firm-level dataset which encompasses 17 EU countries, comprises around 60 sectors, and spans a 15-year time period. This unique "micro-distributed" database enables cross-dimensional analysis. CompNet data makes it possible to link, for example, trade or the financial status of firms with their productivity.[11] Research based on CompNet data is providing new insights on European countries' integration and position within international production processes: this is often referred to as the Global Value Chain (GVC).[12]

What is immediately apparent is that CompNet data reveals considerable dispersion of labour productivity across firms (Figure 6.1). In every country, the median labour productivity is situated below the mean, revealing skewness in the distribution (see also Annex _ showing that the density plot for all Italian firms shifted inwards). Labour productivity differentials across euro area countries are extremely large. As data are not yet available for all euro area countries, the following figures illustrate the distribution of labour productivity for a sample of countries during the crisis period 2008-2012. The large blue horizontal bars capture the productivity levels – calculated as real value added per employee averaged over the period – for firms lying between the 10th percentile (least productive) and

11 Macro-data and aggregate figures for the various sectors that we have used so far, have limitations. They cannot explain deep economic structures, and the changes in the resource allocation – and in some cases misallocation - across euro area countries.

12 Evidence on GVCs provides a more accurate picture of a country's true competitiveness level and its changes over time. In this section, only a small portion of CompNet data are utilised, and for periodical updates on CompNet progress please see: https://www.ecb.europa.eu/home/html/researcher_compnet.en.html In this and the following section, several additional references are made to CompNet-related research work.

the 90th percentile (among the most productive. The orange square captures firms between the 30th and 70th percentile with the median (red dot) and mean levels in between.[13]

Figure 6.1
Summary of recent developments in labour productivity (CompNet)

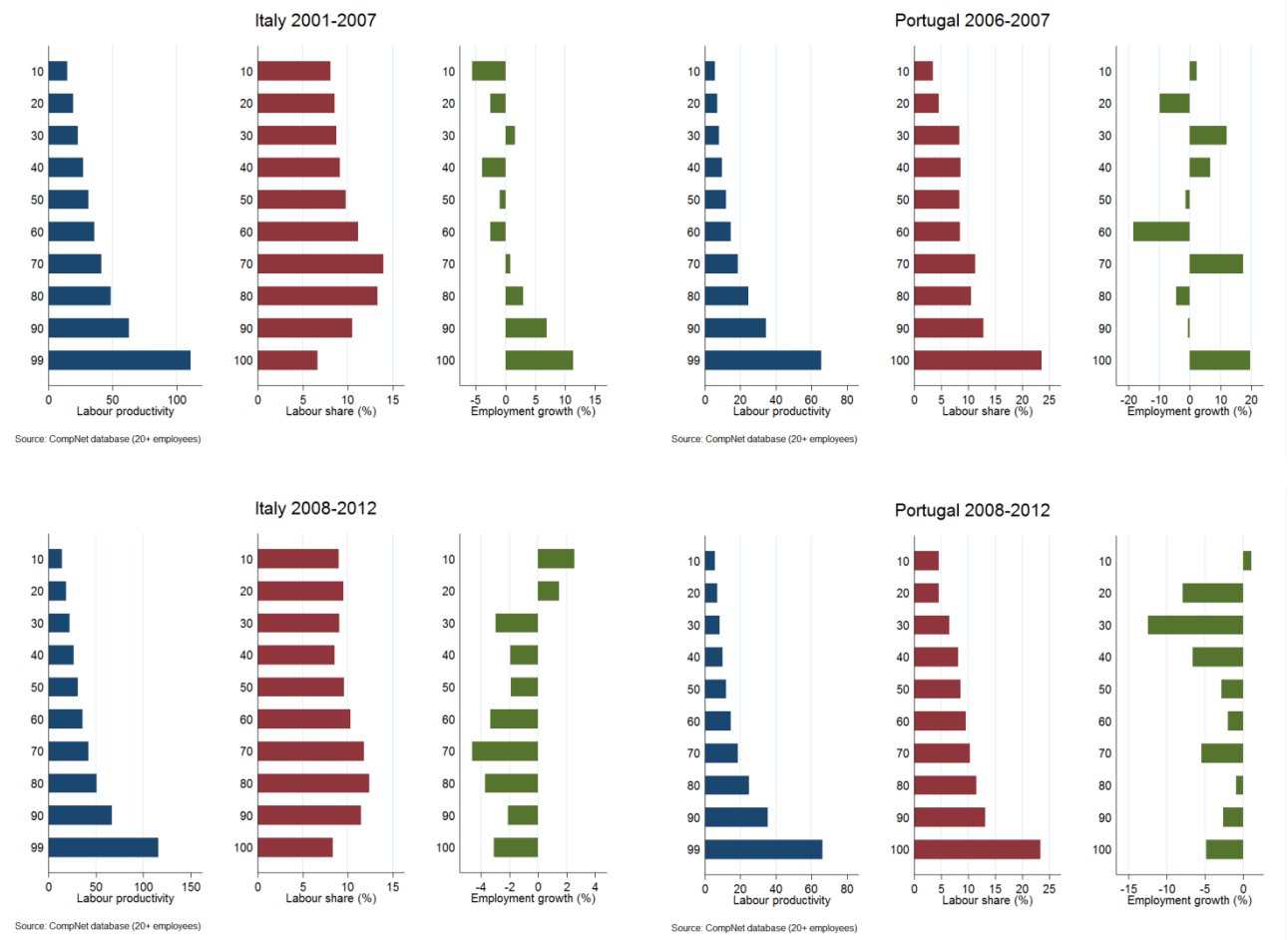
6.2 Adjustment processes: do workers move to higher productivity firms?

The above data can also be plotted by assigning firms according to their labour productivity deciles: this makes it possible to check adjustment processes for high, medium and low productivity firms. The paper looks at Italy and Portugal versus Germany and Austria. Starting with Italy, the upper left panel shows labour productivity, labour share and employment share within the Italian manufacturing sector between 2001 and 2007; the lower left panel shows the same sector developments during the crisis period 2008 to 2012.

[13] The CompNet report warns against over-interpreting these comparisons across countries. Such data are deemed reliable for dispersion comparisons, while caution is required for level comparisons.

Figure 6.2

Labour productivity in manufacturing



Within the Italian manufacturing sector, the crisis has marginally impacted firms' labour productivity (blue lines). Moreover, the number of workers across Italian firms remains relatively evenly distributed both with higher, medium and lower productivity firms (red lines). However, prior to the crisis, employment growth was strongest among highly productive Italian companies, a development which reversed during the crisis. In fact, the crisis had an adverse impact on employment growth in the whole industrial sector. Worryingly, since 2008, employment growth in Portuguese manufacturing was negative across all types of firms, especially around the 30th percentile. Yet the labour share in high productivity firms remained high.

Figure 6.2
Labour productivity in manufacturing

In Austria and Germany, there was a small increase in labour productivity, and generally more productive firms absorb a higher share of labour. In both countries, during 2001-2008, there was a reallocation of workers towards the highest percentile of productive firms: this might have sustained worker retention during the crisis. Overall, employment in manufacturing retrenched unevenly across deciles thereafter. Further evidence is required to check more precisely which frictions are at work and why.

6.3 Takeaways from the misallocation of resources and frictions

Euro area countries allocate their resources differently across manufacturing firms. Moreover, such allocation took different paths across countries and over time. Overall, in Austria and Germany there was a reallocation of labour towards the highest percentile of productive firms: this, in turn, might have sustained employment growth even during the crisis. Conversely, aggregate labour productivity in Italy and

Portugal may also lag behind because inputs are not allocated efficiently across their firms (see also Bartelsman et al. (2013) and Hopenhayn (2014)). In fact, economies and firms operate under various types of frictions, distortions, and constraints including structural rigidities in product and labour markets, technological frictions, financial frictions, policy-induced distortions, asymmetric information about shocks and changes in relative prices, and various types of market inefficiencies, plus differences in preferences and tastes.[14]

Further evidence is required to check more precisely which frictions are at work and why. Yet these findings also have normative implications. First, low-growth countries might enhance their aggregate productivity by allowing labour (and new investments) to shift from less productive to more productive firms (along the green lines). Second, reallocating resources more efficiently also boosts growth potential and macroeconomic flexibility and resilience to various shocks (not discussed in this paper). Third, product markets also need to work more efficiently to enable information about specific shocks to be rapidly transmitted through the economy via changes in relative prices (the initial step in the reallocation of resources).

[14] More efficient economies also have a higher share of innovative firms adopting newer technologies and moving towards the production frontier: a virtuous cycle (Acemoglu et al. (2013)).

7 Macro evidence (IV): Relative shift-share analysis

Is aggregate labour productivity higher in some countries because of the higher share of higher productivity sectors, or because its workers are more productive in any sectors? Shift-share analysis makes it possible to tackle these questions and examine labour productivity developments across the various GVA sectors within a country in greater depth. Specifically, shift-share analysis can detect whether some sectors in a specific country are more productive than in another; whether there are productivity differentials across sectors, or if labour as a production factor is employed in sectors where it is most productive. It must be noted at the outset that capital endowments are left out of this analysis. Thus, these findings are largely indicative.

7.1 Breaking down labour productivity

Shift-share analysis consists of breaking down the differences in labour productivity across all sectors for the EA12 aggregate economy vis-à-vis the same sectors in individual euro area countries (country x). The breakdown follows an accounting procedure and yields three components capturing both labour productivity and mobility:

$$\frac{LP_t^x - LP_t^{EA}}{LP_t^{EA}} = \frac{1}{LP_t^{EA}}\left[\sum_i \left(LP_{it}^x - LP_{it}^{EA}\right)LS_{it}^{EA} + \sum_i \left(LS_{it}^x - LS_{it}^{EA}\right)LP_{it}^{EA} + \sum_i \left(LP_{it}^x - LP_{it}^{EA}\right)\left(LS_{it}^x - LS_{it}^{EA}\right)\right]$$

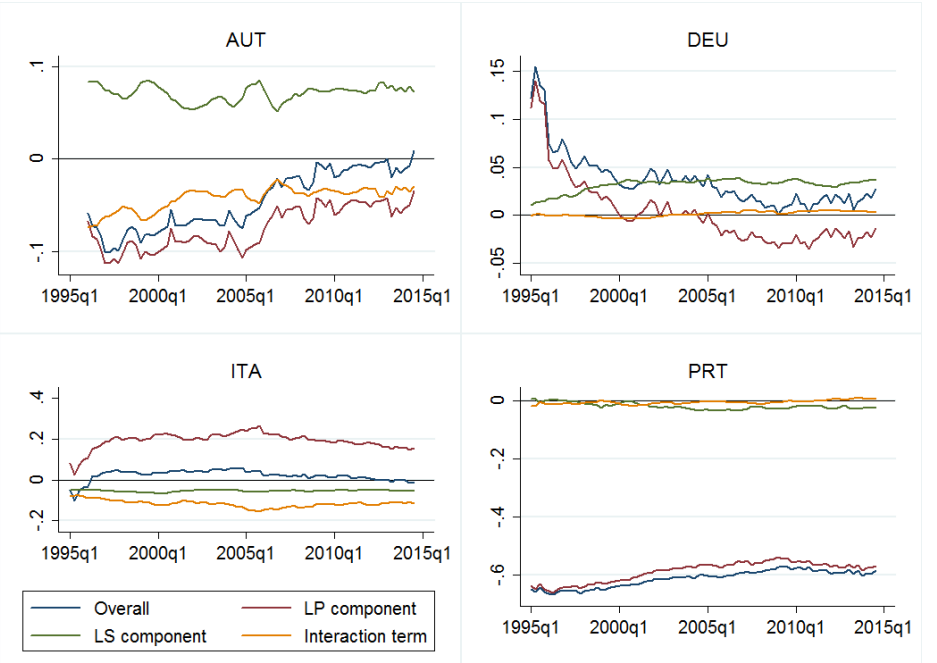
where LP_{it}^x denotes labour productivity measured as GVA/hours worked in sector i in country x, and LS_{it}^x is the labour share of sector i in country x. Some authors simply refer to sectors as “industries”. Relative shift-share analysis makes it possible to break down the relative differences in labour productivity of country x versus the EA12 average into three components:

- differentials in labour productivity of all sectors i of country x relative to the respective sectors in EA12,
- differentials in labour shares of sectors compared to labour shares of the respective sectors in EA12, and
- a dynamic interaction effect, which is a cross term that is positive if a country employs relatively more labour in sectors with higher labour productivity, or conversely experiences declining labour shares in lower productivity sectors. Hence, this term, if positive, captures relative efficiency gains of economy x compared to the EA12 average.

7.2 A comparison with the euro area

Figure 7.1 below illustrates these components of the relative shift-share analysis, i.e. the overall productivity differentials and the three sub-components that provide answers to the above questions. Productivity is defined as GVA over hours worked, and labour share LS are defined in terms of hours worked per sector over total hours worked in the economy. The analysis in this section again focuses on only four countries, while the results of the relative-shift share analysis for six more countries are briefly summarised in the appendix.

Figure 7.1
Relative shift-share analysis



In Austria, labour productivity, defined as GVA over hours worked, was 10% below the EA12 average in 1995, but has since risen considerably. Driven by the labour productivity differential component, the overall productivity difference reached the average level for the first time in 2009. Over the entire period, the labour share differential component stayed at a relatively stable positive level. This indicates that given the EA12 productivity, the labour share of the respective ten Austrian sectors was above average. A negative interaction term indicates that the process of allocating the labour force into productive sectors is not fully optimal. For the case of Germany, overall productivity was above average at the beginning of the sample, but fell towards the average level. When broken down into the three components, the labour productivity differential had already reached negative territory before the crisis. Since 2005, gross value added per hour worked (summed across all ten sectors) fell below average.

Looking at Italy and Portugal, the first component is well above average for Italy, while it is 60% below average for Portugal. This explains why the overall productivity difference is very close to the EA12 average for Italy, but very negative in Portugal. The third component is consistently negative in Italy, indicating that, even though labour productivity is above the EA12 average, its allocation across sectors is not changing in an optimal manner. One notable fact is the different scales of the overall shift-share analysis and its components observed for each of the countries. On the one hand, Germany stays close to the EA12 average, deviating at a maximum of around 15% from it at the beginning of the period under examination and fluctuating at around 5% for most of the time. At the opposite extreme, Portugal's labour productivity component is almost 60% below average and is the one that mainly drives the overall results for this country. Between these two extremes are Austria and Italy, with a balanced pattern of the respective components for the former at around ±10% and for the latter at around ±20%. One difference between the two is that Italy's shift-share analysis components are fairly stable across time and the overall positive figures are due to the positive labour productivity component being larger than the other two. For Austria, the labour share component is mainly stable, but labour productivity and the interaction term show a positive trend, leading to an increase in the overall result.

7.3 Takeaways from the evidence of shift-share analysis

Shift-share analysis encompasses a large amount of information in a relatively comprehensible manner. It also confirms that gradual but persistent, structural changes are under way in the euro area. In most cases, there seems, here too, to be a continuation of trends which had already started prior to the launch of the euro. Ideally, there should be a "shift effect" from low to high productivity sectors. Yet the macro-evidence assembled thus far has severe limitations in explaining more about the transformation of euro area economies and the underlying factors.

Moreover, shift-share analysis uses an accounting principle only, such that, by definition, the left-hand side variable, in this case, productivity relative to the EA12 average, is broken down into three terms that are not always straightforward to interpret. As a robustness check, it might be of benefit to redefine labour productivity and shares in terms of employees per sector. This was not done here due to limitations in data availability across such a wide range of countries and at a sector-based level.

8 Some final remarks

The gradual transformation of the economic structures of euro area countries over the last 15-20 years has received only modest attention. This paper finds evidence suggesting that such transformation is under way: GVA shares of Industry and Agriculture had already started declining prior to the launch of the euro, while the GVA shares of Professional Services and ICT have been steadily rising across the euro area; and Financial Sector and Construction rose until the crisis and then retrenched. Heterogeneity across countries and most sectors is on the rise.

Such incipient specialisation becomes even more apparent when looking at the dispersion across the 18 manufacturing sectors. Thus, the prediction of increasing specialisation and differentiation across countries is corroborated. But, how should these developments be interpreted? There seem to be different forces driving specialisation across countries. Some of the divergence and specialisation can probably be explained by the substantial differences in resource allocation across countries:

- On the one hand, in Germany and Austria, there is a higher share of high-labour productivity sectors, and throughout the economy more productive firms attract a higher share of labour. Hence, there is a legitimate presumption that specialisation is taking place along competitive market forces, generating economies of scales and agglomeration. There is nothing “special” about such specialisation predicted by the new and old trade theory and the income insurance literature.

- On the other hand, in the case of Italy and Portugal, there is evidence that productive resources are misallocated to less efficient firms and less productivity sectors. The reallocation process seems to be hampered by various frictions and inefficiencies. Italy and Portugal might not be reaching their potential or fully benefiting from the removal of trade barriers. This might help to explain the modest convergence and then divergence from the rest of the euro area.

Hence, a combination of inertia, structural rigidities and frictions might be holding back several euro area countries. Unfortunately, this data provides uneven coverage across euro area countries and firms, and only inferences can be drawn without clear causal links.

Furthermore, changing economic structures of euro area countries should not be judged in isolation but understood in the context of several perspectives, such as:

- The role of financial frictions and financial fragmentation especially during the crisis (see Durre et al (2014)). The vast risk-sharing and income insurance literature suggests it might be worth investigating ex-ante and ex-post risk sharing channels and the feedback loop with financial deepening;

- The New Trade Theory/Economic Geography suggests looking more deeply into the role of “borders” and postulates that a “polycentric geography is also sustainable” (Krugman and Venables (1996));
- The degree of business cycle synchronisation across euro area countries and the transmission of monetary policies is seen by some as a meta-OCA property. While economies of scale and agglomeration effects may enhance asymmetries, the net effect of financial integration on specialisation and shock absorption are more complex to decipher.

Hence, the result is a research agenda and more questions.

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Annexes

A.1 Additional graphs and tables

Figure A.1
GVA Share of Agricultural Sector (as a percentage), 1995-2014

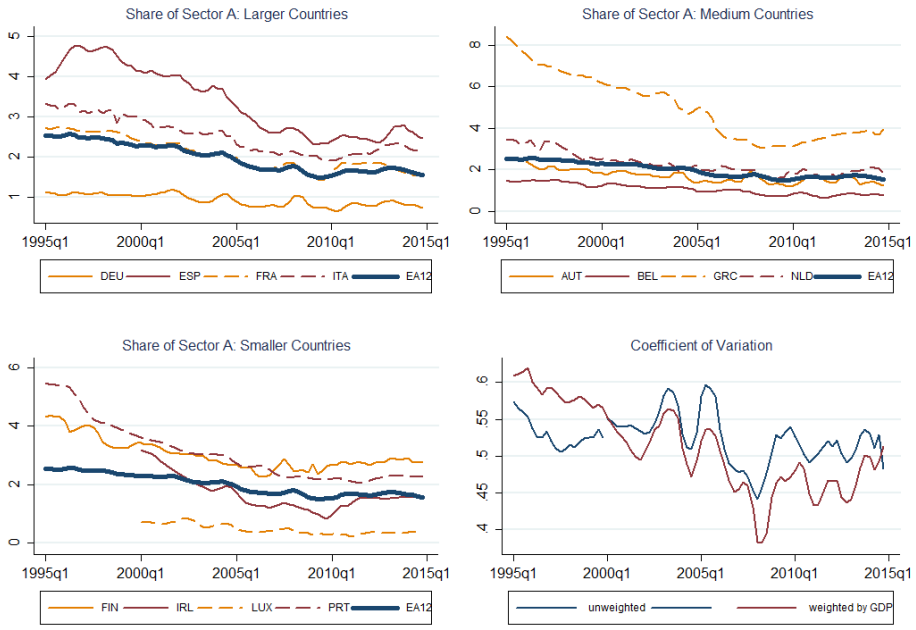


Figure A.2

GVA Share of Real Estate Sector (as a percentage), 1995-2014

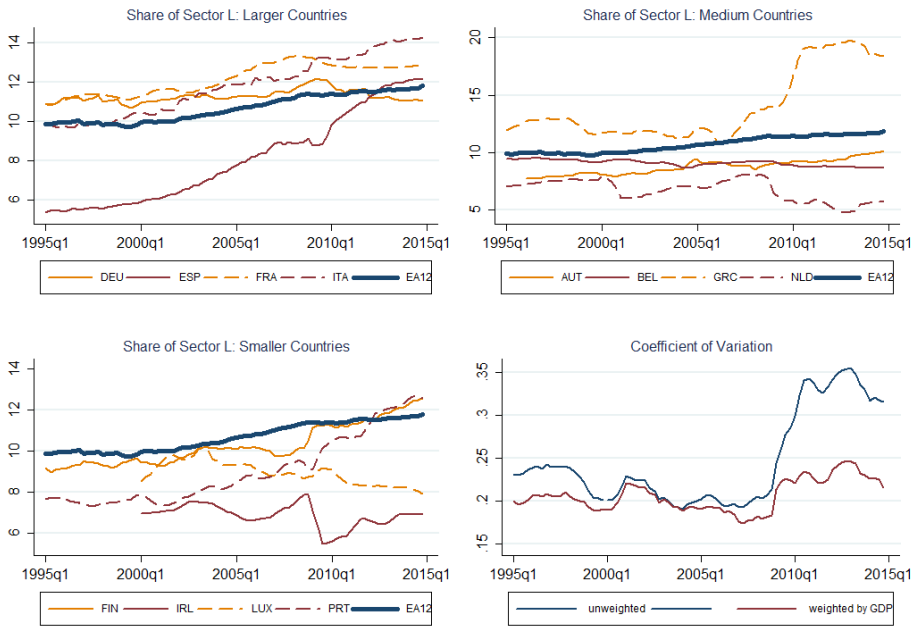


Figure A.3

GVA Share of Wholesale and Retail Trade Sector (as a percentage), 1995-2014

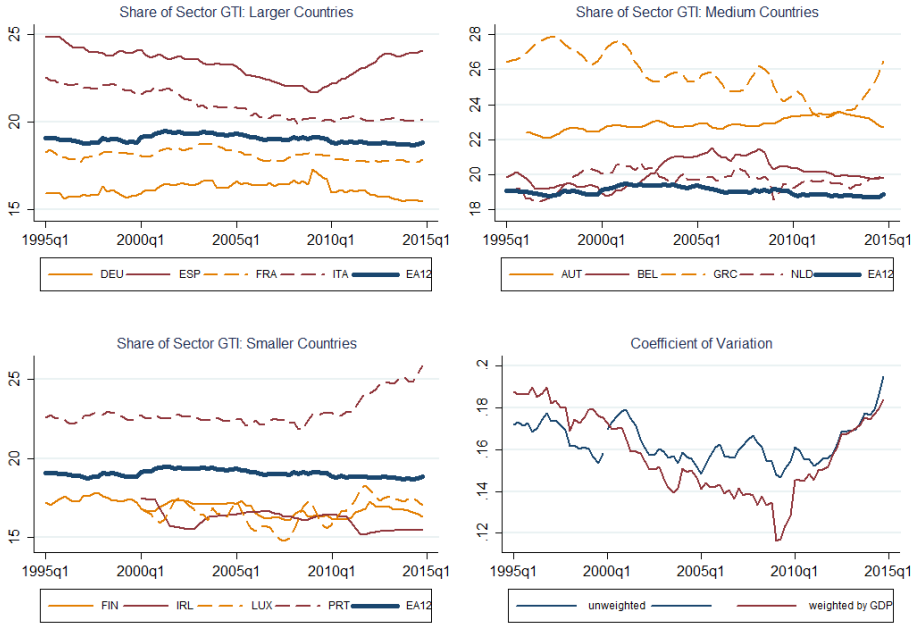


Figure A.4

GVA Share of ICT Sector (as a percentage), 1995-2014

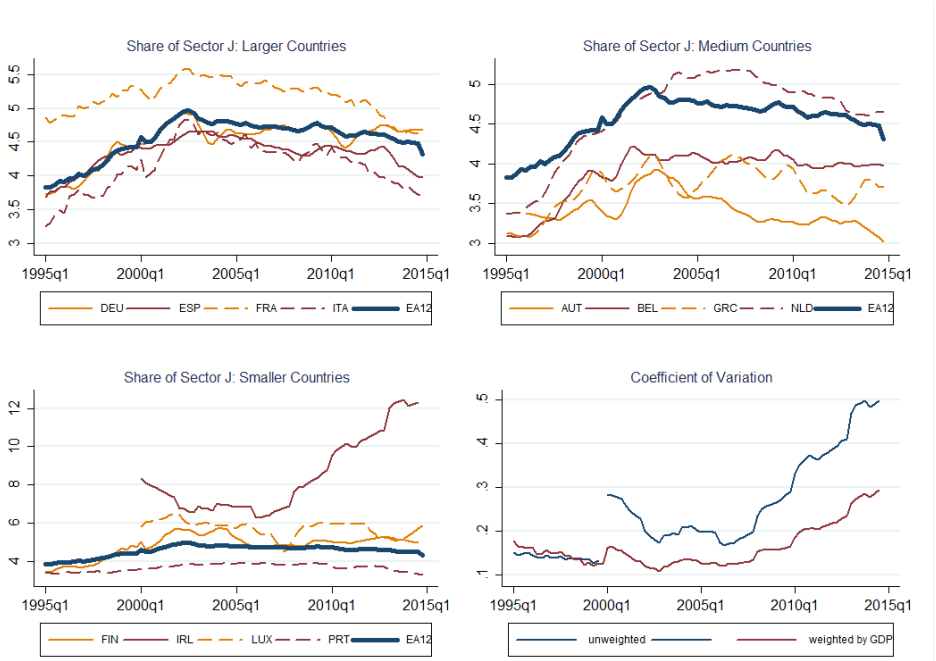


Figure A.5

GVA Share of Professional Sector (as a percentage), 1995-2014

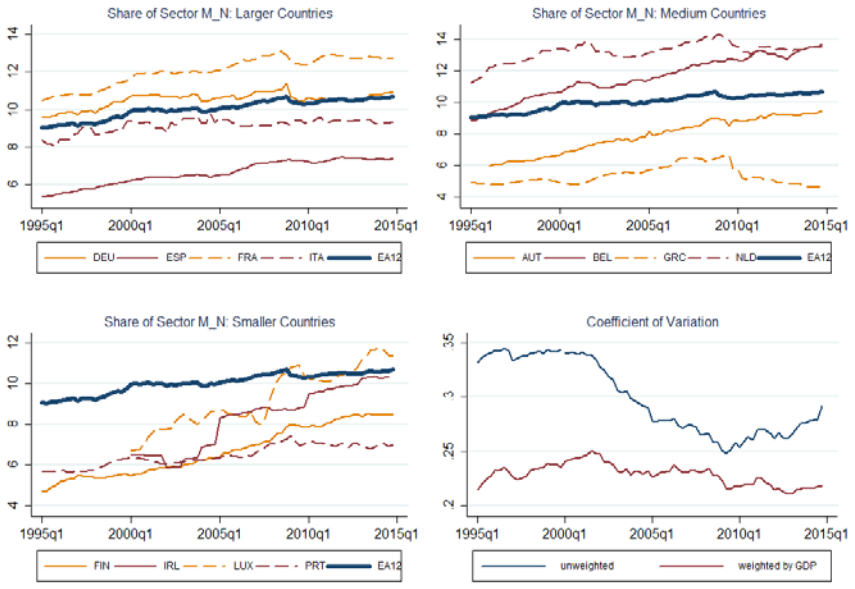


Figure A.6

GVA Share of Arts, Entertainment and Recreational Activities (as a percentage), 1995-2014

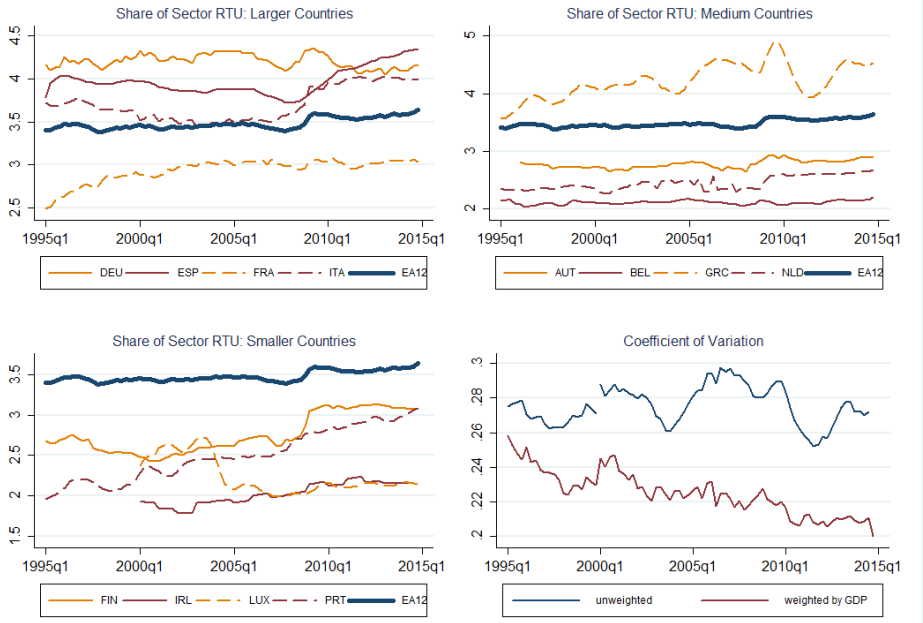


Figure A.7

Sub-sectors of manufacturing (as a percentage of total sub-sector GVA)

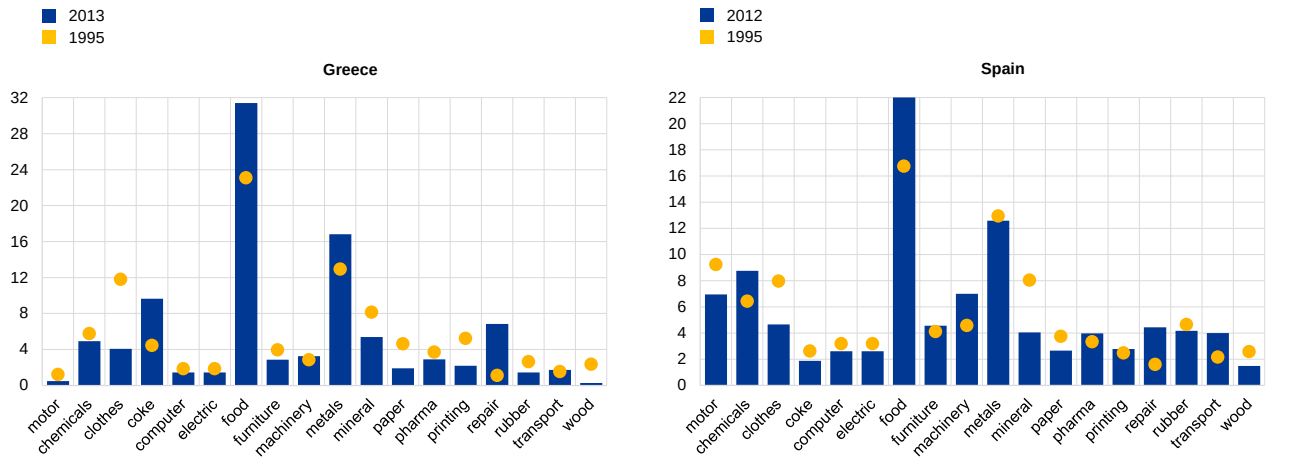


Figure A.8

KSI components for Industry, Construction, Financial and Public sectors

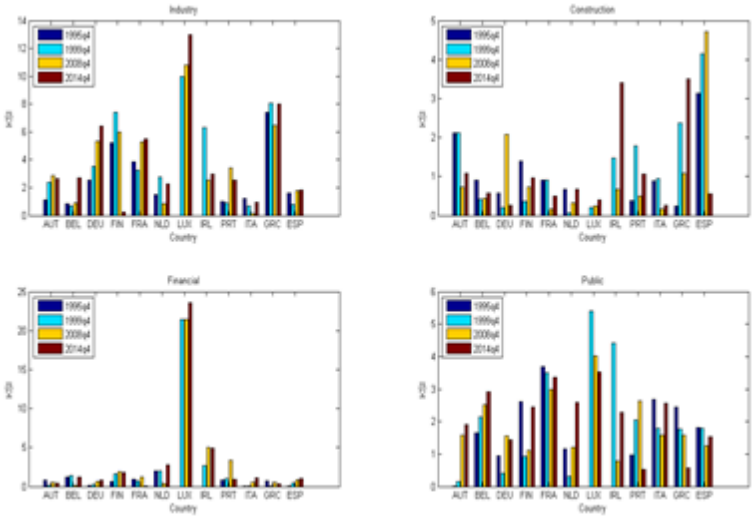


Figure A.9

KSI components for Agriculture, Trade, IT & Real Estate sub-sectors

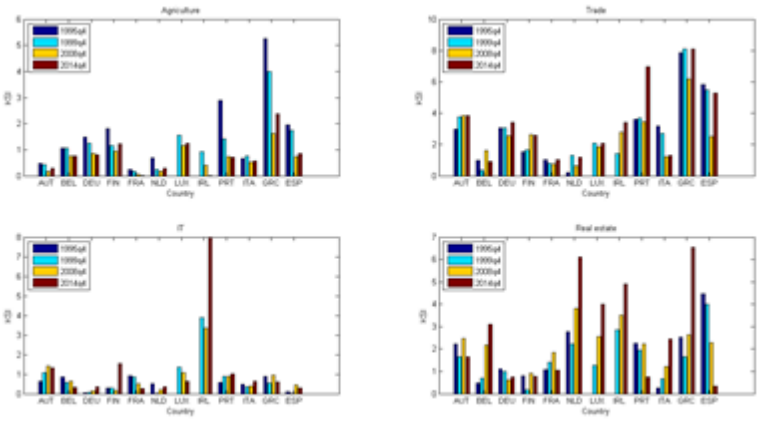


Table A.1

Krugman Specialisation Index (KSI) within the manufacturing sector (C) compared to the EA12 weighted average

Country	1995q4	1999q4	2008q4	2014q4*	Mean	Standard deviation
AUT	30.63	28.78	25.16	25.33	27.48	2.69
BEL	28.43	28.41	33.13	37.26	31.81	4.26
DEU	23.43	24.19	32.61	30.73	27.74	4.61
FIN	52.1	77.61	79	49.87	64.64	15.81
FRA	26.91	27.38	27.8	33.88	28.99	3.28
NLD		37.35	30.83	32.54	33.58	3.38
LUX		80.28	91.05	63.3	78.21	13.99
IRL	79.41	94.3	97.39	101.5	93.15	9.62
PRT	49.42	47.02	49.77	54.68	50.22	3.21
ITA	28.66	27.59	30.37	29.41	29.01	1.17
GRC	54.01	61.19	60.89	67.3	60.85	5.43
ESP	26.39	26.51	22.92	29.03	26.21	2.51

Note: Due to data limitations AUSTRIA's starting date is 1996q4 while LUX & NLD's first observation is at 2000q1 and last at 2014q3

Figure A.10

KSI within Tradables relative to EA12

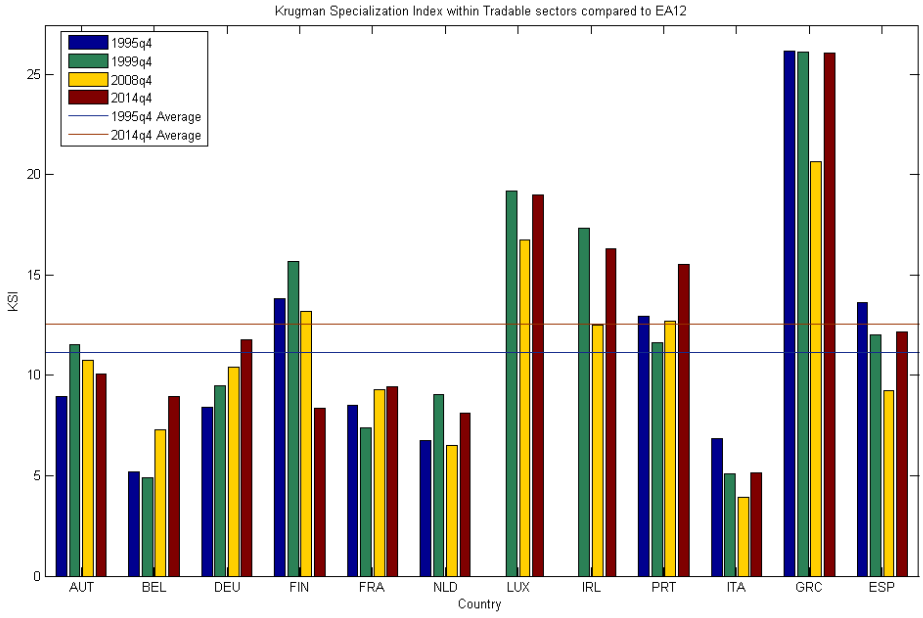
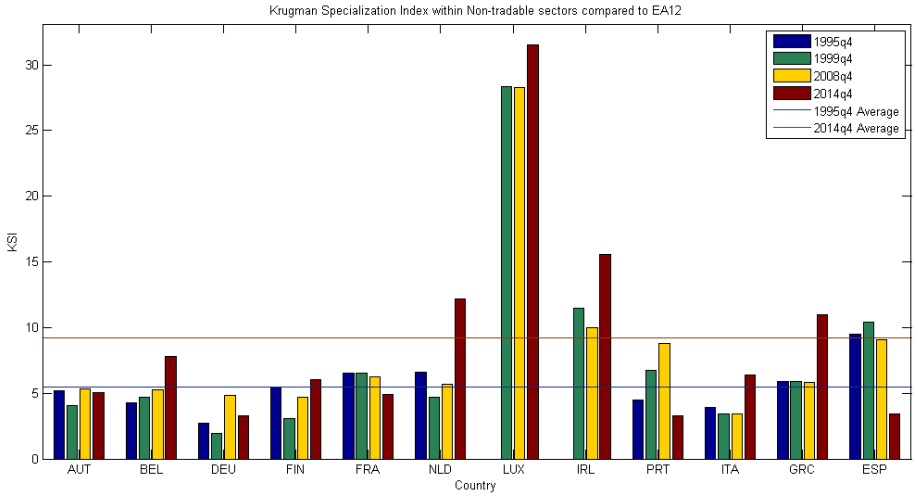


Figure A.11

KSI within Non-tradables relative to EA12



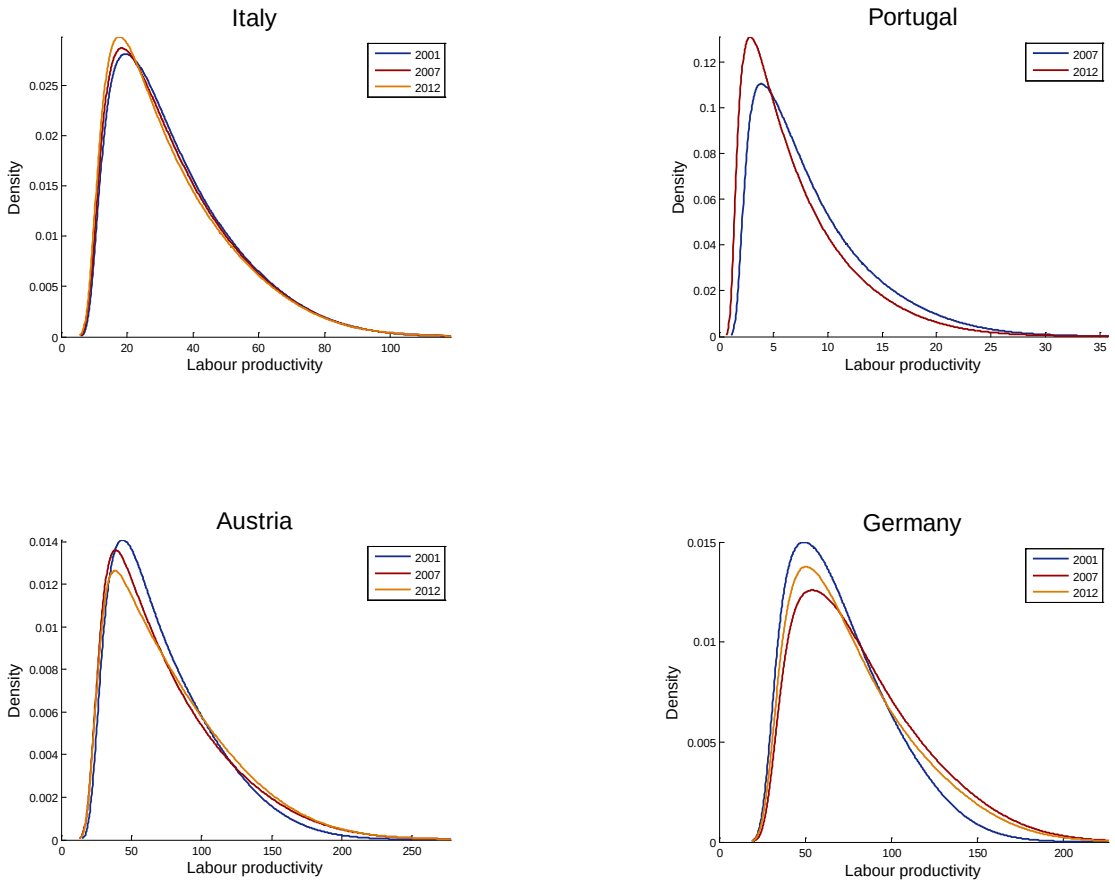
A.2. Kernel density plots using full CompNet database

Kernel density plots the distribution of labour productivity across all sectors of the economy based on firm-level data collected by CompNet.[15] This makes it possible to check how labour productivity, measured in thousand euros, as real value added over the number of employees, evolved across firms and also over time. As this procedure is very intensive, only a few countries are shown in the report: Italy, Portugal, Austria and Germany. They are best suited to highlight the deep-rooted issues of convergence and European integration (ECB (2015)). The evidence must be treated with caution because both sectors and economies vary in their composition over time. Further, there might be differences in the selection of the sample of firms in each country.

15 Kernel densities are estimated in a non-parametric way to capture the probability density function of a random variable. They makes it possible to make inferences about a population based on a finite, yet sufficiently large data sample.

Figure A.12

Kernel density of labour productivity in firms (> 20 employees)



The distribution of the labour productivity of Italian firms in 2012 is more skewed than prior to the crisis (the peak is higher). This might be due to a relative increase in the number of firms with relatively low productivity, or a weakening of overall productivity at the centre of the distribution, compared to before the crisis. This indicates weaker resource allocation. Moreover, the mode of the distribution has shifted to the left over time. However, the distribution of labour productivity in Italy seems unchanged over the past 15 years.

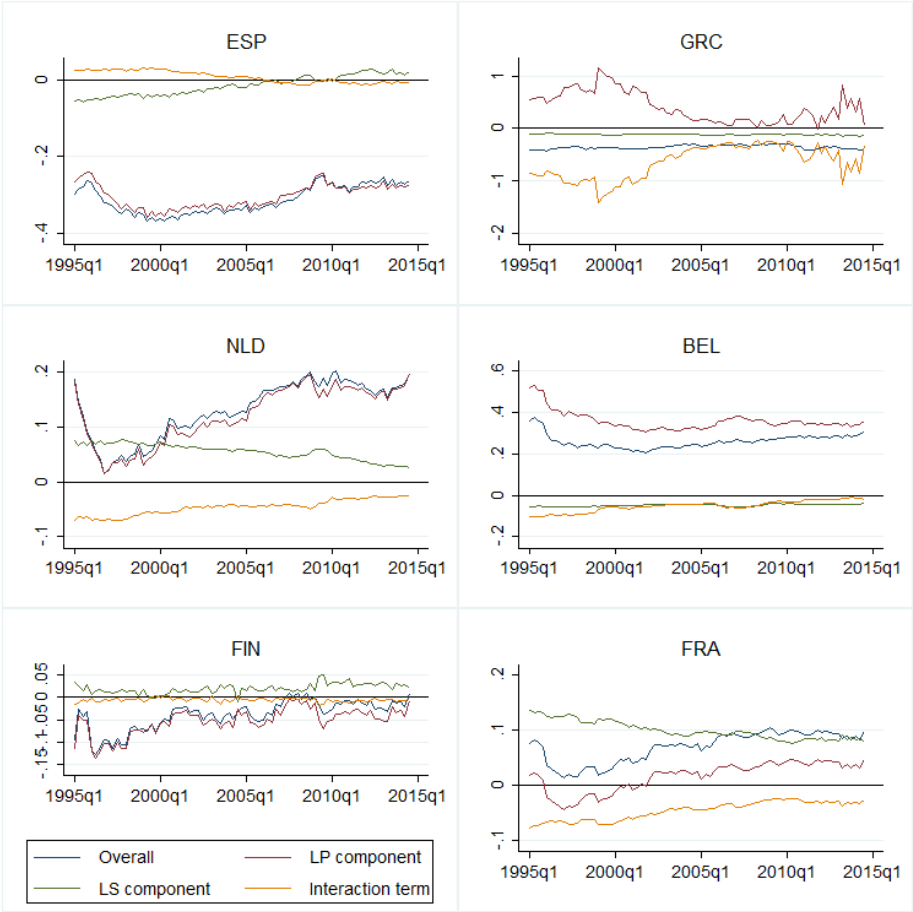
A more worrying rightward shift in the distribution of firms' labour productivity took place in Portugal. A larger number of firms moved to the low productivity region, and there was a decline in productivity across the board: the whole distribution shifted inwards. This widened the gap in labour productivity compared to the rest of the euro area average even further.

The developments in Italy and Portugal contrast with the adjustment processes that have taken place in Austria or Germany. In these countries, the distribution of labour productivity around the mode declined, and the probability mass shifted somewhat

outwards, indicating a rise in the number of productive firms. Also the skewness reduced. Thus, in Austria and Germany, more firms have become more productive, even though the crisis eroded some of the prior gains in productivity.

Figure A.13

Further results of the relative shift-share analysis



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