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Is the Eurozone disintegrating? Macroeconomic divergence, structural polarisation, trade and fragility

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This paper analyses macroeconomic developments in the Eurozone since its inception in 1999. In doing so, we document a process of divergence and polarisation among those countries that joined the Eurozone during its first two years. We find evidence for a 'core–periphery' pattern among Eurozone countries, that is, however, marked by substantial heterogeneity within these two clusters. We show how the polarisation process underlying this pattern first manifested in increasing current account imbalances, before it translated unto the level of general macroeconomic development when the crisis hit. Empirically, we demonstrate how this macroeconomic divergence is tied to a 'structural polarisation' in terms of the sectoral composition of Eurozone countries; specifically, the emergence of export-driven growth in core countries and debt-driven growth in the Eurozone periphery can be traced back to differences in technological capabilities and firm performance. Pushing for convergence within Europe requires the implementation of industrial policies aiming at a technological catch-up process in periphery countries in combination with public investment and progressive redistributional policies to sustain adequate levels of aggregate demand in all Eurozone countries.

Key words: Polarisation, Eurozone, Industrial policy, Financial regulation, Growth trajectories
JEL classifications: E12, E6, F4, F6, O3

1. Introduction

Twenty years after the introduction of the Euro in 1999 and about ten years after the outbreak of the financial crisis of 2007/08, economic developments within the

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Eurozone remain remarkably uneven. Germany has turned from being the 1990s 'sick-man of Europe' to a dominant economic power of today. It has not only bounced back from the financial crisis but has also been able to accumulate large current account surpluses (Simonazzi *et al.*, 2013; Storm and Naastepad, 2015b; Stockhammer and Wildauer, 2016). Real output in Germany increased by 32.4% between 1999 and 2018, which stands in stark contrast to the developments in other Eurozone countries like Italy, where real output increased only by 9.3%, Portugal (+18.9%) or Greece (+7.6%).[1] Such a casual inspection of current macroeconomic statistics indicates that the Euro's alleged role as a 'convergence machine' (e.g. Gill and Raiser, 2012) has been contradicted by a reality of accelerated divergence—at least for those countries joining the Euro during the first two years since its inception in 1999 (Mody, 2018).

In this paper, we study the mechanisms underlying macroeconomic divergence in the Eurozone. By exploiting data on sectoral trade and economic complexity from the *Atlas of Economic Complexity*,[2] we assess the impact of technological capabilities on macroeconomic development paths, and thereby relate the emergence of divergent growth trajectories in the Eurozone to differences in terms of technological capabilities and firm performance.

By doing so, we contribute to the existing literature by extending past works which emphasise the role of divergences in industry structures for macroeconomic developments in the Eurozone (Simonazzi *et al.*, 2013; Botta, 2014; Storm and Naastepad, 2015a, 2015b, 2015c; Vermeiren, 2017). However, since these previous studies largely focus on pre-crisis years, they do not embed their analysis in a broader account of structural polarisation in the Eurozone as a process that has continued in post-crisis years. Our paper closes this gap in the literature by proposing a framework that allows for linking firm performance in core and periphery countries of the Eurozone to the macroeconomic literature on 'export-led' and 'debt-led' growth models (e.g. Stockhammer, 2015; Baccaro and Pontusson, 2016; Stockhammer and Wildauer, 2016).

In doing so, our paper provides evidence on the distribution of technological capabilities during the pre- and post-crisis period, which are essential for future developmental trajectories (Hidalgo and Hausmann, 2009; Cristelli *et al*, 2015, Gala *et al.*, 2018). Our results suggest that the post-crisis Eurozone is characterised by non-convergence in terms of technological capabilities. From a policy perspective, our results indicate that coordinated fiscal, wage and industrial policies will be needed to counteract the on-going structural polarisation process.

To identify the mechanisms underlying European polarisation, we proceed as follows. First, Section 2 links the idea of different growth models in the Eurozone with an analysis of technological capabilities, and discusses the relevance of these factors for the macroeconomic divergence in the Eurozone. Section 3 presents an analysis of the underlying polarisation processes on the micro- and meso-levels, with a particular focus on the divergence of production and trade structures across the Eurozone's member countries. Section 4 summarises our argument and discusses its policy implications.

2. Growth models in the Eurozone

We argue that our understanding of the Eurozone's political economy can be improved considerably by linking the macroeconomic literature on 'export-led' and 'debt-led'

[1] Source: AMECO data on real GDP (Spring 2019); authors' calculations.
[2] http://atlas.cid.harvard.edu (accessed May 2019).

growth models to the issue of technological capabilities and firm performance in core and periphery countries.

2.1 Growth models: some general considerations

Developments in living standards are associated with the emergence of different growth models (e.g. Baccaro and Pontusson, 2016; Stockhammer, 2016; Regan, 2017). From a historical perspective, most developed European economies had a wage-driven growth model after the World War II, that is the most important growth component was wage growth, which resulted in increasing household consumption and high productivity growth (e.g. Lavoie and Stockhammer, 2013). However, a combination of different but related factors—the institutionalisation of strict monetary policy, economic globalisation and capital market liberalisation, the advent of shareholder value orientation and the diminishing strength of trade unions' organisational power—brought about a crisis in the wage-driven growth regime from the 1970s onwards. This crisis in turn also led numerous European countries to search for alternative growth models in which real wage growth would no longer be the driving force of the growth model (Baccaro and Pontusson, 2018).

Starting with the generally accepted stylised fact that inequality has been increasing in most Western countries, including the Eurozone countries (Atkinson *et al.*, 2011), one way to rationalise the emergence of different growth models is to ask whether and how the relative decrease in domestic consumption demand, generally associated with rising inequality, is compensated by the other components of aggregate demand (equation (1), see also Table 1).

Table 1. *A summary of potential reactions to a decrease in effective demand*

Mechanisms compensating for decreasing demand	**Expansionary fiscal policy**	**Substitution of domestic with foreign demand**	**Stabilising demand via debt-led private sector expansion**
Requirements	Creditors (could be central bank)	Competitive advantage, foreign import demand, capital outflows	Sufficiently de-regulated financial markets, capital inflows
Main actor	Government	Firms	Households
Affected component of aggregate demand	Government spending (G)	Net exports ($X - M$)	Consumption (C)
Side effects	Increasing indebtedness of the national government	Net lending, currency re-valuation (not applicable in the Eurozone)	Increasing indebtedness of private households
Examples in the EU	Legal institutions in the EU restrict this strategy	Germany, the Netherlands	Spain, Portugal
Implications for current account	Negative	Positive	Negative

$$Y^{D} = C + I + G + X - M \tag{1}$$

One possibility is that an increase in private investment I compensates for the decline in consumption spending C. While theoretically possible, such a scenario is not very plausible; capital accumulation in the private sector has generally been weak within Eurozone countries, and private investment has fallen since the start of the crisis with the most pronounced impact found in Southern Europe (e.g. Koo, 2015; ECB, 2016; Glötzl and Rezai, 2018).

Alternatively, the government can increase fiscal spending G to compensate the decrease in private spending. For the Eurozone member countries, however, the Stability and Growth Pact explicitly restricts expansionary fiscal policies (e.g. Sawyer, 2018). Another possibility is to stabilise aggregate demand for domestic goods by substituting domestic demand with foreign demand. This implies an increase in exports X relative to current imports M and coincides with net capital outflows (Hobza and Zeugner, 2014). Since countries with an export-led growth model typically run substantial current account surpluses, these countries are often called 'surplus countries', which typically also serve as creditors for countries with a current account deficit. A third possibility is that the decrease in disposable income is compensated by the household sector being increasingly willing to incur debt in order to stabilise consumption spending C (Barba and Pivetti, 2009; Gu and Huang, 2014). If such a demand for credit is accommodated by a corresponding credit supply, this may temporarily mask the reduction in demand associated with increasing inequality, but also leads to higher private sector debt and increased financial fragility (Kapeller and Schütz, 2014).

Obviously, combinations of these three strategies—which are summarised in Table 1—are possible, so that some countries might be more difficult to classify along these lines than others (e.g. Baccaro and Pontusson, 2016). Nonetheless, developmental paths throughout the European Union (EU) have been shaped by these strategies to different degrees, with export-based expansion prevailing in some countries and private debt-led compensation in others (Stockhammer and Wildauer, 2016; Storm and Naastepad, 2016). In what follows, we introduce some basic empirical aspects of this polarisation process and discuss the role of technological capabilities in shaping the emergence and development of growth models. By doing so, we can shed light on the deeper reasons for some countries to follow a more debt-led growth model, and others a more export-led growth model.

In developing our argument, we draw on the distinction between core and periphery countries, which has a strong tradition in the literature on the Eurozone (e.g. Simonazzi *et al.*, 2013; Baldwin *et al.*, 2015; Storm and Naastepad, 2015c; Iversen *et al.*, 2016; Johnston and Regan, 2016; Celi *et al.* 2018; Regan, 2017).[3]

[3] The choice of a core–periphery distinction is not arbitrary. Gräbner *et al.* (2019) show via a cluster analysis that core and periphery countries, respectively, have responded in very different ways to the increase in economic openness that has been triggered by European economic integration. While the core and periphery country group can be inductively derived from the relevant macroeconomic data, Gräbner *et al.* (2019) have also demonstrated that core and periphery countries share important distinguishing characteristics, for example, in terms of overall GDP per capita levels, the importance of industrial production and unemployment, which is why large parts of the more recent literature on developments in Europe have also regularly employed the core–periphery distinction for analytical purposes (e.g. Gaulier and Vicard, 2012; Diaz Sanchez and Varoudakis, 2013; Simonazzi *et al.*, 2013; Storm and Naastepad, 2015a; Stockhammer, 2016).

In most accounts, the group of core countries includes Austria, Belgium, Finland, Luxembourg, Germany and the Netherlands, while the group of periphery countries consists of Greece, Ireland, Italy, Portugal and Spain. Thus, the groups include all countries that joined the Eurozone within the first two years—with the exception of France. The reason is that France remains an intermediate case that is difficult to classify as either core or periphery (Gräbner *et al.*, 2019). This aspect is also visible in those of our figures where France is included in addition to the core and periphery. While this paper will show that these two country clusters are characterised by substantial within-cluster heterogeneity—and, especially in the core, even internal fragmentation—the core–periphery distinction nevertheless proves usefulness as an analytical starting point for assessing the complex path-dependent developmental trajectories in the Eurozone.

Figure 1 illustrates the polarisation between core and periphery countries in the Eurozone by showing the deviation of per capita Gross Domestic Product (GDP) from the Eurozone average (panel a) as well as the evolution of the unemployment rate (panel b) for a selection of Eurozone countries. While a clear core–periphery pattern emerges from this data, there is still a remarkable degree of heterogeneity in country performances since the inception of the Eurozone. The remainder of the paper investigates whether this preliminary finding of a core–periphery distinction can withstand closer scrutiny, and to what extent the core–periphery distinction relates to different growth models and differences in terms of technological capabilities and firm performance in those countries. In doing so, we hope to shed light on the correspondence between the emergence of different growth models and diverging macroeconomic developments.

2.2 Technological capabilities and GDP per capita in the Eurozone: stylised facts

Previous literature on growth models in Europe has not yet provided a satisfactory answer to the question of why particular countries follow a particular growth model. Here we combine the demand perspective of growth models with supply-side considerations; we explore the hypothesis that to follow an export-led growth model, the

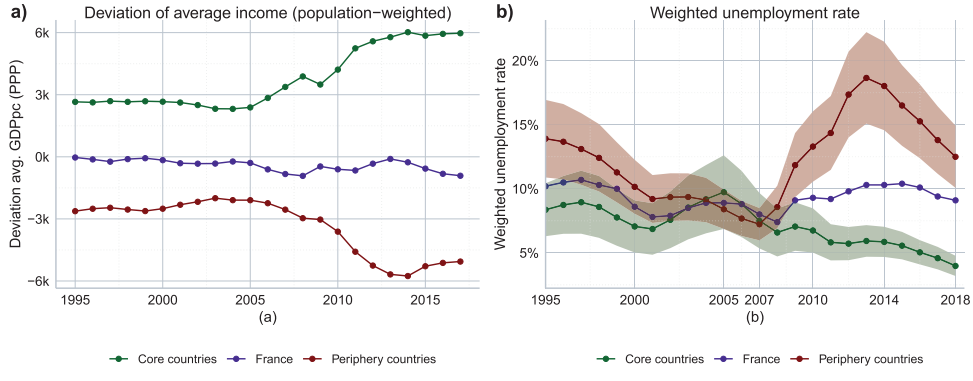

Fig. 1. *The development of income and unemployment in core and periphery.*
Source: World Bank (GPD per capita in PPP, population) and AMECO (unemployment rate); authors' own calculations.
Core countries: Austria, Belgium, Finland, Luxembourg, Germany, Netherlands. Periphery countries: Greece, Ireland, Italy, Portugal, Spain.

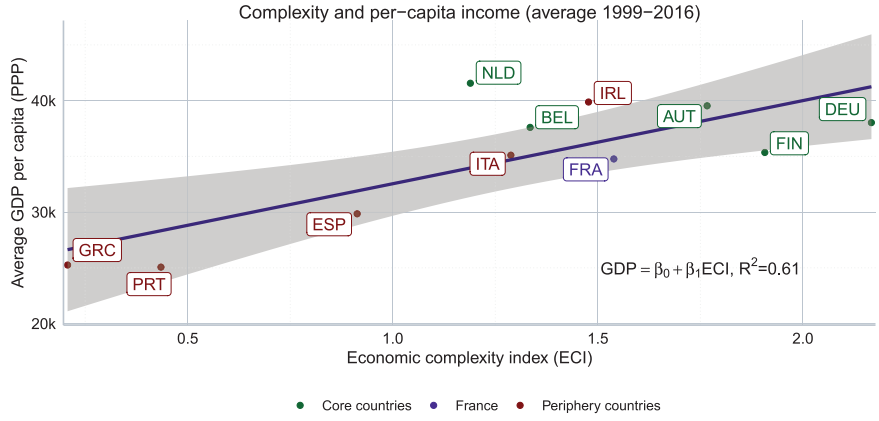

Fig. 2. *The relation between economic complexity and income.*
Source: The Atlas of Economic Complexity (ECI), World Bank (GDP per capita PPP); authors' own calculation.

firms in a country must possess a certain degree of technological capabilities. It is only in this circumstance that they can achieve the non-price competitiveness arising from outstanding product quality or a high degree of specialisation that is necessary to excel on international markets. Countries in which firms do not possess the required level of capabilities have a higher propensity to develop a debt-led growth model based on capital inflows. This hypothesis aligns well with the empirical findings of Hidalgo and Hausmann (2009), who show that 'countries tend to approach the levels of income that correspond to their measured complexity' (Hidalgo and Hausmann, 2009, p. 10574), which can be linked to the case of polarisation in terms of income across different growth models as indicated in Figure 1.[4] 'Complexity' here refers to the index of economic complexity (ECI), which is a measure of the knowledge intensity, or, in other words, the amount of technological capabilities present in a given economy. We use the ECI to study the distribution of technological capabilities in the Eurozone and to explore its relevance for the emergence of different growth models. To this end, we first assess whether the stylised facts on the relationship between economic development and technological capabilities also hold within the Eurozone.

Figure 2 shows the relationship between the ECI and the GDP per capita of the Eurozone countries for the period 1999–2016. Despite considerable heterogeneity within the two groups, there is a significantly positive relationship, indicating that countries with high economic complexity also tend to have high levels of prosperity (and vice versa). This correlation is in line with previous findings from the economic complexity literature, which has shown that technological capabilities are a good predictor of long-run growth performance (Hausmann *et al.*, 2007; Hidalgo *et al.*, 2007; Hidalgo and Hausmann, 2009; Cristelli *et al.*, 2015). As a consequence, the question about whether the income levels of Eurozone countries will converge upwards in the

[4] In an supplementary appendix, we provide detailed explanations on how the economic complexity data used in this paper are constructed; we also discuss the advantages and potential shortcomings of using these data to proxy technological capabilities.

long run can be linked to the question of how technological capabilities are distributed across Eurozone countries.

The latter is an empirical question, which is addressed in Figure 3 based on import and export data for the period 2000–16. Specifically, we compare the export baskets of all Eurozone countries and measure the diversity of producers associated with goods of a given degree of complexity by means of a Gini index. The result illustrates that the capabilities to export complex products are distributed very unequally among Eurozone countries, while the corresponding import propensities do not show such a pattern. Hence, if the path to macroeconomic success in times of increased economic openness in Europe heavily relies on the production of very complex products (as suggested by, e.g., Hidalgo and Hausmann, 2009; Cristelli *et al.*, 2015), while the capabilities to produce such products are distributed unevenly, not all Eurozone countries will manage to take a path of upward convergence. Given that such inequality cannot be observed with regard to imported products, technological distinction should typically materialise in export success as it comes with an inherent advantage in terms of international competitiveness. In order to fully understand how these stylised facts contribute to the emergence of different growth models within the Eurozone, we have to take a look at how the distribution of economic capabilities is linked to patterns of export-led and debt-driven growth.

2.3 How do technological capabilities shape growth models?

The link between technological capabilities and the emergence of export-led and debt-driven growth models has so far not been made explicit in the existing literature. It is,

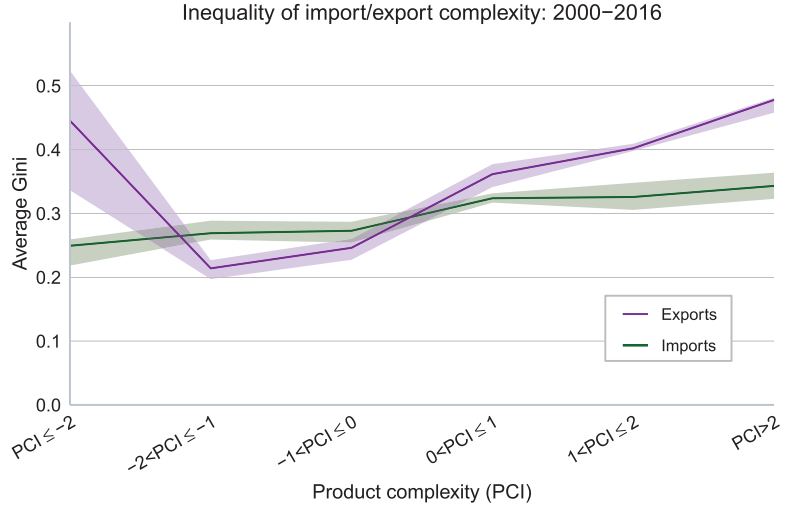

Fig. 3. *Inequality in terms of the complexity of the products exported and imported by the Eurozone countries between 2000 and 2016.*

Note: Inequality is measured by the Gini index, which has been weighted by the total exports (or imports, respectively) of the countries. The shaded area indicates the 25 and 75 percentile of the yearly Ginis.

Source: The Atlas of Economic Complexity (accessed May 2019); authors' own calculations. For details on the advantages and shortcomings on using the economic complexity data, see the supplementary appendix.

however, crucial for understanding the conditions for growth trajectories in core and periphery countries. We exploit the fact that an export-led growth model typically comes with current account surpluses, while countries with a debt-driven growth model accumulate current account deficits. Figure 4 illustrates that core–periphery patterns in the evolution of current account balances mainly emerged in pre-crisis years; while the population-weighted average of the current account in the core countries rose from about 0.3% in 2000 to 6.0% of GDP in 2007, the weighted average of current account deficits in the periphery nearly doubled from −3.2% at the start of the Euro project to −6.3% before the financial crisis. As technological capabilities are crucial for understanding why different growth models have developed within the Eurozone, the long-run evolution of current account imbalances is also intricately linked with the question of how technological capabilities are distributed across the member countries of the monetary union.

2.3.1 Export-led growth

Our focus on technological capabilities deviates from the dominant view of intra-Eurozone trade imbalances, according to which the latter are the result of divergence in relative unit labour costs (ULC). In this account, the higher growth of ULC in the periphery compared to the core reduced the attractiveness of products from the periphery and increased demand for products of firms in the core, hence divergence in price competitiveness led to current account imbalances (e.g. Flassbeck and Lapavitsas, 2013; Sinn, 2014). Storm and Naastepad (2015a, 2015b) have convincingly shown that this narrative is incompatible with the empirical evidence as the Eurozone's 'trade imbalances are determined by domestic and world demand—whilst RULC [relative unit labour costs] divergences play only a negligible role.' (Storm and Naastepad, 2015a, p. 959). However, the actual relevance of relative ULC depends on

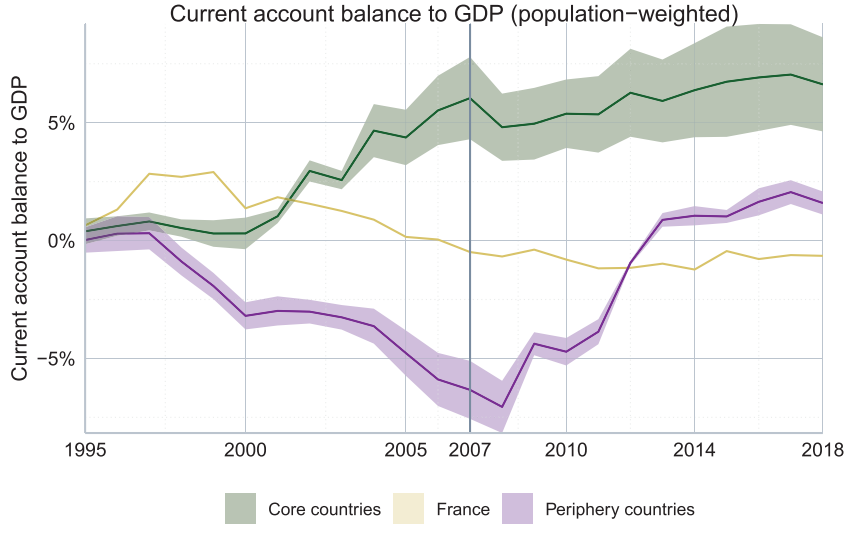

Fig. 4. *Current account balances in core and periphery countries.*
Source: AMECO; authors' own calculations.
Core countries: Austria, Belgium, Finland, Luxembourg, Germany, Netherlands. Periphery countries: Greece, Ireland, Italy, Portugal, Spain.

the sectoral composition of the economy. The sensitivity to ULC is lower in high-tech industries, since firms that want to export high-tech goods are mostly competing for quality. When export-success is to a large extent determined by non-price factors, the impact of ULC is found mainly on the side of import demand. Lower domestic wage growth that puts downward pressure on ULC typically also dampens aggregate demand, which implies a reduced propensity to import that can exacerbate trade imbalances (e.g. Storm and Naastepad, 2015a, 2015b).

As low-tech industries face stronger competition from emerging countries, the relative importance of ULC developments is higher than in high-tech industries (Carlin *et al.*, 2001; Dosi *et al.*, 2015). Given that in core countries more firms operate in medium to high-tech industries than in periphery countries, the export performance in core economies shows a relatively smaller sensitivity to changes in relative ULC. And indeed, while Germany has become stronger and more productive in high-tech manufacturing over the last two decades, Southern European countries have increasingly been locked into lower-tech and non-tradable activities (Simonazzi *et al.*, 2013; Botta, 2014; see also Section 3 of this paper).[5] As a consequence, German firms often do not directly compete with Spanish, Portuguese, Greek or even most Italian firms; rather, they are price-setters due to their strong market standing coined by a high degree of technological sophistication. In contrast, firms located in the periphery (e.g. Greece and Portugal) are more often confined to the role of price takers as they compete with low-cost Asian producers (Straca, 2013).

In this context, the role of China is a suitable example for illustrating how the emergence of East Asia as a major player in the world economy has fostered the divergence between core and periphery in the Eurozone by reinforcing the different growth models that emerge from the unequal distribution of technological capabilities. As shown in Figure 5(a), a growing share of the core's imports is coming from China, and this increase in Chinese imports substitutes for former imports from the Eurozone's periphery. More precisely, in 2000, 10.2% of the imports of the core countries came from periphery countries; in 2016, this number had decreased to 9.2%. At the same time, imports from China more than tripled from 2.7% in the year 2000 to 8.6% in 2016 (calculations based on data from the Atlas of Economic Complexity). In other words, the periphery's export base has deteriorated because of the direct competition with Chinese firms that show more price competitiveness when it comes to producing low-tech goods than firms in the Eurozone periphery. At the same time, while China has been a welcome customer for the high-tech exports from the Eurozone core, products from the periphery are relatively less attractive. In 2000, core and periphery countries were responsible for 5.2% and 1.5% of China's imports, respectively. In 2016, for the periphery countries, this value had increased slightly to 1.7%. Yet the relative increase for the core countries was almost three times larger; they managed to increase their share in Chinese imports by 47.0%, leading to an import share of 7.7% (calculations based on data from the Atlas of Economic Complexity).[6]

The analysis of growth models and their implications for macroeconomic imbalances in the Eurozone can gain from directly considering technological capabilities,

[5] On the other hand, Eastern European countries benefited from low wages and their geographically proximity to Germany and Austria, which made them a prime target for the outsourcing of less difficult and sophisticated steps in the production process of main core countries (e.g. Storm and Naastepad, 2015b; Stöllinger, 2016).

[6] The import and export shares reported above were calculated by including the Eurozone's core and periphery countries as well as China, while the rest of the world is excluded.

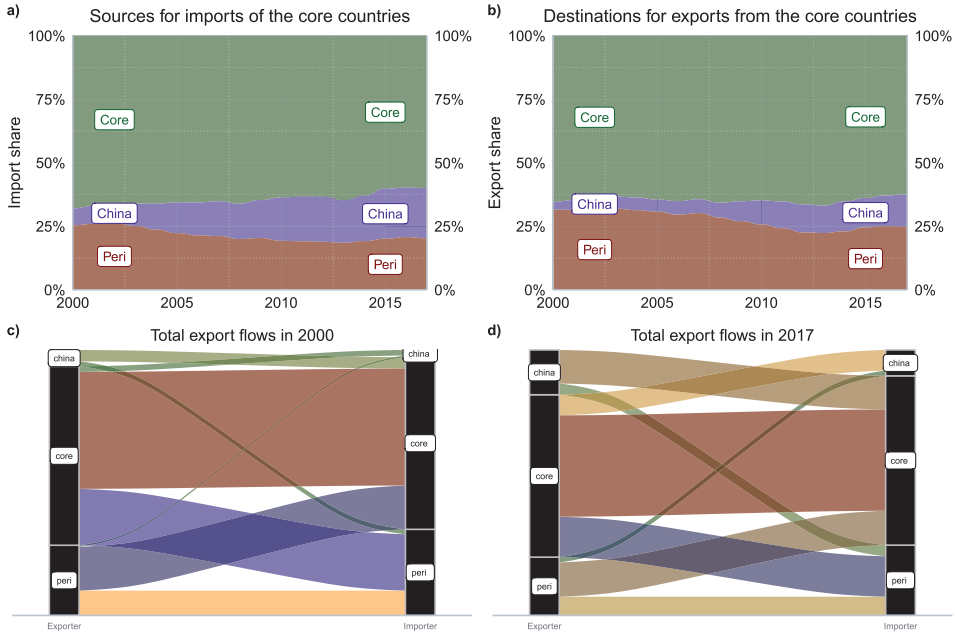

Fig. 5. *The impact of China as an emerging player on the import–export relationship between core and periphery countries.*
Source: The Atlas of Economic Complexity; authors' own calculations.
Core countries: Austria, Belgium, Finland, Luxembourg, Germany, Netherlands. Periphery countries: Greece, Ireland, Italy, Portugal, Spain.
The vertical axis in figures 5c and 5d shows the shares of total trade flows, respectively.

whose role has so far not been explicitly addressed in this context. If firms in a given country have not accumulated a sufficient amount of technological capabilities, the main route to export-led growth is essentially blocked, because the world market for high-tech goods is dominated by firms that have accumulated specific skills and knowledge, that is high levels of technological capabilities. Due to Germany's high level of accumulated technological capabilities, there was relatively stable world demand for German machinery exports to China and other countries, which allowed the German economy to follow a path of export-led economic recovery (Storm and Naastepad, 2015b).

The only path to export-led growth other than accumulating a sufficient amount of technological capabilities would be to compete in markets characterised by a *lower* degree of technological sophistication, in which wage costs are more important as a determinant of export performance. This alternative path, however, would be very destructive; for example, hourly labour costs are currently about 70% higher in Spain (a Southern periphery country) than in the Czech Republic (Eurostat, 2019), where the latter is an example of an Eastern European country that is kind of a 'low-wage industrial workbench' integrated into Europe's industrial core (e.g. Stöllinger, 2016). What is more, wage levels in China are currently still considerably lower than in most of Eastern Europe, despite the relatively fast wage growth in China over recent years (ILO, 2018). Running an export-led growth model within the Eurozone based on

competing for wage costs in low-tech industries would, therefore, require large wage cuts in Southern Europe that can be expected to drastically reduce domestic demand (e.g. Stockhammer and Sotiropoulos, 2014), leading to considerable risks concerning political instability and prolonged economic recession. As a consequence, it is likely that countries largely populated by firms that lack the technological capabilities necessary to pursue export-led growth based on high-tech industrial sophistication will instead enter a path of debt-driven growth—which becomes evident by looking at the debt-driven growth models in Eurozone periphery countries.

2.3.2 Debt-driven growth

In the pre-crisis period running up to the year 2007, GDP growth and developments in unemployment and long-term interest rates indicated that the observed nominal convergence would also contribute to a convergence of real living standards (e.g. Gill and Raiser, 2012). The Eurozone countries were becoming by and large more similar in terms of these three indicators, with the poorer countries in Southern Europe (on the basis of their private-debt-driven economic models) often growing even faster than the richer countries in the North. This also came with—in some cases quite considerable—reductions in unemployment rates in Southern Europe. However, as shown in Figure 6, these temporary convergence dynamics were in large parts based on increasing private sector indebtedness made possible by foreign capital inflows, and they eventually proved unsustainable when the financial crisis hit (e.g. Baldwin *et al.*, 2015).

The increase in debt observed since the establishment of the common currency has been distributed unequally across Eurozone countries. We can see from the data that over the period 1999–2017 the growth of household and corporate debt in periphery countries exceeded the growth in core countries (see Figure 6). However, there is still marked within-group heterogeneity, as some core countries also show considerable increases in debt (e.g. corporate debt in Belgium), and some periphery countries only record a moderate rise in indebtedness (e.g. household debt in Italy). It should also be noted that the average level of household debt relative to GDP in the periphery countries was, on average, smaller than that of the core countries before the onset of the Eurozone. Nonetheless, we find that there is an obvious divergence between core and periphery when it comes to household debt after the advent of the Euro as a common currency. On the one hand, growth rates in household debt have in general been stronger in periphery countries; on the other hand, even the minimum growth of household debt in the periphery (which is found for Italy) surpassed the maximum growth of the same debt category in the core before the crisis. Among the core countries, Germany shows the smallest changes in household and corporate indebtedness since the inception of the Eurozone as both, household debt and corporate debt, have fallen in Germany relative to their respective starting levels. Despite the fact that there is considerable heterogeneity in the evolution of debt within both groups, Figure 6 nonetheless indicates a core–periphery pattern. In general, the increase in debt has been much more pronounced in the periphery, suggesting a relative dominance of debt-led growth regimes.

Already in pre-crisis times, the periphery countries' export bases were too narrow and technologically stagnant (Simonazzi *et al.*, 2013; Botta, 2014) to implement an export-led growth model. What emerged instead in large parts of the periphery was

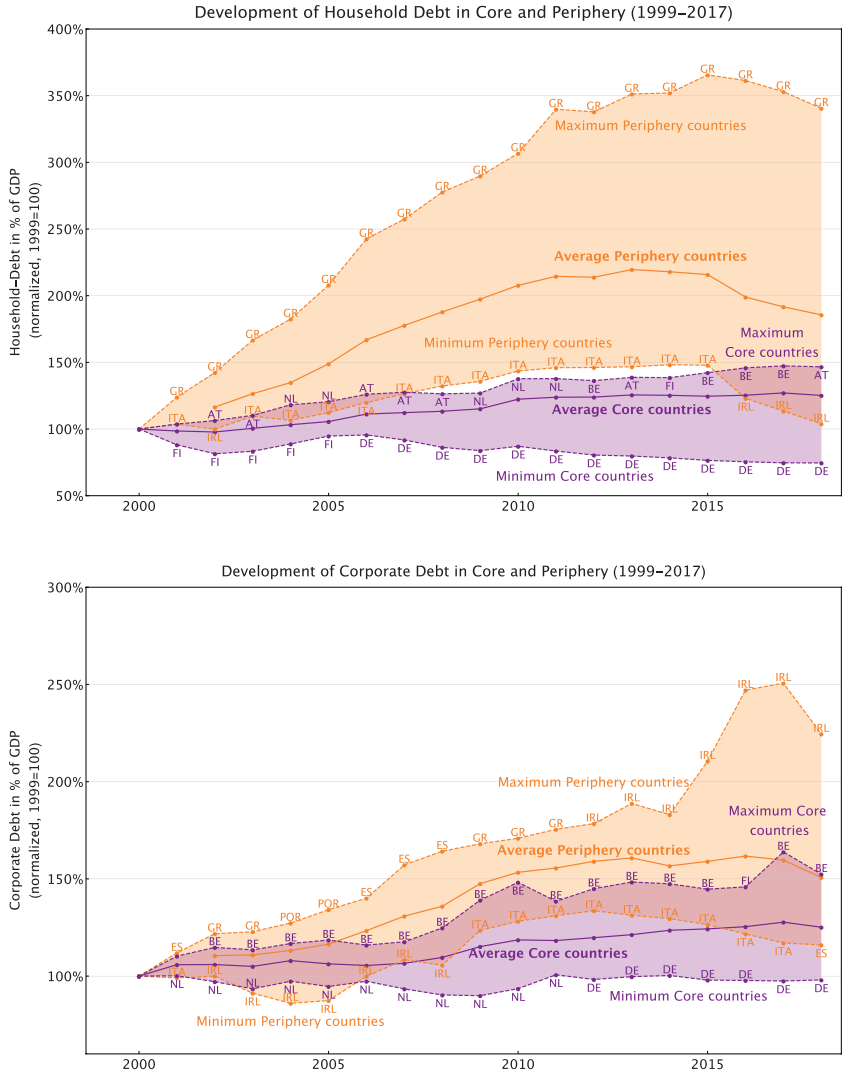

Fig. 6. *Development of household and corporate debt in core and periphery. Aside from the group average, for each point in time the respective extreme values for each group are also shown.*
Data: OECD; authors' own calculations.
Core countries: Austria, Belgium, Finland, Germany, Netherlands. Periphery countries: Greece, Ireland, Italy, Portugal, Spain.
Luxembourg was excluded from the core group due to missing data.

debt-led growth that was further facilitated by the introduction of the Euro (e.g. Celi *et al.*, 2018). European monetary unification facilitated the cross-border movement of capital, implying that sectors with above-average rates of return experienced a steep rise in capital inflows, which allowed for increasing private sector indebtedness (e.g. Perez, 2019). This tendency reinforced existing upward pressures on dynamic asset markets, including housing markets in Ireland and Spain. Low real interest rates in the Southern periphery were also a consequence of the low common interest rate set by

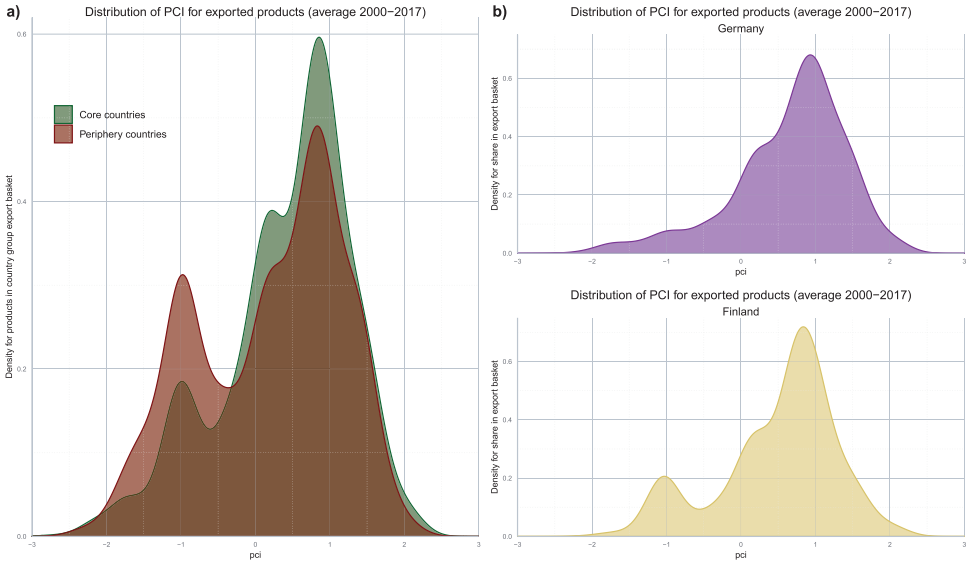

Fig. 7. *The production complexity index (PCI) distribution of the average expert baskets from core and periphery countries between 2000 and 2017 (a) and for Germany and Finland (b).*
Core countries: Austria, Belgium, Finland, Luxembourg, Germany, Netherlands. Periphery countries: Greece, Ireland, Italy, Portugal, Spain.

the European Central Bank (ECB), which implied that countries with above-average inflation rates (mostly the countries of the Southern periphery) experienced substantial declines in their real interest rates. The low nominal interest rate set by the ECB in turn was a response to low inflation, lacklustre growth and relatively high long-term unemployment in the Eurozone core—particularly in Germany, where growth had slowed and inflation had fallen in the early 2000s. Low long-term real interest rates were a prime factor underlying the credit boom that took place in large parts of the periphery (e.g. Storm and Naastepad, 2016).

3. Dimensions of structural polarisation in the Eurozone

So far, we have discussed the emergence of growth models in the Eurozone. We now turn to the underlying polarisation processes on the micro- and meso-levels. We argue that a central problem of the Eurozone is that monetary unification has not led to convergence of production and trade structures across the Eurozone's member countries, but rather fostered a process of structural polarisation. In what follows, we analyse polarisation in terms of exported products (Section 3.1) and technological capabilities (Section 3.2) and discuss the implications for convergence and divergence patterns.

3.1 Divergence of product diversification

In this section, we show that a main channel of polarisation relates to the kind of products being exported. As has already been noted in Section 2.2 and illustrated in Figure 3, the capacity to produce particularly simple and complex products is distributed rather unequally. Figure 7 further underscores this point by indicating that the average export

baskets of core and periphery countries indeed show significant differences in this regard. Figure 7(a) makes evident that core countries have a considerably higher share of exports in more complex products, while the production capacities of the European periphery are focussed more strongly on products associated with low or medium complexity.[7] More specifically, all periphery countries show a bimodal density distribution similar to the ones shown in Figure 7(a);[8] there is more structural heterogeneity within the group of core countries as illustrated in Figure 7(b). Some countries, such as Austria or Germany, show a unimodal distribution of export complexity, indicating their strong focus on complex high-tech products. Other countries, such as Belgium or Finland, show a similar bimodal distribution as the periphery countries, although with considerably more density mass in the more complex part of the distribution. This finding indicates that the core countries are actually more heterogeneous than one might anticipate as some countries, such as Germany or Austria, stabilise their forerunner position as high-tech exporters, while others, such as Belgium or Finland, actually struggle to defend their technological lead on a global scale. This finding points towards an on-going fragmentation of the core, that does not directly change the observed core–periphery pattern (due to the relatively poor performance of periphery countries which eventually prohibits catch-up tendencies), but indicates that the variation and range of outcomes achieved by core countries are widening. In other words, the heterogeneity within core and periphery as the two major analytical blocks used in this paper seems to be greater in the former, but is much smaller than the level differences between the groups.

In order to gain a more nuanced view of these persistent level differences between the core and periphery countries, we now inspect the differences in export performance between countries more explicitly. On the *y*-axis of Figure 8, we plot the difference between actual exports of products with complexity greater than some threshold (specified on the *x*-axis) and the hypothetical share of exports that would prevail if the capability to produce all products would be distributed evenly across countries. The lines for the Eurozone countries illustrate their respective deviation of actual from expected exports for different thresholds of product complexity.[9]

This way, the figure illustrates how countries differ with regard to their structural specialisation by visualising the deviations from the expected exports of more or less complex products. By doing so, it shows how countries differ in terms of the *kind* of products exported. To see how, consider that in the period 2000–15 about 8.5% of total exports in the world came from Germany, 1.7% from Spain, and only 0.35% from Portugal. However, as can be seen from panel (a), the share of German exports for products with a complexity index above 1 was much larger than 8.5%. More precisely, Germany's exports were about 71% higher than expected based on the share of Germany in total world exports.

[7] The figure also shows that both core and periphery countries are able to export complex products, indicating that, on a global scale, basically all European countries belong to the group of technologically more advanced countries, which is why, as argued in Section 2.3.1, their non-price competitiveness is of particular relevance.

[8] The precise shape of the distribution differs to some degree between periphery countries, with those countries with some stronger industrialised regions such as Northern Spain or Italy, showing more mass in the complex part of the distribution as compared to countries such as Greece, where the vast majority of probability mass is centred around simple products. Detailed distribution plots for all Eurozone countries are available in the supplementary appendix.

[9] The mathematical derivation of the deviations plotted on the *y*-axis of Figure 8 as well as general information about the distribution of products with regard to their complexity can be found in the Supplementary appendix.

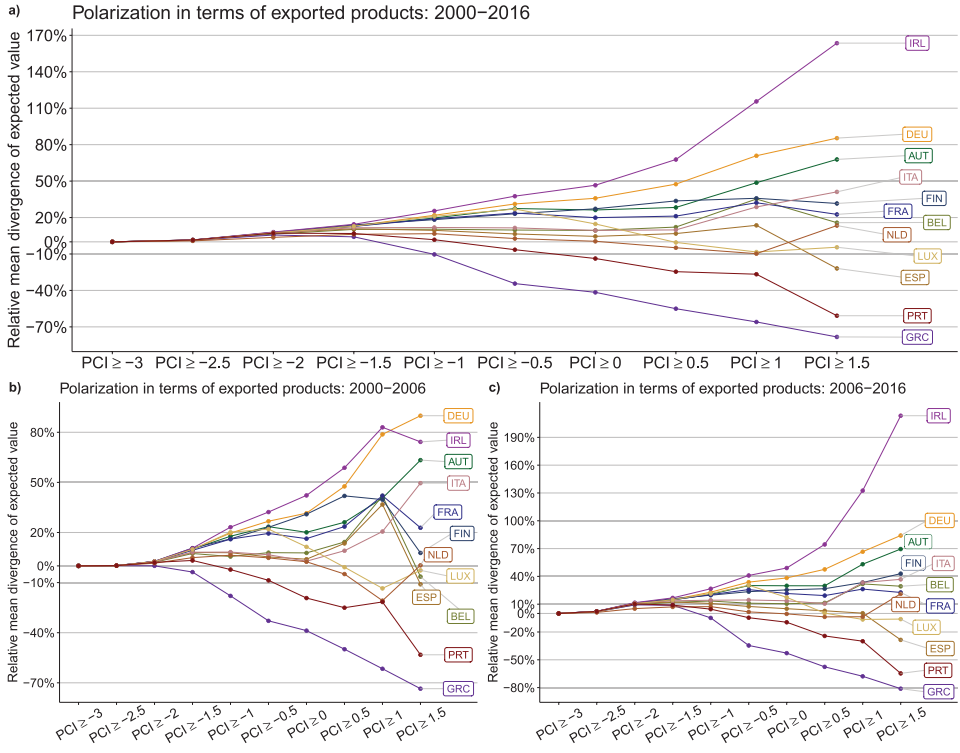

Fig. 8. *Deviations from the export volume of countries with a PCI of various thresholds (on the x-axis) that would be expected based on the total export share of the countries.*
Source: The Atlas of Economic Complexity (accessed May 2019); authors' own calculations. More details on the derivations are available in the supplementary appendix.

For Spain they are just 13.6% higher, and for Portugal even 26.6% lower than expected.[10] Thus, Figure 8 provides clear evidence for a polarisation in terms of exported products. While the periphery countries increasingly move into negative territory as the product complexity index (PCI) threshold increases—which implies that in general there is a negative deviation of actual exports from expected exports—the inverse does hold for the core countries. However, core countries show considerable within-group heterogeneity, as indicated above. This fragmentation is visible in Figure 8 as well, where countries such as Germany and Austria are clear over-performers for more complex products, but Belgium and Finland struggle with defending their position in high-tech markets. At the same time, a considerable within-group heterogeneity for the periphery countries also becomes evident. For instance, Italy and—to a lesser extent—Spain are quite good in exporting a certain limited number of complex products. This is due to the specific industrialised regions in the North of these countries.

[10] When considering only EU trade, about 32.3% of total exports in the period 2000–15 in the EU came from Germany and only 6.6% from Spain, with the German export for products with a complexity greater one was about 21.6% higher than expected based on the share of Germany in total EU exports, while we observe the opposite pattern for Spain and Portugal, whose actual export shares of such more complex products were 19.5% and 47.8% lower than expected based on their export share within the EU, respectively.

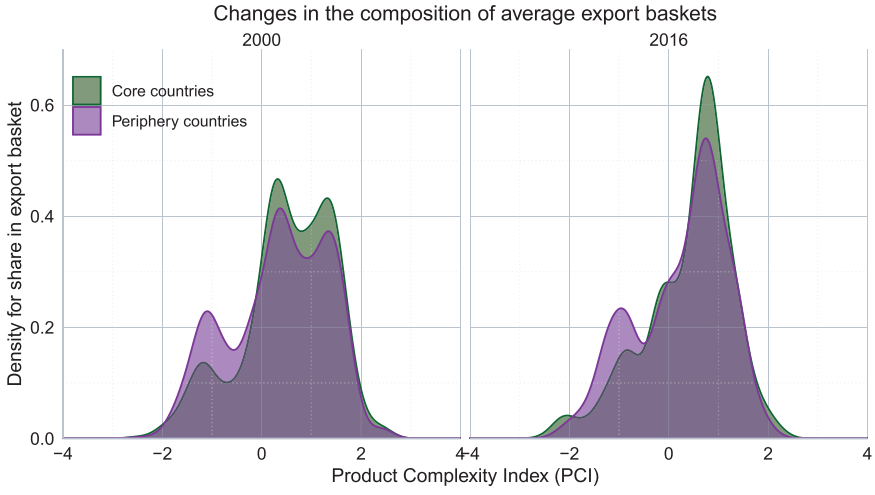

Fig. 9. *Changes in the complexity distribution of the export baskets of core and periphery countries. Source*: The Atlas of Economic Complexity (accessed May 2019); authors' own calculations. Core countries: Austria, Belgium, Finland, Luxembourg, Germany, Netherlands. Periphery countries: Greece, Ireland, Italy, Portugal, Spain.

Even more successful is Ireland, which is the only country that has managed to challenge the dominance of Germany in the category of the most complex products. This point becomes evident in the increasing deviation of Ireland's actual exports from expected exports for higher PCI thresholds. Overall, the main driver of export growth in Ireland has been the pharmaceutical sector (Barry and Bergin, 2012). The technological upgrading of the Irish economy is due to the creation of a business cluster specialised on complex information telecommunication products, the Irish 'Silicon Docks' (Brazys and Regan, 2017, Regan and Brazys, 2018), which was made possible due to state-led enterprise policy aimed at establishing links with the tech industry in the Silicon Valley, low corporate taxes and the migration inflow of highly skilled labour from other European countries (Brazys and Regan, 2017, Regan and Brazys, 2018). Finally, we observe that the financial crisis has not had a large impact on these relationships; panels (b) and (c) of Figure 8 indicate that the polarisation of exported products has proven very persistent in the pre-crisis (2000–06) and post-crisis (2009–16) periods.

3.2 Technological capabilities and structural change

In order to further investigate the issue of polarisation in industrial structures and its path-dependent nature from a more dynamic viewpoint, we study structural change of industrial sectors in the Eurozone's economies since the introduction of the Euro. As becomes evident from Figure 9, both core and periphery countries managed, on average, to shift their export baskets towards more complex products. Yet, this shift has been more pronounced for the countries in the core, which begs the question whether the dynamics of the relevant capability accumulation are characterised by a path-dependent process.

The usefulness of any typology of growth models or country taxonomies depends on the persistence of the respective groups—and path dependencies are one important

source for such persistence. To investigate whether path dependencies play a role, we use a measure for the directedness of structural change proposed by Gräbner *et al.* (2019). It is based on assessing the average complexity of all changes in the Eurozone countries' export baskets on a sectoral level.

The intuition behind this approach is to measure how the directedness of technological change in the Eurozone's economies has evolved over time. In particular, we calculate the weighted average complexity associated with the decline and growth of individual sectors over two time windows: first, the 'pre-crisis directedness measure' looks at structural changes from the pre-Eurozone (1995–99) to the pre-financial-crisis period (2003–07); second, the 'post-crisis directedness measure' captures structural changes from the pre-financial-crisis period (2003–07) to the post-crisis period (2010–14). The measure indicates for a given Eurozone country whether export values improve more markedly for more complex products (in which case the value of the directedness measure is positive) or for less complex products (in which case its value is negative; more information on the derivation and estimation of the variable is available in the supplementary appendix).

The upper panel in Figure 10 plots the directedness of technological change against the initial economic complexity position of the respective Eurozone country for the two time-spans introduced above. Thereby, the arrows indicate the relative shift in position from the pre- to the post-crisis periods. Several observations can be made from the upper panel in Figure 10. First, it shows that periphery countries typically occupy lower ranks in terms of complexity as compared to core countries. Second, we find a general and inverse relationship between a country's starting position in terms of complexity ranks and the directedness of technological development. This result aligns well with the classic Kaldorian claim that success breeds success (Kaldor, 1980), which suggests that countries with a more favourable starting point in terms of technological capabilities gain further structural advantages over time, while relative laggards tend to lose even more technological ground. Finally, the arrows indicate that the major commonality between periphery countries lies in their structural development since the onset of the crisis as their position has deteriorated in terms of both their complexity ranks as well as their technological outlook. The core countries, in contrast, show more heterogeneity in their behaviour after the financial crisis and exhibit quite different development paths. To better illustrate this aspect, the lower panel of Figure 10 shows the changes in position for all countries anchored in a common vantage point; in doing so, we can identify more clearly the homogenous development of periphery countries, which have witnessed both declines in complexity ranks as well as in their technological outlook. Consequently, the periphery countries are the only, and lonely, inhabitants of the lower left quadrant, where not a single core country can be found.

As already indicated, the results in Figure 10 also point to considerable heterogeneity among the core countries; while some are struggling to hold on to their initial position, Germany has clearly sustained its technologically dominant role, leading to an increasing distance from the periphery countries. Hence, technological divergence is clearly visible if one considers that all of the Southern periphery countries have lost ground relative to their pre-crisis position. This observation also holds for the special case of Ireland, which was affected by the crisis in a similar way as the remaining periphery countries (see lower panel in Figure 10), but of course enjoys a favourable general trend due to its specific development model discussed in the preceding section (Regan and Brazys, 2018).

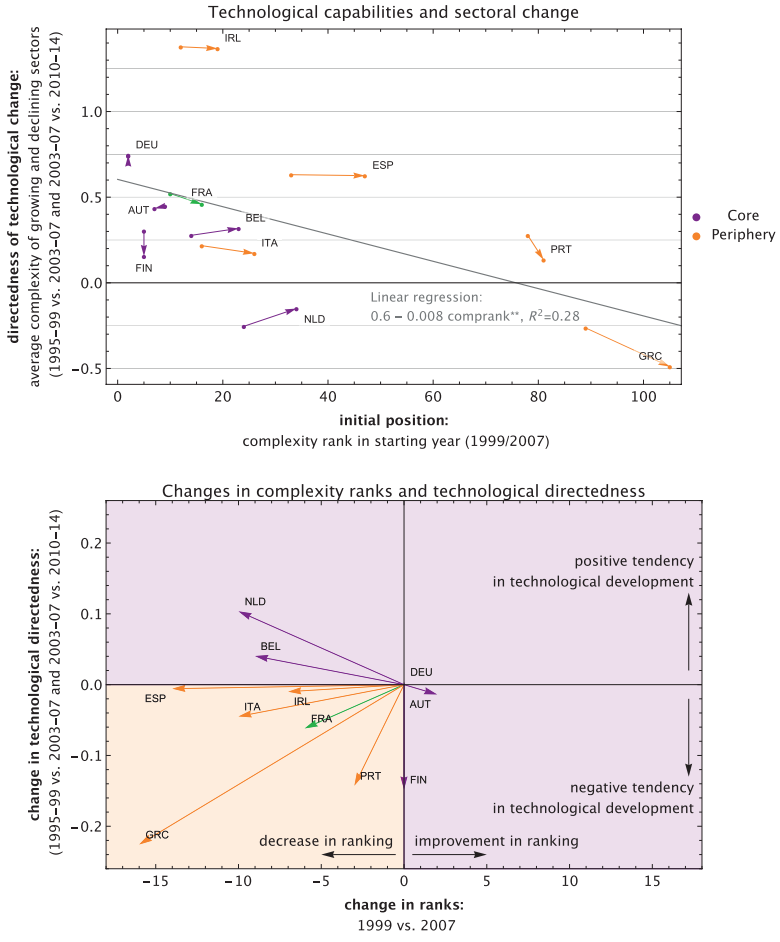

Fig. 10. *Technological capabilities and structural change.*
Data: The Atlas of Economic Complexity (accessed May 2019); authors' own calculations. The calculation of the directedness of technological change variable on the *y*-axis is based on our own calculations of changes in average complexity derived from changes in export composition. For details, see the text as well as the supplementary appendix. The measure for technological directedness has been introduced in Gräbner *et al.* (2019).

Our consistent finding in this section was that the core countries are fragmented in the sense that some countries are able to further improve their leading technological positions, while others struggle to replicate their earlier success. This finding can be related to the literature on the institutional and political determinants of specific national growth models. The Eurozone countries are characterised by differences in their institutional and legal embedding—in areas such as tax and corporate law, the labour market or the financial sector (e.g. Hassel, 2017; Regan and Brazys, 2018; Behringer and van Treeck, 2019). In a 'race for providing the best business location' for international investors, some countries—such as Germany and Austria—succeed in global competition primarily because of their unique characteristics in the area of technological capabilities, while other countries try to achieve success in international competition by creating a particularly favourable business

environment in the areas of corporate taxation (e.g. Ireland) or financial services (Luxembourg, the Netherlands). Such differences in the institutional embedding across countries also affect the development of their production structures and growth models and thereby contribute to explaining existing within-group heterogeneity (Gräbner *et al.*, 2019).

4. Discussion and conclusions

Considering the central role of technological capabilities for the assessment of (future) economic developments (Hidalgo and Hausman, 2009; Cristelli *et al.*, 2015), our results suggest that one cannot expect a natural convergence process to materialise in the Eurozone. The problem is that the emergence of a structural competitive advantage in terms of technological capabilities (e.g. in Germany's case) rests on increasing returns to production, which itself have their roots in—*inter alia*—geographic specialisation (Fujita *et al.*, 1999), the presence of business communities and social ties among entrepreneurs and managers (Banerjee and Munshi, 2004), and trust and innovation clusters (Elsner *et al.*, 2015). All the mentioned factors have been at the heart of the classical arguments on circular cumulative causation and backwash effects (Myrdal, 1958), and cumulative causation and export-led growth (Kaldor, 1970; Thirlwall, 1980; Boggio and Barbieri, 2017). Our empirical findings clearly point to the presence of such path dependent, Kaldorian developments in the Eurozone. Hence, the current trajectory very likely represents a 'lock-in' in terms of industrial specialisation and, thus, economic development, which cannot be broken without coordinated policy intervention.

We have shed light on the mechanisms underlying the polarisation in the Eurozone by integrating micro- and macroeconomic perspectives into a coherent view. In doing so, we have shown how macroeconomic divergence between core and periphery countries is driven by the co-existence of two different growth trajectories (export-led vs. demand-driven models), which themselves can be traced back to a 'structural polarisation' in terms of technological capabilities. The emergence of export-driven growth in the core and debt-driven growth in the periphery is linked to the micro level of technological capabilities and firm performance. By examining this relationship empirically, our findings also carry implications for future analysis, for example, by pointing to the exceptional character of the Irish development or by documenting that the privileged position in terms of income and prosperity currently enjoyed by core countries might not be stable in the future: processes of cumulative causation are still operating, and a further differentiation among the core countries in the upcoming years does not only seem theoretically plausible, but is also suggested by the empirics.

A number of important policy implications follow from our findings. First, as long as core and periphery countries remain mired in structural polarisation and follow different growth models, macroeconomic divergence in the Eurozone will continue. Second, a set of active policy interventions is required to change the underlying export-led and debt-driven growth patterns. Against the background of our framework, such policies should *simultaneously* address the divergence of production structures and growth regimes through European industrial policies as well as the increasing inequality in European economies through a macroeconomic policy program based on public investment and redistribution.

Overcoming polarisation in terms of production structures in Europe requires an active industrial policy that aims at fostering a catching-up process in terms of innovative activity and technological capabilities for firms in the European periphery (Mazzucato, 2013; Bahar *et al.*, 2014; Cimoli and Dosi, 2017; Noman and Stiglitz, 2017). These policies must pose incentives, so that technological capabilities diffuse more freely from the European core to the periphery. In addition, they must entail investments into knowledge policies that support technological, organisational and institutional innovations in the periphery. Such policies could, for example, subsidise entrepreneurs, which are the players that help an economy discover its cost and opportunity space (Hausmann and Rodrik, 2003). Since this discovery process leads directly to public knowledge and production techniques that can be imitated by others, entrepreneurial activity in the face of uncertainty represents a social learning process that should be facilitated by government policies. Finally, macroprudential regulation of the financial sectors and industrial policies should be accompanied by public investment and redistribution policies (Noman and Stiglitz, 2017) to counteract the rise in income inequality, which is the main root of deficient demand in Europe that underlies current processes of economic polarisation.

Due to considerable country heterogeneity within both the core and periphery group, a 'one-size-fits-all' policy approach is unlikely to work. While it is illusory to believe that any country can simply replicate the German success in terms of technological superiority, it would be similarly naïve to expect that the same industrial policies will work for periphery countries like Greece, Spain and Portugal when it comes to increasing their level of technologic capabilities. Instead, the approach should be targeted towards the specific industrial policy needs of the respective country. Allowing more flexibility for targeted policies, however, will require institutional reforms, especially of the current focus on horizontal industrial policy and the rigid fiscal framework, because overcoming structural polarisation in the Eurozone within the given focus on improving international competitiveness will eventually require fiscal scope for public investment to allow for structural improvements and innovations (e.g. Mazzucato, 2013; Koo, 2015; Heimberger and Kapeller, 2017). Against this background, it is also apparent that the 'one-size-fits-all' approach of fiscal consolidation in the crisis-ridden periphery countries from 2010 onwards was bound to fail spectacularly: 'public spending cuts exacerbate the gap between potential production and effective demand, and salary and wage cuts only marginally restore the competitiveness of distressed sectors' (Boyer, 2012, pp. 290–291). Fiscal austerity is adverse to the restoration of strong productive sectors in the Eurozone. Since structural polarisation fuels macroeconomic divergence, the Eurozone must indeed be expected to disintegrate eventually, if the 'lock-in' of industrial specialisation between core and periphery countries is not broken up by targeted policy interventions.

Supplementary data

Supplementary data are available at *Cambridge Journal of Economics* online.

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References

Atkinson, A. B., Piketty, T. and Saez, E. 2011. Top incomes in the long run of history, *Journal of Economic Literature*, vol. 49, no. 3, 3–71.

Baccaro, L. and Pontusson, J. 2016. Rethinking comparative political economy: the growth model perspective, *Politics & Society*, vol. 44, no. 2, 175–207

Baccaro, L. and Pontusson, J. 2018. *Comparative Political Economy and Varieties of Macroeconomics*, MPIfG Discussion Paper 18/10. Cologne: Max Planck Institute for the Study of Societies.

Bahar, D., Hausmann, R. and Hidalgo, C. A. 2014. Neighbors and the evolution of the comparative advantage of nations: evidence of international knowledge diffusion?, *Journal of International Economics*, vol. 92, no. 1, 111–23.

Baldwin, R., Beck, T, Benassy-Quere, A., Blanchard, O., Corsetti, G., de Grauwe, P., den Haan, W., Giavazzi, F., Gros, D., Kalemli-Ozcan, S., Micossi, S., Papaioannou, E., Pesenti, P., Pissarides, C., Tabellini, G. and Weder di Mauro, B. 2015. Rebooting the Eurozone: step 1 – agreeing a crisis narrative, *CEPR Policy Insight*, no. 85. London: Centre for Economic Policy Research.

Banerjee, A. and Munshi, K. 2004. How efficiently is capital allocated? Evidence from the knitted garment industry in Tirupur, *Review of Economic Studies*, vol. 71, no. 1, 19–42.

Barba, A. and Pivetti, M. 2009. Rising household debt: its causes and macroeconomic implications – a long-period analysis, *Cambridge Journal of Economics*, vol. 33, no. 1, 113–37.

Barry, F. and Bergin, A. 2012. Inward investment and Irish exports over the recession and beyond, *The World Economy*, vol. 35, no. 10, 1291–304.

Behringer, J. and van Treeck, T. 2019. Income distribution and growth models: a sectoral balances approach, *Politics & Society*, 47(3), 303–332

Boggio, L. and Barbieri, L. 2017. International competitiveness in post-Keynesian growth theory: controversies and empirical evidence, *Cambridge Journal of Economics*, vol. 41, no. 1, 25–47.

Botta, A. 2014. Structural asymmetries at the roots of the Eurozone crisis: what's new for industrial policy in the EU?, *PSL Quarterly Review*, vol. 67, no. 269, 169–216.

Boyer, R. 2012. The four fallacies of contemporary austerity policies: the lost Keynesian legacy, *Cambridge Journal of Economics*, vol. 36, no. 1, 283–312.

Brazys, S. and Regan, A. 2017. The politics of capitalist diversity in Europe: explaining Ireland's divergent recovery from the euro crisis, *Perspectives on Politics*, vol. 15, no. 2, 411–27.

Carlin, W., Glyn, A. and Van Reenen, J. 2001. Export market performance of OECD countries: an empirical examination of the role of cost competitiveness, *The Economic Journal*, vol. 111, 128–62.

Celi, G., Ginzburg, A., Guarascio, D. and Simonazzi, A. 2018. *Crisis in the European Monetary Union. A Core–Periphery Perspective*, London, Routledge.

Cimoli, M. and Dosi, G. 2017. Industrial policies in learning economies, pp. 23–64 in Noman, A. and Stiglitz, J. E. (eds.), *Efficiency, Finance, and Varieties of Industrial Policy*, New York, NY, Columbia University Press.

Cristelli, M., Tacchella, A. and Pietronero, L. 2015. The heterogeneous dynamics of economic complexity, *PLoS ONE*, vol. 10, no. 2, e0117174.

Diaz Sanchez, J. and Varoudakis, A. 2013. *Growth and Competitiveness as Factors of Eurozone External Imbalances*, World Bank Policy Research Working Paper No. 6732. Washington, D.C.: World Bank.

Dosi, G., Grazzi, M. and Moschella, D. 2015. Technology and costs in international competitiveness: from countries and sectors to firms, *Research Policy*, vol. 44, 1795–814.

ECB. 2016. *Business investment developments in the euro area since the crisis*, *Economic Bulletin*, vol. 7, 48-70.

Elsner, W., Heinrich, T. and Schwardt, H. 2015. *The Microeconomics of Complex Economies: Evolutionary, Institutional, Neoclassical, and Complexity Perspectives*, Amsterdam, Elsevier/ Academic Press.

Eurostat. 2019. Hourly labour costs ranged between EUR 5.4 and 43.5 in 2018, Eurostat publication (April 2019), http://ec.europa.eu/eurostat/statistics-explained/index.php/Hourly_labour_costs#Hourly_labour_costs_ranged_between_EUR.C2.A05.4_and_43.5_in_2018 (accessed 5 August 2019)

Flassbeck, H. and Lapavitsas, C. 2013. *The systemic crisis of the Euro – true causes and effective therapies*, *STUDIEN*, Berlin, Rosa-Luxemburg-Stiftung.

Fujita, M., Krugman, P. and Venables, A. J. 1999. *The Spatial Economy*, Cambridge, MA, MIT Press.

Gala, P., Rocha, I. and Magacho, G. 2018. The structuralist revenge: economic complexity as an important dimension to evaluate growth and development, *Brazilian Journal of Political Economy*, vol. 38, no. 2, 219–36.

Gaulier, G. and Vicard, V. 2012. Current account imbalances in the euro area: competitiveness or demand shock?, *Banque de France - Quarterly Selection of Articles*, 27, 5–26.

Gill, I. and Raiser, M. 2012. *Golden Growth: Restoring the Lustre of the European Economic Model*, Washington, DC, World Bank.

Glötzl, F. and Rezai, A. 2018. A sectoral net lending perspective on Europe, *Cambridge Journal of Economics*, vol. 42, no. 3, 779–95.

Gräbner, C., Heimberger, P., Kapeller, J. and Schütz, B. 2019. Structural change in times of increasing openness: assessing path dependency in European integration, *Journal of Evolutionary Economics*, DOI: https://doi.org/10.1007/s0019.

Gu, X. and Huang, B. 2014. Does inequality lead to a financial crisis? Revisited, *Review of Development Economics*, vol. 18, no. 3, 502–16.

Hassel, A. 2017. No way to escape imbalances in the Eurozone? Three sources for Germany's export dependency: industrial relations, social insurance and fiscal federalism, *German Politics*, vol. 26, no. 3, 360–79.

Hausmann, R., Hwang, J. and Rodrik, D. 2007. What you export matters, *Journal of Economic Growth*, vol. 12, no. 1, 1–25.

Hausmann, R. and Rodrik, D. 2003. Economic development as self-discovery, *Journal of Development Economics*, vol. 72, no. 2, 603–33.

Heimberger, P. and Kapeller, J. 2017. The performativity of potential output: pro-cyclicality and path dependency in coordinating European fiscal policies, *Review of International Political Economy*, vol. 24, no. 5, 904–28.

Hidalgo, C. A. and Hausmann, R. 2009. The building blocks of economic complexity, *Proceedings of the National Academy of Sciences*, vol. 106, no. 26, 10570–5.

Hidalgo, C. A., Klinger, B., Barabàsi, A.-L. and Hausmann, R. 2007. The product space conditions the development of nations, *Science*, vol. 317, no. 7, 482–7.

Hobza, A. and Zeugner, S. 2014. The 'imbalanced balance' and its unraveling: current accounts and bilateral financial flows in the euro area, *European Economy – Economic papers*, no. 520. Brussels: European Commission.

ILO. 2018. *Global Wage Report 2018/2019*, Geneva, International Labour Organisation.

Iversen, T., Soskice, D. and Hope, D. 2016. The Eurozone and political economic institutions, *Annual Review of Political Science*, vol. 19, no. 1, 163–85.

Johnston, A. and Regan, A. 2016. European monetary integration and the incompatibility of national varieties of capitalism, *Journal of Common Market Studies*, vol. 54, no. 2, 318–36.

Kaldor, N. 1970. The case for regional policies, *Scottish Journal of Political Economy*, vol. 17, no. 3, 337–48.

Kaldor, N. 1980. The foundations of free trade theory and their implications for the current world recession, pp. 85–100 in Malinvaud, E. and Fitoussi, JP (eds.), *Unemployment in Western Countries* London: Palgrave Macmillan.

Kapeller, J. and Schütz, B. 2014. Debt, boom, bust: a theory of Minsky-Veblen cycles, *Journal of Post Keynesian Economics*, vol. 36, no. 4, 781–813.

Koo, R. 2015. *The Escape from Balance Sheet Recession and the QE Trap*, Singapore, John Wiley and Sons.

Lavoie, M. and Stockhammer, E. 2013. *Wage-led Growth: An Equitable Strategy for Economic Recovery*, Basingstoke, Palgrave Macmillan.

Mazzucato, M. 2013. *The Entrepreneurial State. Debunking Public vs. Private Myths in Risk and Innovation*, London, Anthem Press.

Mody, A. 2018. *Euro Tragedy: A Drama in Nine Acts*, Oxford, Oxford University Press.
Myrdal, G. 1958. *Economic Theory and Underdeveloped Regions*, Bombay, Vora & Co Publishers.
Noman, A. and Stiglitz, J. E. (eds.) 2017. *Efficiency, Finance, and Varieties of Industrial Policy*, New York, NY, Columbia University Press.
Perez, S. 2019. A Europe of creditor and debtor states: explaining the north/south divide in the Eurozone, *West European Politics*, vol. 42, no. 5, 989–1014.
Regan, A. 2017. The imbalance of capitalisms in the Eurozone: can the north and south of Europe converge?, *Comparative European Politics*, vol. 15, no. 6, 969–90.
Regan, A. and Brazys, S. 2018. Celtic phoenix or leprechaun economics? The politics of an FDI-Led Growth Model in Europe, *New Political Economy*, vol. 23, no. 2, 223–38.
Sawyer, M. 2018. *Can the Euro Be Saved?*, Malden, MA, Polity Press.
Simonazzi, A., Ginzburg, A., and Nocella, G. 2013. Economic relations between Germany and southern Europe, *Cambridge Journal of Economics*, vol. 37, no. 3, 653–75.
Sinn, H. 2014. Austerity, growth and inflation: remarks on the Eurozone's unresolved competitiveness problem, *The World Economy*, vol. 37, no. 1, 1–13.
Stockhammer, E. 2015. Rising inequality as a cause of the present crisis, *Cambridge Journal of Economics*, vol. 39, no. 3, 935–58.
Stockhammer, E. 2016. Neoliberal growth models, monetary union and the Euro crisis. A post-Keynesian perspective, *New Political Economy*, vol. 21, no. 4, 365–79.
Stockhammer, E. and Sotiropoulos, D. 2014. Rebalancing the Euro area: the costs of internal devaluation, *Review of Political Economy*, vol. 26, no. 2, 210–33.
Stockhammer, E. and Wildauer, R. 2016. Debt-driven growth? Wealth, distribution and demand in OECD countries, *Cambridge Journal of Economics*, vol. 40, no. 6, 1609–34.
Stöllinger, R. 2016. Structural change and global value chains, *Empirica*, vol. 43, no. 4, 801–29.
Storm, S. and Naastepad, C. W. M. 2015a. Europe's hunger games: income distribution, cost competitiveness and crisis, *Cambridge Journal of Economics*, vol. 39, no. 3, 959–86.
Storm, S. and Naastepad, C. W. M. 2015b. Crisis and recovery in the German economy: the real lessons, *Structural Change and Economic Dynamics*, vol. 32, 11–24.
Storm, S. and Naastepad, C. W. M. 2015c. NAIRU economics and the Eurozone crisis, *International Review of Applied Economics*, vol. 29, no. 6, 843–77.
Storm, S. and Naastepad, C. W. M. 2016. Myths, mix-ups and mishandlings: understanding the Eurozone crisis, *International Journal of Political Economy*, vol. 45, no. 1, 46–71.
Straca, L. 2013. *The Rise of China and India: Blessing or Curse for the Advanced Countries?*, ECB Working Paper No. 1620. Frankfurt: European Central Bank.
The Atlas of Economic Complexity. 2019 Center for International Development at Harvard University, http://www.atlas.cid.harvard.edu (accessed May 2019).
Thirlwall, A. P. 1980. *Balance-of-payments Theory and the United Kingdom Experience*, London, Macmillan Press.
Vermeiren, M. 2017. One-size-fits-some! Capitalist diversity, sectoral interests and monetary policy in the euro area, *Review of International Political Economy*, vol. 24, no. 6, 929–57.