European Stability Mechanism

Regional disparities in Europe: should we be concerned?

The economic impact of the coronavirus is likely to differ from region to region, depending on their sectoral specialisation, and may exacerbate regional disparities. This paper provides an overview of how regional disparities have evolved since the euro's inception with an aim to help policymakers develop appropriate policy responses to support recovery following the economic shock caused by the coronavirus, and maintain the convergence process. Modes of regional support and policy intervention are crucial to helping adjustment and boosting productivity to ensure long-term sustainability and income convergence.

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Executive summary

The economic shock from the coronavirus may well exacerbate regional disparities. The impact is likely to differ from region to region, depending on exposures to tradable sectors, integration into global value chains (GVCs), and sectoral specialisation. This paper provides an overview of how regional disparities have evolved since the euro's inception, aiming to help policymakers develop appropriate responses to support recovery and maintain the convergence process.

The economic shock from the coronavirus may well exacerbate regional disparities.

Over the last 30 years we have been addressing the question of whether European integration would be the 'convergence machine' some leading economists have predicted. The internal market followed by Economic and Monetary Union (EMU) were

European integration had been expected to be a 'convergence machine'…

expected to enhance intra-industry trade, leading to more-similar economic structures, and therefore to better-synchronised economic cycles.

…but there is also a risk of persistent growth, employment, and inflation differentials.

At the same time, numerous economists and policymakers argued that EMU would lead to greater sectoral specialisation – reinforced by enhanced trade links – resulting in higher sensitivity to industry-specific shocks; more-idiosyncratic business cycles; and more-pronounced growth, employment, and inflation differentials. At the time, the adjustment process within EMU was a concern, given limited price and wage flexibility, low labour mobility, and a lack of any risk-sharing mechanism.

We examine how European integration and globalisation had affected Europe's regions before the coronavirus shock.

We examine how European integration and globalisation had affected Europe's regions before the coronavirus shock: had they successfully converged, and what drove that success? Or had they fallen behind, and if so, why? Most disparities between Member States have diminished, so how have Member States fared in regional disparities? Answers to these questions have implications for growth prospects, macroeconomic stability, and, potentially, political stability. This suggests policymakers should incorporate any understanding of these mechanisms into policy responses during this emergency and afterwards.

The European integration process and the role of trade relationships can appear in different forms as driving forces.

The European integration process and the role of trade relationships can appear in different forms as driving forces. Today, GVCs play an important part in international trade and trade specialisation, as do agglomeration effects in increasingly knowledge-based economies, and this may determine where highly productive firms locate.

Our findings show regional disparity is indeed a serious concern in Europe because many regions are falling behind.

Our findings show regional disparity is indeed a serious concern in Europe because many regions are falling behind. Diverse starting positions, varied distances from growth centres, and different capital and labour mobility mean the disparity could intensify. No one factor explains the issues involved, but the patterns emerging from our analysis have policy implications.

- On average, poorer European Union (EU) regions grew faster from 2000 to 2016 than those more advanced. Most of the poorest regions in new Member States were catching up. High-productivity sectors such as manufacturing and professional services, together with integration into GVCs, drove the convergence.
- However, regional disparities have been on the rise in the euro area and across the EU. We found symptoms of a regional 'middle-income trap,' with about a quarter of small regions in the old Member States falling behind – with the negative distance-to-average income widening.
- Regional sectoral compositions and productivity differences appear to be part of the explanation. The regional patterns suggest greater complexity than urban-rural or north-south differences can explain.
- Inherent advantages flow from close proximity to an economic centre of gravity. Agglomeration effects show a positive association with change in gross domestic product (GDP) per capita; those further away fall behind.
- Hysteresis following the previous crisis has aggravated regional disparities. The most affected regions experienced persistently lower employment and weaker investment, while less affected regions rebounded.
- After the previous crisis, a pattern of outward migration emerged from the lagging regions, while inward migration increased to the leading ones. We found some evidence to suggest regions with higher productivity growth attracted more entrants.
- Regional government quality and the labour force proportion with tertiary education have a positive link to GDP per capita change, while employment protection seems to have an unfavourable impact on regional income growth within the euro area.

Policies matter.

Regional disparities may widen even further in the absence of supportive developments as changes in the effects of trade, value chains, outward migration, and other factors bear on developments. We draw some tentative conclusions from our analysis and suggest some policies that may contribute to a more even regional development in Member States.

Regional support must ensure long-term sustainability.

Modes of regional support are crucial to ensure long-term sustainability. Policy intervention that helps adjustment and boosts productivity can set the scene for a catch-up process and income convergence. Policies need to be designed overall, with mutually supportive interdependencies. National-level policies will still be important but, increasingly, urban policies will determine growth, productivity, and high-quality employment. The EU Member States and their regions should all design policies carefully to try to avoid regional growth-centre clustering, such as has emerged in the United States (US).

A two-track approach is needed to generate a virtuous circle.

A two-track approach may be needed to generate a virtuous circle. One would improve the labour supply through education and the other would attract investment to generate labour demand and enhance productivity. This will require education designed to retain qualified people. Also, the role of research and development and innovation-enhancing policies needs to suit the comparative advantages of the region or urban area, with EU funds focused, for example, on helping to develop high quality research and education centres.

Quality in national, regional, and local government and administration plays a large role.

Quality in national, regional, and local government and administration plays a large role. Inward investment will take place when corruption is absent, administrative procedures work swiftly, and the outcomes of administrative and legal proceedings are predictable.

EU policies need to re-examine ways to help reverse, or at least mitigate, regional disparities.

The underlying processes that cause some regions to profit more from integration and trade linkages, and others less, will not vanish, and it would be economically and politically unacceptable for regions to slowly wither away. EU and national economic policies need to re-examine ways to help reverse these processes, or at least mitigate their impact.

Introduction

Regional disparities and agglomeration effects were already attracting policy attention before the coronavirus pandemic. The issue was discussed in a flagship report by the Organisation for Economic Co-operation and Development (OECD), in notes to the Economic and Financial Affairs Council (Ecofin), at the European Central Bank's (ECB) Sintra Forum, at the European Commission's Economic and Financial directorate's Annual Research Conference, and in an analytical chapter of the International Monetary Fund's World Economic Outlook (WEO).[1] The debate is not new, but the emergence of GVCs over the past decades, and the most recent pandemic shock, have added to the issue's complexity.

The economic shock of the coronavirus may exacerbate regional disparities. The immediate impact is higher in urban areas because high-density regions have a greater contagion risk and a concentration of services directly impacted by closures. Over time, however, rural areas may be increasingly affected when weak demand and mobility disruptions spread across the economy.[2] Sectors with less scope for remote working may be hit particularly hard, putting incomes and jobs at risk.[3]

The longer-term economic impact will likely differ across regions, depending on their exposure to particular trade sectors, their integration into GVCs, and their sectoral specialisation. This could lead to wide variations in regional employment and GDP, affecting the distribution of economic recovery.[4] Furthermore, regions with smaller buffers, fewer savings, and less fiscal space may find adaptation more challenging. Recent Bank for International Settlement (BIS) research suggests that employment in southern European regions and in France may be at higher risk.[5]

This paper aims to place this question into context with an overview of how regional disparities evolved over past decades. This could help design appropriate policy responses to support recovery and keep convergence on track; policymakers should incorporate an understanding of these mechanisms into policy responses during the emergency and afterwards.

The single market and EMU, to some extent, aimed to be a 'convergence machine.' The Delors Report that outlined the path to EMU, established income convergence as an explicit EMU objective.[6] An 'endogeneity' hypothesis predicted EMU would lead to greater intra-industry

[1] OECD (2018a), Productivity and Jobs in a Globalised World: (How) Can All Regions Benefit? Demertzis M, A. Sapir and G. Wolff (2019), "Promoting sustainable and inclusive growth and convergence in the European Union," Bruegel Policy Contribution to informal Ecofin meeting; ECB (2019), 20 Years of European Economic and Monetary Union; Bridging the growing divides: DG ECFIN's Annual Research Conference 2019; IMF (2019) "Closer Together or Further Apart? Subnational Regional Disparities and Adjustment in Advanced Economies."

[2] World Bank (2020), "Poverty and Distributional Impacts of COVID-19," April 16.

[3] Bergamini, E. (2020), "How COVID-19 is laying bare inequality," Bruegel blog post, March 31.

[4] OECD (2020), The territorial impact of COVID-19.

[5] Doerr, S. and L. Gambacorta (2020), "Covid-19 and regional employment in Europe," BIS Bulletin 16.

[6] Delors Report (European Council, 1989) cited in Franks, JR, BB. Barkbu, R. Blavy, W. Oman and H. Schoelermann (2018), "Economic Convergence in the Euro Area: Coming Together or Drifting Apart?" IMF Working Paper 18/10.

trade. Industrial structures would therefore become more-similar and economic cycles more-synchronised. An influential study by Frankel and Rose (1998) argues that countries joining EMU would eventually satisfy optimum currency area conditions.[7]

However, the 'concentration' or 'specialisation' hypothesis predicted that EMU would reinforce comparative advantages, which might lead to divergence. For instance, Krugman (1993) argues that the euro, together with stronger trade and financial ties, would lead to more sector specialisation.[8] This might result in higher sensitivity to industry-specific shocks, more idiosyncratic business cycles, and pronounced growth, employment, and inflation differentials. Furthermore, the adjustment process had been a concern, given relatively limited price and wage flexibility, low labour mobility, and the lack of a risk-sharing mechanism. The ECB's first chief economist, Otmar Issing, flagged this issue at the end of his tenure in a speech entitled "The euro – a currency without a state."[9] Going further, de Larosière (2012) argued that a monetary union does not by itself create economic convergence, but tends to concentrate economic prosperity in regions better endowed with productive capital and human resources.[10]

The emergence of GVCs was not foreseen at the time of the euro's inception, nor how this would affect shock transmissions. The single market played a key role in trade integration, and the euro contributed; recent ECB research has found the euro facilitated trade expansion and the emergence of GVCs within the euro area, especially between 'old' and 'new' Member States since 2007.[11] And because demand shocks are transmitted along a supply chain, trade that is linked by value chains will generate more synchronisation than trade in final goods.

Along with the emergence of GVCs, studies of the US have identified agglomeration effects at work too, as economies become more knowledge-based. For instance, Moretti (2012) provides an overview of agglomeration economies and analyses the causes of productivity differences across local labour markets in the US. He finds that productivity differences across regions are unlikely to be exogenous.[12]

As these factors combine, convergence at the national level may well go hand in hand with divergence at the regional level (Figure 1). Value chains increase both specialisation and synchronisation, but regions' participation in value chains varies; some are more exposed to agglomeration effects than others. As national comparative advantages are exploited, regional advantages and specialisation may lead to some regions participating strongly in international trade flows and GVCs, while others lag behind. This is similar to Krugman's argument suggesting this trend creates concentration and may exacerbate regional disparities. On the other hand, scope does exist for a different interpretation of any GVC impact, because some regions might catch up by joining these value chains, which could help business cycle synchronisation.

In the meantime, regional disparities might exacerbate economic, social, and political stability

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[7] Frankel, JA. and AK. Rose (1998), "The Endogeneity of the Optimum Currency Area Criteria," Economic Journal 108/449: 1009-1025.

[8] Krugman, P. (1993), "Lessons of Massachusetts for EMU," in Torres, F. and F. Giavazzi (eds.) Adjustment and growth in the European Monetary Union, Cambridge University Press, pp. 241-261.

[9] Issing, O. (2006), "The euro – a currency without a state," Speech at an event organised by the Bank of Finland, Helsinki, BIS Review 23.

[10] de Larosière, J. (2012), "The Long-term Outlook for the European Project and the Single Currency," Group of Thirty, Occasional Paper 84.

[11] Gunnella, V, M. Fidora and M. Schmitz (2017), "The impact of global value chains on the macroeconomic analysis of the euro area," ECB Economic Bulletin 8. Draghi, M. (2018), "Europe and the euro 20 years on," speech at Laurea Honoris Causa in Economics by University of Sant'Anna, Pisa. ECB Working Group on Global Value Chains (2019), "The impact of global value chains on the euro area economy," ECB Occasional Paper 221.

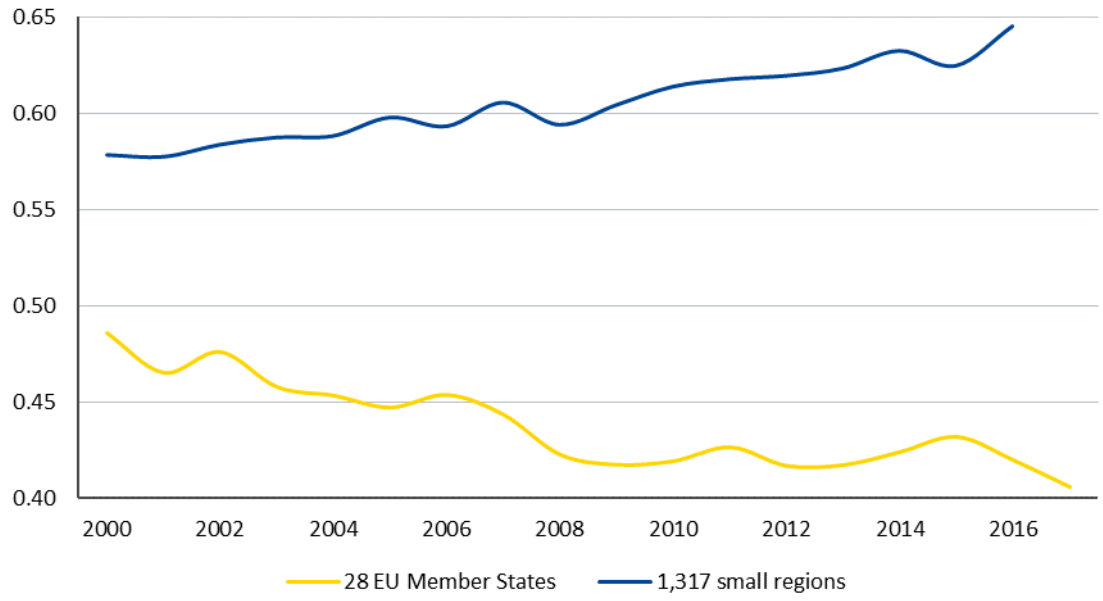
[12] Moretti, E. (2012), The New Geography of Jobs, Houghton Mifflin Harcourt.

risks. Differences in income levels themselves should not prevent cyclical stabilisation,[13] but participation in GVCs, combined with agglomeration effects, might unevenly magnify the impact of exogenous shocks. Resulting cyclical heterogeneity or structural divergence can generate internal imbalances and vulnerabilities to shocks. Furthermore, large and growing income gaps among regions may weigh on political dynamics and risk undermining both social cohesion and support for sound policies.

Motivated by these considerations, this paper summarises recent trends in regional disparities across EU Member States, with a focus on possible drivers and implications for EMU. We start with a survey of related academic and policy-relevant literature, then present stylised facts to depict patterns of regional disparities in Europe. We explore productivity changes and sectoral shifts over the past 20 years to gauge what differentiates leading and lagging regions.

The analytical section aims to assess the impact of GVCs, specialisation, and agglomeration effects, along with policy variables. In particular, we test variables for education, institutional quality, and national policies covering labour and product market regulation, to assess how they might alter regional outcomes. We also extend the analysis by examining labour mobility implications. We conclude with a discussion about policy implications, considering macro-financial risks that might emanate from regional disparities, and identifying policy areas that could help mitigate such risks.

Figure 1
Dispersion of regional income per capita since 2000
(Coefficient of variation)



Note: The coefficient of variation is a standardised measure of dispersion. It is the ratio of the standard deviation to the mean. The higher the coefficient of variation, the greater the level of dispersion around the mean and the larger the disparity. 1317 small regions refers to OECD regional breakdown of EU28.
Source: ESM based on OECD Regional Database

[13] Cœuré, B. (2017), "Convergence matters for monetary policy," speech at the Competitiveness Research Network (CompNet) conference on "Innovation, firm size, productivity and imbalances in the age of de-globalization" in Brussels.

1. A brief look at the literature

When the euro area was introduced, views differed as to how the economy and business cycle would react. It was clear from the start that the euro area did not fulfil all the optimal currency area criteria.[14] It scored well on some measures – such as economic openness, diversification in production and consumption, degree of price stability, and some elements of financial integration. But in other areas it scored less well – such as price and wage flexibility, labour market mobility, and broader financial integration.

It was generally expected that monetary integration would deepen reciprocal trade, which created the basis for the 'endogeneity' hypothesis.[15] The implication for the euro area was that it could turn into an optimal currency area after the launch of monetary integration, even if it was not one beforehand. Hence, EMU was expected to bring countries closer together, and converge economies that joined.

However, there was a risk that idiosyncratic shocks might become more frequent, and business cycles less correlated. In addition to Krugman's initial concern, cited above, de Larosière (2012) argues that monetary union in itself does not create economic convergence, but tends to concentrate economic prosperity in regions better endowed with productive capital and human resources.[16] A natural process of economic specialisation exists in a diversified region such as the euro area, and belonging to an economically and financially integrated zone might exacerbate this. Conversely, some sectors could tend to be sheltered from competition, reducing their efficiency and increasing the price of their services to households and industry – which also deters foreign investment.

Beyond the cyclical synchronisation issue, real income convergence is crucial for political and social cohesion in a monetary union. The dominant empirical approach to understand income-per-capita differences lies within the neoclassical framework: relatively poor regions with less capital and lower productivity are expected to attract capital from rich and capital-abundant areas. In theory, such capital flows facilitate a productivity catch-up by spreading new technologies from the world's more-advanced areas to the less-advanced. Hence, the model posits real income convergence – the tendency of lower income countries to grow faster than higher income ones to converge at higher incomes. However, this model's emphasis on the dynamics of capital stock offers limited insight into efficiency differences across regions within countries, given the assumed mobility of physical capital inside national boundaries.[17]

Sala-i-Martin (1996) marshals empirical evidence about the convergence of real incomes. He analyses long time series that include a cross-section of 110 countries (1960-1990), US states (1880-1990), prefectures of Japan (1955-1990), and regions within selected European countries (1950-1990).[18] This work finds that per capita income and product in poor areas tended to grow faster than in rich ones, both in terms of aggregates and within sectors. The rate of convergence is surprisingly similar across the data sets, but not rapid; the gap between poor and rich states declines by roughly 2% a year.[19] Sala-i-Martin and his co-authors use the neoclassical growth

[14] Mundell, R. (1961), "A Theory of Optimum Currency Areas", American Economic Review, 51: 657-65.

[15] Several authors brought forward concepts about the possible sources of "endogeneities." Artis and Zhang have discussed the endogeneity of symmetry of shocks; Blanchard and Wolfers, and Saint Paul and Bentolila, have discussed the endogeneity of labour market institutions; Kalemli-Ozcan, Sørensen, and Yosha discuss the effects of sharing a single currency on financial markets; cited in Issing, O. (2006) "The euro – a currency without a state," Speech at an event organised by the Bank of Finland, Helsinki, 24 March 2006, BIS Review 23.

[16] de Larosière, J. (2012).

[17] Acemoglu, D. and M. Dell (2010), "Productivity Differences Between and Within Countries." American Economic Journal: Macroeconomics 2/1: 169–88.

[18] Sala-i-Martin, X. (1996), "The Classical Approach to Convergence Analysis," Economic Journal, 106/437.

[19] This implies that 50% difference of the distance disappears in 35 years; even after 70 years 25% of the income difference remains.

model as a framework, but note the findings could be reconciled quantitatively with the neoclassical model only if diminishing returns to capital set in very slowly.[20] Sala-i-Martin (1996) points to the technological diffusion hypothesis as a possible explanation.[21]

In contrast, Rodrik (2011) argues that convergence depends on sustaining structural change in the direction of tradables such as manufacturing and modern services.[22] Policies that successful countries have used to achieve this are hard to emulate. More recently, Buti and Turrini (2015) argue that sustainable real convergence is linked to structural convergence, notably an economy's sectoral composition, productivity, and labour costs.[23]

Several euro area countries have achieved significant progress in real convergence, but others have not managed to bridge the gap in real incomes. Both an ECB article (2015)[24] and an International Monetary Fund (IMF) paper (2018)[25] showed that real convergence of per-capita income has been uneven across euro area countries. In a note to the Ecofin, Daniel Gros (2018) finds that the convergence process in Europe has bifurcated; new Member States are catching up but the north and south have diverged within the euro area.[26] However, he argues that the lack of north-south convergence has roots other than the euro. Similarly, Diaz del Hoyo et al. (2017) argue that the main reason for the lack of convergence in the South represents a gradual reduction in total factor productivity growth, which began long before the introduction of the euro.[27]

Empirical results on convergence across regions in Europe are mixed. Sala-i-Martin (1996) reports that the convergence process across European regions between 1950 and 1990 was similar to that for US states.[28] This work finds evidence that poorer regions within a country tend to grow faster than richer ones, relative to the respective country's average.[29] Similarly, economic historians have documented a narrowing of regional inequality during most of the 20th century – but from the 1980s this convergence stopped, and partly reversed.[30]

Magrini (2004) cautions that different methods deliver different results. He argues that "a substantial lack of convergence" exists across Europe. Indeed, many studies found a persistence in income disparities, rather than convergence, for a long time. Recognition of a European 'regional problem' led to the devotion of substantial resources to try to mitigate its manifestations. Magrini depicts a polarisation process, within which a group of richer regions have drawn away from the rest of the cross-sectional distribution. He suggests spatial factors

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[20] Barro, RJ, and X. Sala-i-Martin (1992), "Convergence," Journal of Political Economy, 100/2: 223-251.

[21] Sala-i-Martin, X. (1996), "Regional cohesion: evidence and theories of regional growth and convergence," European Economic Review 40/6.

[22] Rodrik, D. (2011), "The Future of Economic Convergence" National Bureau of Economic Research (NBER) Working Paper 17400.

[23] Buti, M. and A. Turrini (2015), "Three waves of convergence. Can Eurozone countries start growing together again?" voxeu.org

[24] "Real convergence in the euro area: evidence, theory and policy implications," ECB Bulletin 2015/5.

[25] Franks, JR, BB. Barkbu, R. Blavy, W. Oman and H. Schoelermann (2018), "Economic Convergence in the Euro Area: Coming Together or Drifting Apart?" IMF Working Paper 18/10.

[26] Gros, D. (2018), "Convergence in the European Union: Inside and outside the euro," CEPS for Ecofin.

[27] Diaz del Hoyo, JL, E. Dorrucci, F. Heinz and S. Muzikarova (2017), "Real convergence in the euro area: a long-term perspective," ECB Occasional Paper 203.

[28] Sala-i-Martin, X. (1996).

[29] Barro, RJ, X. Sala-i-Martin, OJ. Blanchard and RE.Hall (1991), "Convergence Across States and Regions" Brookings Papers on Economic Activity 1991/1: 107-182.

[30] Rosés, JR and N. Wolf (2018), "The Economic Development of Europe's Regions," Routledge.

could explain much of the cross-sectional per-capita income distribution.[31]

An OECD paper (2012) finds that aggregate inequality in Europe rose between 1985 and 2008.[32] An inequality increase within countries dominated this trend, although some countries converged to higher-income levels and cross-country inequality might have declined. And a more recent OECD report (2018b) also highlighted increasing regional disparities in countries hit hardest by the global financial crisis.[33]

Goecke and Hüther (2016) argue that NUTS3[34] regions have travelled down a convergence path since 2000, but with huge differences. Many eastern European countries, along with several Spanish and Portuguese regions, are characterised by a convergence process, but the opposite holds for many regions in Greece, Italy, and the United Kingdom. Their findings identify a region's manufacturing size as important for this convergence process.[35] (Figure 12 in Annex.)

A Centre for European Policy Studies (CEPS) study (2018) also finds considerable regional convergence heterogeneity within EU countries from 2000 to 2015.[36] A related article challenged the argument that deeper economic integration would lead to income convergence, arguing that economic integration leads to production agglomeration and income concentration, which are difficult to reconcile with income convergence.[37]

A recent National Bank of Belgium analysis concludes that intra-country income disparities remain substantial and have widened over time. Metropolitan regions – especially capitals – have grown faster than average, contributing to regional convergence across EU countries and to intra-country disparities. Agglomeration effects have likely played a role here, notably a concentration of higher-productivity activities and innovation.[38]

At the same time, Kalemli-Özcan suggests poorer euro area regions catch up with the richer ones on average, controlling for standard growth determinants such as demographic variables and education.[39] However, these factors might be endogenous to regional characteristics. A section in the European Investment Bank's (EIB) 2018/2019 Investment Report shows the strong variation in research and development expenditures, patenting activities, and productivity in EU regions and argues that a good mix of institutional quality and a skilled labour force is crucial for regional catch up.[40]

Dijkstra et al. (2015) point out that growth patterns in and across Europe differ from the simple city-led growth patterns. The previous crisis led to big contractions, especially in urban and remote rural regions, while intermediate and rural regions close to a city displayed more resilience.[41] A Centre for European Reform (CER) note (2019) also argues that the much-

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[31] Magrini, S. (2004), "Regional (di) convergence," Handbook of Regional and Urban Economics 4: 2741-2796.

[32] Fredriksen, KB. (2012), "Income Inequality in the European Union," OECD Working Paper 952.

[33] OECD (2018b) Regions and Cities at a Glance.

[34] Nomenclature of Territorial Units for Statistics (NUTS) embraces NUTS3, which covers the EU statistical regions.

[35] Goecke, H. and M. Hüther (2016), "Regional Convergence in Europe," Intereconomics 51/3, pp. 165-171.

[36] Alcidi. C, JN Ferrer, R. Musmeci, M. Di Salvo and M. Pilati (2018), "Income Convergence in the EU: Within-country regional patterns," CEPS.

[37] Alcidi. C. (2019), "Economic Integration and Income Convergence in the EU," Intereconomics.

[38] Bisciari, P, D. Essers and E. Vincent (2020), "Does the EU convergence machine still work?" National Bank of Belgium Economic Review, June 2020.

[39] Şebnem Kalemli-Özcan (2019), "Twenty Years of Convergence " Discussion at ECB Forum on Central Banking.

[40] EIB's Investment Report 2018/2019, pp. 115-126.

[41] Dijkstra, L, E. Garcilazo and P. McCann (2015), "The effects of the global financial crisis on European regions and cities", Journal of

discussed rural-urban divide is too simplistic, and does not fit the data.[42] Some industrial heartlands suffered relative decline but industrial output growth was stronger in the countryside and towns of western Europe, and spread evenly across regions in central and eastern Europe. Some large cities and regions managed to replace shrinking industrial production with high-value services, especially tradable services such as finance, technology, culture, and advertising, and in some cases with high-technology manufacturing.

Collier (2017) argues that an interaction of trade with spatial agglomeration can produce powerful transfers, with costs to greater trans-national connectivity. An increase in international trade can make everyone better off, but those who gain do not necessarily compensate those who lose, generating adverse effects.[43] This is corroborated by the World Bank's Global Value Chain Development Report (2017), which provides some evidence that the benefits from GVC-related trade were distributed unevenly within the respective countries.[44]

An OECD report (2018a) identifies drivers of contrasting trends in productivity within countries. On average, regions with a higher specialisation in the tradable sector – implying a higher exposure to international competition – or located near a city experience faster catch-up to the most prosperous regions in their country.[45] The report also notes some European regions seem to fall into a regional 'middle income trap.'[46]

In terms of the possible agglomeration effects, Moretti (2019) consistently finds that manufacturing productivity gains also benefit employment and earnings in other sectors.[47] Local manufacturing productivity growth reduces local inequality because it raises earnings of local less-skilled workers more than the earnings of local more-skilled workers. So the benefits from productivity growth mainly depend on where workers live.

At the ECB Central Banking Forum in 2019 two papers offered additional insights for Europe. Imbs and Pauwels (2019) show that pairs of sectors with high export intensity are significantly more correlated, which explains aggregate convergence in GDP growth at a country level.[48] Alfaro et al. (2019) indicate that greater manufacturing agglomeration in 2004 in the euro area regions was associated with higher average real GDP growth between 2005 and 2017.[49] Analysis by Jacob and Mion (2020) suggests higher prices mainly drive the productivity advantage of denser areas, while firms in denser areas can also sell greater quantities.[50]

Iammarino et al. (2018) complement the analysis by highlighting the role of technology shocks.[51]

Economic Geography 15/5: 935-949.

[42] Odendahl, Ch, J. Springford, S. Johnson, J. Murray (2019), "The big European sort? The diverging fortunes of Europe's regions," CER Policy brief.

[43] Collier, P. (2017) "The downside of globalisation: Why it matters and what can be done about it" World Economy 41/4: 967-974.

[44] World Bank (2017), Global Value Chain Development Report "Measuring and Analyzing the Impact of GVCs on Economic Development."

[45] OECD (2018a).

[46] Gill, I. and H. Kharas (2015), "The Middle-Income Trap Turns Ten", World Bank Policy Research Working Paper 7403.

[47] Moretti, E, and R. Hornbeck (2019), "Estimating Who Benefits From Productivity Growth: Direct and Indirect Effects of City Manufacturing TFP Growth on Wages, Rents, and Inequality."

[48] Imbs, J. and Pauwels, L. (2019), "Real convergence in the EMU", in 20 Years of European Economic and Monetary Union, ECB.

[49] Alfaro, L, M. Chen and H. Fadinger (2019), "Superstar firms and spatial agglomeration: An exploration of effects in Europe", in 20 Years of European Economic and Monetary Union, ECB.

[50] Jacob, N. and G. Mion (2020), "On the Productivity Advantage of Cities," LSE CEP Discussion Paper 1687.

[51] Iammarino, S, A. Rodríguez-Pose and M. Storper (2018) "Regional inequality in Europe: Evidence, theory and policy implications," voxeu.org Iammarino, S, A. Rodríguez-Pose and M. Storper (2018), "Regional inequality in Europe: evidence, theory and policy

They argue that increasing inter-regional inequality in Europe is partly due to a wave of technological innovation that stimulated the concentration of high-technology and knowledge-intensive sectors in large metropolitan areas, coupled with the demise of the more traditional industrial jobs across most of Europe. This is corroborated by the analytical chapter of the IMF's 2019 autumn WEO, which finds technology shocks raise unemployment in regions more vulnerable to automation, with the more-exposed lagging regions particularly hurt.[52]

Rodríguez-Pose (2018) highlights the negative externalities of agglomeration and the social costs of economic distress in many non-agglomerated areas.[53] Furthermore, the capacity and willingness of individuals to move may be overestimated, because those who stay in lagging or declining regions may be unlikely to relocate due to emotional attachment, age, or lack of sufficient skills and qualifications. Hence, encouraging mobility, or making it easier to find housing in dynamic areas, may not be sufficient to attract people.

Meanwhile, the evidence of business cycle synchronisation remains inconclusive. De Grauwe and Ji (2016)[54] find the bilateral business cycle correlation is higher within the euro area than outside, but do not consider whether the degree of synchronisation has evolved over time. Enderlein et al. (2016)[55] note a lack of improvement in business cycle synchronisation since the start of EMU. Bayoumi and Eichengreen (2017)[56] find the euro area falling short of an optimal currency area in its response to demand and supply shocks, with little evidence of the "endogeneity of the optimal currency area criteria." Recent IMF analysis shows that business cycles have become increasingly synchronised across euro area countries, but the amplitude of these cycles remain different.[57]

Blanchard and Katz (1992) show that in the US, the dominant adjustment mechanism to labour demand shocks is labour mobility, rather than job creation or job migration.[58] They suggest the conventional adjustment mechanism, in which countries that suffer adverse shocks restore full employment through real depreciation, is virtually absent in the US. Wages decline in states that suffer adverse shocks, but there is no tendency for states to recover lost jobs. Instead, workers move – and the unemployment rate falls.

Following a similar approach, Beyer and Smets (2015) find that in Europe labour mobility is a less important adjustment mechanism than in the US, but they detect a rise in the role of migration.[59] However, this does not address Krugman's initial concern that a combination of single market and EMU would produce a European economy that is "likely to exhibit greater disparity in regional growth rates, because with increased factor mobility regions will tend to adjust to shocks by adding or shedding resources rather than by adding or shedding industries." In keeping with this, "Europe will have a problem if it starts to experience American-style

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implications," Journal of Economic Geography.

[52] IMF (2019).

[53] Rodríguez-Pose, A. (2018), "The revenge of the places that don't matter (and what to do about it)", Cambridge Journal of Regions, Economy and Society 11/1.

[54] De Grauwe, P. and Y. Ji (2016), "Synchronisation in business cycles: An endogenous explanation," voxeu.org.

[55] Enderlein, H, E. Letta et al. (2016), "Repair and Prepare: Growth and the Euro after Brexit," Gütersloh, Berlin, Paris: Bertelsmann Stiftung, Jacques Delors Institut – Berlin and Jacques Delors Institute in Paris.

[56] Bayoumi, T. and B. Eichengreen (2017), "Aftershocks of Monetary Unification: Hysteresis with a Financial Twist," NBER Working Paper 23205.

[57] Franks et al. (2018).

[58] Blanchard, O. and L. Katz (1992), "Regional Evolutions," in Brookings Papers in Economic Activity 1.

[59] Beyer, RCM. and F. Smets (2015), "Labour market adjustments in Europe and the US: How different?" ECB Working Paper 1767.

regional slumps without American-style fiscal federalism." Hence, "Some kind of policy reform will be necessary if the increasingly unified European economy is not to pay an even higher price for that unification than the US does."[60]

[60] Krugman (1993).

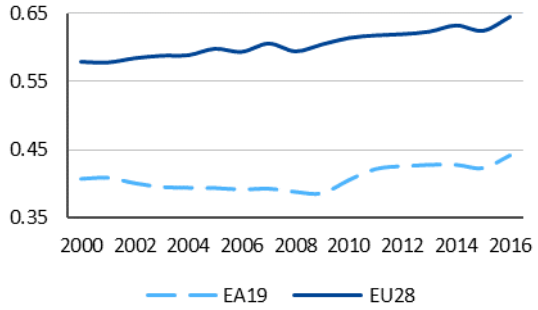
2. Patterns of regional disparities in Europe

Our analysis suggests European regional disparities intensified from 2000 to 2016. In this section, we look at regional patterns between 2000 and 2016 both in the 19 euro area member states (EA19) and then more broadly across the 28 EU Member States (EU28). We analyse data for large regions with an average population around 2.5 million and small regions with an average of around 400,000, based on Eurostat and the OECD Regional Database. The EA19 covered 141 large and 924 small regions, while the EU28 as a whole gathers 213 large and 1,317 small regions into our sample.[61] Figure 2, left panel, depicts the coefficient of variation, a standardised measure of dispersion, for the EA19 and the EU28.[62]

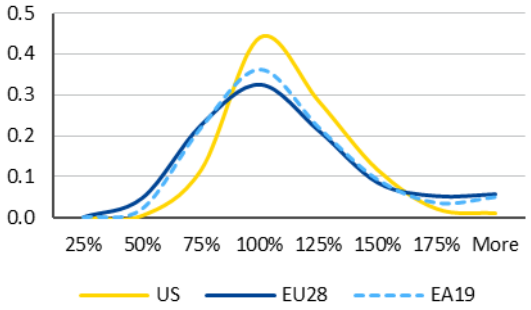
Regional disparities in Europe compare to those in the US. By some measures, disparities in the EA19 and the EU28 are even larger, with both the coefficient of variation and the 90/10 ratio[63] is higher when comparing large regions in Europe and regions in the US. The 90/10 ratio is about 1.8 for the US, 2.4 for EA19 and 2.8 for EU28. The regional distribution of GDP per capita in Europe is less concentrated around the mean and has 'fatter tails', suggesting a larger share of regions at the extremes (Figure 2, right panel).

Figure 2
Regional disparities in Europe and the US

Dispersion of income per capita, coefficient of variation



Distribution of regions by GDP per capita, as % of average



Note: The left panel is based on data for small regions, 924 in EA19 and 1,317 in EU28. The right panel is based on data for large regions to ensure comparability with the US, 141 in EA19, 213 in EU28 and 179 in the US. The chart depicts latest data available: 2017 for Europe and 2016 for the US.
Source: ESM based on OECD Regional Database

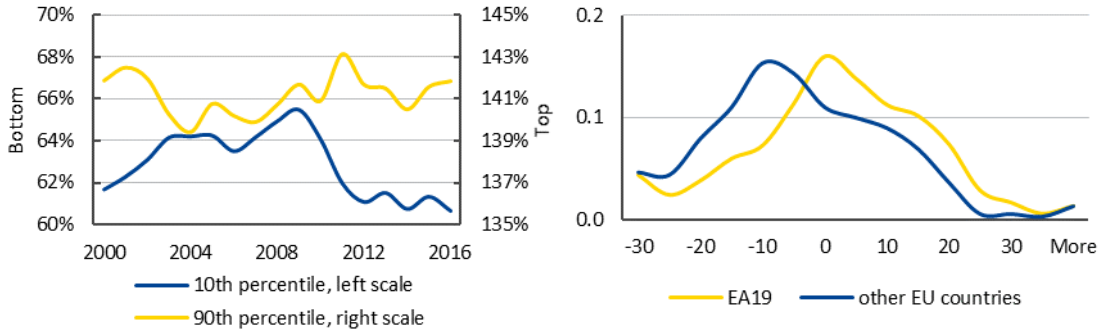
However, the dynamics were different inside and outside EMU. In the euro area, dispersion was stable until the previous crisis, and lower income regions were catching up to some extent. Divergences emerged afterwards, when both the top-income and bottom-income regions moved further away from the average. In other EU countries, low-income regions continued to catch up during the crisis. Overall, the share of regions moving away from the average in the euro area from 2000 to 2016 was higher than in other EU countries (Figure 3).

[61] In this section, we follow the OECD's classification for better data coverage. The large/small region classification is similar, but not identical to the Eurostat's NUTS2/3 level classification. Notably, there is a difference between the OECD's large regions for Germany (16 states) and the Eurostat's NUTS2 regions (41).

[62] The coefficient of variation is a standardised measure of dispersion. It is the ratio of the standard deviation to the mean. The higher the coefficient of variation, the greater the level of dispersion around the mean and the larger the disparity.

[63] The 90/10 ratio is the ratio of real GDP per capita, PPP-adjusted, of the 90th percentile subnational region to the 10th percentile subnational region, calculated for each country.

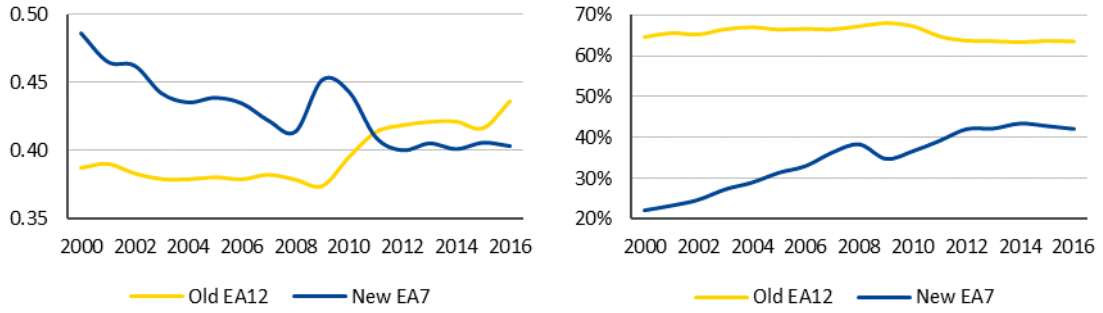
Figure 3
Change in distance to average GDP per capita
Top and bottom regions' GDP per capita, as % of average | Change in distance to average between 2000–2016



Note: The left panel is based on data for 924 small regions in the euro area. The right panel is based on data for 924 euro area and 393 other EU regions. The horizontal axis depicts the change in distance of a region's GDP per capita to the EU average GDP per capita expressed in percentage points. The vertical axis shows the share of regions in the respective bracket.
Source: ESM based on OECD Regional Database

Also, the catching-up effect in new EU Member States may contribute to different regional dynamics. When we split our sample between the 12 'old' euro area member states (EA12) and seven 'new' euro area member states (EA7), we find the regional dispersion increases across the EA12, but declines across the EA7, reflecting the catch-up in regions with an initially lower income (Figure 4).

Figure 4
Regional disparities and catching up in old and new euro area member states
Dispersion of income per capita, coefficient of variation | Income per capita in poorest regions, as % of EA19 average



Note: Both charts are based on data for small regions, 881 in old EA12 and 43 in new EA7. The right panel depicts the regions with GDP per capita falling into the lowest 10% in a given year.
Source: ESM based on OECD Regional Database

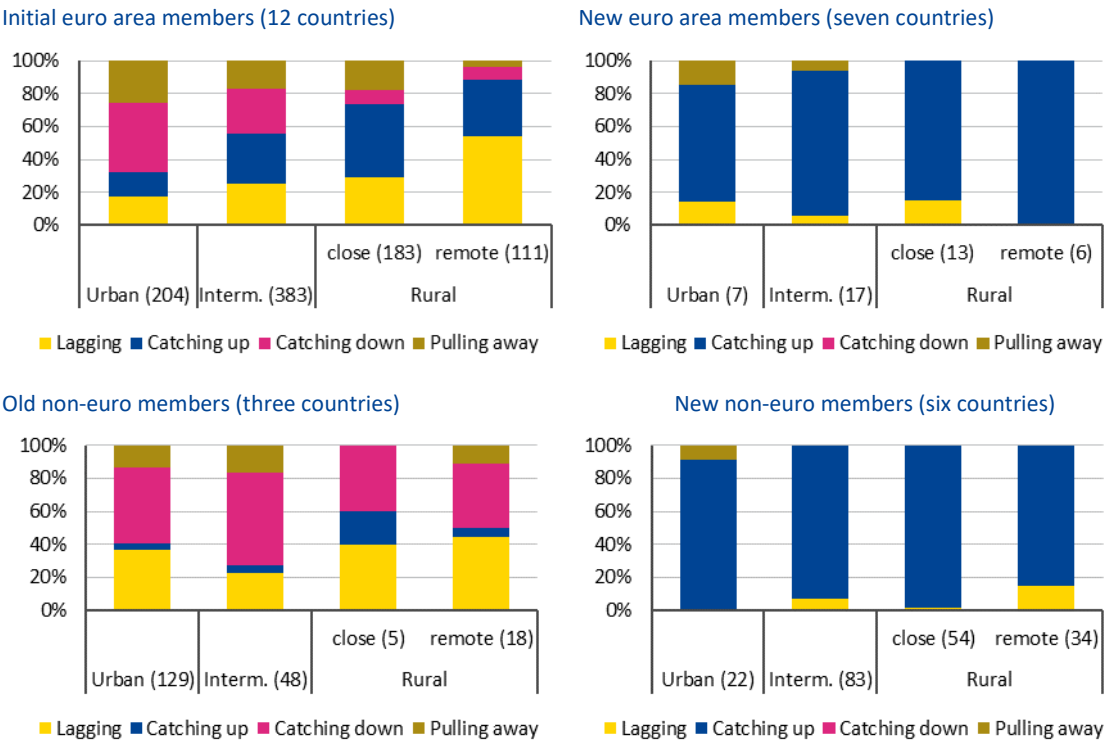
For a more granular analysis, we distinguish four groups of regions, based on how their GDP per capita evolved between 2000 and 2016. These four groups are: (1) those pulling away (initially above-average and rising faster than average); (2) those 'catching down' (above average but rising slower than average); (3) those catching up (below average rising faster than average); and (4) those lagging (below average rising slower than average). The GDP per capita is based on US dollar per head, at current prices and purchasing power parity (PPP), and we compare euro area member states to the euro area average and non-euro countries to the EU average.

In Europe, about a quarter of the small regions are falling behind, while around 15% are pulling away. In the EU28 group, 26% of the small regions recorded a below-average GDP per capita in 2000 and fell further below average by 2016, while 14% were above the average and pulled further ahead. In the EA19 group, 28% fell further behind, with 17% pulling away (Table 5 in Annex). Once again, a striking difference emerges between the old and new Member States; in the new Member States, the overwhelming majority of small regions are catching up, but the

picture is more uneven in the old Member States (Figure 5, comparing the left and right panels).

Urban-rural differences do not seem to fully explain regional variations.[64] Urban regions are the most likely to be pulling away, but this only represents a minority of urban regions in the EA12 (about 25%), while 42% of urban areas have been catching down and 17% have been lagging. Rural regions close to a city are most likely to be catching up (45%), while remote rural areas are the most likely to be lagging (54%) in the EA12. Intermediate regions, which are the most common in the EA12 at 383 out of 881, are relatively evenly distributed across the four categories, with a modest skew towards catching up (31%). The pattern is broadly similar in Denmark, Sweden, and the United Kingdom (UK) – the three old EU Member States that did not introduce the euro – with a relatively bigger share of catching down regions as opposed to catching up, consistent with the higher initial income level of these three countries (Figure 5, top left and bottom left).

Figure 5
Small regions by urban/rural typology and by relative change in GDP per capita between 2000 and 2016



Note: The number of regions in each category are shown in brackets.
Source: ESM based on OECD Regional Database

Taking a closer look at the initial 12 euro area countries, it is apparent that regional dynamics are not necessarily about north-south differences. Pulling-away regions represent a higher share in some northern countries, such as Ireland, Austria, Germany, and Belgium at above 20%, but the split between catching up and lagging regions is more nuanced. Catching-up regions are in a relative majority in Portugal, Austria, Germany, Spain, and Finland, standing above 40%, while more regions are lagging in Greece, France, Italy, and Belgium, at over 40%; in particular, the share of lagging regions in France is a strikingly high 72%[65] (Figure 6).

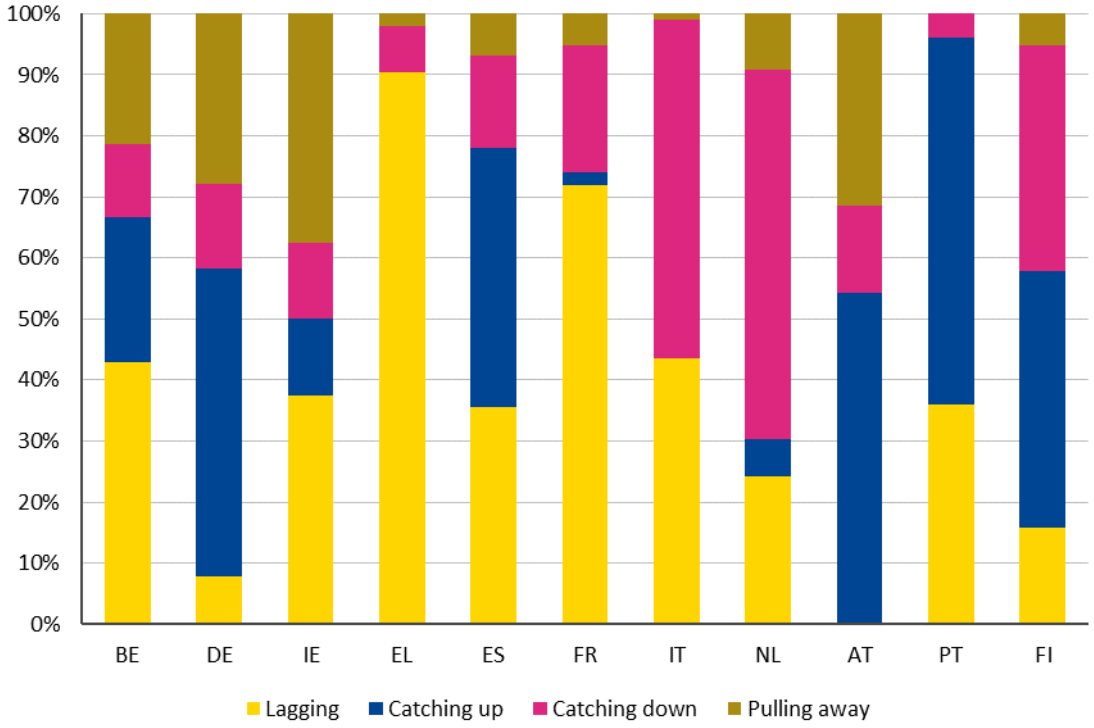
[64] We follow the classifications in the OECD's Regional Database.

[65] The basis for comparison in this case is the average of the 12 countries.

Figure 6

Share of small regions in each country by relative change in GDP per capita between 2000 and 2016

Compared to full-sample cross-country average of the initial 12 euro area member states



Note: Based on a total sample of 881 small regions. Luxembourg is omitted due to the limited number of regions.
Source: ESM based on OECD Regional Database

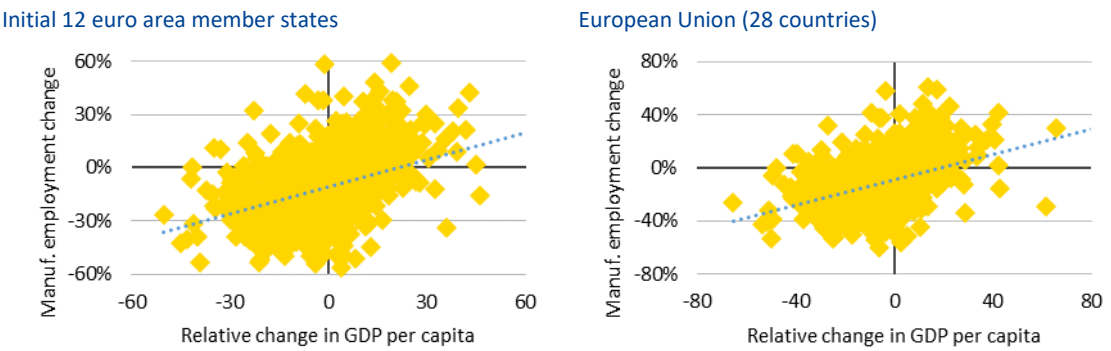
If we consider the GDP-weighted and employment-weighted ratios, a similar picture emerges, but with notable differences. In the GDP-weighted iteration, the relative share of pulling-away and lagging regions increases, suggesting a pattern of polarisation; the pulling-away and lagging regions appear to be economically more significant. In particular, over 80% of GDP is concentrated in pulling away regions in Ireland and in lagging Italian regions. The balance also tilts towards lagging regions in Portugal. On the other hand, when weighted by employment the relative share of lagging regions is lower at some 50% in France and 30% in Italy, but the weight of catching-down regions is higher (Figure 11 in Annex).[66]

Sectoral composition

Manufacturing appears to play an important role when considering possible differentiating factors. In the OECD Regional Database we find sectoral data for agriculture, industry, manufacturing and construction in small regions, and a more comprehensive breakdown for large regions. Based on this, we analyse the sectoral composition of regional economic activity. At first glance, the change in manufacturing employment shows some correlation with the change in GDP per capita relative to the average both in the euro area and in the EU more broadly (Figure 7).

[66] Weighting is based on GDP and employment at the beginning of the period, in 2000.

Figure 7
Change in manufacturing employment and in relative GDP per capita between 2000 and 2016

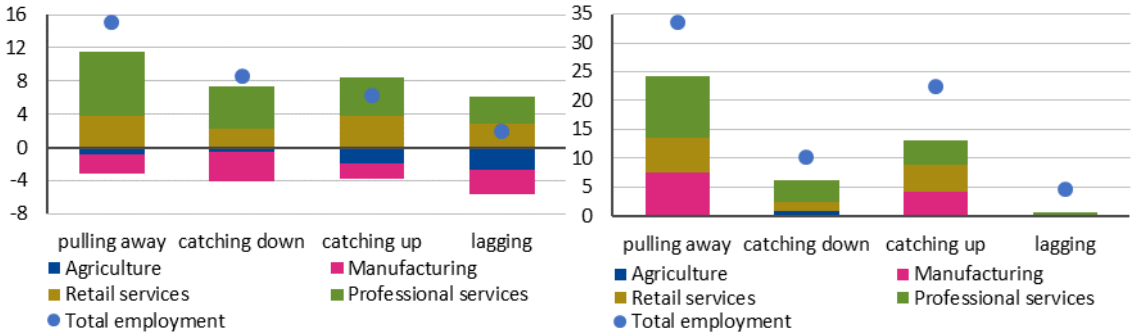


Note: The left panel is based on data for 881 small regions in EA12. The right panel is based on 1,317 small regions in EU28. The horizontal axes in both panels depict the change in a region's GDP per capita relative to the sample average GDP per capita in percentage points.
Source: ESM based on OECD Regional Database

Regions that could retain manufacturing and so benefit from productivity gains, turned out to be the more successful. As a general pattern, manufacturing employment fell from the year 2000, while its gross value added (GVA) increased. However, the manufacturing employment decline was more modest and the GVA increase more pronounced in the pulling-away and catching-up regions.

A shift to professional services is another driver in leading regions. In the pulling-away regions, gains in professional-services employment, including finance and information technology (IT), more than offset losses in manufacturing employment, and contributed considerably to GVA gains. Catching-down regions recorded comparable employment gains in services, but with more modest GVA gains. The lagging and catching-up regions experienced shifts from agriculture to services, but the resulting GVA gains were more meaningful in the catching-up regions. This seems to suggest weaker sectoral productivity gains in catching-down regions compared to the lagging ones (Figure 8).

Figure 8
Contribution to regional growth by sector in the initial 12 euro area member states between 2000 and 2016



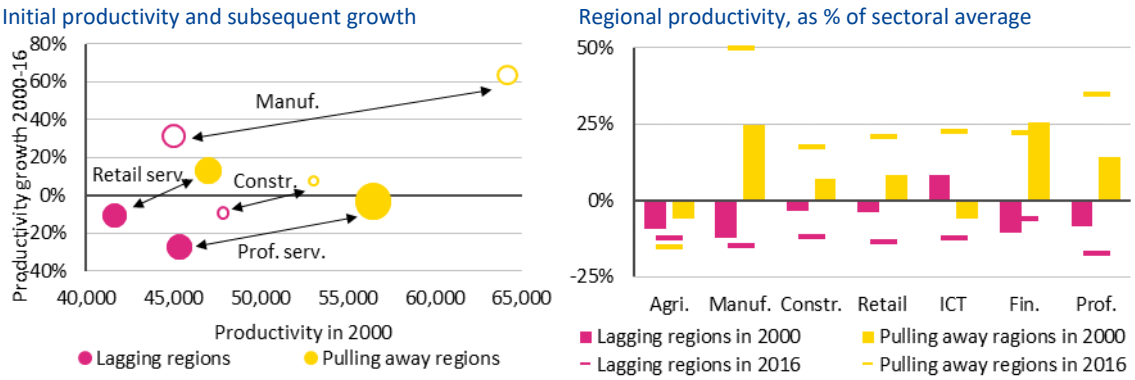
Note: Based on data for 131 large regions. Retail services include distributive trade, repairs, transport, accommodation, food service activities; professional services include scientific, technical, administrative, support, information, communication, financial and insurance service activities.
Source: ESM based on OECD Regional Database

Rising intra-sector productivity differentials contribute to regional disparities. Overall, regions with higher initial total labour productivity seem to gain productivity at a slower pace than the initially less-productive regions, presumably approaching the technology frontier. However, this does not appear to be consistent within sectors across regions. Leading regions seem to have had higher sectoral labour productivity to begin with, and then recorded more pronounced sectoral productivity gains than lagging regions. Consequently, the productivity gaps between

leading and lagging regions appear to have been widening in most sectors (Figure 9).

Figure 9

Regional productivity change by sector in the initial 12 euro area member states between 2000 and 2016



Note: Based on data for 131 large regions. Productivity is measured by gross value added per employee. In the left panel, the size of the bubbles reflects the contribution of employment growth in the respective sector to overall employment growth; empty bubbles show negative contribution. Retail services include distributive trade, repairs, transport, accommodation, food service activities; professional services include scientific, technical, administrative, support, information, communication, financial and insurance service activities.

Source: ESM based on OECD Regional Database

To obtain some econometric evidence on this pattern, and on the importance of starting conditions, we run a set of fixed-effects panel regressions based on annual data for large regions. We split the regions according to their initial (2000) productivity levels into five quintiles, and run estimates for total, manufacturing, and professional-services productivity growth. As an explanatory variable, we include the lagged productivity level respectively (Table 1). This also provides some insights into the stability of sectoral productivity dynamics for different groups of regions. The results for the full sample (c) corroborate that regions with higher initial total labour productivity gain productivity at a slower pace than initially less-productive regions. However, the results are not significant for manufacturing and services productivity separately. Looking at the breakdown by quintiles, results are stronger for the first quintile, the least productive, and weaker for the fifth and most productive quintile (a and b). This seems to suggest that the lowest productivity regions achieve some catch-up to the average, but productivity growth is unlikely to slow for the most productive.

Agglomeration may be another factor driving regional differentiation. To explore this possibility we introduce a gravity index following Odendahl et al. (2019). The gravity equation from physics is the basis of this measure: the product of the masses of two objects, divided by the square of the distance between them determines gravity. Translated to our setting, we calculate this measure based on GDP for all possible region-pairs, and then sum it up for each region. The closer a region is to other economically large regions, the higher the gravity index (Figure 13 in Annex).[67] This measure proves to be significant and robust across most of the iterations estimating productivity growth.

[67] See Odendahl et al. (2019) Chart 14 pp. 14-15.

Table 1

Panel data analysis of regional productivity growth between 2000 and 2016

(Annual productivity growth)

		EU28			EA19			EA12		
		Overall	Manu-facturing sector.	Service sector	Overall	Manu-facturing sector.	Service sector	Overall	Manu-facturing sector.	Service sector
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Q1 (a)	Productivity in t-1	-0.420***	-0.720***	-0.763***	-0.339**	-0.431***	-1.246***	-0.558***	-0.273***	-1.061***
		(-3.86)	(-7.29)	(-6.41)	(-3.11)	(-5.11)	(-6.70)	(-8.48)	(-7.84)	(-7.32)
	Gravity index (ln)	35.40***	41.52***	24.02**	27.99***	30.23***	48.16***	26.23***	38.63**	33.54***
		(7.11)	(5.60)	(2.98)	(8.67)	(3.72)	(5.05)	(13.14)	(3.69)	(4.05)
	GDP per capita in t-1 (ln)	-40.63***	-32.90**	14.95	-32.88***	-50.16***	-31.03*	-20.44***	-69.43***	-19.77
		(-5.74)	(-3.43)	(1.48)	(-6.76)	(-4.72)	(-2.08)	(-6.15)	(-4.03)	(-1.65)
Q5(b)	Productivity in t-1	-0.109	-0.0542*	-0.144*	-0.138	-0.0564**	-0.110	-0.184	-0.219*	-0.118
		(-1.73)	(-2.22)	(-2.14)	(-1.92)	(-2.85)	(-1.91)	(-1.94)	(-2.25)	(-1.56)
	Gravity index (ln)	47.39**	100.8	25.54***	55.70**	121.8	24.72***	31.04**	30.80***	24.60***
		(3.26)	(1.91)	(9.29)	(3.38)	(2.01)	(7.63)	(3.60)	(3.77)	(4.00)
	GDP per capita in t-1 (ln)	-65.71**	-145.1	-25.83***	-68.78**	-154.0	-25.84***	-34.09**	-30.50*	-28.03*
		(-2.91)	(-1.95)	(-4.85)	(-2.90)	(-1.94)	(-4.40)	(-2.85)	(-2.17)	(-2.73)
Full (c)	Productivity in t-1	-0.185***	-0.117	-1.632	-0.202***	-0.101	-2.546	-0.196***	-0.0953	-2.633
		(-4.24)	(-1.88)	(-1.48)	(-4.14)	(-1.87)	(-1.24)	(-3.66)	(-1.76)	(-1.22)
	Gravity index (ln)	29.38***	42.33***	51.10	28.98***	42.64*	88.06	29.19***	44.77*	94.36
		(8.15)	(3.61)	(1.94)	(5.73)	(2.41)	(1.50)	(5.37)	(2.35)	(1.47)
	GDP per capita in t-1 (ln)	-42.16***	-65.66***	-24.21	-36.76***	-67.26**	-13.55	-37.73***	-75.02*	-17.19
		(-8.02)	(-3.98)	(-1.97)	(-4.66)	(-2.68)	(-0.55)	(-4.13)	(-2.58)	(-0.72)
Full sample		3601	3439	3439	2387	2274	2274	2193	2087	2087
EA19 member dummy		yes	yes	yes						
Crisis dummy for BMS*		yes	yes	yes	yes	yes	yes	yes	yes	yes
Region and year fixed effects		yes	yes	yes	yes	yes	yes	yes	yes	yes

Note: Cluster-robust t-statistics in parentheses. The table presents the estimated coefficients of 27 independent time and region fixed effects panel regressions, sampled by region group (EU28, EA19, and EA12), by starting productivity (first quintile, fifth quintile, full sample), and by sector (full economy, manufacturing sector, services sector). T-1 refers to previous year. Ln refers to the natural logarithm. *ESM beneficiary Member States.

Source: ESM calculations based on Eurostat and OECD data

Crisis impact and the risk of hysteresis

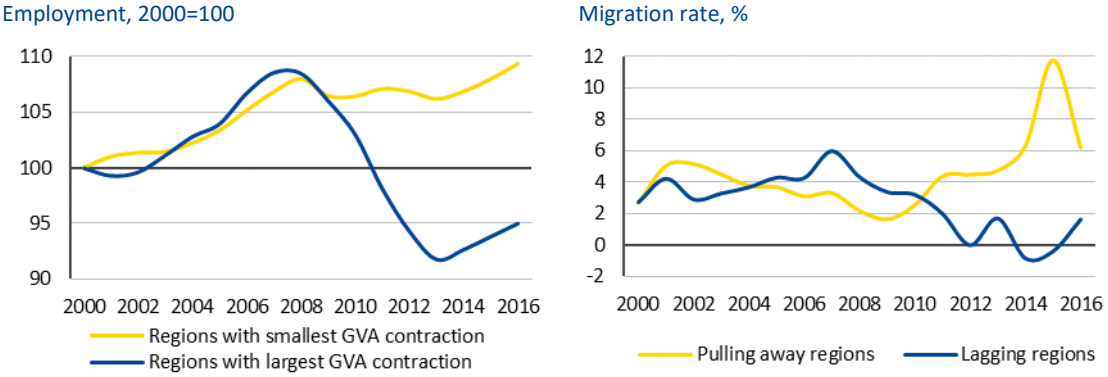
Hysteresis after the previous crisis aggravated regional disparities. The crisis demonstrated that the growth models of several regions were not sustainable. Many experienced persistently lower employment and weaker investment, raising the spectre of protracted stagnation. But, at the same time, leading regions were less affected or rebounded faster.[68] Part of this difference may be due to flexible exchange rate adjustments (in non-euro area countries), or with a longer-term trend of catching up from a low-income starting point (in new Member States). However, the difference between the most- and least-affected regions within the initial 12 euro area countries is still striking, given these countries are homogeneous in their exchange rate regime and relatively more similar in income levels (Figure 10, left panel).

An OECD report finds that regions with the largest non-tradable sector expansions suffered the strongest employment losses.[69] Tradable sectors may appear more exposed to external shocks, but, in fact, post-2008 employment declined more in regions that expanded their non-tradable sectors relative to tradable activities in the pre-crisis period 2000–2007. Hence, non-tradable activities are not immune from external shocks; local links tie tradable and non-tradable sectors together. Furthermore, non-tradable sectors depend more on local demand, while tradable sectors have more opportunities to find alternative markets.

From a different perspective, a recent ECB analysis[70] shows sizeable heterogeneity across regions in the evolution of total hours worked in the euro area between 2007 and 2018. Richer regions were more insulated during the recession period, and poorer regions did not fully catch up during the recovery period. By 2018 total hours worked had recovered to their pre-crisis levels only in the regions at the top of the GDP per capita distribution, while in the remaining regions they still stood below their 2007 levels. The smaller decline in total hours worked in the richer regions during the downturn can be partly attributed to regional differences in the employment rate and in population growth consistent with labour migrating from poorer to richer regions.

Figure 10

Regional employment and migration in the initial 12 euro area member states between 2000 and 2016



Note: In the left panel, regions with smallest GVA contraction had no decline in GVA, while regions with largest GVA contraction had 10% or more contraction peak-to-trough. In the right panel, migration rate is net migration during the year in % of average population in that year.
Source: ESM based on Eurostat

[68] See also the European Commission's 8th progress report on economic, social and territorial cohesion, 2013.

[69] OECD (2018a), p. 76.

[70] Botelho, V, C. Foroni and L. Vivian (2020), "Regional labour market developments during the great financial crisis and subsequent recovery," ECB Economic Bulletin 4.

Migration

Migration has shifted people away from lagging regions towards leading ones. Migration rates[71] were broadly similar until 2008, but after the previous crisis, across the euro area, migration rates in lagging regions declined and in leading ones increased. Eventually, around 2014, the rate turned negative in lagging regions and increased in leading ones, also presumably reflecting the shock of the crisis (Figure 10, right panel).[72]

An IMF study finds that the better-educated or employed are more likely to move within countries, which can exacerbate unemployment and skill shortages in lagging regions.[73] Also, a section in the EIB's 2019/2020 Investment Report argues that technological transformation also aggravates the spatial polarisation of European labour markets.[74]

Overall, we observe the following key patterns of regional disparities in Europe:

- Regional disparities have been rising both in the euro area and across the EU more broadly, especially following the crisis. The magnitude of regional disparities in Europe is comparable to the US, and larger by some measures.
- We find symptoms of a regional 'middle income trap', with most lagging regions – those with an increasing negative distance to average income – in old Member States, while most of the poorest regions in new Member States seem to be catching up.
- The regional disparity pattern suggests an urban-rural divide or north-south differences cannot offer simple explanations; regional sectoral composition and productivity differences appear to form part of the story.
- Regions that could retain manufacturing, and so benefit from productivity gains, turned out to be more successful. A shift to professional services is another driver in leading regions and it would appear regions benefitted from trade integration, given that manufacturing and a large part of professional services can be considered 'tradables'.
- The intra-sector productivity gap between leading and lagging regions has been widening in most sectors, which could be explained by agglomeration effects and GVC integration.
- Hysteresis following the financial crisis may have aggravated regional disparities. The most-affected regions experienced persistently lower employment and weaker investment, while other regions were less affected, or rebounded more swiftly.
- A clear pattern of outward migration from lagging regions emerged after the financial crisis, while inward migration to leading ones increased.

[71] Migration rate is net migration during the year in % of average population in that year.

[72] The refugee crisis in 2015 may have also contributed to the spike in leading regions.

[73] IMF (2019), pp. 77-78.

[74] EIB Investment Report 2019/2020, p. 374.

3. The role of global value chains, specialisation, and agglomeration

Empirical evidence corroborates the importance of the GVC integration and agglomeration effects. In this section, we undertake a multivariate analysis to overlay the increase in regional disparities with GVC integration, specialisation, agglomeration effects and policy variables, such as government quality and labour market protection. Our analysis aims to test the hypotheses on the impact of GVC and agglomeration for the EU and the euro area.

We estimate the change in regional GDP per capita compared to sample average expressed in percentage point change.[75] We run the regressions for the 28 EU Member States, for the current 19 members of euro area and for the initial 12 members of the euro area, using the respective averages as bases for comparison. All three estimation periods cover 2000 to 2016, in two different approaches. The first focuses on the overall change during this period (Table 2), while the second uses annual data during this period for the explanatory variables where the time-series is available (Table 3, see Annex for details.)

Regional data are available from the OECD's regional database, and from the Productivity and Jobs in a Globalised World[76] report that is based on regional input-output tables and provides information on regional GVC integration. We also calculate a sectoral specialisation indicator, the so-called Balassa-Hoover index[77] and the gravity index cited above. Additionally, we include proxies for education and patenting, and control for the initial income level. In an alternative specification (Table 1/7-8), we include a region's distance to the respective national capital, and its interaction term with the country's federal structure to gauge its impact on the agglomeration structure.

As policy variables, we use the regional European Quality of Government Index and EU fund allocations, as well as national-level indicators for labour and product market regulation. We include dummy variables for euro area membership depending on the time of accession, and dummies for ESM beneficiary Member States (BMS) to gauge the possible financial crisis impact.

The results from our analysis from 2000 to 2016 suggest the following:

- There seems to be a significant negative association between initial GDP per capita and the subsequent change across most iterations, suggesting poorer regions grow faster on average, and that income convergence is indeed taking place overall. Notably, in the cross-section, results are only significant for the EA12 if we control for government quality (Table 2/3-4).
- The share of value-added from GVCs in the total regional value-added has a significantly positive association with change in GDP per capita across all iterations (Table 1). This suggests that stronger integration into GVCs is a growth-enhancing factor that can support catching up. However, the simple specialisation indicators, like the Balassa-Hoover index, do not appear to be significant in the panel data analysis, for neither manufacturing nor services (Table 3).[78]

Agglomeration

- The gravity index, which is a proxy for agglomeration effects, shows a significantly positive association with change in GDP per capita throughout the euro area in the cross-sectional analysis (Table 2/3-4), and also more broadly in the panel regressions (Table 3). This seems to

[75] Although the exercise if focused on EU member states, we use the USD-based series from the OECD to improve data availability and facilitate possible comparisons beyond Europe.

[76] OECD 2018a, Figures 3.3 and 3.5 on pp. 101 and 116.

[77] Based on Rusticelli, E, D. Haugh, A. Arquie and L. Demmou (2018), "Going local: A regional perspective on how trade affects labour markets and inequality," OECD Working Paper 1530, Annex D.

[78] These results are in line with the findings of Rusticelli et al (2018).

support de Larosiere's argument that there may be an inherent advantage in being close to an economic centre of gravity that determines outcomes. The interaction term of the gravity index and productivity growth is also significantly positive (Tables 3/6-8), suggesting agglomerations may be amplifying the impact of labour productivity growth on change in income more broadly.

- Consistent with this result, the alternative measure of distance-to-capital proves to be significantly negative, especially in centralised states (Tables 2/7-8). This may also be interpreted as different models of development – development of the metropolitan capital against development across regions.

Skills and innovation

- The share of the labour force with tertiary education has a significantly positive association with change in GDP per capita in the cross-sectional analysis for the EU as a whole. This holds for the 2000–2016 average ratio (Table 2/1) and for the initial ratio in 2000 (Table 2/5), underlining the importance of the starting conditions, as suggested by de Larosiere. Similarly, the impact of patenting activity is significantly positive (Table 2/4).
- However, the results do not appear to hold in the panel regressions (Table3). This may also be explained by a non-direct causal link (e.g. longer studies because of unemployment) or a lagged transmission of educational achievements to productivity gains.

Policy variables

- Employment protection seems to have an unfavourable impact within the euro area; it is negatively associated with change in GDP per capita (Table 2/2-3). For the EU28, the association only turns significant if we introduce an interaction term with euro membership, suggesting that the importance of appropriate labour market regulation becomes more important when joining EMU (Table 2/6, 8).
- The results for product market regulation are similarly negative for GDP per capita growth in the EA12 (Table 2/3), but the results are weaker for other iterations.
- If we add the quality of government variable (which is available for a subset of our sample so we focus on the EA12), it shows a favourable impact, being positively associated with change in GDP per capita, while the significance of labour and product market regulation weakens.
- EU fund allocations turn out to be significantly positive only for the EU28 iterations in the panel data analysis (Table 3/1, 6), suggesting they may have a more meaningful impact for new Members outside the euro area.

Table 2

Cross-section regression analysis of regional income developments

(Change in regional GDP per capita relative to average over 2000-2016, in percentage points)

	Change in regional GDP per capita relative to average							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share of value-added from GVCs in total value-added	1.541*** (5.24)	1.195** (3.00)	0.792*** (4.27)	0.499* (2.13)	1.493*** (4.73)	0.947* (2.55)	1.018** (3.31)	0.840** (2.66)
Gravity index (ln)- average (agglomeration proxy)	-0.0461 (-0.09)	0.912 (1.20)	1.610*** (3.77)	1.267*** (3.50)		1.217 (1.89)		
Gravity index (ln) - initial (agglomeration proxy)					-0.221 (-0.35)			
Share of labour force with tertiary education - average	78.30*** (4.25)	41.81* (2.12)	17.03 (1.19)	9.031 (0.64)		58.43** (3.15)	39.33** (2.79)	35.58** (2.62)
Share of labour force with tertiary education - initial					61.62** (3.32)			
Patent cooperation treaty patent applications per million habitants				0.0605** (3.29)				
Country-Level Employment Protection Legislation Index	-5.248 (-0.95)	-19.02*** (-3.63)	-17.59*** (-3.79)	-3.546 (-0.85)	-11.19 (-1.72)	18.98* (2.17)	-2.951 (-0.60)	8.847 (1.46)
Employment protection x euro area membership						-39.98*** (-3.93)		-20.25** (-2.90)
Country-Level Product Market Regulation Index	4.217 (0.70)	-9.757 (-1.38)	-15.78*** (-3.58)	8.509 (1.12)	7.168 (1.05)	-3.064 (-0.47)	5.779 (1.09)	1.407 (0.27)
EU Fund allocations	52.04 (1.11)	19.03 (0.38)	22.45 (0.44)	-23.93 (-0.84)	72.25 (1.25)	64.78 (1.24)	15.20 (0.39)	51.22 (1.05)
European Quality of Government Index				0.314*** (6.29)				
Distance to capital							-3.664*** (-3.60)	-3.414*** (-3.43)
Federal state dummy							-16.18 (-1.86)	-15.49 (-1.81)
Distance to capital x federal state dummy							5.237*** (3.51)	4.875*** (3.40)
GDP per capita in 2000 (ln)	-17.54*** (-3.35)	-17.01* (-2.51)	-8.774 (-1.13)	-34.15*** (-6.84)	-16.12* (-2.56)	-19.13*** (-3.79)	-19.83*** (-5.92)	-18.79*** (-5.62)
Euro area dummy	1.279 (0.28)				5.309 (0.93)	97.77*** (4.19)	-2.772 (-0.61)	46.98** (2.70)
Crisis dummy for BMS	0.571 (0.16)	4.747 (1.17)	9.568** (3.13)	1.499 (0.38)	-1.944 (-0.45)	-0.00399 (-0.00)	-5.759 (-1.79)	-6.809* (-2.01)
Constant	132.8* (2.41)	191.7** (2.78)	115.8 (1.45)	285.6*** (5.51)	137.8* (2.24)	102.4 (1.95)	185.3*** (5.38)	157.9*** (4.34)
Sample	EU28	EA19	EA12	EA12	EU28	EU28	EU28	EU28
N	188	134	126	89	176	188	188	188
r2	0.489	0.460	0.481	0.729	0.466	0.543	0.615	0.633

Note: Robust t-statistics in parentheses. Ln refers to the natural logarithm. N refers to the number of observations. r2 refers to the coefficient of determination.

Source: ESM calculations based on European Commission, OECD, and University of Gothenburg data

Table 3

Panel regression analysis of regional income developments

(Annual change in regional GDP per capita relative to average, in percentage points)

	Change in regional GDP per capita relative to average							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Gravity index (ln) (agglomeration proxy)	22.50*** (8.74)	21.66*** (6.65)	21.87*** (6.26)	22.33*** (6.18)	22.18*** (5.81)	10.66*** (8.06)	5.319*** (4.49)	4.853*** (3.99)
Balassa-Hoover Index manufacturing	1.101 (0.57)	2.802 (1.05)	3.718 (1.34)	3.772 (1.54)	4.463 (1.73)	-1.407 (-1.15)	-0.585 (-0.50)	-0.191 (-0.16)
Balassa-Hoover Index services	0.966 (0.73)	3.141 (1.34)	2.680 (1.18)	2.804 (1.26)	2.206 (1.03)	1.197 (1.09)	1.688 (1.02)	0.718 (0.48)
EU Fund allocations	15.63*** (4.10)	10.99* (2.48)	5.876 (1.26)	9.069 (1.88)	7.016 (1.43)	8.582* (2.59)	1.954 (0.56)	-1.498 (-0.42)
Share of labour force with tertiary education	-6.661 (-1.65)	-1.326 (-0.30)	-1.313 (-0.29)	-1.291 (-0.32)	-0.890 (-0.22)	-2.721 (-0.86)	-1.295 (-0.50)	-0.788 (-0.32)
Productivity growth						-0.377 (-1.53)	0.00430 (0.03)	0.0475 (0.31)
Productivity growth x Gravity index						0.0577** (3.07)	0.0490*** (3.39)	0.0467*** (3.39)
GDP per capita in t-1 (ln)	-34.77*** (-9.43)	-38.09*** (-7.12)	-40.96*** (-6.77)	-35.24*** (-6.76)	-37.16*** (-5.94)	-16.93*** (-8.68)	-12.33*** (-7.17)	-12.89*** (-6.97)
Euro area dummy	-0.102 (-0.11)	1.054 (1.10)				-0.108 (-0.14)	1.403* (2.03)	
Crisis dummy for BMS (from 2008)	-2.866*** (-8.13)	-3.127*** (-9.37)	-3.005*** (-9.07)			-3.181*** (-10.59)	-3.305*** (-11.36)	-3.228*** (-11.07)
Constant	11.22 (0.92)	53.17** (3.32)	77.95*** (4.65)	12.81 (0.84)	32.38 (1.86)	10.13 (1.15)	42.39*** (4.80)	56.89*** (7.00)
Sample	EU28	EA19	EA12	EA19	EA12	EU28	EA19	EA12
Region and year fixed eff.	yes	yes	yes	yes	yes	yes	yes	yes
Crisis dummy -time-varying	no	no	no	yes	yes	no	no	no
N	3171	2116	1978	2116	1978	3171	2116	1978
r2	0.316	0.327	0.338	0.390	0.400	0.520	0.648	0.666

Note: Cluster-robust t-statistics in parentheses. t-1 refers to previous year. Ln refers to the natural logarithm. N refers to the number of observations. r2 refers to the coefficient of determination.

Source: ESM calculations based on European Commission and OECD data

It appears that regions with higher productivity growth attract labour from other regions. To shed some light upon the drivers of regional labour mobility, we run a set of panel regressions on regional migration. Most results are quite intuitive, showing that the net migration rate (arrivals less departures over population) is lower when the unemployment rate is higher, and entrants are attracted by higher employment growth. Nevertheless, there is also some tentative evidence that regions with higher productivity growth attract more entrants from the same country (Table 4/5). Our results are inconclusive regarding the role of education and labour market regulation in migration.

Table 4

Possible drivers of regional labour mobility

	Net migration rate t+1	Net migration rate t+1	Net migration rate t+1	Net migration rate t+1	Entrants from same country ln t+1	Leavers to same country ln t+1
	(1)	(2)	(3)	(4)	(5)	(6)
Employment (ln)	0.360 (1.46)		-0.380 (-0.78)		0.799** (3.28)	
Unemployment rate		-0.0116*** (-3.42)		-0.0136* (-2.39)		0.00443 (1.25)
Productivity growth	0.00274* (2.33)	0.00215 (1.92)	0.00343 (1.22)	0.00359 (1.16)	0.00377** (3.04)	-0.00229 (-0.71)
Gravity index (ln) (agglomeration proxy)	0.130 (1.13)	0.0527 (0.33)	0.323 (1.64)	0.0152 (0.06)	0.154 (1.89)	0.321 (1.24)
EU Fund allocations	0.109 (0.13)	-0.307 (-0.33)	0.316 (0.31)	-0.340 (-0.37)	-0.689 (-1.39)	-0.118 (-0.15)
Country-Level Employment Protection Legislation Index	-0.0402 (-0.24)	-0.109 (-0.69)	-0.0185 (-0.07)	-0.217 (-0.95)	-0.0412 (-0.64)	0.00748 (0.04)
Share of labour force with tertiary education	-1.835 (-1.48)	-2.036 (-1.61)	-2.530 (-1.51)	-2.664 (-1.49)	-0.305 (-0.88)	1.160 (1.04)
Euro area dummy	0.0369 (0.35)	0.0422 (0.37)	-0.00360 (-0.03)	0.0462 (0.34)	-0.0584 (-1.15)	-0.120 (-0.78)
Crisis dummy for BMS (from 2008)	0.00601 (0.09)	0.0849 (1.16)	-0.0356 (-0.45)	0.103 (1.13)	0.00802 (0.23)	-0.0507 (-1.37)
Constant	-6.327 (-1.63)	0.0616 (0.03)	0.565 (0.09)	1.134 (0.28)	-3.287 (-1.08)	4.266 (1.16)
Sample	EU28	EU28	EA19	EA19	EA19	EA19
Region and year fixed eff.	yes	yes	yes	yes	yes	yes
N	1539	1520	1008	989	1008	1037
r2	0.0246	0.0417	0.0337	0.0506	0.233	0.0274

Note: Cluster-robust t-statistics in parentheses; t+1 refers to consecutive year. Ln refers to the natural logarithm. N refers to the number of observations. r2 refers to the coefficient of determination.

Source: ESM calculations based on European Commission and OECD data

4. Policy implications

Our findings show that regional disparity is indeed a serious concern in Europe and deserves a higher degree of policy attention. Regional disparities can raise both cyclical and structural challenges, so looking at national aggregate variables is not always enough to ensure the economic, social and political impact and sustainability of policy settings.

In cyclical terms, deeper integration into GVCs can strengthen business cycle synchronisation across the most integrated regions. This is good news when it comes to cyclical stabilisation policies, such as a monetary policy stance and automatic fiscal stabilisers. However, it raises two challenges: first, it may increase susceptibility to asymmetric shocks, especially if a large share of the economy is concentrated around a few major GVCs; second, it may widen gaps between more-integrated and less-integrated regions, raising obvious social and political challenges, even if it could occasionally allow for some risk diversification. The two countervailing mechanisms of external orientation and domestic buffers should be balanced carefully.

In structural terms, uneven specialisation and differentiation along GVCs can challenge territorial cohesion and convergence. In addressing regional disparities, there are theoretically two extremes: on one side, facilitating labour mobility to help people find the jobs best suited to them, regardless of the location, which might be the most efficient solution in aggregate economic terms, but might lead to a hollowing out of lagging regions given agglomeration effects and endogeneities. On the other side, policymakers might prefer to support lagging regions to mitigate against pressure for emigration and geographic concentration.

Trade integration, growth of manufacturing and high-end services offer avenues to catching up, convergence, and not falling behind. The right conditions need to be in place to take advantage, which has not been the case everywhere. This highlights the importance of the right policies required to support possible sustainable regional development. In the absence of supportive developments, regional disparities may well expand as the effects of trade, value chains, outward migration and other factors bear on developments. We draw some tentative conclusions from our analysis and suggest some policies that may contribute to a more even regional development in Member States.

The modalities of regional support are crucial to ensure long-term sustainability. The EU, the Member States, and the regions should carefully design policies that attempt to avoid the regional clustering of growth centres, as happened in the US. Policy intervention that aids adjustment and boosts productivity can set the scene for a catching-up process and income convergence. But regional transfers that merely conceal the symptoms of divergence can hinder adjustment and might eventually become fiscally unsustainable. Policies need to be designed as an overall approach where interdependencies are mutually supportive. Policies at the national level remain important, but urban policies increasingly determine issues of growth, productivity, and high-quality employment.

Labour markets and labour mobility

Key policies that mitigate divergences address labour market dynamics such as wage adjustments, together with labour supply and demand. A region's economy must generate a virtuous circle between labour supply and demand. Innovative companies representing labour demand want to be there because they know they will find workers with the skills they need at the right price. And skilled workers that determine the labour supply want to be there because they know they will find the jobs they want.[79]

Challenges may arise if regional wage differences do not reflect productivity differences. Within

[79] Dauth, W, S. Findeisen, E. Moretti and. J Suedekum (2018), "Matching in Cities", CEPR Discussion Paper 13347.

a monetary union, disconnected wage and productivity growth can lead to competitiveness imbalances, both nationally and regionally. Regions where labour productivity grows faster than wages enhance their competitiveness. In contrast, if regional wages grow faster than productivity, unit labour costs rise and the tradable sector's competitiveness declines. This effect can be indirect – rising wages in the non-tradable sector, without productivity growth, leads to higher tradable sector prices.[80] Large differences in the price and wage-setting mechanism arrangements can also lead to different output and inflation responses to shocks, which could exacerbate cyclical heterogeneity across the currency union.[81]

Increasing the adaptability of labour and product markets might help reduce regional disparities. In particular, flexible labour market regulations could facilitate the alignment of regional wages and productivity. For instance, an earlier IMF study (2012) found that low minimum wages and low severance payments are associated with faster convergence to the frontier regions.[82] However, centralised wage-setting mechanisms, combined with persistent productivity differences, can lead to divergences in unit labour costs across regions. Limited geographical wage differences in nominal terms undermine the relationship between local productivity and local wages, and create costly geographic imbalances; low productivity regions tend to have higher non-employment rates than high productivity regions.[83] Similarly, product market regulations in wholesale and retail trades appear to have particularly negative impacts on the productivity growth of a country's least-productive regions.[84] For instance, previous research shows European regions with more sheltered economies performed worse in terms of employment change after the financial crisis compared to those with more open economies.[85] However, open and transparent policies can promote trade integration and GVC-led growth.[86]

Dedicating resources to education might be another way to improve skills and the labour supply. Our results demonstrate skilled labour might be an important factor behind a region's relative success. Given the importance of human capital for economic development, many local governments try to enhance the education of their residents by supporting local colleges and universities. Research suggests the presence of a university is associated with a better-educated labour force and higher local wages, but that in itself is not enough to form a sustainable cluster of innovative companies;[87] unless market conditions are attractive, college graduates tend to be mobile and do not stay where they went to school.

This in turn raises the question of labour mobility. 'Centripetal' labour movements to more productive agglomerations may leave 'hollowing-out' regions behind. This may not be desirable politically or sustainable economically. A challenge arises for policy-makers: should they invest in areas in relative decline, to dampen the outflow of the highly skilled labour force and compensate the regions that are 'left behind'? Or, should they invest in education, housing, and transport in agglomerations to facilitate the move towards successful cities? A focus on the agglomerations might lead to larger productivity gains but risks deepening social and political

[80] OECD (2018a), pp. 138.

[81] Cœuré, B. (2017).

[82] Spilimbergo, A. and N. X Che (2012), "Structural Reforms and Regional Convergence," IMF Working Paper 12/106.

[83] Boeri, T, A. Ichino, E. Moretti and J. Posch (2019), "Wage Equalization and Regional Misallocation," NBER Working Paper 25612.

[84] OECD (2018a), pp. 138.

[85] Fratesi, U. and A. Rodríguez-Pose (2016), "The crisis and regional employment in Europe: what role for sheltered economies?" Cambridge Journal of Regions, Economy and Society 9/1, pp. 33-57.

[86] World Trade Organization (2019), Global Value Chain Development Report "Technological Innovation, Supply Chain Trade, and Workers in a Globalized World."

[87] Moretti, E. (2014), "Are Cities the New Growth Escalator?" World Bank Working Paper 6881.

'fault-lines.'[88] A development strategy focused on the capital city could lead to more volatile and potentially lower growth than offered by a more a balanced development approach. [89]

Productivity catch-up

Job creation is not the only measure of success. A sustained rise in productivity is another measure, as a trade-off may exist between employment and productivity growth. Structural policies that address regional productivity differences would help technology diffusion, innovation, and local-economy integration into European and GVCs.

Regional policy that favours the productivity performance of lagging regions can drive a broader growth strategy. Territorial asymmetry means that there is potential to stimulate productivity in lagging regions.[90] Aggregate productivity growth can be driven by a lagging region's rebound towards that of frontier regions, while frontier regions themselves sustain high productivity. The main justification for regional policy is to achieve territorial equity objectives, but it is also a way to increase aggregate productivity growth. Hence, regional policy can be considered an integral part of a structural policy package aimed at improving a broad growth potential.

Yet, the productivity convergence of lagging regions will depend on the interaction and linkages with frontier regions.[91] Links between cities and the surrounding rural can spread agglomeration benefits more broadly while reducing congestion costs in cities. Connections include transport links, access to finance, and cooperation with the universities and research centres often found in cities. Areas where policy intervention can make a difference encompass innovation, information and communications technology infrastructure and measures to support digital growth;[92] the digital economy provides opportunities for small- and medium-sized enterprises to play a more active role in GVCs, where they have been under-represented.[93]

Another widespread example of place-based industrial policies is the use of economic subsidies to attract large companies to struggling communities to seed clusters in new locations.[94] However, subsidies need to be commensurate with the social benefit they provide, which involves assessing the aggregate impact of place-based policies for the entire country. Even when there is economic rationale for a subsidy in a particular region, it may not be beneficial for the country as a whole because the competition among regions for a given company can turn out to be a zero-sum game.[95] Furthermore, place-based policies targeted at lagging regions must be carefully calibrated to ensure that they help rather than hinder beneficial adjustments and do not shelter or preserve inefficient economic structures.[96]

A big push might be needed to generate growth centres far from existing agglomerations, shifting a region from a bad equilibrium to a good one. A coordinated policy package can break an impasse and simultaneously attract skilled workers, employers, and specialised business

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[88] Odendahl et al. (2019).

[89] Dijkstra et al. (2015).

[90] OECD (2018a), pp. 43-45.

[91] OECD (2018a), p. 152.

[92] Hendrickson, C, M. Muro, and WA Galston (2018), "Countering the geography of discontent," Brookings.

[93] World Trade Organization (2019).

[94] Shambaugh, J. and R. Nunn eds. (2018), "Place-based policies for shared economic growth," Brookings.

[95] Moretti (2014).

[96] IMF (2019).

services to a new location. Public authorities may be best placed to initiate such 'big push' policies, because they can coordinate the individual actors — workers and employers — to trigger a new agglomeration process. For instance, public subsidies provided to first-movers can later be phased out once the process becomes self-sustaining.[97] Support for the innovation sector and direct research and development funding could be central to such a package. Workforce training, business financing, tax and regulatory benefits, as well as economic inclusion and infrastructure development could also provide significant inputs, while public contributions to urban planning and innovation districts could also prove helpful.[98]

Other structural reforms might help foster development in lagging regions and accelerate the rate of convergence. For instance, an IMF study (2012) found that financial development and internal capital mobility enhances the convergence process.[99] Therefore, ensuring businesses in lagging regions have access to capital might help reduce disparities. Efforts to improve data on small business performance can help banks reduce the transaction costs of extending small loans, while financial technology innovations could help create a secondary market for such loans and reduce risk. In addition, boosting alternative, non-bank sources of capital, such as venture capital funding, might help support regional economic growth.[100]

The quality of national, regional, and local government and administration plays a large role.[101] Inward investment depends on an absence of corruption, on how fast administrative procedures work, and on the predictability of administrative and legal proceedings outcomes. The above cited IMF study (2012) also finds that a good institutional environment – involving the rule of law, bureaucratic quality, and low corruption – can benefit catching-up regions, possibly indicating that good institutions make resource reallocation easier.[102] As an example, the average duration for insolvency procedures in the EU varies by a factor of four. And, in the slower countries, non-negligible regional differences are evident. Long procedures mean less investment and credit for companies, especially for innovative small- and medium-sized enterprises, and consequently lower growth and employment. This is something entirely for Member States to address.

Among the solutions, the European Commission's lagging regions report (2017) highlights the importance of investing in the quality of institutions and regional administrative capacity. In particular, the EU's cohesion policy supports programmes to strengthen institutional capacity and improve the efficiency of public administrations. These programmes can increase the efficiency, transparency, and accountability of public services, promote e-government, reduce regulatory red tape, modernise public procurement, support anti-corruption measures and promote judicial reform.[103]

Overall, a two-track approach may be desirable to generate a virtuous circle: the first would be to improve the labour supply through education, and the second to attract investment to generate labour demand and enhance productivity. These must build upon education calibrated in a way that emphasises the retention of qualified people, while the role of innovation-enhancing policies needs to suit the comparative advantages of a region or urban area. EU funds

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[97] Moretti (2014).

[98] Atkinson, RD, M. Muro and J. Whiton (2019), "The Case for Growth Centers," Brookings.

[99] Spilimbergo, A. and N. X Che (2012).

[100] Hendrickson, C, M. Muro, and WA Galston (2018).

[101] Acemoglu, D. and M. Dell (2010).

[102] Spilimbergo, A. and N. X Che (2012).

[103] European Commission (2017), "Competitiveness in low-income and low-growth regions."

should focus on such aspects, for example helping to develop high-quality research and education centres.[104]

[104] We do not cover the implications for monetary policy here, but for some considerations see "Hauptmeier, S, F. Holm-Hadulla and Katerina Nikalexi (2020), "Monetary policy and regional inequality," ECB Working Paper Series 2385.

5. Conclusion

The European integration process and the role of trade relationships can appear in different forms as driving forces. GVCs play an important role in international trade and trade specialisation, as do agglomeration effects in increasingly knowledge-based economies, which may well determine just where highly productive firms locate.

Convergence is indeed at work, and has helped new Member States greatly. Across the EU between 2000 and 2016 poorer regions grew faster than more advanced regions on average because most of the poorest regions in new Member States seem to be catching up, suggesting that convergence is at work. The single market and EMU both had a positive impact through facilitating trade and strengthening integration. Tradables, particularly manufacturing, are a source of growth that can help catching-up regions, favouring those with a comparative advantage in certain traded goods.

Trade and integration into GVCs is a source of growth, but participation by regions is uneven. The share of GVC value-added in the total regional value-added has a significantly positive association with change in GDP per capita, suggesting that stronger integration into GVCs is a growth-enhancing factor that can support catch-up. In particular, any integration of regions into the GVCs can produce innovation and productivity benefits. However, some regions are lagging in GVC integration, so the chains might also lead to regional differentiation. And not all types of GVC integration yield the same benefits. Labour intensive, low-skilled manufacturing can bring important jobs to regions with high unemployment, but the value-added may be limited.

Agglomeration effects do matter, particularly in old Member States. Our results identify agglomeration effects very much at work, especially in the euro area. Fixed capital has become more flexible, less tied to certain geographies, and so might have contributed to a widening of disparities; de Larosiere's thinking has proven to be quite prescient and there may be an inherent advantage in being close to an economic centre of gravity.

Hence, a lack of careful policy attention might risk deepening regional disparities. Our findings suggest regional disparity is a serious concern in Europe and deserves more policy attention. Regional disparities appear to be rising, with hysteresis after the financial crisis possibly an aggravating factor. The magnitude of regional disparities in Europe is comparable to the US, and larger by some measures. We also see symptoms of a regional 'middle income trap,' because most regions suffering from an increasing negative distance to the average income are in old Member States, which has a bearing on labour mobility; a clear pattern of outward migration from lagging regions has emerged, and inward migration to leading ones has increased.

Regional disparities can raise both cyclical and structural challenges. In cyclical terms, regional disparities may increase susceptibility to asymmetric shocks, especially if a large share of the economy concentrates around a few major GVCs. In structural terms, uneven specialisation and differentiation along GVCs can challenge territorial cohesion and hinder convergence, with competitiveness and unit labour costs divergence giving rise to regional-level imbalances similar to those seen previously between Member States.

Therefore, Member States must adopt the right policy framework to facilitate broad-based integration and avoid exacerbating regional disparities. Such regional disparities may well grow without supportive developments when the effects of trade, value chains, outward migration and other factors on influence change. Regional support modalities are crucial to ensure long-term sustainability, and policy intervention that helps adjustment and boosts productivity can set the scene for a catch-up process and income convergence. However, regional transfers that merely conceal the divergence symptoms can only hinder adjustment – and may eventually become fiscally unsustainable.

A two-track approach may be desirable to generate a virtuous circle: the first approach would improve the labour supply through education and training and the second would attract the

investment needed to generate labour demand and enhance productivity. In parallel, structural policies that reduce distortions and encourage more flexible and open markets can facilitate regional adjustment to adverse shocks. In particular, enhancing the adaptability of labour and product markets could help prevent the re-emergence of imbalances.

EU and national economic policies need to address how to contribute to reversing, or at least mitigating, the process by which regions slowly wither, an economically and politically unacceptable trend. The underlying processes by which some regions profit more than others from integration and trade linkages will not disappear. Policymakers should incorporate an understanding of these mechanisms into their policy response during the coronavirus shock and afterwards, because only such an appropriate commitment can help support recovery and sustain convergence.

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Annex

Table 5
Sample for the descriptive section
(Number of regions, share of the sub-sample %)

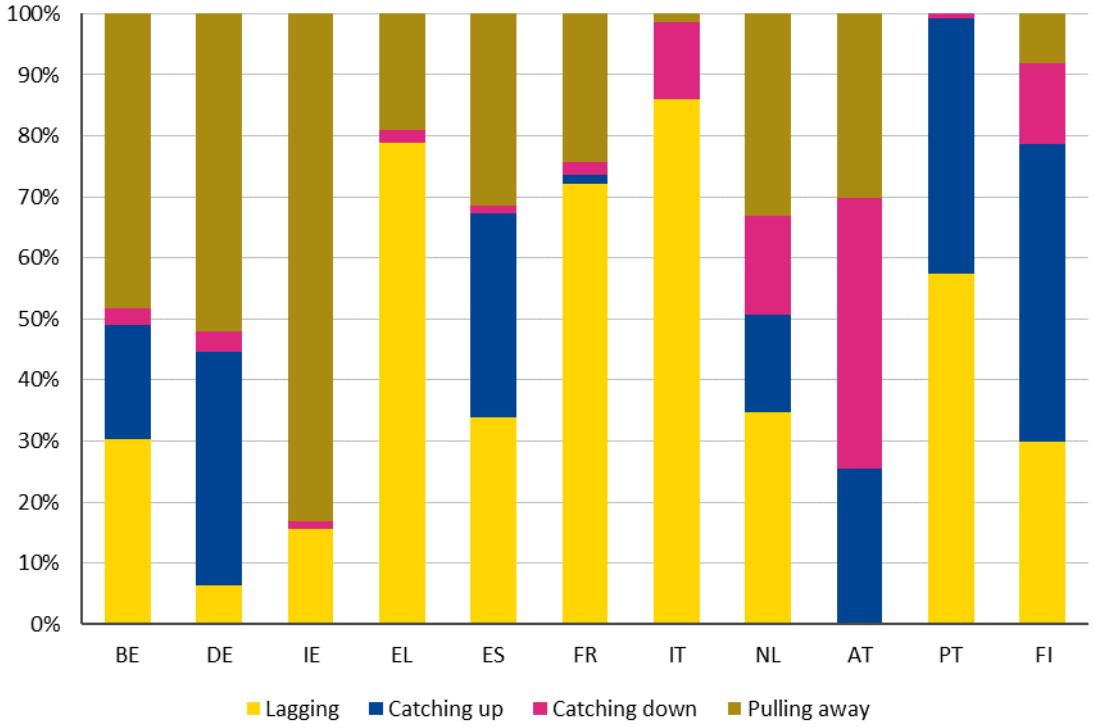
	Pulling away	Catching down	Catching up	Lagging
Initial EA12		(Benchmarked to EA12 average)		
-NUTS2	26 (20%)	27 (21%)	34 (26%)	44 (34%)
-NUTS3	151 (17%)	188 (21%)	285 (32%)	257 (29%)
New EA members (7)		(Benchmarked to EA19 average)		
-NUTS2	1 (10%)	0 (0%)	8 (80%)	1 (10%)
-NUTS3	2 (5%)	0 (0%)	37 (86%)	4 (9%)
EA-19 total		(Benchmarked to EA19 average)		
-NUTS2	27 (19%)	27 (19%)	42 (30%)	45 (32%)
-NUTS3	153 (17%)	188 (20%)	322 (35%)	261 (28%)
Old non-EA members (3)		(Benchmarked to EU28 average)		
-NUTS2	4 (16%)	16 (64%)	0 (0%)	5 (20%)
-NUTS3	27 (14%)	96 (48%)	9 (5%)	68 (34%)
New non-EA members (6)		(Benchmarked to EU28 average)		
-NUTS2	2 (4%)	0 (0%)	45 (96%)	0 (0%)
-NUTS3	2 (1%)	0 (0%)	179 (93%)	12 (6%)
EU-28 total		(Benchmarked to EU28 average)		
-NUTS2	33 (15%)	43 (20%)	87 (41%)	50 (23%)
-NUTS3	182 (14%)	284 (22%)	510 (39%)	341 (26%)

Note: We distinguish four groups of regions based on how their GDP per capita evolved between 2000 and 2016: pulling away (initially above average and rising faster than average), catching down (above average but rising slower than average), catching up (below average rising faster than average), and lagging (below average rising slower than average). The GDP per capita is based on USD per head, current prices and PPP, and we compare euro area member states to EA average and non-euro countries to EU average respectively.
Source: OECD Regional Database

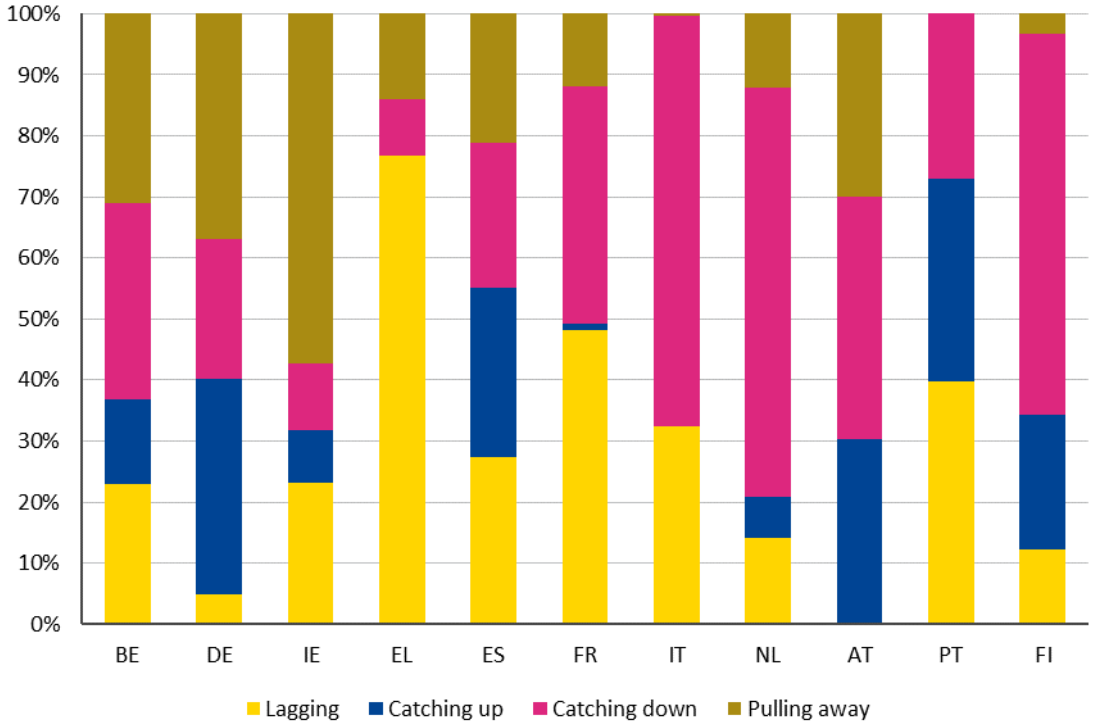
Figure 11

Share of small regions in each country by relative change in GDP per capita between 2000 and 2016

Compared to full-sample cross-country average, GDP weighted

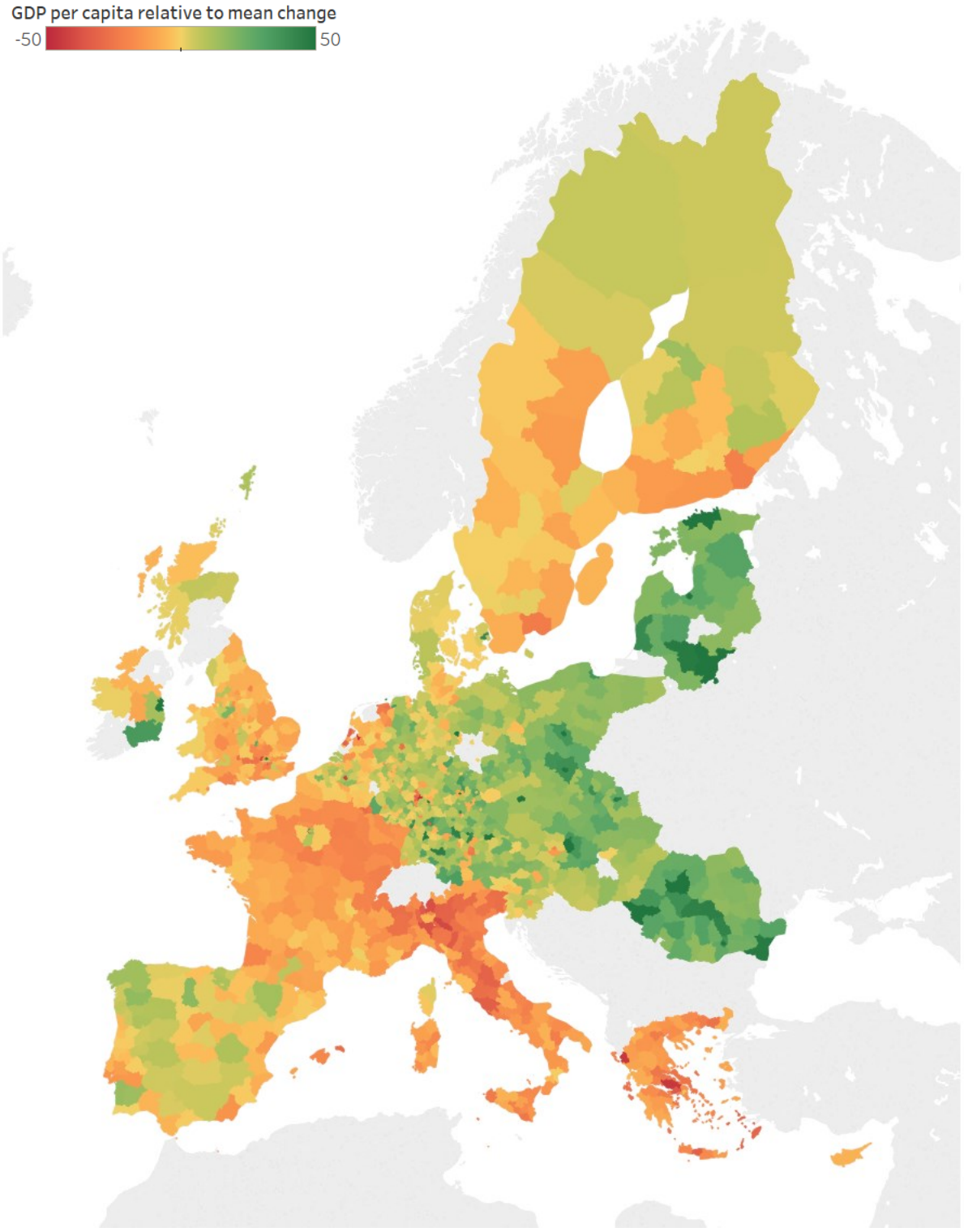


Compared to full-sample cross-country average, employment weighted



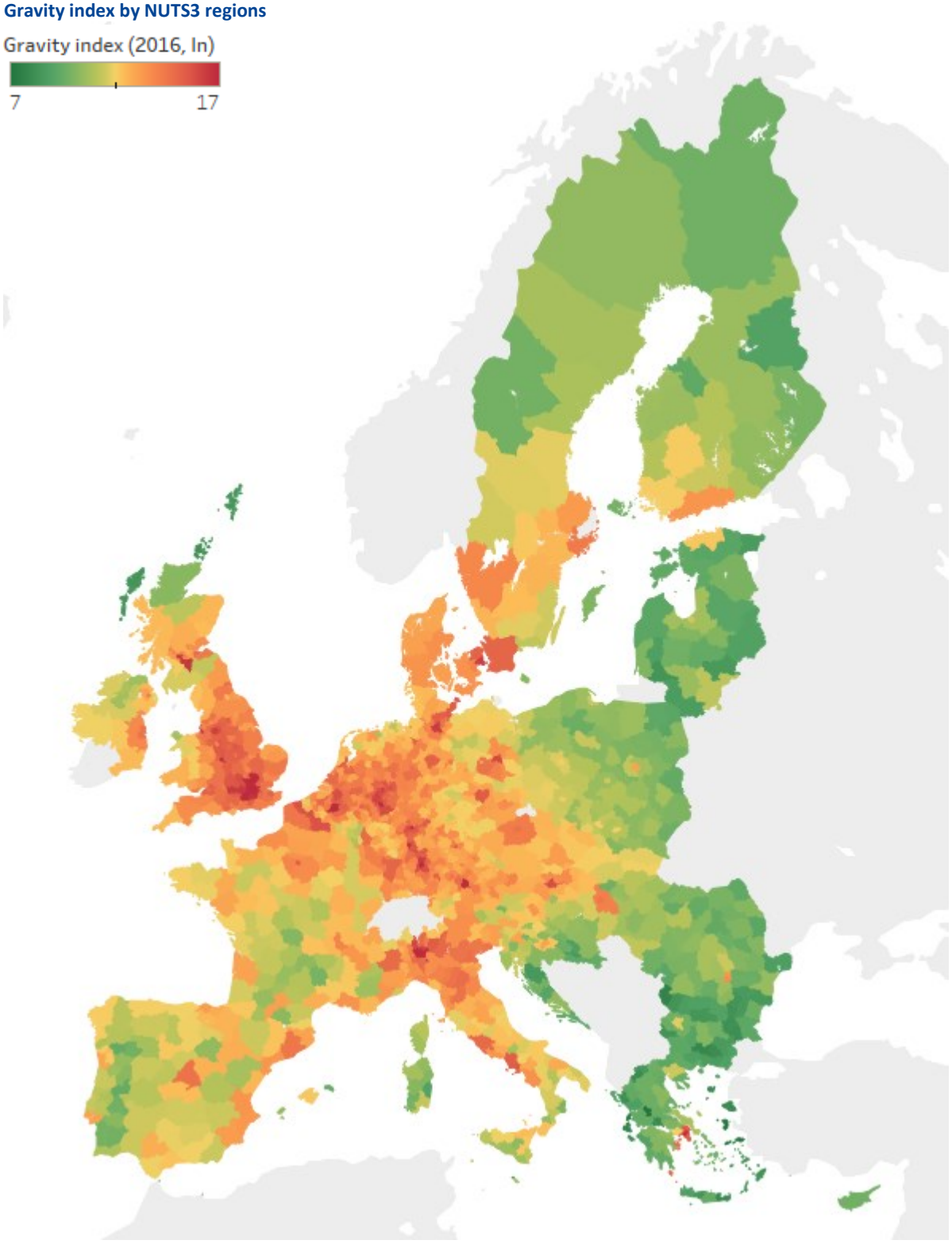
Source: ESM based on Eurostat and OECD. Luxembourg is omitted due to the limited number of regions

Figure 12
GDP per capita relative to EU28 mean change 2000-16 by NUTS3 regions



Source: ESM based on Eurostat and OECD; geographic data from Mapbox and OpenStreetMap

Figure 13
Gravity index by NUTS3 regions



Source: ESM calculation using methodology by Odendahl et al. (2019), based on Eurostat and OECD data; geographic data from Mapbox and OpenStreetMap

Summary statistics

Table 6a

Summary statistics of variables used in cross sectional regressions

	EU28			EA19		EA12	
	count	mean	sd	mean	sd	mean	sd
GDP per capita relative to mean change	210	2.17	20.16	0.26	17.82	-0.00	14.87
GVC value-added share in regional total	212	17.77	5.48	16.41	5.60	16.13	5.53
Gravity index (ln)	215	14.98	2.48	15.19	2.67	15.38	2.68
Labour force share with tertiary education	222	0.25	0.08	0.25	0.08	0.25	0.08
Patent applications per million inhabitants	181	106.19	139.38	126.72	157.98	127.08	161.80
Employment Protection Legislation index	201	2.61	0.35	2.75	0.26	2.76	0.26
Product Market Regulation index	217	1.59	0.26	1.57	0.24	1.56	0.24
EU Fund allocations	208	0.02	0.02	0.02	0.02	0.02	0.02
European Quality of Government index	152	56.31	21.40	62.08	18.41	63.03	18.23
Federal state dummy	202	0.23	0.42	0.34	0.47	0.36	0.48
Distance to capital (ln)	215	4.67	1.99	4.73	2.06	4.99	1.82
GDP per capita in 2000 (ln)	210	9.88	0.48	10.03	0.33	10.08	0.29

Note: sd refers to standard deviation. Ln refers to the natural logarithm.
Source: ESM calucations based on European Commission, OECD, and University of Gothenburg data

Table 6b

Summary statistics of variables used in panel regressions

		EU28		EA19		EA12	
	count	mean	sd	mean	sd	mean	sd
GDP per capita relative to mean change	3708	0.16	3.58	0.02	3.59	-0.00	3.53
Productivity growth overall (%)	3782	3.85	4.31	3.29	3.65	3.08	3.45
Productivity growth manufacturing (%)	3601	4.98	10.38	4.32	10.45	4.15	10.50
Productivity growth services (%)	3585	3.54	46.10	3.28	56.17	3.14	58.66
Productivity overall	4004	58.45	20.60	64.59	17.87	66.14	17.16
Productivity manufacturing	3823	66.65	36.81	73.27	37.89	75.76	38.16
Productivity services	3807	47.70	16.79	49.70	16.12	50.17	16.07
Gravity index (ln)	3870	15.02	2.51	15.22	2.69	15.41	2.70
Labour force share with tertiary education	4130	0.25	0.09	0.25	0.09	0.25	0.09
Employment Protection Legislation index	3118	2.70	0.43	2.85	0.36	2.85	0.36
EU Fund allocations	4925	0.01	0.02	0.01	0.02	0.01	0.02
Balassa-Hoover Index manufacturing	3835	0.99	0.35	0.96	0.37	0.96	0.38
Balassa-Hoover Index services	3835	0.91	0.32	0.90	0.25	0.89	0.23
GDP per capita (ln)	3930	10.20	0.46	10.33	0.35	10.36	0.33
Net migration rate (%)	3087	-0.01	0.34	0.00	0.38	-0.00	0.39
Entrants from same country (ln)	3095	9.54	1.18	9.64	1.28	9.78	1.23
Leavers to same country (ln)	3179	9.60	1.16	9.69	1.30	9.81	1.27
Employment (ln)	4004	13.39	0.98	13.30	1.09	13.32	1.13
Unemployment rate (%)	4105	9.76	5.91	10.10	6.06	10.07	6.12
EA19 dummy	6438	0.42	0.49	0.65	0.48	0.68	0.47
BMS dummy	6438	0.05	0.22	0.08	0.27	0.09	0.28

Note: sd refers to standard deviation. Ln refers to the natural logarithm.
Source: ESM calucations based on European Commission and OECD data

GDP per capita refers to OECD regional GDP statistics in USD per head in current purchasing power parity (PPP) adjusted prices.

GDP per capita relative to mean change, refers to the percentage point change in the ratio of per capita output relative to the mean per capita output of the period sample. For the cross sectional regressions this refers to the difference between 2000 and 2016, while for the panel regressions we compare ratios to the previous year.

$$\text{GDP per capita relative to mean change}_{r,t} = \left(\frac{y_{r,t}}{\bar{y}_t} - \frac{y_{r,t-1}}{\bar{y}_{t-1}}\right) * 100$$

GVC value-added share in regional total, refers to the share of regional value-added that is created within GVCs throughout the year 2010. The data is based on regional input-output tables, as published in the context of OECD 2018a, Figures 3.3 and 3.5 on pp. 101 and 116.

Gravity index is based on the gravity equation from physics: the product of the masses of two objects, divided by the square of the distance between them determines gravity. Translated to our setting, we calculate this measure based on OECD published regional GVA in PPP-adjusted current USD for all possible region-pairs, and then sum it up for each region. The closer a region is to other economically large regions, the higher the gravity index. Regional distances refer to data published under Eurostat's Territorial Classifications and Typologies initiative. The calculation methodology follows Odendahl et al. (2019) Chart 14 pp. 14-15. For the cross sectional regressions this refers to the average across time.

$$\text{gravity}_{r,t} = \ln\left(\text{GVA}_{r,t} \sum_{a \in \text{regions}, a \neq r} \frac{\text{GVA}_{a,t}}{\text{distance}_{a,r}^2}\right)$$

Labour force share with tertiary education refers to Eurostat table "lfst_r_lfp2acedu". The age range for economic active population is 15 to 74 years. Tertiary education refers to ISCED 2011 levels five and higher. This includes Short-cycle tertiary education, Bachelor, Master, Doctoral or equivalent. For the cross sectional regressions this refers to the average across time.

Patent applications per million inhabitants refers to Eurostat table 'ipr_ta_popr', European Union trademark (EUTM) applications. For the cross sectional regressions this refers to the average across time.

Employment Protection Legislation Index refers to the synthetic composite of the OECD indicators of employment protection legislation of regular employment. For the cross sectional regressions this refers to the average across time.

Product Market Regulation Index refers to the OECD published composite of a comprehensive and internationally-comparable set of indicators that measure the degree to which policies promote or inhibit competition in areas of the product market where competition is viable. For the cross sectional regressions this refers to the average across time.

EU fund allocations refer to data provided by the European Commission's Directorate-General for Regional Policy. In our regressions we refer to billion euros of the estimated expenditure of funds, and not to the annual EU payments made. For the cross sectional regressions this refers to the average across time.

European Quality of Government Index developed by the Quality of Government Institute of Gothenburg University, is the only measure of institutional quality available at the regional level in the European Union. Institutional quality is defined as a multi-dimensional concept consisting of high impartiality and quality of public service delivery, along with low corruption. For the cross sectional regressions this refers to the average across time.

Federal state dummy follows OECD definition and is 1 for federal states (AT, BE, DE, ES), and 0

for unitary countries (CZ, DK, EE, GR, FI, FR, HU, IE, IT, LU, LV, NL, PL, PT, SE, SI, SK, UK).

Distance to capital refers to the natural logarithm of $(\text{distance in km} + 1)$ between the NUTS region and the NUTS region of the countries capital. Regional distances refer to data published under Eurostat's Territorial Classifications and Typologies initiative.

Productivity growth refers to the year-on-year growth rate of gross value added per employment in current USD PPP adjusted prices as reported by the OECD, for regional total and by sector for Manufacturing (sector C) and Services (sectors M and N).

Balassa-Hoover Index is calculated based on OECD sectoral and regional employment data for Manufacturing (sector C) and Services (sectors M and N). It refers to the employment share of a particular sector in a region, relative to the countrywide ratio. In the formula below, s refers to the sector and c refers to the country of region r.

$$\text{BHI}_{s,r,t} = \frac{\text{empl}_{s,r,t}}{\text{empl}_{r,t}} \Big/ \frac{\text{empl}_{s,c,t}}{\text{empl}_{c,t}}$$

Net migration rate refers to OECD database on migration, the difference between the number of persons entering and leaving a country during the year, per 1,000 persons (based on midyear population). The net migration rate indicates the contribution of migration to the overall level of population change. The net migration rate does not distinguish between economic migrants, refugees, and other types of migrants nor does it distinguish between lawful migrants and unlawful migrants.

Entrants from & leavers to same country refer to the logarithm of OECD regional migration data.

Employment refers to the logarithm of OECD regional labour market data.

Unemployment rate refers to OECD regional labour market data.

EA19 dummy is defined 1 from the year a country joined the euro area onwards and 0 otherwise.

BMS dummy is defined 1 for European Stability Financial Facility (EFSF) and ESM beneficiary Member States from 2008 until the end of the financial assistance programme. That is 2013 for Ireland and Spain, 2014 for Portugal, 2016 for Cyprus, and 2018 for Greece.

Regression model

For the model in Table 1 we regress in a time and region fixed effects ordinary least squares (OLS) panel regression productivity growth on lagged productivity, gravity, lagged GDP per capita, as well as the EA19 and BMS dummies for the sample period 2000 to 2016. This regression is subsampled 27 times. We sampled by region group (EU28, EA19, and EA12), by productivity in the year 2000 (first quintile, fifth quintile, full sample), and by sector (full economy, manufacturing sector, services sector). We assume standard errors clustered by region.

$$\frac{p_{r,t}}{p_{r,t-1}} - 1 = \beta_1\, p_{r,t-1} + \beta_2\, \text{grav}_{r,t} + \beta_3\, \text{gdppc}_{r,t-1} + \beta_4 \text{EA19}_{r,t} + \beta_5 \text{BMS}_{r,t} + \gamma_r + \delta_t + \epsilon_{r,t}$$

For the model in Table 2 we regress in a simple cross section OLS regression the change in regional GDP per capita relative to the period sample average on the GVC, gravity, education, patent applications, employment protection legislation, product market regulation, EU funds, governance index, GDP per capita in 2000 and the EA19 and BMS dummies. In specification 5, instead of referring to 2000-2016 period averages for explanatory variables, we consider the values for gravity and education in the year 2000. In specifications 6 and 8, we present results

also considering interactions between employment protection and EA19 dummy. In specifications 7 and 8 we additionally control for distance to capital, the federal state dummy and the interaction of the two. The sample refers to EA19 for specification 2, EA12 for specification 3 and EU28 otherwise. Heteroskedasticity robust standard errors are reported.

$$\left(\frac{y_{r,2016}}{\bar{y}_{2016}} - \frac{y_{r,2000}}{\bar{y}_{2000}}\right) * 100 = \beta_1 y_{r,2000} + \beta\, X_r + c + \epsilon_r$$

For the model in Table 3 we regress in a time and region fixed effects OLS panel regression the change in regional GDP per capita relative to the period sample average on gravity, Balassa-Hoover Index, EU funds, education, lagged GDP per capita, as well as the EA19 and BMS dummies for the sample period 2000 to 2016. In specifications 4 and 5 we replace the BMS dummy by year dummies interacted with 1 for EFSF and ESM programme countries. In specifications 6, 7, and 8, we also control for productivity growth and its interaction with gravity. We assume standard errors clustered by region.

$$\left(\frac{y_{r,t}}{\bar{y}_t} - \frac{y_{r,t-1}}{\bar{y}_{t-1}}\right) * 100 = \beta_1 y_{r,t-1} + \beta\, X_{r,t} + \gamma_r + \delta_t + \epsilon_{r,t}$$

For specifications 4 and 5 the time varying crisis dummies are modelled:

$$\left(\frac{y_{r,t}}{\bar{y}_t} - \frac{y_{r,t-1}}{\bar{y}_{t-1}}\right) * 100 = \beta_1 y_{r,t-1} + \beta\, X_{r,t} + \gamma_r + \delta_t + \rho_t\, BMS_r + \epsilon_{r,t}$$

For the model in Table 4, we estimate a time and region fixed effects OLS panel regression for the sample period 2000 to 2016. The migration proxy explanatory variables are net migration rate, entrants from same country, and leavers to same country. All control variables are lagged. We consider employment or unemployment rate, productivity growth, gravity index, EU funds, employment protection legislation, education, as well as the EA19 and BMS dummies. We assume standard errors clustered by region.

$$migr_{r,t+1} = \beta\, X_{r,t} + \gamma_r + \delta_t + \epsilon_{r,t}$$

Acronyms

BIS	Bank for International Settlements
BMS	European Stability Mechanism beneficiary Member States
CEPS	Centre for European Policy Studies
CompNet	Competitiveness Research Network
DG ECFIN	European Commission's Directorate-General for Economic and Financial Affairs
EA12	12 countries that joined the euro area up until 2001
EA19	19 euro area member states
ECB	European Central Bank
Ecofin	Economic and Financial Affairs Council
EFSF	European Financial Stability Facility
EIB	European Investment Bank
EMU	Economic and Monetary Union
ESM	European Stability Mechanism
EU	European Union
EU28	27 European Union Member States and United Kingdom
GDP	Gross domestic product
GVA	Gross value added
GVC	Global value chain
IMF	International Monetary Fund
NBER	National Bureau of Economic Research
NUTS	Nomenclature of Territorial Units for Statistics
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary least squares
PPP	Purchasing power parity
UK	United Kingdom
US	United States
USD	US dollars
WEO	IMF's World Economic Outlook