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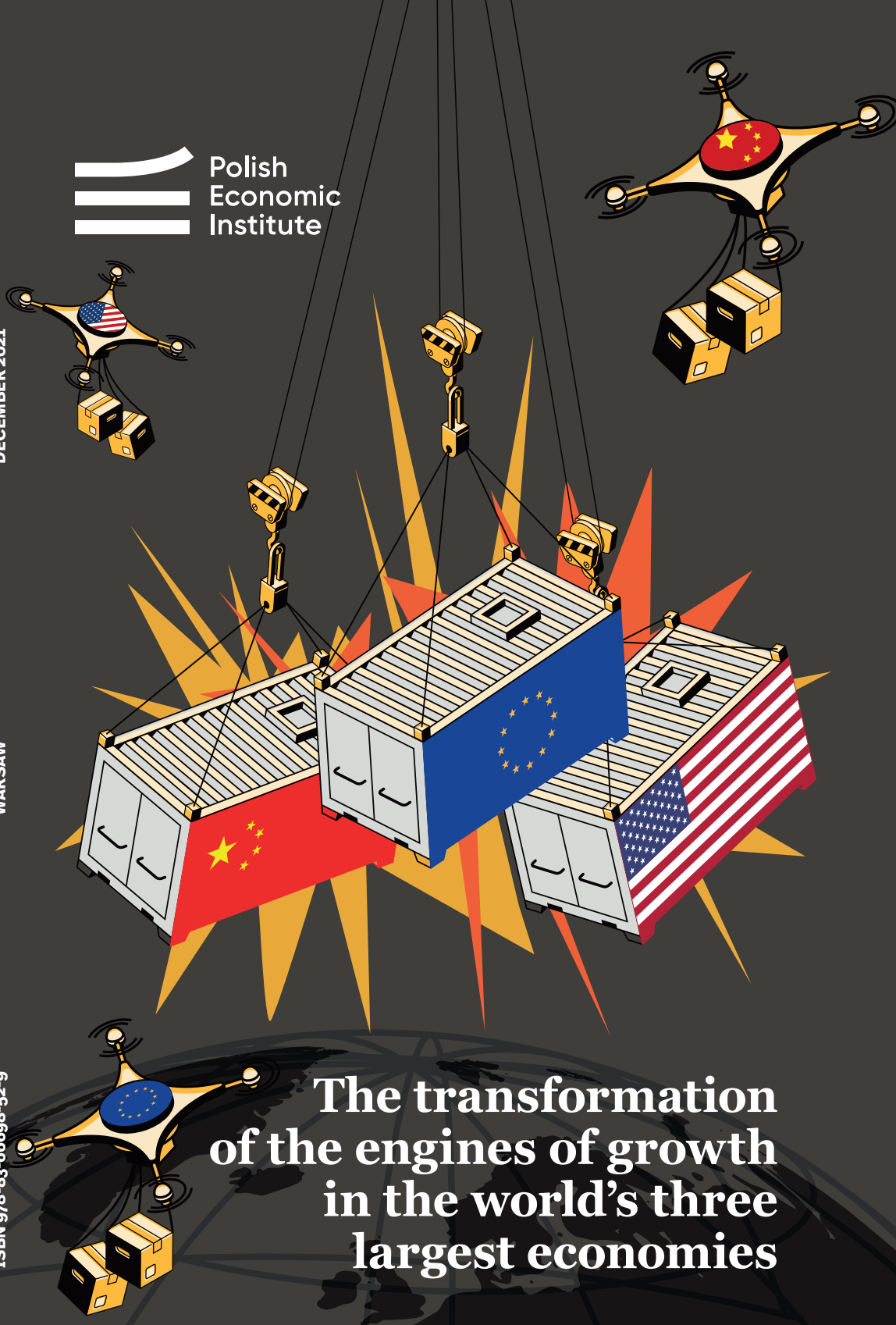

The transformation of the engines of growth in the world's three largest economies

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WARSAW

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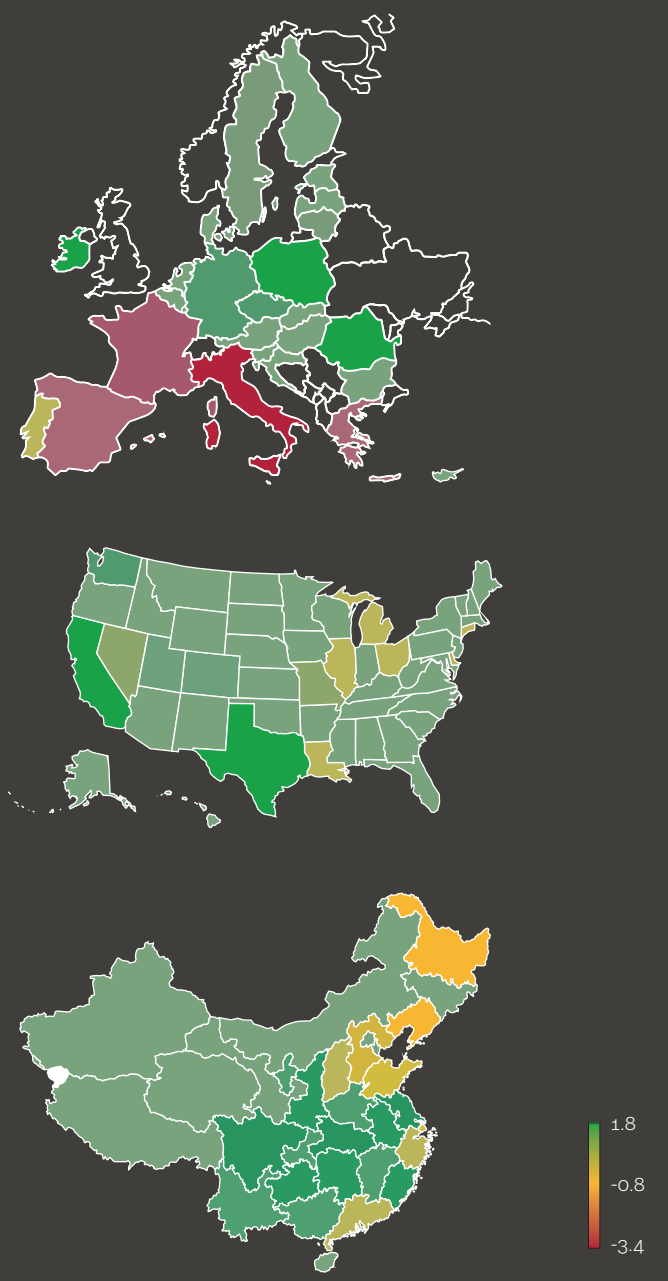
Table of contents

Key numbers

48%	of the global economy is made up of China, the EU and the US
In 2015	the E7 group of seven largest emerging economies overtook the G7 group of seven developed economies in terms of GDP PPP
6 of the 10	largest unicorns (start-ups with a capitalisation above USD 1 billion) come from China
1.7 pp	increase in Poland's share in generating EU GDP in 2004-2020 – Poland is the leader in the EU in this respect
0.800	China has still not reached this HDI level, which refers to highly-developed countries
3.3 pp	increase in Central Europe's share in EU GDP in 2004-2020. Southern Europe's share fell by 6.4 pp
2.6 pp	share in the Pacific region's share in US GDP in 2020-2020. The Rust Belt's share fell by 2.8 pp
58%	of China's GPD in 2020 was generated by 11 eastern provinces inhabited by one-third of its population. This share did not change in 2000-2020
82.5%	of the value of Chinese exports in 2020 was generated by the eastern provinces. The western provinces generated just 8%

↘ Map 1. Changes in regions' share in a given great power's GDP in 2004-2020 (in percentage points)



Source: prepared by PEI based on BEA, Eurostat and NBS data.

Key findings

The world economy has become three-polar in the past 20 years. Three, rather than two, powers account for half of GDP in purchasing power parity (PPP). China joined the United States and the European Union, which we treat as a single economic entity in this study. These three constitute the three most important hubs within global value chains and are the top trading partners of countries in their region.

The major emerging economies – apart from China – have run out of breath. More countries will not join this trio of economic powers soon, as their GDP growth slowed down before the COVID-19 pandemic. The International Monetary Fund's economic forecasts indicate that, in the coming years, the highest growth will still be observed in China. Only India can keep up with it, but starting from a much lower level. The pandemic has the potential to slow down growth in emerging economies even more. China is the biggest beneficiary of the turmoil in world trade in 2020. China, the EU and the US will remain the main powers to be reckoned with in the near future.

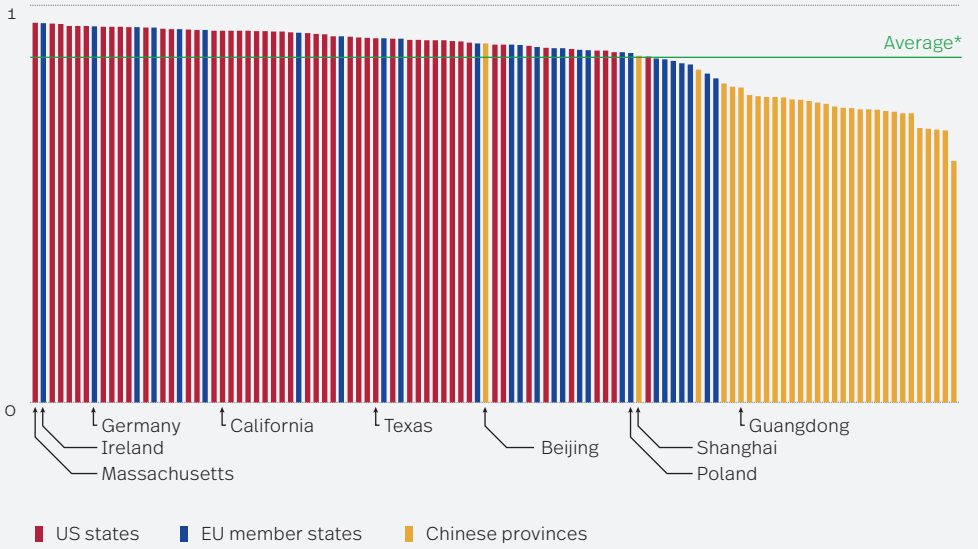
Although China has become the world's largest economy in terms of GDP PPP, it has yet to catch up with the EU and the US in terms of development and prosperity. China is still not among the countries with a high level of development, as measured by the Human Development Index (HDI). GDP *per capita* there is a third of that in the EU and 25% that in the EU. However, China is making up for this rapidly. It has already caught up with the EU in terms of spending on research and development, which has reached 2% of GDP.

Differences within the powers, especially in terms of the speed of change, are influencing policy. The decline in the economic importance of the Rust Belt states (around the Great Lakes) has contributed significantly to the US's withdrawal from trade liberalization policy. In the EU, the economic slowdown in southern member states was behind the historic decision for the EU to issue debt. In China, the desire to develop the central-western regions has fostered the development of the Belt and Road Initiative.

Chinese provinces are growing rapidly, but the level of development in EU member states and US states is still much higher. According to the HDI for 2019, Beijing – China's most developed province – ranks ahead of the eight US states at the bottom of the ranking and in 11th place among the EU member states. American states dominate top ten; the only European countries in it are Ireland (2nd place) and Germany (8th place).

The three powers differ in terms of their internal transformation. In the EU, Central Europe's rapid economic growth is partly related to attracting production. In the US, the development of the west coast, in which tech play a significant role, and Texas, where oil shale deposits started being exploited in the 21st century, is the most visible. At the same time, it was deindustrialisation that influenced the negative trends in the Rust Belt, for example. In China, the rapid development of the east coast has been visible since China joined the World Trade Organisation (WTO) in 2001; initially through industrial activity and then through tech, too. The takeover of industrial production by the central provinces has supported their development. However, this is happening to a lesser extent in the Western and Northeastern China.

↘ Image 1. The US states and EU member states are ahead of the EU provinces in terms of development, measured based on the HDI



* US states dominate in terms of HDI - none of them is below the average for all regions of the three powers. In contrast, two provinces of China are already above the average, Beijing (at the level of Spain) and Shanghai (almost at the Polish level). Seven EU member states are below the average HDI level.

Source: prepared by PEI based on: HDR (2021).

Central Europe region – especially Poland – has become the leader in terms of economic growth. With Germany, the region has become an industrial engine of growth. Poland has taken a lead in the EU when it comes to reducing unemployment over the past 20 years or increasing employment in manufacturing. Poland's share in EU GDP has increased by 1.7 pp since it joined the EU. Within the EU, Poland was the largest beneficiary of the pandemic in terms of trade; it not only achieved a record surplus, but it also increased its share in world trade more than any other member state (by 0.14 pp). In 2000-2020, the whole region was ahead of Southern Europe in terms of its share in European trade turnover (from 33% of EU turnover to 39%, compared to a decrease from 35% to 28% in Southern Europe).

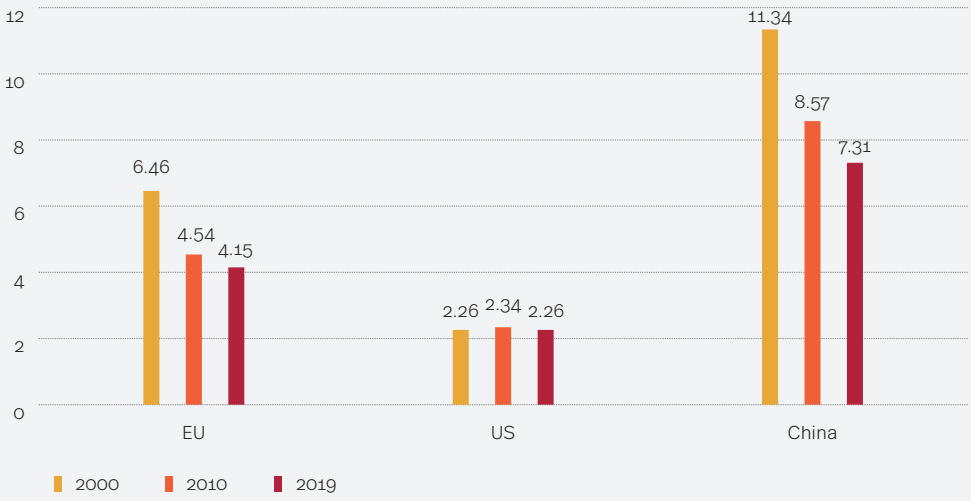
The EU has been the best at increasing internal cohesion; in the US and China, the strongest regions are strengthening the most. The development gap between the countries that have joined the EU since 2004 and the rest is closing. This is especially true in relation to the southern member states, rather than those in the more developed north, but it contributes to reducing inequalities. In the US, the importance of the richest states (California, Texas) in the American economy increased the most. Similarly, in China, the province with the second-largest economy, Jiangsu, recorded the biggest increase as a share of GDP.

The differences in the regional HDI points to increasing cohesion within the EU and China. The much larger discrepancies means that convergence is taking place in these powers in the 21st century. In the US, the discrepancies in HDI are relatively small and are not changing.

The COVID-19 pandemic is increasing inequality within the great powers. In the EU, the pandemic had the largest negative economic impact in the South. The leader in terms of growth over the past two decades – Central Europe, with Poland at the forefront – was the relative beneficiary. Due to the pandemic, the variation coefficient for GDP *per capita* increased again from 42% to 46%. In the US, the pandemic is increasing the differentiation and has strengthened the states with the strongest economies in relative terms. This was also the case in China, where the Eastern provinces became even stronger compared to the other regions in 2020.

↘ Chart 1. **Decrease in differences in levels of development in EU and China**

Coefficient of variation for HDI between the EU member states, US states and Chinese provinces in 2000-2019



Source: prepared by PEI based on: HDR (2021).

Introduction

In 2017, China became the world's largest economy in terms of GDP based on purchasing power parity (PPP). Meanwhile, in 2015, the GDP PPP of seven big emerging economies (Emerging 7, E7) exceeded the level of developed economies (G7), according to World Bank data. This was due to the very high rate of growth in the 2000s among developing countries. Developed economies struggling to recover after the financial crisis, especially in the EU, seemed doomed to a rapid further decline in importance (www1). However, the emerging economies ran out of breath and began to slow down; above all, their advantage over developed economies in terms of GDP growth was diminishing. Russia, Brazil and Mexico periodically fell into recession in 2015-2019 and GDP growth in China, the fastest-growing economy in 2019, fell below 6%. The pandemic was an additional blow to emerging economies, not only due to the significant decline in GDP in 2020, but also due to the outlook for the years ahead. The lower availability of the COVID-19 vaccine and less opportunity for expansionary fiscal policy have made it difficult for these economies to increase their advantage over developed ones.

E7 – China, India, Brazil, Russia, Indonesia, Mexico and Turkey.

G7 – France, Japan, Germany, the US, the UK, Italy and Canada.

In this report, emerging markets' shortness of breath provides a benchmark for demonstrating the existence and endurance of the three global economic powers – China, the EU and the US. Together, they account for half of the global economy and will remain the main players for at least the next decade. When considering relations between the three great powers, the main question concerns the consequences of China's growing economic position, both for international relations and for the future of the liberal international order and types of capitalism shaped in the West. The debate centres on the rivalry between the US and China. However, this bipolar logic ignores another key economic and political player: the EU. The EU's importance is clearly visible in the basic indicators of economic and social development, and the deep economic integration between EU countries, including common trade policy, entitles the EU to be treated as an economic superpower (Moravcsik, 2017; Cox, 2017; Ash, 2020). These indicators for the entire EU often turn out to be higher than those for the US or China.

The first part of this reports compares the three powers and points to the pace of the changes taking place. We emphasise that, while China is the world's largest economy in terms of PPP GDP, it is only just approaching the EU or US in other aspects of development. **In the second part of the report, we zoom in and examine the EU, the US and China both in terms of the current economic situation and the pace of changes over the past 20 years.** This allows us to analyse regional heterogeneity within the great powers and the determinants of socio-economic growth. The

situation in the three powers and the competition between them will determine the direction of the development of the global economy in the coming years – it could be that, as tensions escalate, all the countries will lose out on this dispute, or that the normalisation of these relations will point to three strong economic centres that will have the greatest impact on global demand and the direction of political and economic changes.

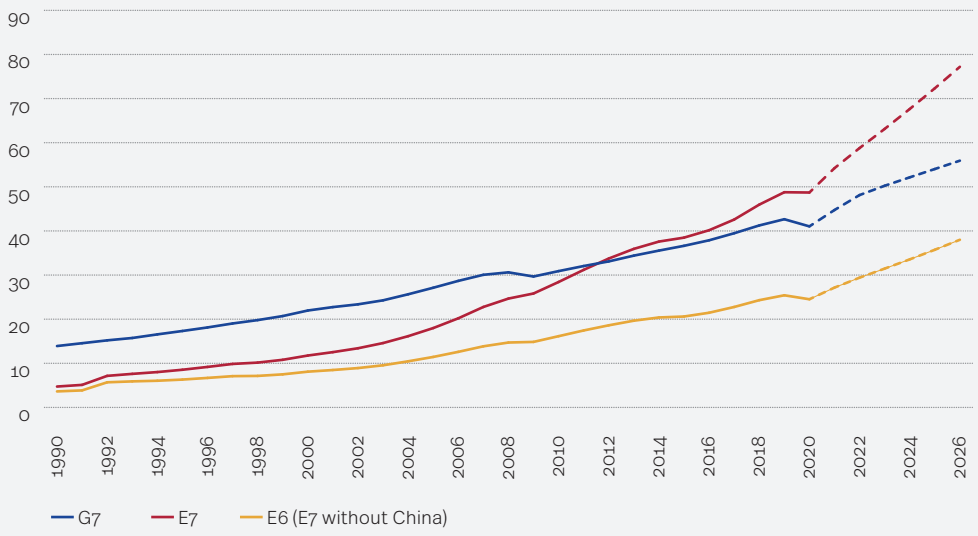
The three great powers – China, the EU and the US

Economic growth

The group of seven emerging economies (E7) has overtaken the seven developed economies (G7) in terms of GDP based on purchasing power parity (PPP); that is, taking into account differences in domestic prices. China, which recorded the fastest GDP growth over the past three decades, is responsible for more than half of the E7 group's GDP PPP. Without China, average economic growth in the E7 over the last 30 years was 1.8 pp lower and only 1.6 pp higher than in the G7.

↘ Chart 2. The E7 has overtaken the G7, above all thanks to China

Forecast GDP PPP (in trillions of international dollars)



Source: prepared by PEI based on IMF.

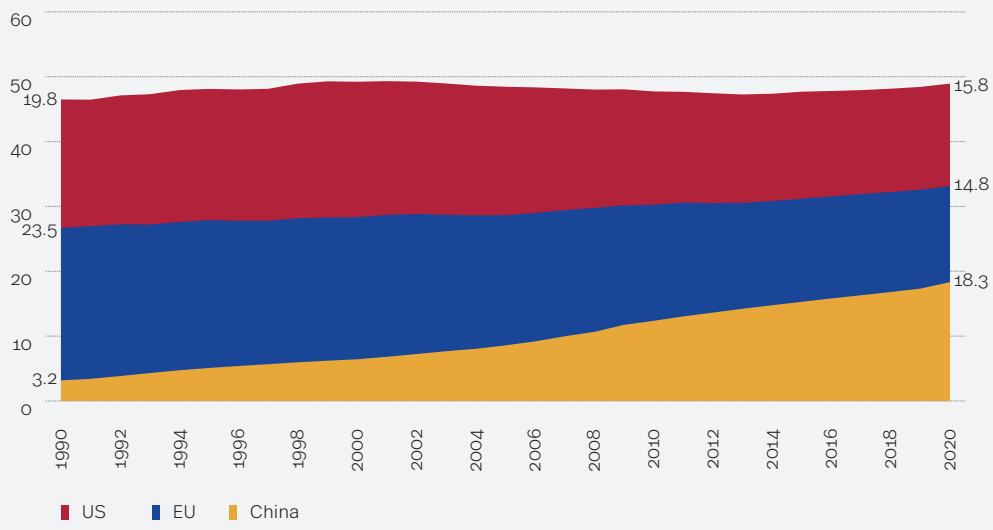
The E7 countries already have their years of double-digit growth in GDP PPP behind them. All the E7 countries are growing less rapidly than a decade ago – the last time that the Turkish economy grew at a pace of over 10% was in 2011. The IMF's economic forecasts indicate that, in the years to come, the fastest growth will still be observed in China. According to the IMF's estimates, China's GDP PPP will increase by 64% in 2019-2026, while the other E7 countries will grow by 46% and the G7 countries by 25%.

> If the UK had remained in the EU, the EU would have been the world's largest economy in terms of PPP GDP by 2019.

At current market prices, China, the US and the EU together account for 60% of global GDP (the US is in first place, followed by the EU and then China) and more than half of global GDP based on PPP. The EU and the US alone accounted for 43 per cent of global GDP PPP in 1990, but their share in the global economy had decreased to 31% in 2020; that is, by 12 pp. The rise of China has exceeded this decline: China grew by 14 pp to 17%, becoming the world's largest economy in terms of PPP GDP in 2017. The COVD-19 pandemic has strengthened China's position. In 2020, it was responsible for around 18% of global GDP PPP, the US for around 16 per cent and the EU for around 15 per cent.

↘ Chart 3. **China has decreased the share of the US and the EU from 43% to 31%**

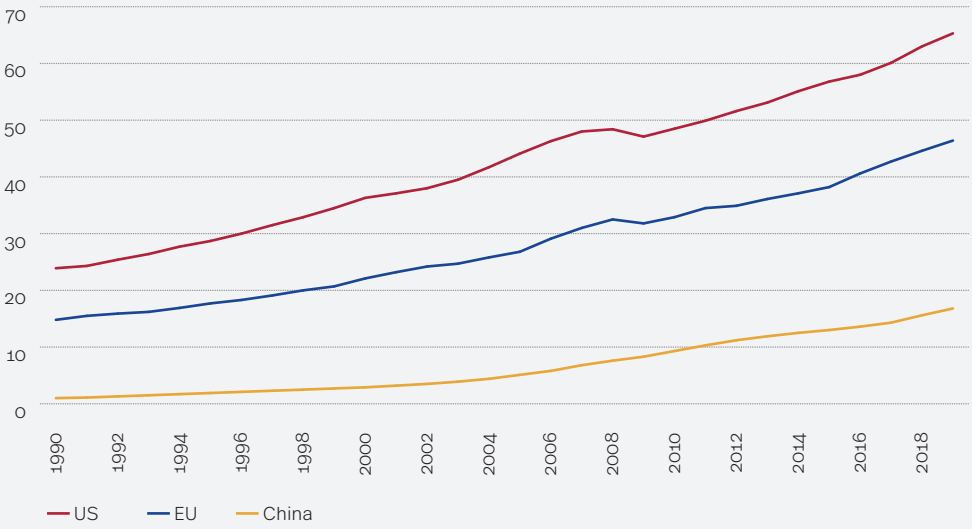
The share of the US, the EU and China in global GDP PPP (as a percentage)



Source: prepared by PEI based on World Bank data.

However, GDP *per capita* PPP in China is third of that in the EU and about 25% of that in the US. The growth in GDP *per capita* in China shows that the country has successfully reduced poverty through economic development. However, the income gap between China and the EU and the US will be closed very slowly.

↘ Chart 4. GDP *per capita*, PPP (in thousands of USD)



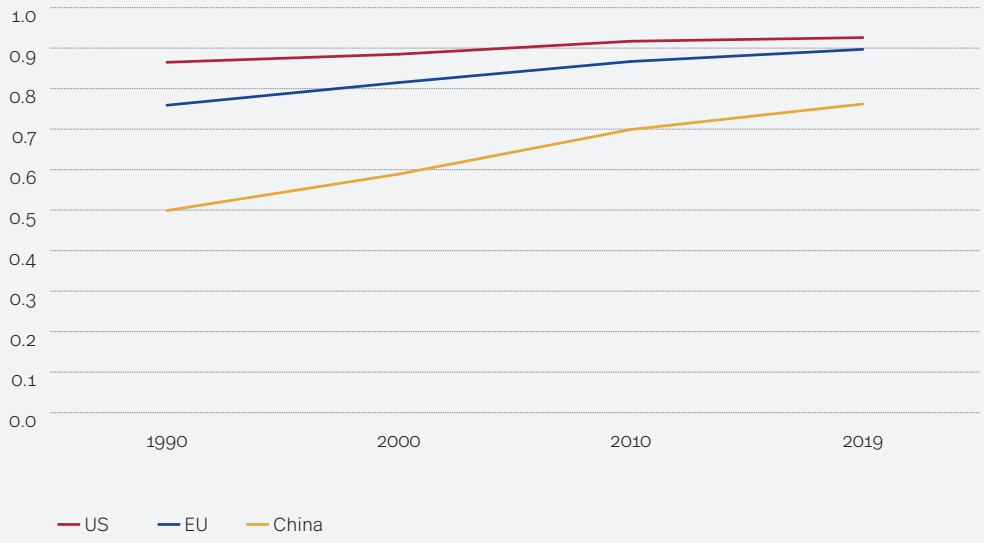
Source: prepared by PEI based on the World Bank's.

If development factors other than GDP are taken into account, China is relegated to third place. GDP has numerous limitations as an indicator of development and prosperity, which makes it worth analysing other measures of human development that take into account data on living standards and quality of life. The best-known measure of this kind is the Human Development Index (HDI), which combines gross national income PPP *per capita* with data on health and education. The US came first among the three great powers in terms of HDI in 2019. The EU was second, based on the average for the 27 member states, followed by China. China has increased its score significantly and, in 1990-2000, joined the group of countries with an average level of human development.

Over the past two decades, the HDI for China has increased the most. Although it increased by 0.17 over this period, the country has not yet managed to join the group of countries with a high level of social development, which have a score of over 0.8 in the HDI.

↘ Chart 5. **China is gradually decreasing the development gap**

HDI for China, the EU and the US in 1990-2019



Source: prepared by PEI based on: HDR (2021).

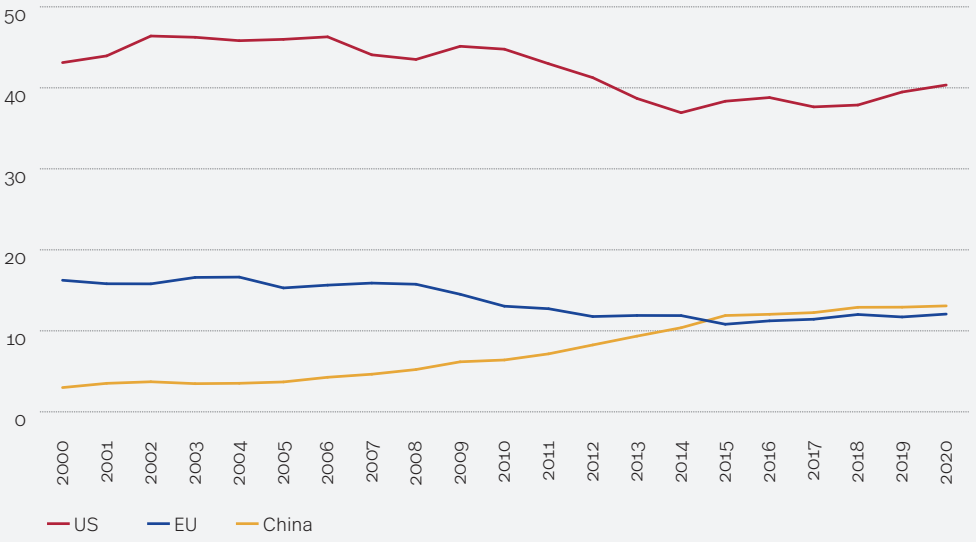
The world's three largest economies accounted for 65.5% of defence spending in 2020. The US spends the most (over 40% of global spending on defence). In 2020, it spent 3.7% of its GDP on defence, China 1.7% and the EU countries only 1.6% on average. Chinese spending on defence has increased at the fastest pace: its share in global defence spending has risen by 11.7 pp since 1990. The level of defence spending is not only important for the superpowers' security and military interests; it also affects the level of innovation in the economy as a whole.

The US still comes first when it comes to the level of spending on research and development in relation to GDP. China has caught up with the EU. During the past decade, the share of spending on innovation in relation to GDP in China exceeded 2%; in 2018, it even surpassed spending in the EU. This is a reflection of the problems relating to innovation in the EU, as well as China's efforts to achieve structural economic change and the Chinese champions' technological race. The closing of the technological gap with the West is a fact and a threat to the old powers' competitiveness. In terms of the number of patent applications submitted, China overtook the EU in 2004 and the US in 2011. In 2018, China filed a record 1.5 million patents, compared to 597,000 in the US and 116,000 in the EU.[1] China is behind the US when it comes to key

[1] Summary data on applications by residents and non-residents based on World Bank data.

new technologies – the development of artificial intelligence – but already ahead of the EU (Castro, McLaughlin, Chivot, 2019). Huge investments in this segment could soon put China in the lead.

↘ Chart 6. **Share in global defence spending (as a percentage)**



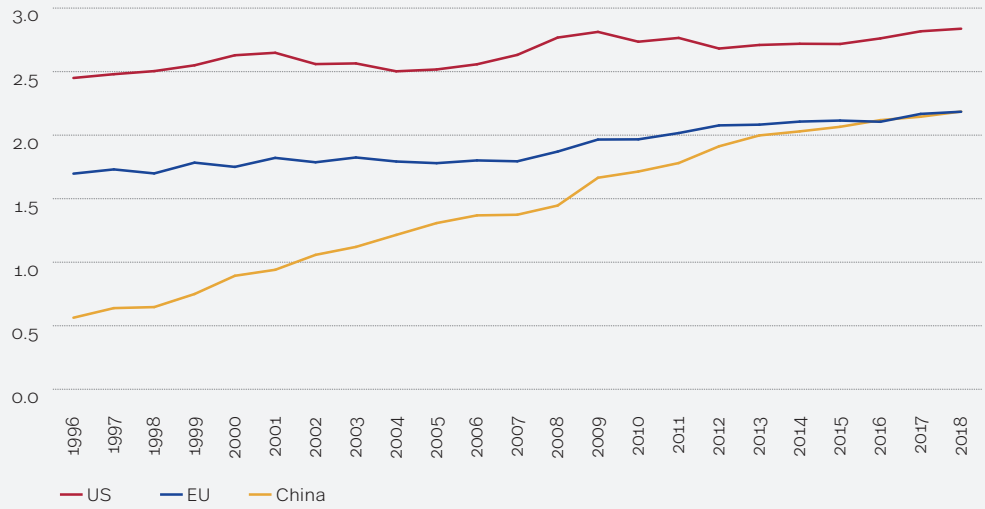
Source: prepared by PEI based on World Bank data.

The race for technological dominance is taking place in a way that has led to opposition from Washington and Brussels. Disputes have been triggered by subsidies for Chinese companies, forced technology transfers by foreign investors as a condition for access to the Chinese market, and patent infringement. This has resulted in the limiting of technological cooperation with China (including the limiting of cooperation by NASA via the Wolf Amendment passed by Congress in 2011) and, more recently, a trade war between the US and China and the move towards a more assertive EU policy towards China.

Chinese consumers' purchasing power, and therefore their consumer spending, is significantly lower than Western consumers'. In *per capita* terms, China is not catching up quickly and the gap with the US is actually widening.

↘ Chart 7. **The US ranks first in terms of innovation, China has caught up with the EU**

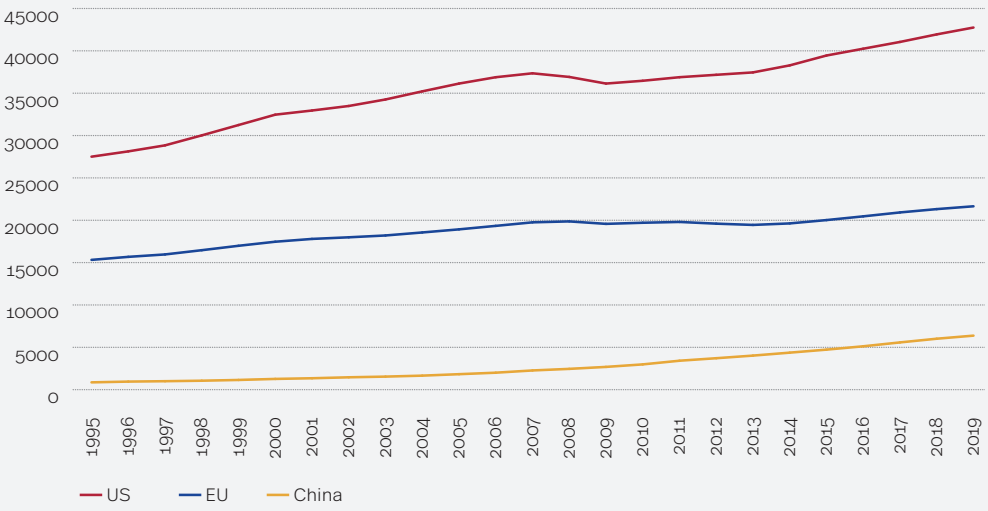
Spending on R&D as a share of GDP (as a percentage)



Source: prepared by PEI based on World Bank data.

↘ Chart 8. **The US is the largest consumer market**

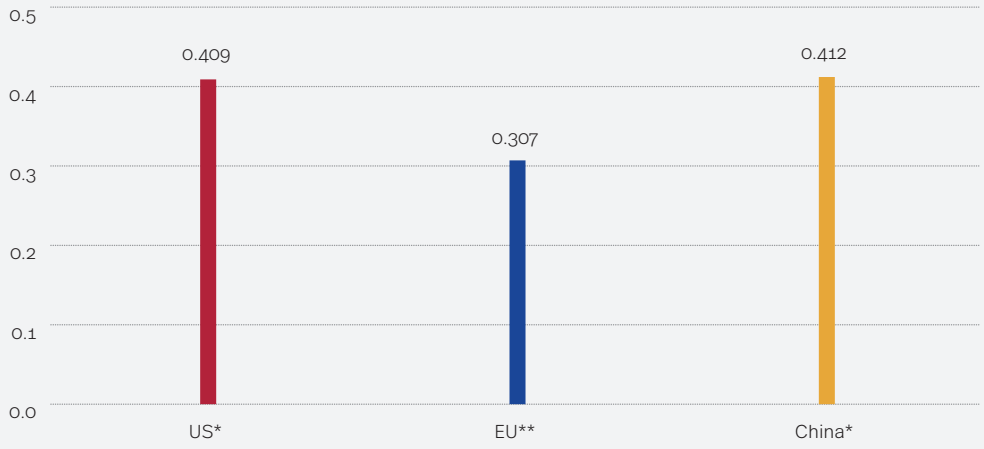
Household spending on consumption of final goods and services in 1995-2019 (PPP, 2017 constant prices in international dollars)



Source: prepared by PEI based on: World Bank (2021).

The US and China have high levels of income inequality as measured by the Gini coefficient. In the US, the level of inequality remains stable and high. In China, official data in recent years has pointed to a slight decrease in income inequality, but its credibility has been questioned and many researchers believe that income inequality there is much higher than in the US and growing (Xiea, Zhou, 2014). There is much less inequality in EU countries. However, following the economic crisis of 2008-2009, income inequality – as measured by the Gini coefficient – stopped declining in the EU, which raises concerns relating to the stability of economic growth and social cohesion. The COVID-19 pandemic has made social inequality a development challenge for each of the world's three largest economies.

↘ Chart 9. Average Gini coefficient in 2005-2015

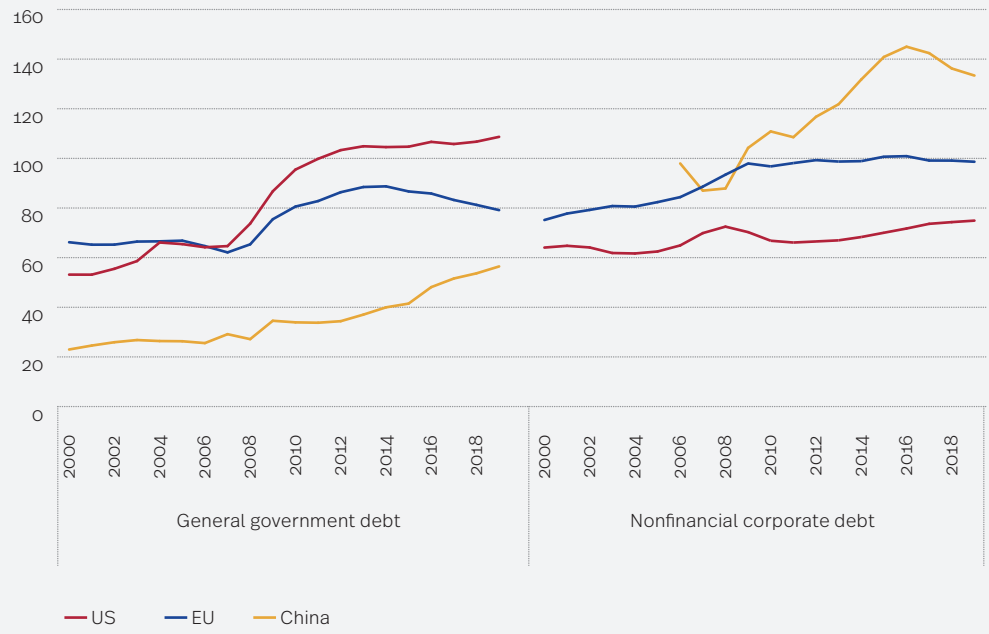


Source: prepared by PEI based on data: * World Bank, ** Eurostat.

Public debt in all three great powers increased markedly after the global financial and economic crisis. This was linked to the numerous economic support programmes. In 2019, the US had the highest level of public debt (108% of GDP) and China the lowest (56%). In the EU, it did not exceed 80% of GDP. Non-financial corporate debt also increased after the crisis over a decade ago. The largest increase was recorded in China, where the ratio of private debt to GDP was 133% in 2019. Evergreen's insolvency in China shows the dangers of such a high level of corporate debt. However, the expected support for enterprises by units subordinate to the Chinese authorities (including banks) will mitigate this risk in China.

↘ Chart 10. **China has the highest level of private sector debt**

General government and nonfinancial corporate debt (as a percentage of GDP)



Source: prepared by PEI based on: IMF (2021).

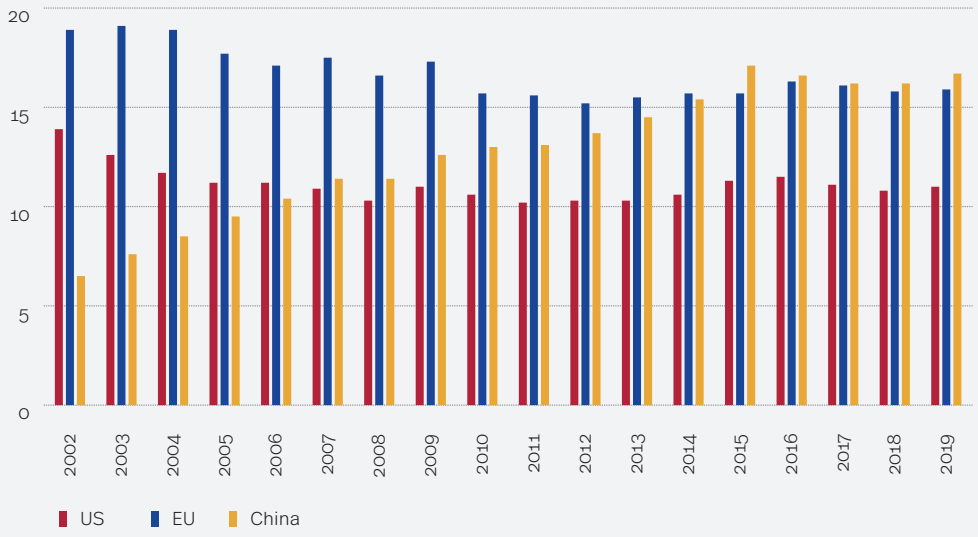
Three global trade powers

The scale of trade is an important parameter determining a country's position in the world economy and the system of international relations. The EU countries largely built their prosperity on the rapid development of exports, which currently amount to almost half of the entire EU's GDP. In 2015, China overtook the EU as the largest exporter. Its share in world exports in 2019 amounted to over 17%. Exports from the EU (outside the EU) accounted for less than 16% and generated one in seven jobs in the EU. The US was third (11%).

Global value chains (GVCs) have three key manufacturing hubs. The organisation of production processes in many countries within a GVC creates a kind of map of international ties. Analysing GVCs enables us to identify centres and peripheries within production networks. Data from TiVA input-output tables for 1995-2015 shows that there were profound changes in the structure of value chains over this period. As recently as the mid-1990s, the world could be divided into two production ecosystems around the centrally-located US and the EU. Since 2005, there has been a shift away from traditional

production centres towards an ever greater concentration around the emerging economies in Asia. The production network centred around China took over a large part of the American one, while the European one has not changed much. The next decade saw the further development of the Asian network, still strongly focused around China. Yet with economic growth and the increase in household incomes, labour costs in China have increased, reducing the country's advantage when it comes to offering the world cheap goods. The Chinese economy is transforming and the amount of domestic value added in Chinese exports has also increased significantly in the past decade, in contrast to the EU, where this has hardly changed.

↘ Chart 11. **China has the largest share in world exports (as a percentage)**



Source: prepared by PEI based on Eurostat.

Centres and peripheries within the great powers

Comparing the level and pace the development in regions within the great powers enables us to examine the most important economic zones within them, but also the changes in differences between the regions over the past 20 years.[2] The comparison of the EU, the US and China below is arbitrary, because – unlike the American states or Chinese provinces – the EU is made up of 27 countries, rather than administrative units within a country.[3] It was not only the EU enlargement of 2004 that created the possibility for greater differences in the pace of change between regions; there were linguistic, cultural and monetary factors, too. They may have influenced the differences in the pace of development between the countries, compared to the states or provinces, due to the greater barriers when making decisions about migration. In addition, as part of its cohesion policy, the EU aims to reduce differences in the level of development between countries and regions in the EU. In 2004-2019, EUR 482 billion from the EU budget was allocated for this purpose.

Although the list should be approached with caution, it is also worth emphasising the importance of regions, such as California and Texas, where the size of the economy makes them important players involved in shaping domestic and foreign policy. If it were in the EU, Chinese region Guangdong would be the most populous country, with the fourth-largest GDP. Regions and cities are increasingly appearing in the international arena as entities that shape international policy (Kuznetsov, 2015). For years, they have participated in climate summits, created alliances of cities and regions and sought to influence negotiations. They also promote economic cooperation, seek investors or undertake other initiatives; for example, cultural ones. Above all, however, regions' strength and the changes between them can be reflected in top-level decisions. This is why it is worth looking at the pace of development within the powers, differences between the regions and trends within them.

Due to problems with the reliability and availability of Chinese data, the regional analysis of this country is presented as a separate study.

The European Union

The EU member states are more diverse in terms of their GDP than the US states or Chinese provinces. The EU consists of 27 countries. Malta, the smallest, is responsible for 0.1% of the EU's GDP; Germany, the largest, accounts for 25.2 per cent. These disproportions are greater than in the US (0.2% and 14.2%) or China. Similarly, the differences in terms of

[2] The period was chosen due to the availability of Chinese data. For the entire period being considered, the 27 current member states were included in the EU.

[3] Currently, there are officially 92 regions in the EU. For more on the subject, see the *Eurostat Regional Yearbook* (2021).

population are larger. The smallest countries (Malta, Luxembourg) have a population of just over half a million people, while the largest country (Germany) has 83.5 million.

Over the past 30 years, Europe has experienced very significant changes due to the systemic transformation and accession of 13 countries in Central and Eastern Europe. Central Europe – made up of six countries: Austria, the Czech Republic, Germany, Poland, Slovakia and Hungary – is becoming a kind of economic centre in the EU with a higher GDP growth rate and lower unemployment than the southern member states. The high rate of growth of indicators such as GDP also stems from the low base and differences in the level of development, which remain significant.

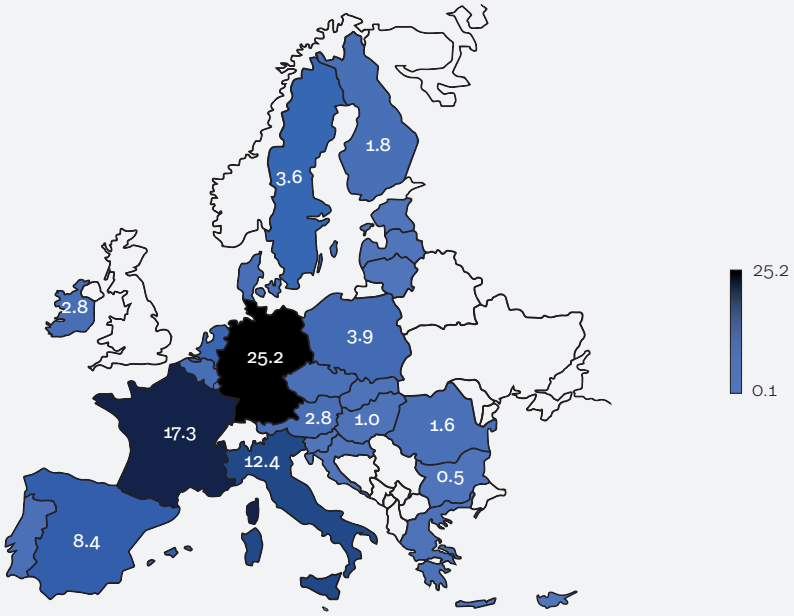
Before to the pandemic, the highest level of cohesion so far had been achieved. However, the pandemic has hit the declining South and East more strongly than other regions, which will hamper the EU's efforts to reduce inequality between regions (Busse et al., 2020).

Economic growth

Based on its share of EU GDP and population, the Central and Eastern European countries' economic importance is still much smaller than that of the rest of the EU. The countries that joined the EU in 2004-2013 account for just 11% of EU GDP and 23% of its population. However, if we remove the Visegrad Group, Eastern Europe (Bulgaria, Romania, Croatia, Slovenia, Malta, Cyprus, Lithuania, Latvia,

↘ Map 2. The old EU still dominates in terms of its share in EU GDP

Member states' share in EU GDP in 2020 (as a percentage)



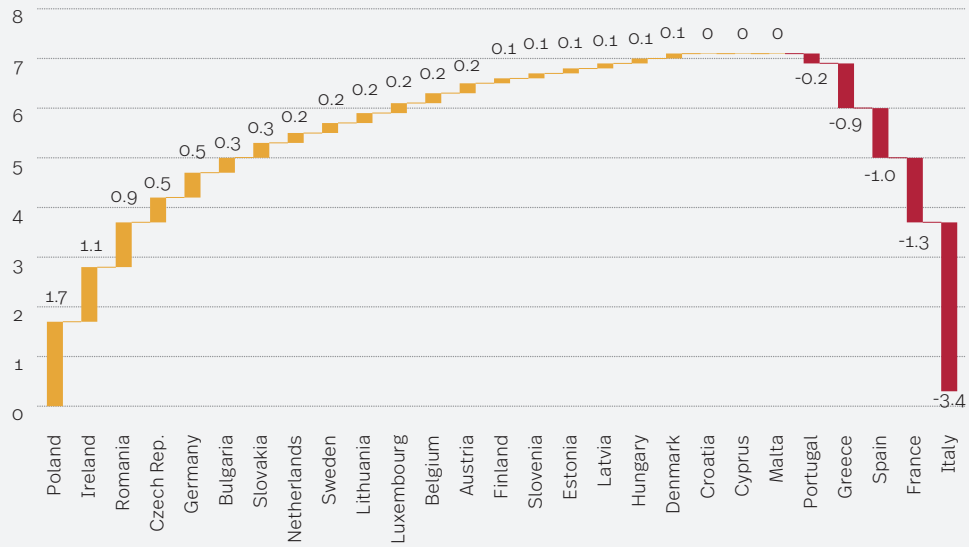
Source: prepared by PEI based on Eurostat.

Estonia) accounts for just 3.7% of the EU's GDP and around 9% of its population. Central Europe, understood as the Visegrad Group, Austria and Germany, is responsible for 35% of the EU's GDP and population. Southern Europe (France, Italy, Spain, Portugal and Greece) has a higher share, with 42% of GDP and 37% of the population. Northern Europe (Ireland, Belgium, the Netherlands, Luxembourg, Denmark, Sweden and Finland) makes up 19.5% of the EU's GDP and 12.5% of its population.

In 2000-2020, the southern European countries' share in EU GDP decreased by 5.4 pp (only Spain recorded an increase, by 0.2 pp). The declines mainly took place after the financial crisis. Meanwhile, the share of the Visegrad Group and Austria increased by 3 pp, with the fastest growth in Poland (1.5 pp). The importance of Germany in the European economy decreased during this period, by 1.5 pp, but the decline took place before 2004. Since 2004, a very clear split has been visible: rapid growth in Central Europe (3.3 pp increase in its share in EU GDP) and Eastern Europe (1.7 pp), growth in Northern Europe (2.1 pp; this is the result of the pandemic and Ireland's significant increase, by 1.1 pp) and collapse in Southern Europe (-6.8 pp).

↘ Chart 12. **Poland's significance in EU GDP has increased the most**

Change in countries' share in EU GDP in 2004-2020 (in percentage points)

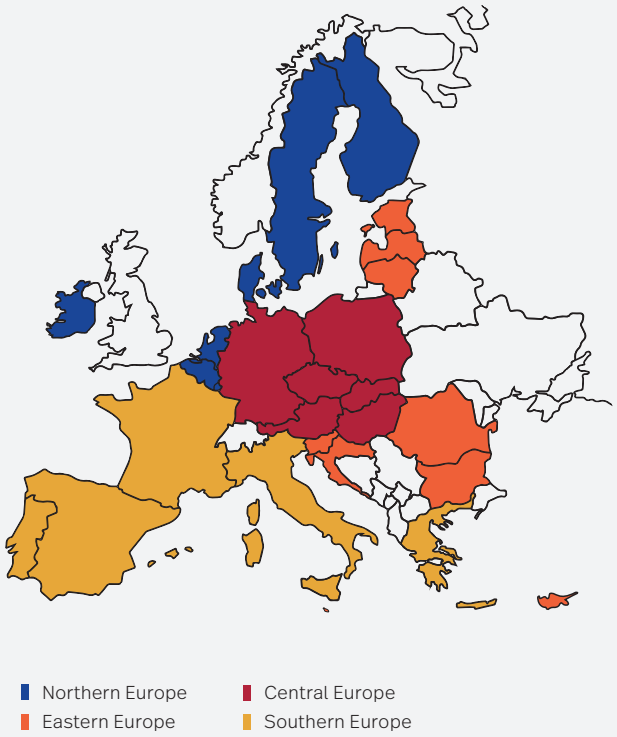


Source: prepared by PEI based on Eurostat.

Central Europe bridged the income gap and, in 2011, exceeded the EU average. The change results from wealthy Austria and Germany's high level and the much slower economic growth in Southern Europe. It should be remembered Central Europe is very diverse:

GDP *per capita* in Slovakia in 2020 was just 57% of that in Austria. The Visegrad Group is still below the EU average (86%), although the gap has been closed by 22 pp over the past 20 years. Due to the low base, Eastern Europe is developing the fastest (three-fold increase), and Southern Europe is slowest (GDP *per capita* has increased by just 29%). While Central Europe's GDP *per capita* grew by 70% between 2000 and 2020, it also grew rapidly in Northern Europe, by 54%. The income gap – expressed in euros – persists and is even widening. Although the GDP *per capita* of the poorest EU country accounted for 10% of that of the richest in 2000, and compared to over 20% in 2020, the difference between these values increased from EUR 43,000 to EUR 64,000. This shows that, while maintaining stable development, the countries in Northern Europe also retain an advantage expressed in absolute values. The coefficient of variation characterising average deviations from the mean is decreasing in the EU, but slowly. Over 20 years, its value dropped from 49% to 42% in 2019, before rising to 44% in 2020 due to the economic recession caused by the pandemic.

↘ Map 3. **Division of the EU into four zones**

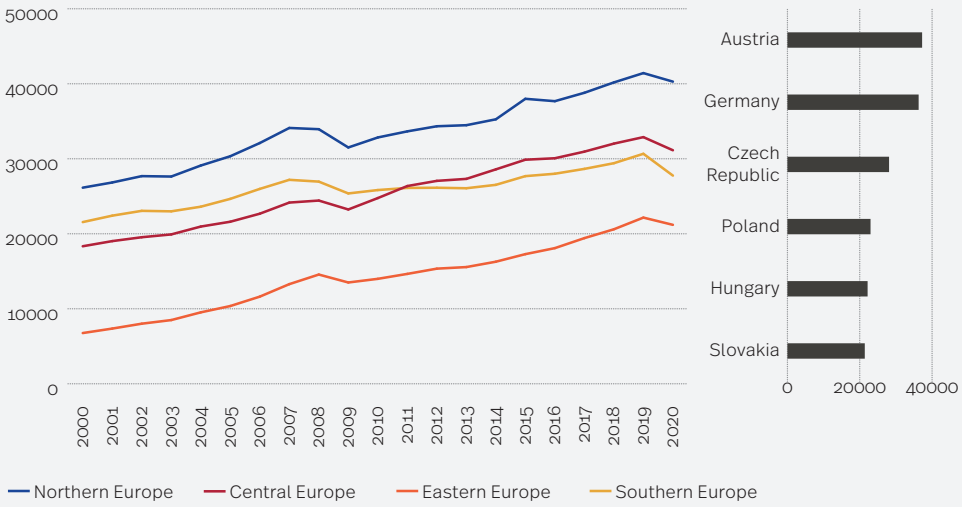


The EU has been divided into four zones: the smallest and poorest states of Eastern Europe with a high growth rate, the significantly larger Central Europe, which is developing equally rapidly, the rich and stable Northern Europe, and Southern Europe, which is still relevant, but losing importance. In the following section, we focus on the two groups with the highest growth in opposite directions, which both of great importance for the EU: Central and Southern Europe.

Source: prepared by PEI.

↘ Chart 13. **Central Europe has become the second-richest region in the EU, but there are differences within it**

GDP (PPP) *per capita* in euros in 2000-2020, GDP (PPP) *per capita* in euros in 2020 in countries in Central Europe



Source: calculations by PEI based on Eurostat data.

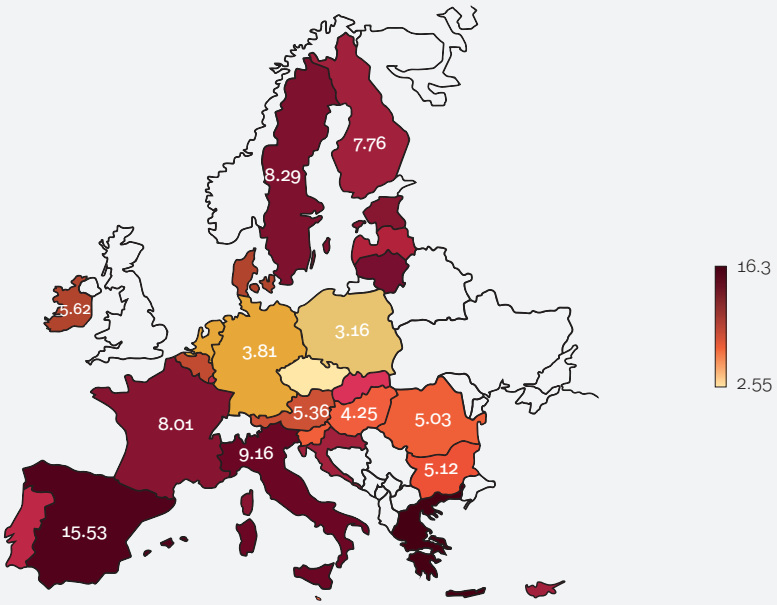
Unemployment, employment in industry and productivity

Central Europe has the lowest level of unemployment. It remained low both before and after the start of the pandemic. In Southern Europe, individual countries have recorded high unemployment since the financial crisis. This had only just begun to decline before the pandemic and increased again during it. In 2000-2020, unemployment in the countries that joined the EU in 2004 decreased, with the strongest decrease in Poland, Slovakia and Bulgaria, by over 10 pp. Czech Republic, Germany, Poland, the Netherlands and Hungary currently have the lowest unemployment rate. 20 years ago, the situation on the labour market in these countries differed. However, is worth recalling, before the deregulation reform of its labour market, it was Germany that was called "the sick man of Europe". Now these countries form the centre of economic growth in Europe.

Part of this socio-economic success is the relocation of industrial production to Central Europe. While the share of people employed in industrial production in Southern Europe decreased in by more than 4 pp in 2000-2020, it increased by 6 pp in Central Europe. The largest increase was recorded in Germany (2.4 pp), just ahead of Poland (2.3 pp). Only five countries recorded an increase in the number of employees: Poland, Slovakia, the Czech Republic, Austria and Cyprus. Almost half of the workers in industry are employed in Central Europe (48%). 32% are in the South, 11% in the East and just 9% in the North.

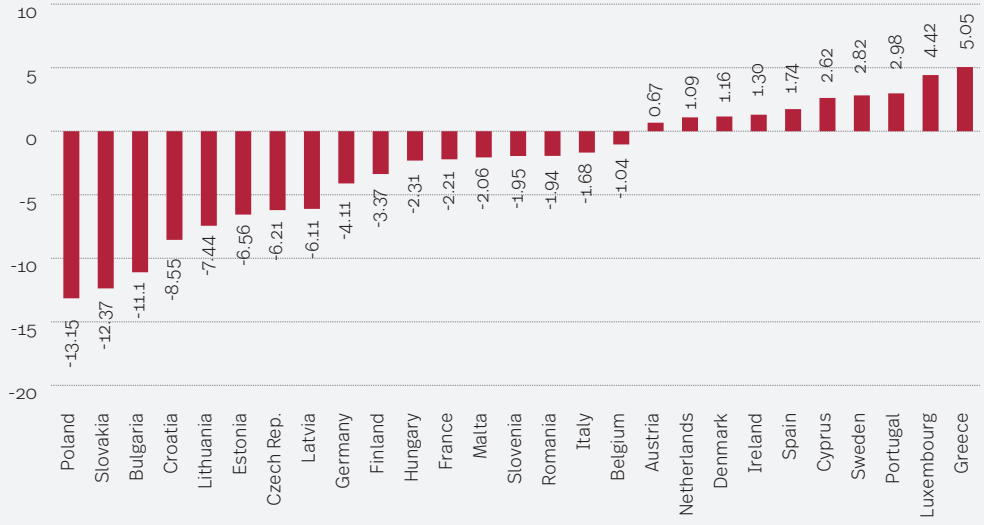
↘ Map 4. **Central Europe has the lowest unemployment in the EU**

Unemployment in 2020



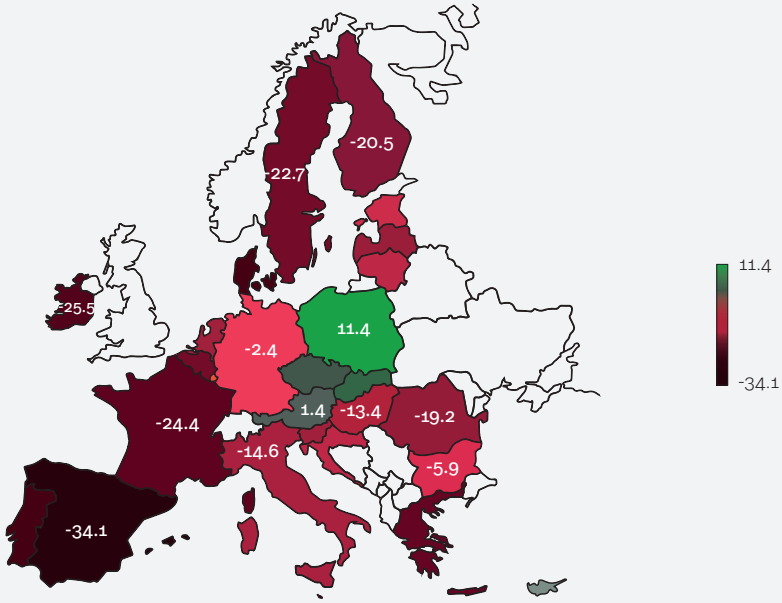
Source: prepared by PEI based on Eurostat.

↘ Chart 14. **Change in unemployment rate in 2000-2020 (in percentage points)**



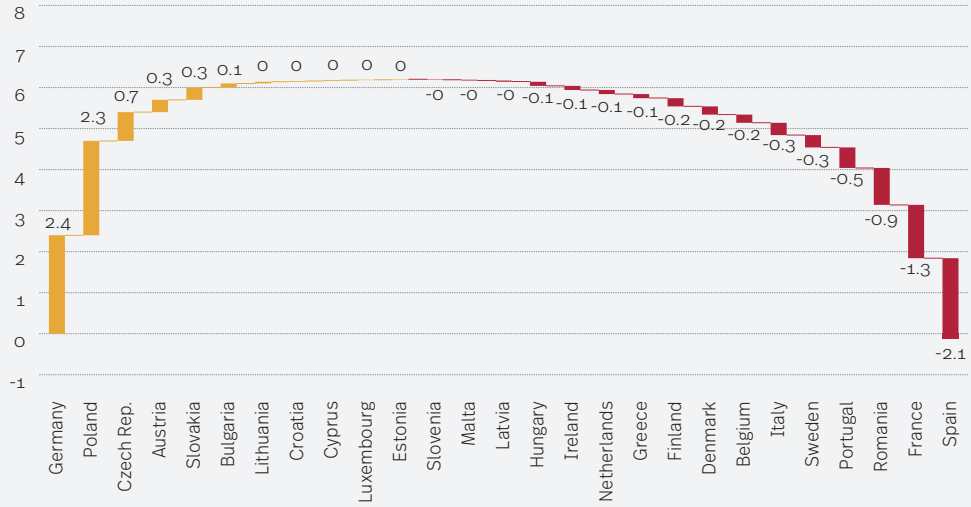
Source: prepared by PEI based on Eurostat.

↘ Map 5. Change in employment in industrial production in 2000-2020 (as a percentage)



Source: prepared by PEI based on Eurostat (2020 or latest data available).

↘ Chart 15. Change in share of people employed in industrial production in 2000-2020 (in percentage points)

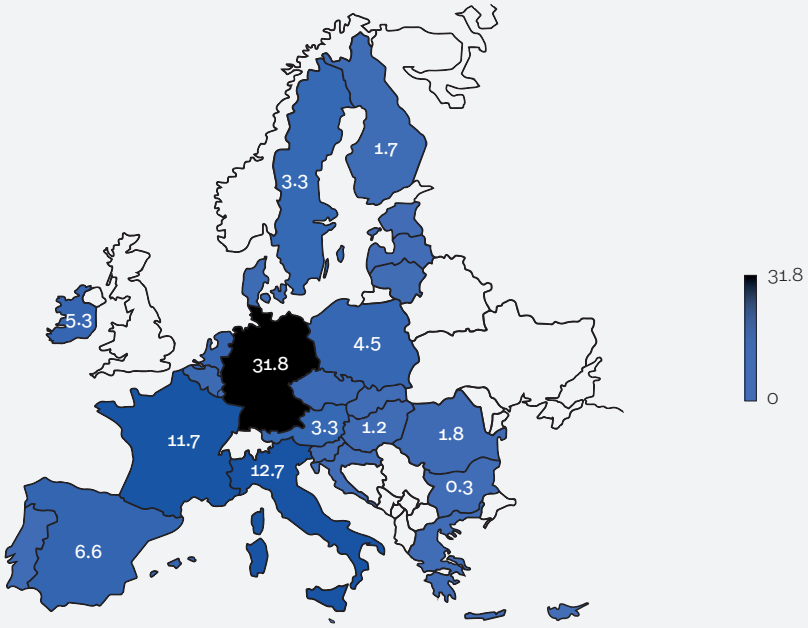


Source: prepared by PEI based on Eurostat (2020 or latest data available).

There has also been a spike in value added to industrial production in Central Europe, although there is still a development gap. The value added generated by industry in Central Europe is growing very rapidly: since 2000, it has quadrupled in Slovakia and more than tripled in Poland. Although, 20 years ago, Southern Europe surpassed Central Europe in terms of industrial value added, this has changed. While Central Europe's share has increased by 5 pp, Southern Europe's has fallen by as much as 9 pp. An increase was also recorded in Northern Europe, by 2 pp. Germany is in a key position, accounting for 32 pp of value added in industry in the EU. Heavy industry – metallurgy, refining, and the chemical and automotive industries – is primarily responsible for the development of processing in Central Europe.

↘ Map 6. Germany accounts for one-third of value added in EU industry

Share in value added generated in EU industry (as a percentage)



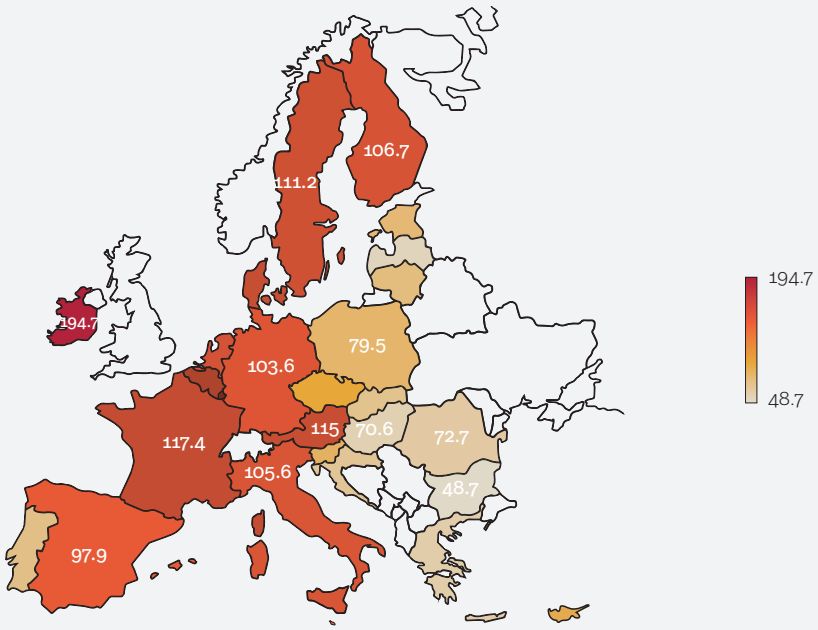
Source: prepared by PEI based on Eurostat.

The data on industrial productivity shows the essence of Northern Europe's development advantage over other regions. Above-average productivity is recorded in all the countries in Northern Europe (on average, 132% of the EU average) as well as Austria, Germany and Italy. Eastern Europe fared the worst in this respect, with average

productivity at 76%. In Central Europe, average productivity was 88% of the EU average; in Southern Europe, this was 94%. The EU average and the results of the North are inflated by Ireland, but it is worth noting that, in 2000-2019, the fastest growth in labour productivity was in the Eastern European countries (an increase of 25%), while the largest decline was in Southern Europe (a decrease of 6%). Central Europe boosted its productivity by 6% and Northern Europe by 2% (it decreased by 4% if Ireland is excluded). Poland was sixth in the EU in terms of productivity growth.

↘ Map 7. **Highest labour productivity in Ireland, fastest improvement in Eastern and Central Europe**

Labour productivity per person employed and hour worked in 2020 (EU-27 = 100, PPS, current prices)



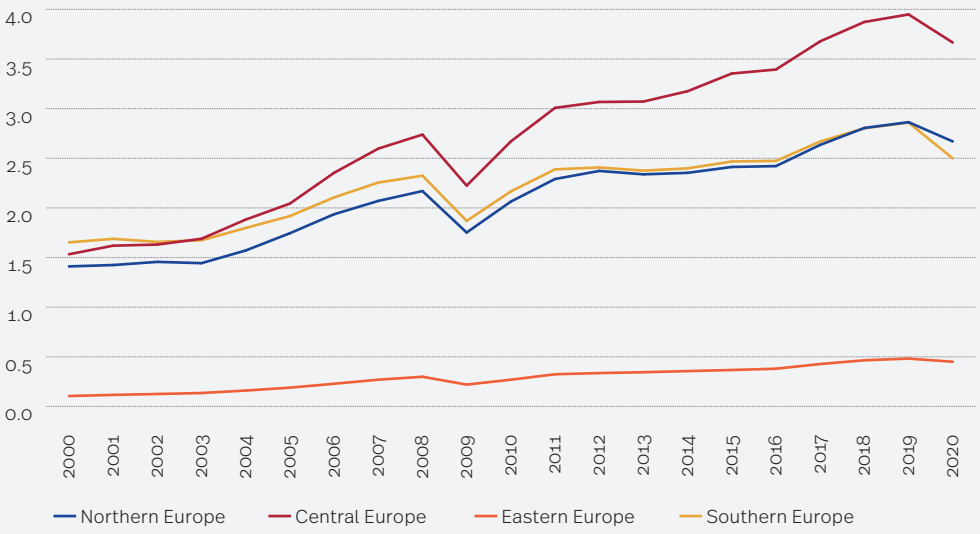
Source: prepared by PEI based on Eurostat.

Trade

Central Europe has swapped places with Southern Europe and became the leader in trade in goods. In 2000-2020, Central Europe overtook the South in terms of its share in European trade (from 33% of EU turnover to 39%, compared to a decline from 35% to 27% in Southern Europe). The highest growth rate was achieved by the countries that joined the EU after 2004 and, among the largest countries, Poland recorded over fivefold growth. The main driver is Germany, the Central European countries' most important trade partner, through which added value from the Visegrad Group countries goes to other places in the world. The significant role of exports in this growth in Central Europe is also illustrated by the data on the share of exports in GDP: in each country, it is higher (from 47% in Germany) than in any of the Southern European countries (to 43.5% in Portugal). Still, apart from Germany, which is in first place, individual countries in the Visegrad Group have a much lower turnover in terms of value than France, Italy or Spain.

↘ Chart 16. **Since the EU enlargement of 2004, Central Europe has become the largest exporter of goods in the EU**

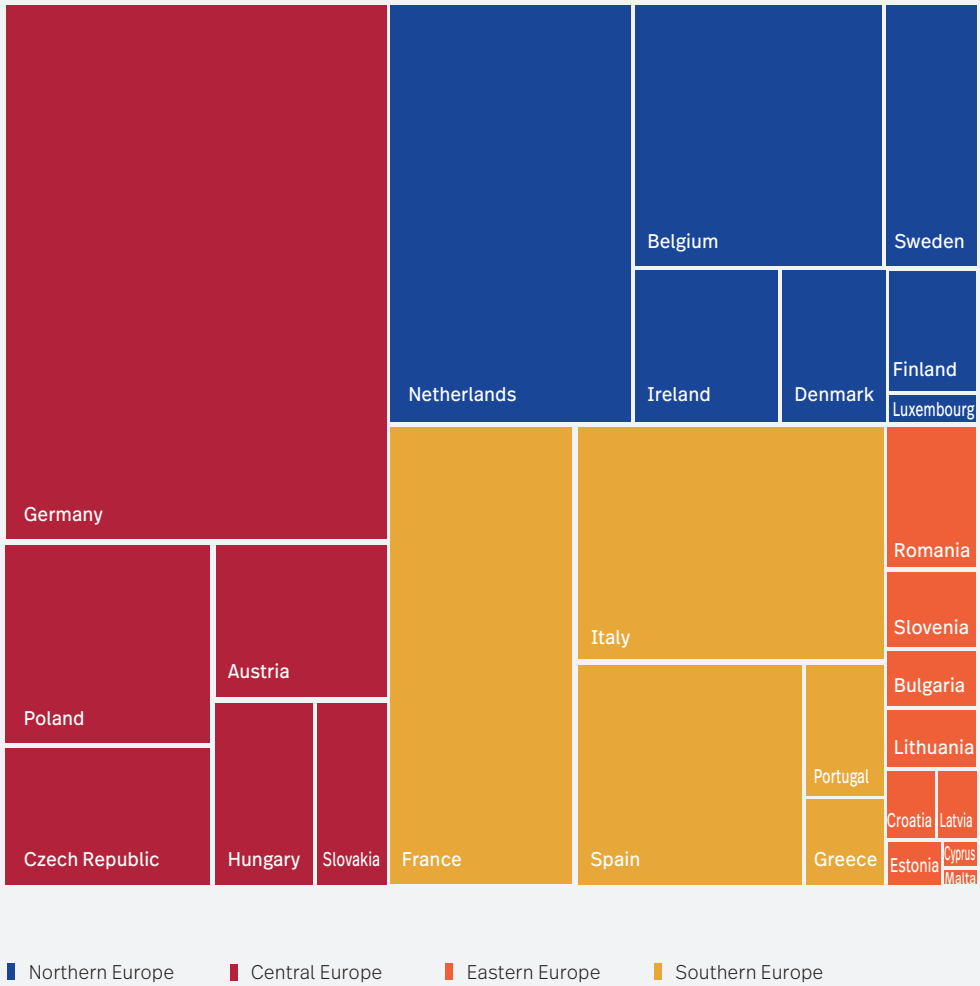
Turnover in goods in 2000-2020 (w trillions of EUR)



Source: prepared by PEI based on Eurostat.

↘ Chart 17. **The largest economies dominate in turnover in trade in goods**

Turnover in goods in 2020 (in billions of EUR)



Source: prepared by PEI based on Eurostat.

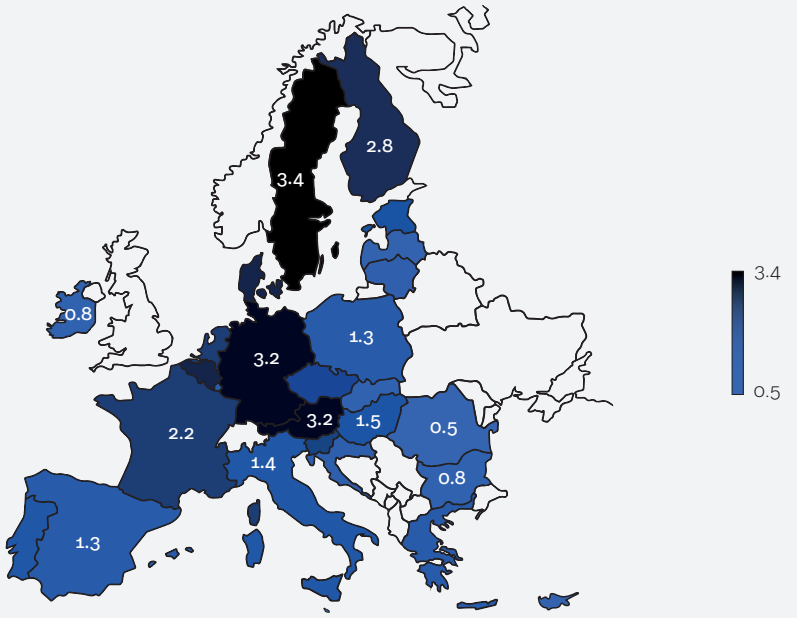
Technology and innovation

Investment in information and communication technologies is the Achilles' heel of the entire region of Central Europe (except the Czech Republic). Among the OECD countries for which data are available, Poland allocates the lowest share of gross investments towards fixed assets in these technologies. France, Italy, Spain and Portugal spend four and three times more than Poland for these purposes, and more than twice as much as Germany.[4] Central Europe is not a leader of growth in this category.

The countries in Southern Europe are improving the innovation index faster than the Visegrad Group or Germany. This shows the problems of Central Europe's economic structure: its growth model is based on industry, but it is not innovative growth. This creates the risk that its competitiveness will be limited with the increase in production costs caused by rising electricity costs or rising wages.

↘ Map 8. Northern Europe and part of Central Europe invest the most in R&D

Spending on R&D (as a percentage of GDP PPP)



Source: prepared by PEI based on Eurostat.

[4] Latest available data from 2018 https://data.oecd.org/gdp/investment-by-asset.htm#indicator-chart [accessed: 21.10.2021].

In the latest edition of the *European Innovation Scoreboard* (EIS, 2021), both Central and Southern Europe are clearly behind Northern Europe. Only Germany and France are among the strong innovators. All the other countries in these regions are below the EU average, with Southern Europe and the Czech Republic moderate innovators, and Hungary, Slovakia and Poland emerging ones (EIS, 2021). The data on spending on R&D in relation to GDP is slightly different. Among the four EU regions, the leader is Central Europe (2.6% of GDP), ahead of Northern (2.4%), Southern (1.7%) and Eastern Europe (0.8%). However, if we consider the Visegrad Group alone, spending on R&D amounts to just 1.4%. The percentage in four southern European countries (excluding France) – Greece, Spain, Portugal and Italy – is also low, slightly below the V4 level.

Conclusions

In terms of overall development within the EU, based on the HDI index, the EU has managed to reduce heterogeneity. There have not been any declines in the index's value in any EU country, and the difference between the index's highest and lowest value fell by a quarter in 2000-2019, and the coefficient of variation from 6% to 4%. Moreover, all countries exceeded the 0.800 mark, which signifies high development. The fastest growth was recorded in the new member states (over 10% in 2000-2019), as well as Greece and Ireland. Nevertheless – apart from Germany and Austria, which rank second and eighth in the EU in terms of the HDI – the Central and South European countries are outside the top ten. The biggest improvement was recorded by Ireland, which advanced from 12th place to first, followed by Estonia (by 5 places, to 15$^{th)}$ and the Czech Republic (by 4, to 13th). The following countries dropped the most in the ranking: Slovakia (by 7 places, to 23th), Italy (by 6, to 16th), Greece (by 4, to 17th) and Belgium (by 4, to 7th).

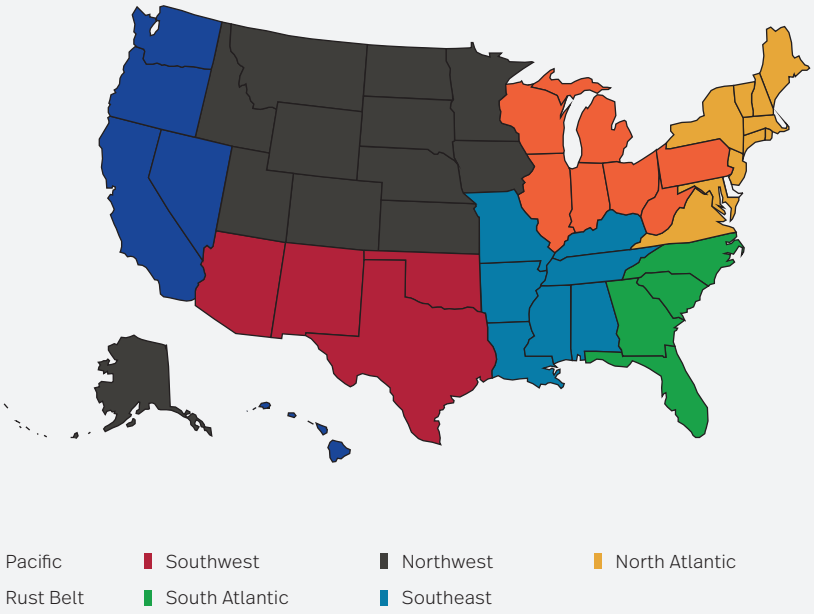
Central Europe is emerging as an engine of growth, but still less important in the EU than the countries of Southern Europe. The Visegrad Group itself – without Germany – is an area of rapid development that is catching up, but that is far from a significant socio-economic force in the EU. This is also confirmed by data on investment in industrial machinery and equipment; significant increases are visible in Central and Eastern Europe, but this share would still be very low were it not for Germany. Southern Europe's share in investment in machinery exceeds Central Europe's share by 2 pp. This means that, despite the intensive growth in Central Europe, means of production are growing faster in Southern Europe (www2).

All Europe's regions face major demographic challenges, especially Eastern Europe and the Visegrad Group. Rising labour and energy costs will limit opportunities for industrial production in the region to further increase. To keep reducing the income and development gap, the countries will need to invest primarily in innovative industries and services, as well as attract immigrants and strengthen institutions (Piątkowski, 2019).

The United States

The states in the US are more homogeneous than the EU member states or Chinese provinces. Unlike in the EU, the functioning of the American economy has not undergone fundamental changes over the past 20 years that would increase the speed of growth or differences. For the EU, the most important change was the enlargement to 13 new member states. Nevertheless, there are differences in the speed of growth, both between states and regions, which exacerbate inequalities; for example, in terms of states' share in US GDP.

↘ Map 9. Regional division of the US



Source: prepared by PEI.

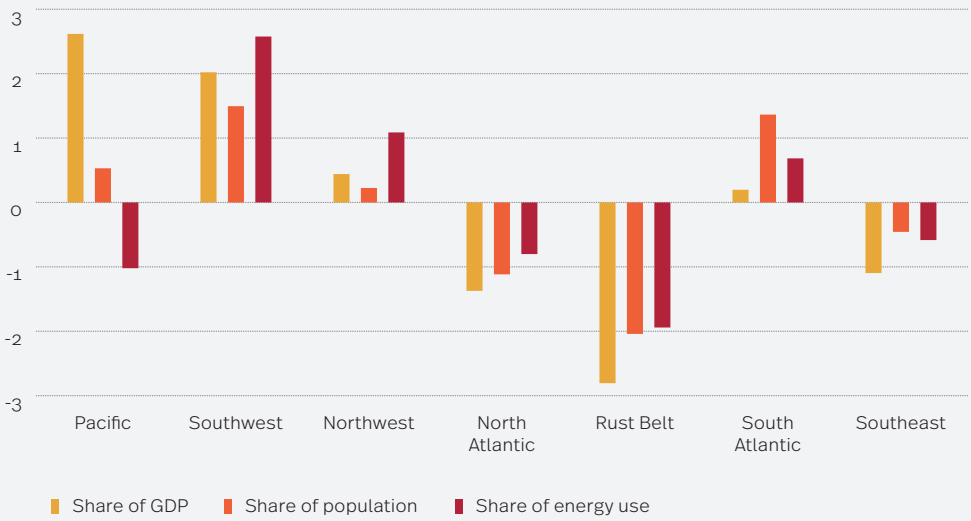
Economic growth

Three states – California, Texas and New York – accounted for almost a third of US GDP in 2019. The first two's share in US GDP has also increased by most – by almost 4 pp since 2000 The most important economic areas in these regions remain the eastern and western coasts, accounting for more than half of US GDP. The North-Atlantic region is the largest in terms of GDP (21%) and the second-largest in terms of population (18%). The Pacific region is second (20% and 17%, respectively) and recorded the highest growth rate (just under 3 pp). The Rust Belt (Pennsylvania, Ohio, West Virginia, Indiana, Illinois, Michigan and Wisconsin) was third, despite a downward trend. It had a 17% share in GDP in 2019 and is also the most populous region (19%).

The Rust Belt has recorded the greatest downward trends. As a result of de-industrialisation and energy transition (the decline of coal and gas), the region's share in US GDP has fallen by almost 3 pp. Meanwhile, thanks to the extraction of gas and oil from shale, the Southwestern region, primarily Texas, has gained 2 pp. The three remaining regions are the South Atlantic (12% of GDP and 14% of the population), Northwest (9% of GDP and population) and Southeast (8% and 10% respectively) regions. It is worth noting that regions characterised by a declining share in US GDP also recorded a decrease in population between 2000 and 2019.

↘ Chart 18. **The Rust Belt is the biggest loser is the past two decades**

Changes in regions' share in GDP, the population and use of energy in the US (in percentage points)

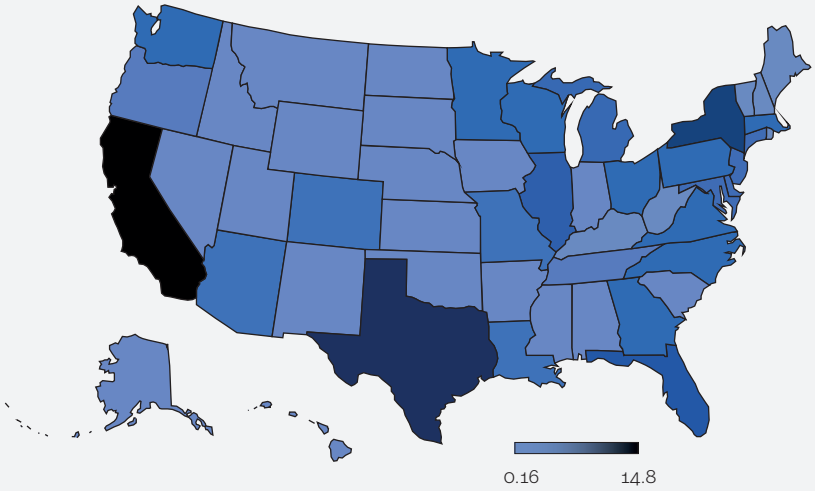


Source: prepared by PEI based on: BEA (2021).

Changes in the population that have accompanied the decline in GDP mean that differences in terms of GDP *per capita* have not been compounded. These differences increased until 2010, when the values for the states deviated from the arithmetic mean (volatility index) by an average of 40.5%. In the 2010s, the indicator decreased systematically, to 35.5% in 2019. The shock of the financial crisis, which forced people to migrate, and the ongoing energy revolution, may have helped reduce heterogeneity, measured in terms of GDP *per capita*. During the COVID-19 pandemic, the volatility index increased to 36.3%, which meant a reversal of the trend and an increase in differences in GDP *per capita* between states.

↘ Map 10. **Three states dominate the US economy and are growing the fastest**

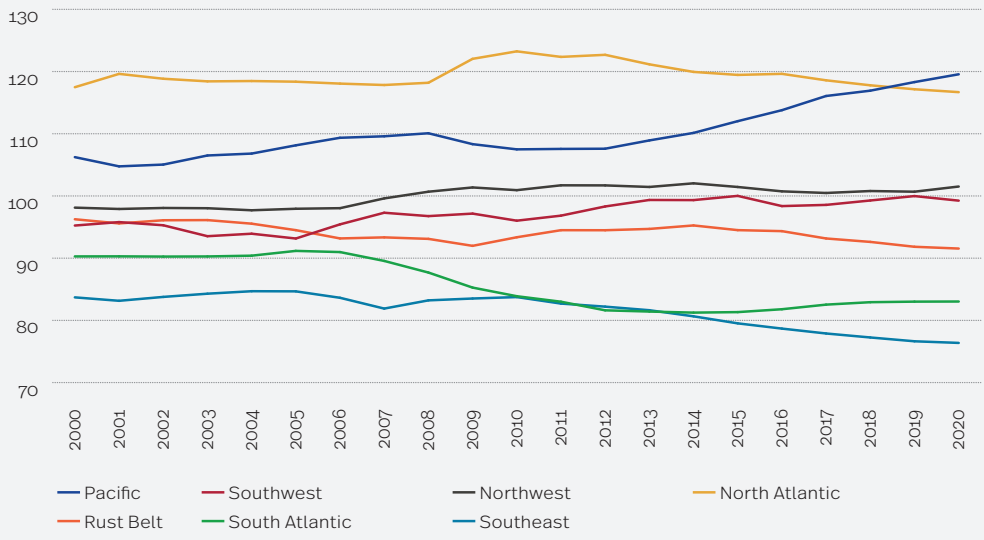
States' share in US GDP in 2020 (as a percentage)



Source: prepared by PEI based on: BEA (2021).

↘ Chart 19. **Silicon Valley has made the Pacific region the richest**

GDP *per capita* in US regions in relation to the national average (national average = 100, as a percentage)



Source: prepared by PEI based on: BEA (2021).

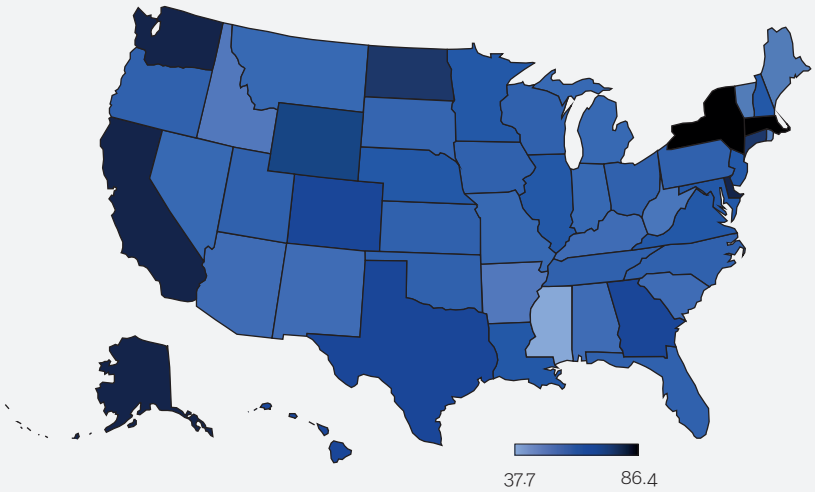
In the 2010s, the region with the highest GDP *per capita* changed. In 2019, the Pacific region became the richest: average income *per capita* was 18.3% higher than the national average. The main sector driving this state's rapid development is the service sector, encompassing tourist and business services, in particular IT (Silicon Valley). The state of Washington, located on the Northwestern part of the Pacific Coast, is also of great importance. Many IT and aviation (Boeing) companies are located in its capital. The significance of services in the region's development of the region is reflected in the reduction in its share in electricity consumption and the export of goods.

The Southeast and South-Atlantic regions were the least prosperous. In 2000, GDP *per capita* there was 83.7% and 90.3% of the national average, respectively. Two decades later, the distance from the average had increase, to 76.6% and 83%. These regions also had the lowest share of spending on R&D as a percentage of GDP.

In 2020 the distance between the richest region, the Pacific, and the national average – as well as the distance between the poorest region, the Southeast, and the average – increased due to the COVID-19 pandemic. These changes followed the previously-observed trend. A similar situation was observed in the Rust Belt and the North-Atlantic region (the ratio between their GDP *per capita* and the national average decreased), and, to some extent, in the Northwest (the region became richer in relative terms).

↘ Map 11. The poorest states are in the Southwestern part of the US

GDP *per capita* in individual states in 2020 (in thousands of USD per inhabitant)



Note: For the sake of clarity, GDP *per capita* level for the District of Columbia was omitted from the image. In 2020, it amounted to USD 207,900 *per capita*.

Source: prepared by PEI based on: BEA (2021).

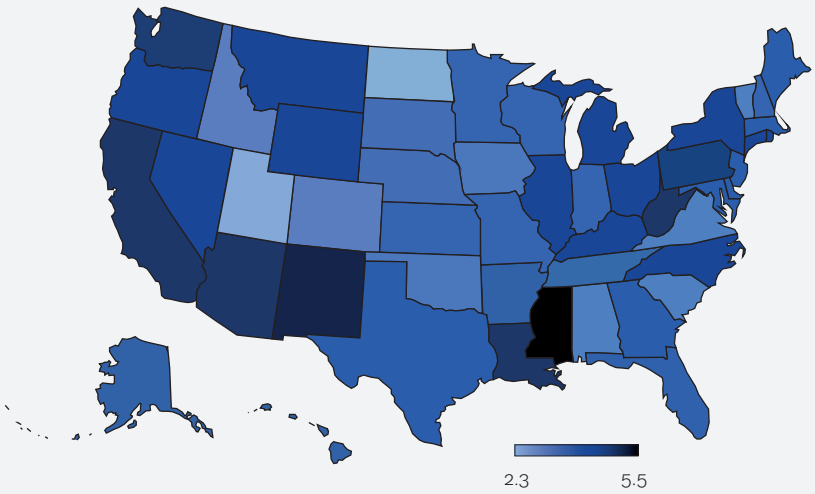
Unemployment and the significance of industry in the economy

Over the past 20 years, the level of unemployment has changed slightly between regions. The periodic, sharp increase in the unemployment rate was influenced by the financial crisis, which increased it to up to 14% in Nevada, before returning or drop to the levels from the early 2000s by 2019. In 2000-2019, it decreased the most in Idaho, Hawaii, Alabama, Alaska and Oregon – by over 1.5 pp. The largest increases in the unemployment rate were recorded in Connecticut (by 1.5 pp) and Arizona (by 0.9 pp). The number of unemployed people increased, too, including in Michigan, South Dakota, Virginia and Pennsylvania. In 2019, the unemployment rate exceeded 5% in just states: the District of Columbia, Mississippi and New Mexico. In another ten states in the Pacific region, the Rust Belt, and the Southeast, it was above 4%. Similarly to two decades earlier, unemployment was lowest in states located in the central part of the US (including Utah and Colorado) and some in the eastern part of the country, including South Carolina, Virginia and Vermont.

The data on unemployment shows that the US states are much more homogeneous than the EU member states. Inhabitants' mobility is probably of great importance here. The relatively high unemployment in regions that are gaining significance in the US economy points to this explanation.

↘ Map 12. The unemployment rate in different states is relatively similar

Unemployment rate in individual states in 2019 (as a percentage)



Source: prepared by PEI based on: BEA (2021).

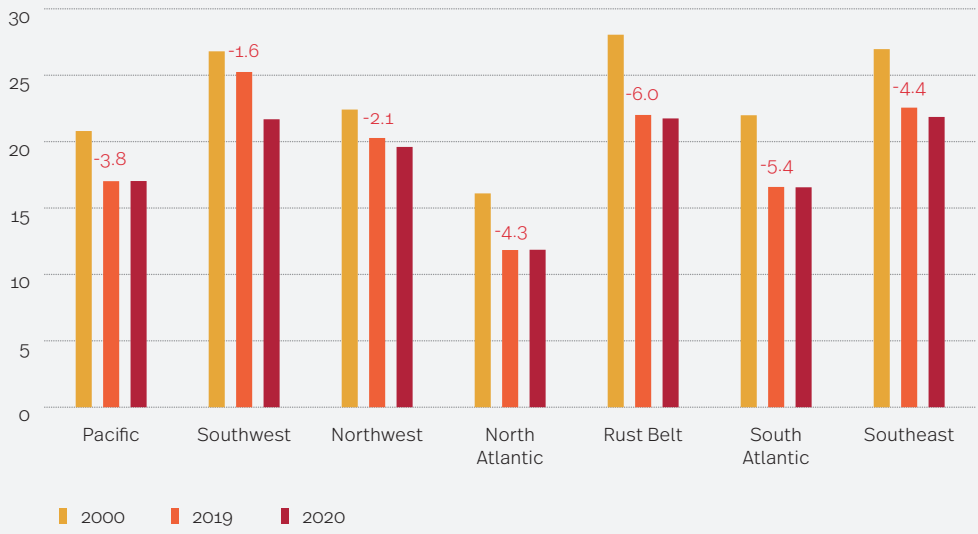
The economic crisis caused by the COVID-19 pandemic increased unemployment in the US by as much as 4.4 pp, from 3.7% in 2019 to 8.1% in 2020. It increased the most in the Pacific (by as much as 8.9 pp in Nevada and 5.9 pp in California), the North Atlantic (by over 6 pp in New York and New Jersey) and in the Rust Belt (by nearly 6 pp in Illinois and Michigan). The situation was best in the Northwest, where – with the exception of Colorado – unemployment did not go up by more than 3 pp.

The US economy is increasingly service-driven. In 2000-2019, the share of industry (mining, manufacturing, public utility services and construction) in US GDP decreased by 4.2 pp, from 22.5% to 18.3%. The scale of the decline varied depending on the region. The decrease in the share of industry in the Rust Belt economy, by as much as a 6%, confirms the deindustrialisation of the region and the ongoing energy transition. The importance of industry in the economy of the South-Atlantic region decreased by over 5 pp, mainly due to South and North Carolina.

The relatively small decrease in the share of industry in the GDP of the Southwest and Northwest regions is the result of the increasing extraction and processing of raw materials. Texas leads the way with shale oil and gas extraction. In the 2000s, it was joined by North Dakota, where large deposits of these raw materials were discovered. In 2019, industry accounted for over 30% of this state's GDP.

↘ Chart 20. Deindustrialization is taking place the fastest in the Rust Belt

Share of industry in individual regions' GDP (as a percentage)



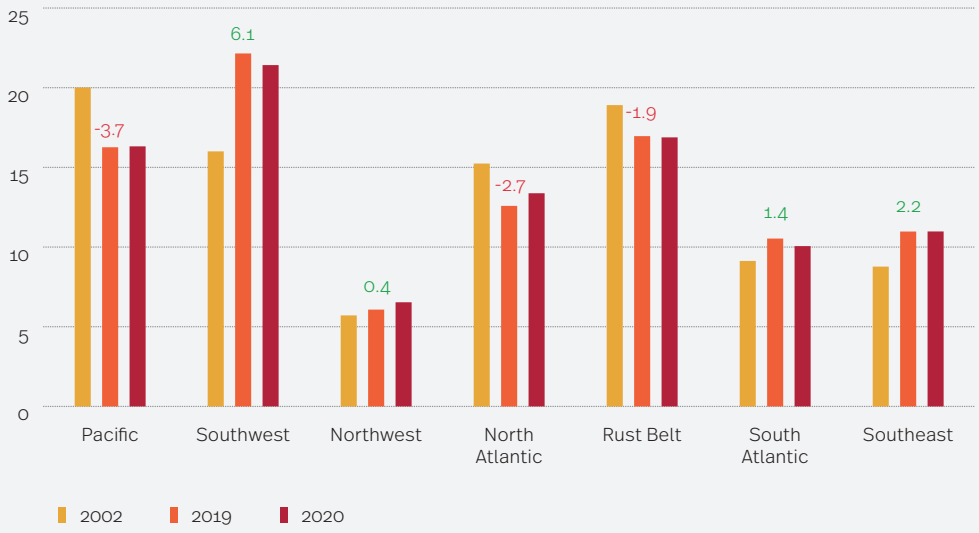
Note: the numbers in the chart refer to the change in share in 2000-2019 (in percentage points).
Source: prepared by PEI based on: BEA (2021).

The increase in industrialization made the Southwest the top exporter of goods at the start of the 2010s. Texas generated as much as one-fifth of revenue from the sale of American goods abroad in 2019. In 2000-2019, the importance of the Pacific, North Atlantic and the Rust Belt decreased.

The changes on the US industrial map are reflected in electricity consumption. Regions where the importance of industry has declined the most – namely, the Rust Belt and the Pacific Region – have seen their share in electricity consumption decline the most. Regions where industry lost importance more slowly increased their share in national consumption, including the Southwest, with Texas.

↘ Chart 21. The Southwestern region exports the most in the US

Regions' share in export of goods (as a percentage)



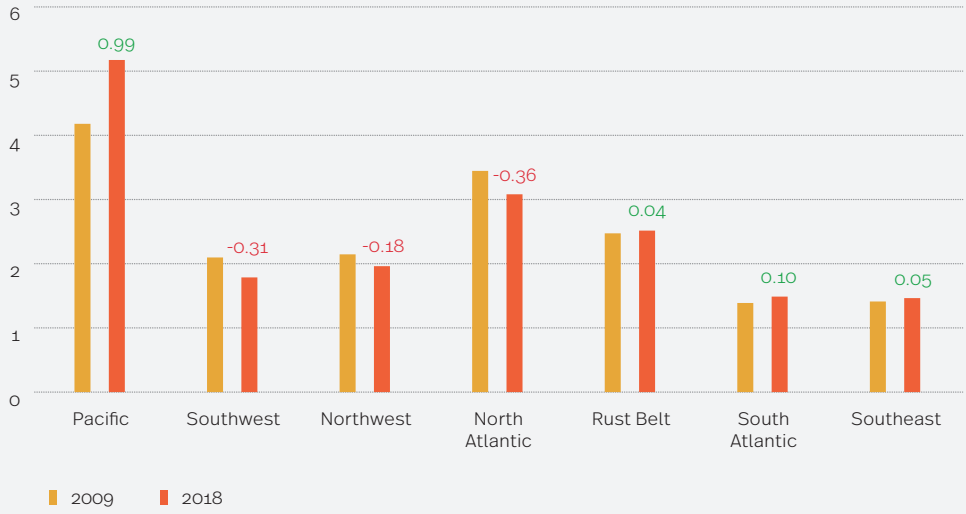
Note: the numbers in the chart refer to the change in share in 2000-2019 (in percentage points).
Source: prepared by PEI based on: USA Trade Online (2021).

Spending on R&D

The Pacific region is the leader in terms of innovative activities. In 2018, spending on R&D accounted for as much as 5.2% of the region's GDP, an increase of 1 pp compared to 2009. Two states stand out: California and Washington, with a strong IT and aviation sector. The poorest regions, the South Atlantic and the Southeast, are the least innovative. In 2018, spending on R&D there did not exceed 1.5%, approximately half the national level. The North-Atlantic region recorded the greatest decrease in innovation (by nearly 0.4 pp in 2009-2018).

↘ Chart 22. **The economy is growing at the fastest rate where spending on innovation is growing the fastest**

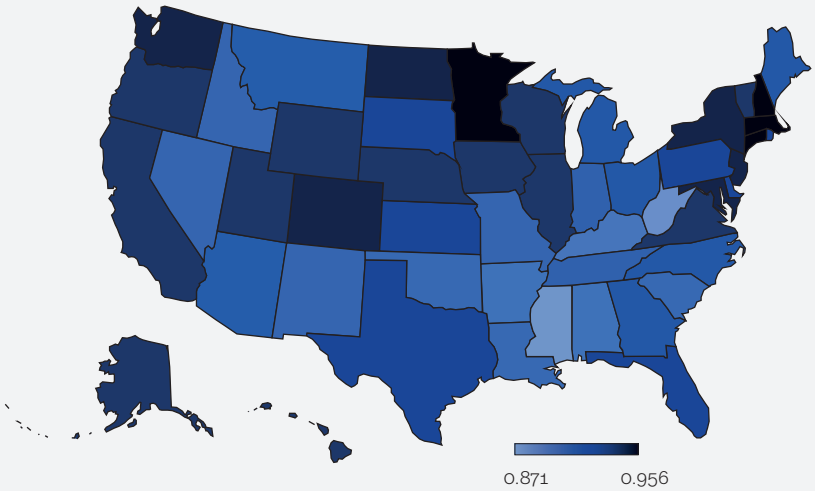
Share of spending on R&D in GDP in individual regions (as a percentage)



Source: prepared by PEI based on: NSF (2021).

↘ Map 13. **The differences in the HDI indicator mainly result from differences in GDP *per capita***

HDI indicator in individual states in 2019



Source: prepared by PEI based on: HDR (2021).

The variation between US states as measured by the Human Development Index (HDI) between 2000 and 2019 has remained essentially unchanged. The regional distribution of the indicator was similar to the variation in GDP *per capita*, which indicates that the economic situation is the most important component of the indicator. It was best to live in the Pacific, North Atlantic and Northwest regions. The states with the best quality of life were Massachusetts, Connecticut and Minnesota (HDI> 0.95).

Conclusions

With the exception of the financial and economic crisis of 2008/2009 and the COVID-19 pandemic, the first two decades of the 21st century have been a period of economic growth in the US. However, there are differences in the rate of growth between individual states and regions. In the 2000s, differences between states in terms of GDP *per capita* and HDI increased and then began to decline. In 2019, they reached the level of the early 2000s. Since 2019, the Pacific region has been the richest, owing its development to its developed service sector and rapidly-growing spending on R&D. In 2009-2018, the share on spending on R&D in the region's GDP increased by 1 pp, to over 5%. The role of the North-Atlantic region, which was the richest until recently, has decreased, but it still generates 21% of US GDP. The Rust Belt has been the biggest loser of the past two decades. Due to deindustrialization and the energy transition (the decline of coal and gas), the region's share in US GDP has fallen by almost 3 pp. Meanwhile, the Southwestern region, primarily Texas, has gained 2 pp thanks to the extraction of gas and oil from shale. The least prosperous regions in the early 2000s – the Southeast and the South Atlantic – remain the least prosperous, and the gap between them and the average has widened. These regions also spent the least on R&D, as a percentage of GDP. In 2018, this spending did not exceed 1.5%, approximately half the national level.

During the COVID-19 pandemic, differences between the states increased again. In most regions, the trend in the relationship between their GDP *per capita* and the national average continued. In 2020, the distance between the richest region, the Pacific, and the average increased, as did the distance between the poorest region, the Southeast, and the average. The unemployment rate more than doubled (to 8.1%). It grew the most in regions where services are important – the Pacific and North Atlantic – as well as in the Rust Belt. It is too early to judge to what extent the pandemic will increase the differences between states, as it was of a different nature to the global financial and economic crisis.

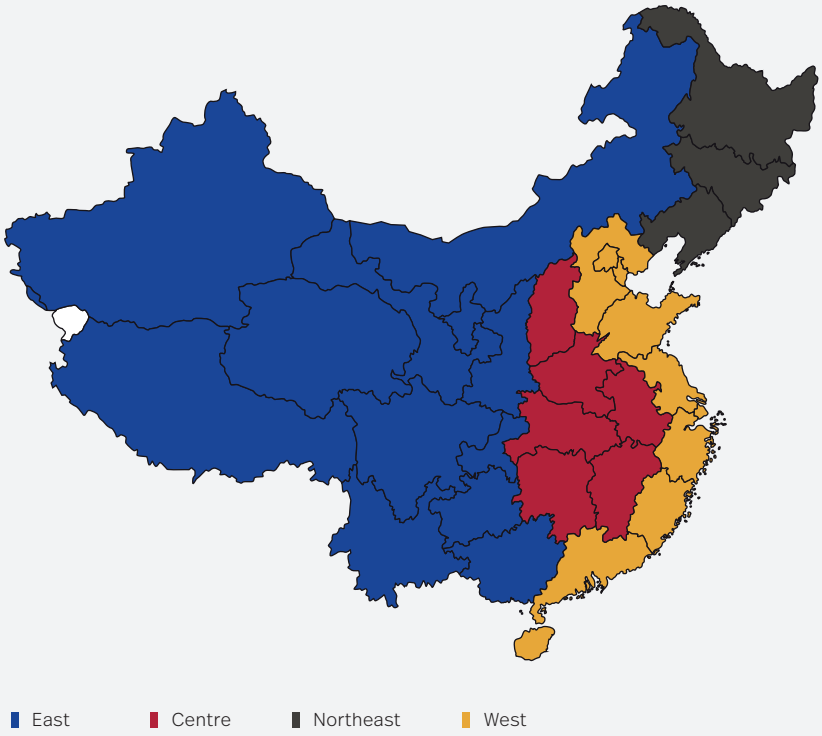
China

In 1980-2020, the share of China's GDP (PPP) in the global economy increased by over 16 pp, from 2.26% to 18.76%. As a result, in 2017, the People's Republic of China overtook the US as the world's largest economy (IMF, 2021). Moreover, in 2020, the nominal annual GDP of its most developed province, Guangdong, placed it in 4th place in the EU in terms of the size of its GDP (Eurostat, 2021). China's position is evidenced not only by the scale of the economy, but also by geographic and social conditions there. Its area is more than double the area of the EU. The largest province, Xinjiang, has an area more than two and a half times that of France and the most populated province, Guangdong, has a population of 126 million

(NBS, 2021), nearly 45 million more people than Germany, which has the largest population in the EU.

Like the two other powers analysed in this report, China is highly heterogeneous. In this chapter, Chinese provinces were grouped into four regions with similar characteristics and development paths: East, Northeast, Centre and West. This division is consistent with the one used by the Chinese National Bureau of Statistics (NBS, 2021), but for the purposes of this report, a Northeastern region has been added, consisting of the provinces of Liaoning, Jilin and Heilongjiang. Due to their geographical separateness, far-reaching dependence on heavy industry and the economic slowdown recorded since 2012, they differ from other eastern provinces. Advanced technologies increasingly drive growth in the hitherto-industrial East, while more labour-intensive manufacturing industries, as well as agriculture, energy and resource extraction, are the basis for the development of the Centre and the West.

↘ Map 14. Division of China into regions



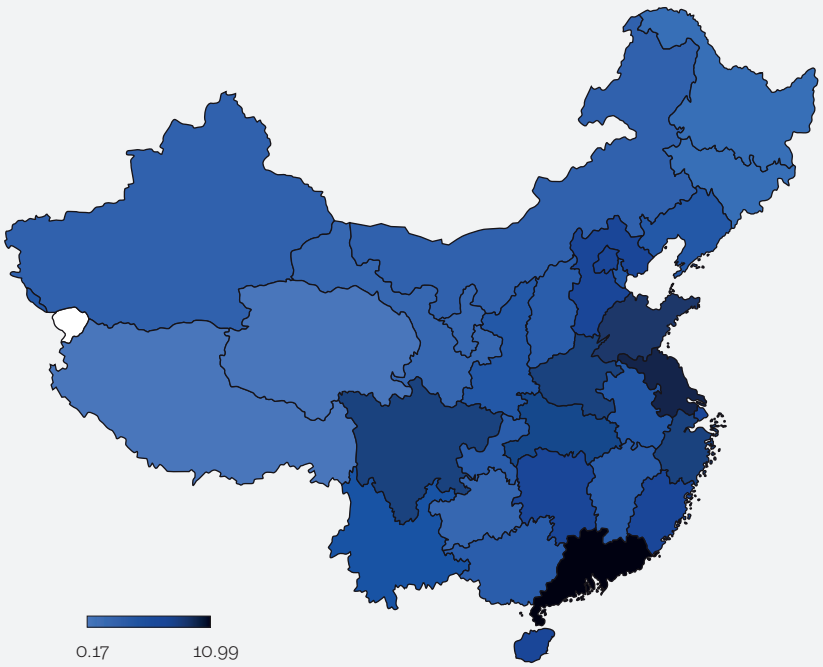
Source: prepared by PEI.

Sources of growth

With the exception of the Northeast provinces, these Chinese regions grew at a rapid pace of over 5% a year during the period being considered. In the Centre and West, economic growth was slightly higher than in the East. The high growth in these regions, which 2000-2010 exceeded as much as 15% per year, resulted mainly from the low base effect (there are still provinces in the West that, despite rapid development, still did not exceed 1% of Chinese GDP in 2020), but also from increasing production capacity and significant investments in provinces with rich deposits of raw materials (NBS, 2021). The East, which benefited first from the economic opening of the PRC in 1979, still account for more than half of China's GDP, although they are home to just over a third of the Chinese population (Map 14). In terms of GDP, they would constitute the world's third-largest economy, after the US and the EU.

↘ Map 15. Provinces' share in China's GDP (as a percentage)

In 2020, the eastern provinces had the largest share in Chinese GDP (as a percentage)



Source: prepared by PEI based on NBS.

With China's accession to the World Trade Organization in 2001, the volume of FDI in the PRC grew significantly; in 2000-2008 alone, its value increased four-fold (Macrotrends, 2021). The central and western regions, where labour-intensive

industries were located, benefited from this. In 2005-2015, the share of industry in gross value added (GVA) increased by an average of 10 pp in the Centre and 8 pp in the West (Moodys, 2019). Greater increases were recorded in central provinces directly adjacent to the coastal provinces – that is, Henan and Anhui. In the West, despite being far from the eastern ports, the greatest beneficiaries of the relocation of production were Sichuan and Chongqing, in which the share of advanced technologies as a percentage of the province's GDP significantly increased. Through the transformation of the resources created during the previous industrialisation (mainly the rich base of heavy and light industry), as well as a rapid reaction to the economic transition after 1978, they were able to build a competitive advantage compared to other provinces in the interior. The combination of an industrial base and a relatively well-educated workforce has proved attractive to local and global producers seeking to reduce production costs. The two provinces located side by side in the West have turned into modern production hubs, their importance further strengthened by the opening of the transcontinental railway linking China and Europe (Box 2).

↘ Chart 23. **GDP growth in selected regions in China in 2000-2020 (as a percentage)**

In 2006-2018, the West and Centre developed more rapidly than other regions

Source: prepared by PEI based on NBS.

↘ Box 1. The problem with Chinese data

The data presented by the Chinese National Bureau of Statistics (NBS) should be treated with great caution; as an approximation, rather than a faithful reflection of the economic situation in the PRC. Local decision-makers are assessed based on the achievement of targets concerning growth, employment or the implementation of environmental and climate policy, which is why they are inclined to overestimate the indicators that describe them. At the same time, a significant proportion of public investment – especially in 2010-2020 – is unproductive and its main goal is to achieve previously-set growth targets (Pettis, 2020). It is true that data from local statistical is are transferred to the NBS, which is responsible for aggregating and correcting them. Yet due to the low transparency of the NBS, it is impossible to indicate which data is false ("Tygodnik PIE", 2020). For example, in 2015, the NBS announced that Chinese GDP amounted to USD 10.4 trillion, 7% lower than the sum of the provincial estimates.

For this reason, a number of alternative indicators (in particular, in terms of measuring GDP) have been created, which aim to better reflect the changes taking place in the Chinese economy. The author of one of them is Chinese Prime Minister Li Keqiang who, in 2007, when he was still managing the Liaoning province, told the US ambassador that a better measure of economic activity in China is an index made up of three indicators: loans issued by banks, the volume of freight rail transport, and electricity consumption. This indicator was popularised by *The Economist*, but the growing share of services in the Chinese economy means that its value is decreasing (Cai, 2016).

The Brookings Institution, the American think-tank, also measures economic activity in the PRC. For this, it primarily uses data on industrial production and retail, which is easier to verify (Owyang, Shell, 2017). BIS experts decided to use provincial data, which they aggregate themselves to estimate Chinese GDP. This enables them to create an alternative growth rate that points to greater fluctuations in GDP than in the official NBS data (Kerola, Mojon, 2021).

The alternative methods of measuring Chinese GDP indicated above suggest that its official value is overestimated. This is especially visible during periods of external economic slowdown. Despite economic downturns, official data show that Chinese GDP fluctuates very little and usually (at the central and regional level) is in line with the goals formulated by political decision-makers. The alternative data points to greater fluctuation and lower resistance to external and internal shocks.

The provinces located in the interior also benefited from the growing demand for raw materials. In the central ones, responsible for most of domestic cereal and livestock production, there has been significant investment in the mechanisation of production, which has increased the sector's efficiency. Meanwhile, the western regions have benefited from rising commodity prices. The nearly threefold increase in world oil prices in 2005-2014 and the sharp increase in the price of natural gas (Macrotrends, 2021) translated into rapid economic growth in regions dich in commodities such as Gansu, Qinghai and Xinjiang. At the same time, the constantly-growing demand for microprocessors and lithium-ion batteries has led to an increase in demand for rare earth metals and, consequently, an increase in their prices. This has resulted in double-digit economic growth in Inner Mongolia, where these natural resources are plentiful.

A different driver of growth was developed by the eastern provinces, which increasingly base their development on high-value-added tech products (Wang, Zhang, Xie, 2020). They are concentrated in the provinces of Zhejiang and Guangdong and the cities of Beijing, Hangzhou and Shanghai. As labour productivity grew, Chinese workers' wages soared. Greater purchasing power translated into increasing opportunities to consume, largely provided by emerging e-commerce companies or digital social and entertainment platforms. Chinese tech producers moved up the value chain and companies focused on meeting the needs of Chinese consumers gained export capacity over time. As a result, companies such as Huawei, Oppo and Xiaomi have become global enterprises and tech accounts for a growing share of the eastern provinces' GDP (Chen, Lin, Zou, 2020).

Compared to these regions, growth was lowest in the Northeast. In 2014-2016, it even experienced economic stagnation. The north-eastern provinces were among the first to be developed in terms of infrastructure and industrialised, largely thanks to their abundant coal and iron deposits. This made the development of the region dependent on heavy industry: metallurgy and machinery. With the decline in global demand and the introduction of US duties on steel and aluminium in 2018, a sharp decline in GDP growth can be observed in these provinces (Chart 23). Despite declining profits from heavy industry, there has been little reorientation towards sectors with higher value added. Dependence on state financing is keeping heavy industry alive, but low levels of human capital, relatively high wages (a legacy of the industrialization era), a declining population of working age, and low spending on R&D are resulting in a lack of new investments and an outflow of old ones. For example, the electromechanical and automotive sectors are moving to central and western provinces (inc. Hunan and Sichuan), which are characterised by increasing technological advancement and lower labour costs (Statista, 2021).

The data shows that the COVID-19 pandemic, which hit the PRC first, has not changed previous trends in regional development. After the collapse in the first quarter of 2020, economic activity quickly returned to its earlier levels throughout China. Both in 2018-2019 and in 2020, the western provinces developed the fastest, followed by the eastern ones. In these years, their growth's deviation from the national average also remained at a similar level. During the crisis year, too, the eastern region experienced steady GDP, and the West and Centre limited and uneven growth. However, it is too early to fully assess the pandemic's impact on differences between regions. The different nature of the shock means that a full assessment of the impact of COVID-19 will only be possible some time after the pandemic.

Exports

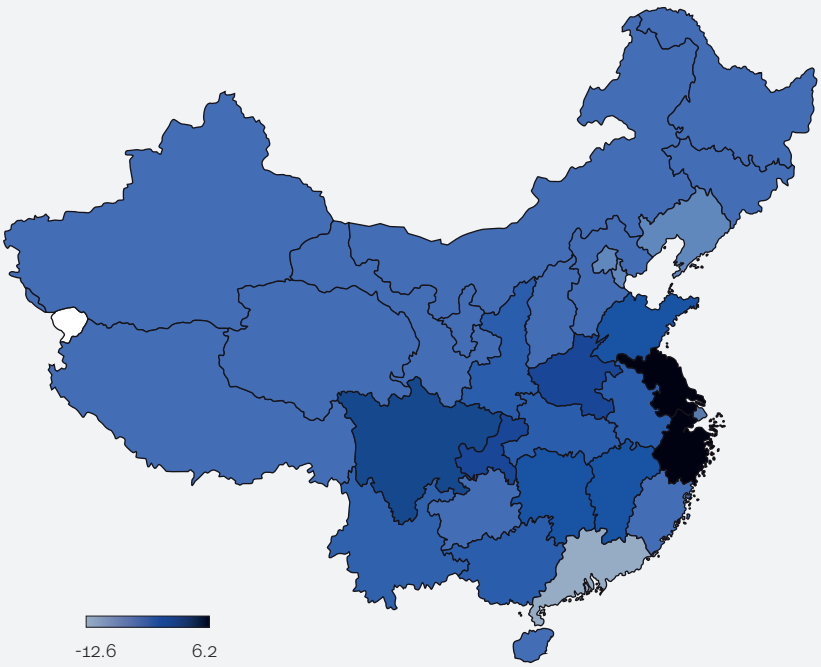
China's growth model to date has been largely based on exports. China recorded an over tenfold nominal increase in the value of exports in 2000-2020 (NBS, 2021). In 2000, it corresponded to around 21% of China's GDP, but after the country joined the WTO, this share began to increase suddenly, reaching its peak in 2006, when exports accounted for as much as 36% of GDP (World Bank, 2021a). With economic development and the internal market's increasing share in the economic structure, it decreased to around 18.5% in 2020.

Chinese exports are still largely concentrated in the eastern provinces. In 2000, as much as 88% their value came from this region. Nearly half of that came from one province, Guangdong. Over the past twenty years,

this trend has reversed slightly. The East still attracts three-quarts of FDI in China (NBS, 2021) and its share in the value of exports has decreased by just 5.5 pp, to 82.5%. Guangdong remains in first place; despite its share dropping by 12.6 pp, it still accounts for 24.3% Chinese export in terms of value. At the same time, the share of other eastern provinces, such as Jiangsu and Zhejiang, which have benefited from their advantageous geographic location and proximity to largest ports, has increased significantly (by around 6 pp). There were no increases of a similar scale in the Centre or West. The biggest ones took place in Anhui and the already-mentioned Sichuan and Chongqing, where they oscillated around 2 pp. At the same time, the share of all three north-eastern provinces in exports decreased, which shows how they have regressed in economic terms in recent years.

↘ Map 16. **Increase in a province's share in Chinese exports in 2000-2020 (in percentage points)**

The share of exports grew the most in the eastern provinces



Source: prepared by PEI based on NBS.

Demographics

China's economic growth is increasingly affected by the limited labour supply. This stems from the low and steadily-declining fertility rate, which fell from 2.7 in 1989 to 1.7 in 2019 (World Bank, 2021b), as well as the lack of migration to the PRC from abroad. As a result, population growth slowed down from 1.6% in 1986 to 0.3% in 2019 (World Bank, 2021c). Fewer new employees are entering the Chinese labour market than earlier, which translates into dwindling resources in the Chinese economy. Official data show that, in 2009-2019, the number of employees decreased by 5 million (NBS, 2021). This phenomenon applies to all the regions, but the scale of the problem differs.

The Northeast was the first region to be industrialized and concentrated into urban centres. It experienced a faster decline in the birth rate in the 1980s and 1990s and a slower increase in its working-age population, compared to other Chinese regions. Emigration to the faster-growing eastern regions reduced the labour force even further. In 2010-2019, the employment rate in this region decreased by around 2.5 pp, while, at the national level, it increased by 0.3 pp (NBS, 2021).

Throughout the 2000s, the West and the Centre suffered as a result of the outflow of labour from their territories to the East. After 2010, this slowed down and a slight increase in employment was recorded mainly in the central regions (by around 0.8 pp). This resulted from the return of workers of working age, among other things. However, the pace of this growth is not high enough to counterbalance negative demographic factors. The rapid aging of the population in the central and western provinces means that, if the current trends continue, the workforce will shrink, which can only increase the importance of optimising the use of the resources available.

The eastern provinces were in the best situation in terms of the labour market. They were characterized by a steadily increasing demand for labour, which was largely met by workers from the rest of the country. In 2000-2010, the employment rate there grew by 2% a year on average. In the next decade, it decelerated significantly, dropping to zero in 2015-2019. The Chinese economy, and the eastern region in particular, faces a structural contradiction resulting from a shortage of skilled workers, coupled with high and growing youth unemployment. Businesses in coastal regions are reporting difficulties in recruiting new employees, even though the unemployment rate for 16-24 year-olds is more than three times the national average of 5.1% in 2021 (Bloomberg, 2021). This reflects the growing problem of matching the skills of people entering the labour market with employers' requirements.

Productivity

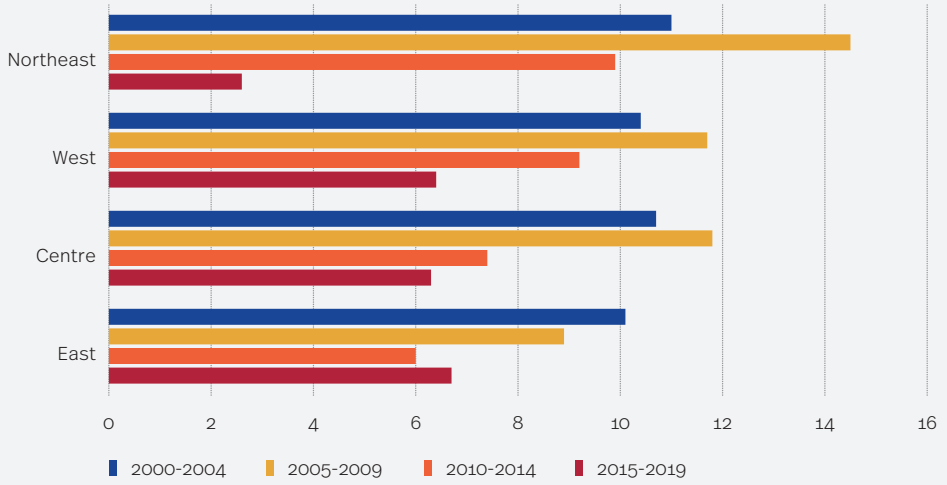
Over the two decades analysed, increases in labour use and productivity have gone hand in hand. The former stemmed from the migration of Chinese labour to cities (World Bank, 2021d), where people were employed in more efficient workplaces. However, demographic changes led to an almost complete slowdown in employment growth, which fell from 0.7% in 2000-2005 to less than 0.2% in 2015-2019. With declining opportunities to use manpower, productivity gains will be needed to sustain economic growth.

In 2000-2014, the West, Centre and Northeast were characterised by a higher rate of growth in labour productivity than the East (NBS, 2021). However, this trend was quickly reversed, with the coastal provinces again showing the greatest productivity gains in 2015-2019. Due to the unfavourable demographic trends throughout the PRC, the East's comparative advantage, which consists mainly

of technologically advanced enterprises and foreign investment, could increase. In 2019, despite the closing of the gap in 2000-2015, the East's advantage was nearly 40% compared to the Centre and West, and over 20% compared to the Northeast.

↘ Chart 24. **Increase in productivity in 2000-2019 (as a percentage)**

The dynamics of productivity growth slowed down after 2010

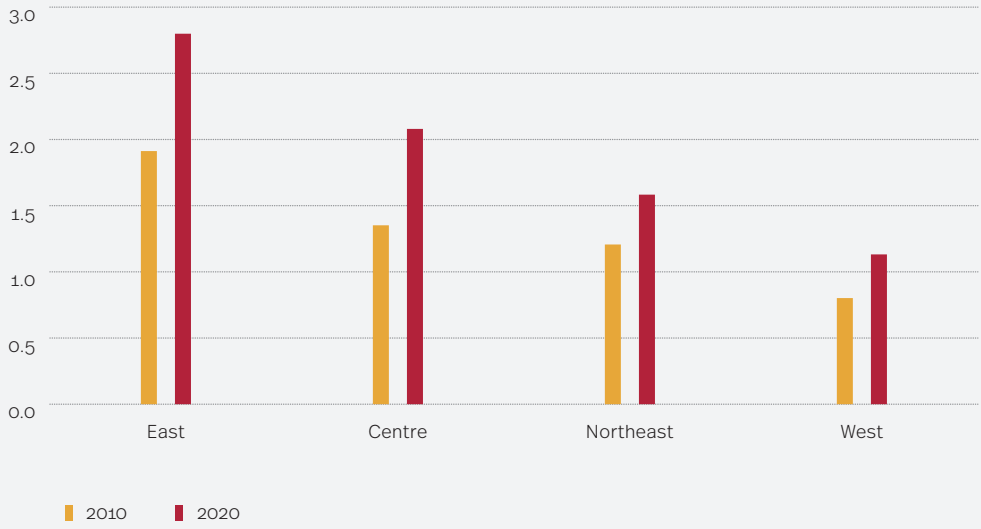


Source: prepared by PEI based on: NBS (2021); Moodys (2019).

Another advantage of the eastern provinces is the higher level of education and spending on R&D there. This results in the high concentration of innovation in the East: in 2019, three-quarters of all approved patent applications came from the coastal provinces (NBS, 2021). They also spent much more on R&D than other Chinese regions; in 2020, the average in the East was 2.9% of GDP. Since 2010, it has increased by 46%, the second-largest increase among all the regions. Individual highly-developed urban centres, primarily Beijing and Shanghai, significantly inflated these statistics; spending there amounted to 6.44 and 4.17%, respectively. The second centre in this ranking, where spending amounted to 2.1%, was below the Chinese average of 2.4%. However, it recorded the largest increase in spending in relation to 2010 (by 54%). The West is still the last; however, much faster growth than in the Northeast means that it could overtake it in coming decades. More and more of the western and central provinces are approaching the national average (Shaanxi, Hubei and Anhui), which is evidence of the rapid technological development of individual areas close to the coastal region.

↘ Chart 25. Spending on R&D (as a percentage PKB)

The eastern provinces spend the most on R&D (as a percentage of GDP)



Source: prepared by PEI based on: NBS (2011; 2020).

The Eastern provinces, which in terms of real GDP per capita are already equal to the countries of Central and Eastern Europe, encounter dilemmas faced by developed economies. How can they use the productivity growth resulting from the development of technologically-advanced sectors (biotechnology, AI, robotics, information technologies) to support other industries and transfer it outside the biggest cities (including Shanghai, Beijing, Hangzhou and Guangzhou)? The rapid development of tech giants (such as Alibaba, Baidu or Tencent) supports the SME ecosystem, but the share of technology in the gross value added of the eastern provinces is still low compared to the US or the most developed countries in the EU. These companies are concentrated in the biggest cities, and the remainder of Chinese provinces remain dependent on less advanced industrial production, where wages – despite significant increases in recent years – remain well below the average for developed countries (IMF, 2018). This is a constraint for Chinese tech enterprises, as limited consumption opportunities affect their performance and foreign expansion is increasingly hampered by political conditions (Gorman, 2020).

The growth engines that have driven China's growth so far seem to be depleted. Return on Assets (RoA) and Incremental Capital-Output Ratio (ICOR) have deteriorated in all the provinces over the past decade. RoA has decreased by half and ICOR has increased from 4.2 to 8.3 (the higher the value, the lower the productivity of capital) over the twenty years analysed (Orsmond, 2019), and threefold in the West and Centre. This suggests that the gains of urbanization and the accumulation of physical capital to date

have been discounted. The significant increase in ICOR points to the diminishing returns on fixed investments. More capital is required to produce each additional unit of production. Over the last decade, Chinese regions have struggled with the productive absorption of new investments (Pettis, 2020). This is primarily a problem for the western and central provinces, as it may raise questions about convergence with coastal areas based on the current model.

↘ Box 2. The belt and trail initiative – opportunities for China's Centre and West?

In 2013, Chinese President Xi Jinping announced the Belt and Road Initiative (BRI). One of its goals was to support the development of the western and central regions through the implementation of railway projects connecting China with Central Asia and Europe. They were supposed to lead to the rapid development of production, transport and logistics, and, as a result, increase exports and the development of the areas indicated (BCI Global, 2020).

In 2013, the first transcontinental YuXinOu freight line opened, connecting Chongqing to Duisburg. This made it possible to halve the transport time compared to the previous overland and sea routes. Although exports from the Centre and West still account for a small share of Chinese exports, it has more than quadrupled since the opening of the line (OECD, 2019).

Railway projects developed as part of the BRI increase the global connectivity of the Chinese interior, but this does not have to translate into economic convergence with the eastern provinces. Although two of the three main trade routes pass through the western and central provinces, the benefits so far have been focused on two provinces: Sichuan and Chongqing. Most of the loads transported to Europe by train come from China's eastern regions (Moodys, 2019).

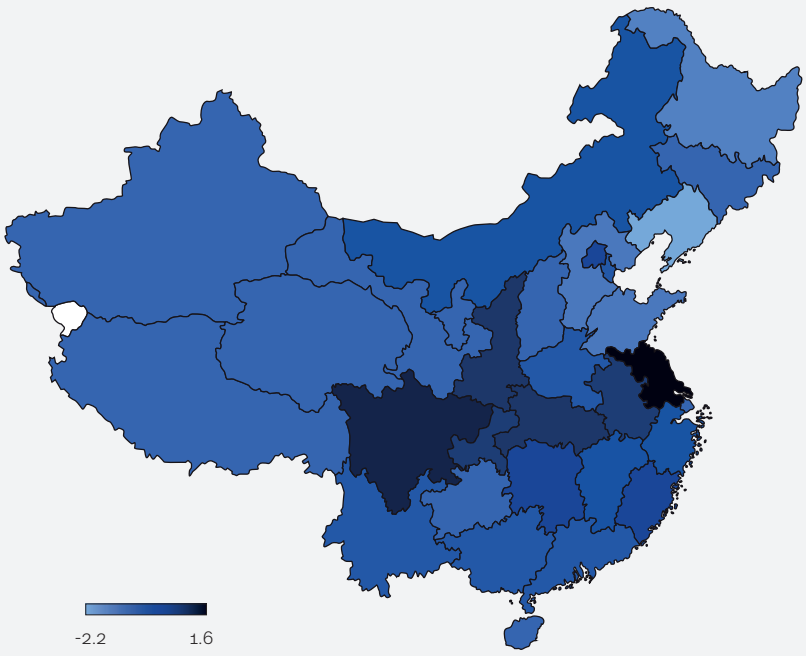
Despite declining profitability, investment levels have continued to rise across China. In the East, they have focused on building housing, while in the Centre and West, larger amounts of funds (with a significant share of public ones) have been spent on infrastructure. After 2010, the average increase in factor productivity (TFP) remained at a low level of 0.8%. It slowed down from 2.7% the previous decade, which points to the decreasing absorption of capital in the economy (Brandt et al., 2020). At the same time, Chinese domestic debt grew rapidly; it cumulative value doubled over twenty years and hovered around 280% of GDP at the end of 2019 (IMF, 2021). This resulted in the tightening of credit standards, which will affect investment decisions, constituting an additional obstacle for the western and central provinces when it comes to economic convergence. Their situation has also been aggravated by intense competition from Southeast Asian countries with lower labour costs and improved infrastructure. The increasingly Chinese authorities' autarchic attitude will also be a challenge.

Conclusions

Although twenty years have gone by, the disproportions between China's provinces have actually widened, with few exceptions. Convergence has taken place internally, within the eastern and, to a lesser extent, central region (Map 17). The eastern coastal provinces still account for around 58% of Chinese GDP, and the slightly increased share of the Centre and West results mainly from the weakening of the Northeast – its share decreased by 1.4 pp. In the interior, individual provinces stand out: Hubei in the Centre and Shaanxi, Sichuan and Guizhou in the West, which were catching up with the East more rapidly.

↘ Map 17. **Increase in provinces' share in China's GDP PPP (in percentage points)**

Over twenty years, the eastern provinces have increased their share in GDP even more (in percentage points)



Source: prepared by PEI based on NBS.

Chinese provinces are characterized by homogeneous sources of growth. In the 2000s, all the regions thrived on productivity gains and urbanization. In contrast, in the 2010s, growth was fuelled by lending, steadily increasing demand for real estate, and government spending. All the regions were affected, except for the two westernmost provinces (Kerola & Mojon, 2021). Until now, only the East and individual provinces in the Centre and West have been able

to develop highly-advanced sectors. This has enabled growth there to become independent of the current economic model, which involves high investments that are becoming less and less productive. In the long run, this predisposes them to greater and more stable growth, which compound inequalities when it comes to development. This is possible, taking into account demographic conditions and the systematic depletion of the current engines of growth.

Prospects

The ten largest regions in the three great powers are almost evenly divided between them. The largest number, four, are in the EU, and the US and China have three each. Germany is first, ahead of France and California. The largest Chinese province, Guangdong, is the fifth-largest region. Poland 13th out of nearly a hundred in the US, China and the EU. It is expected that this ranking will soon be dominated by Chinese provinces.

Chinese provinces are growing rapidly, but the EU member states and US states are still more developed. In terms of the 2019 HDI index, Beijing, China's most-developed province, would overtake the last eight US states in the HDI ranking and would be 11th in the EU. Shanghai would overtake seven EU member states (including Slovakia and Portugal) and the least-developed US state based on to the HDI, Mississippi. The third Chinese province, Tianjin, would be ahead of Romania and Bulgaria. The others would close the ranking of regions based on the HDI. The American states dominate; only Ireland (second) and Germany (eighth) are in the top ten.

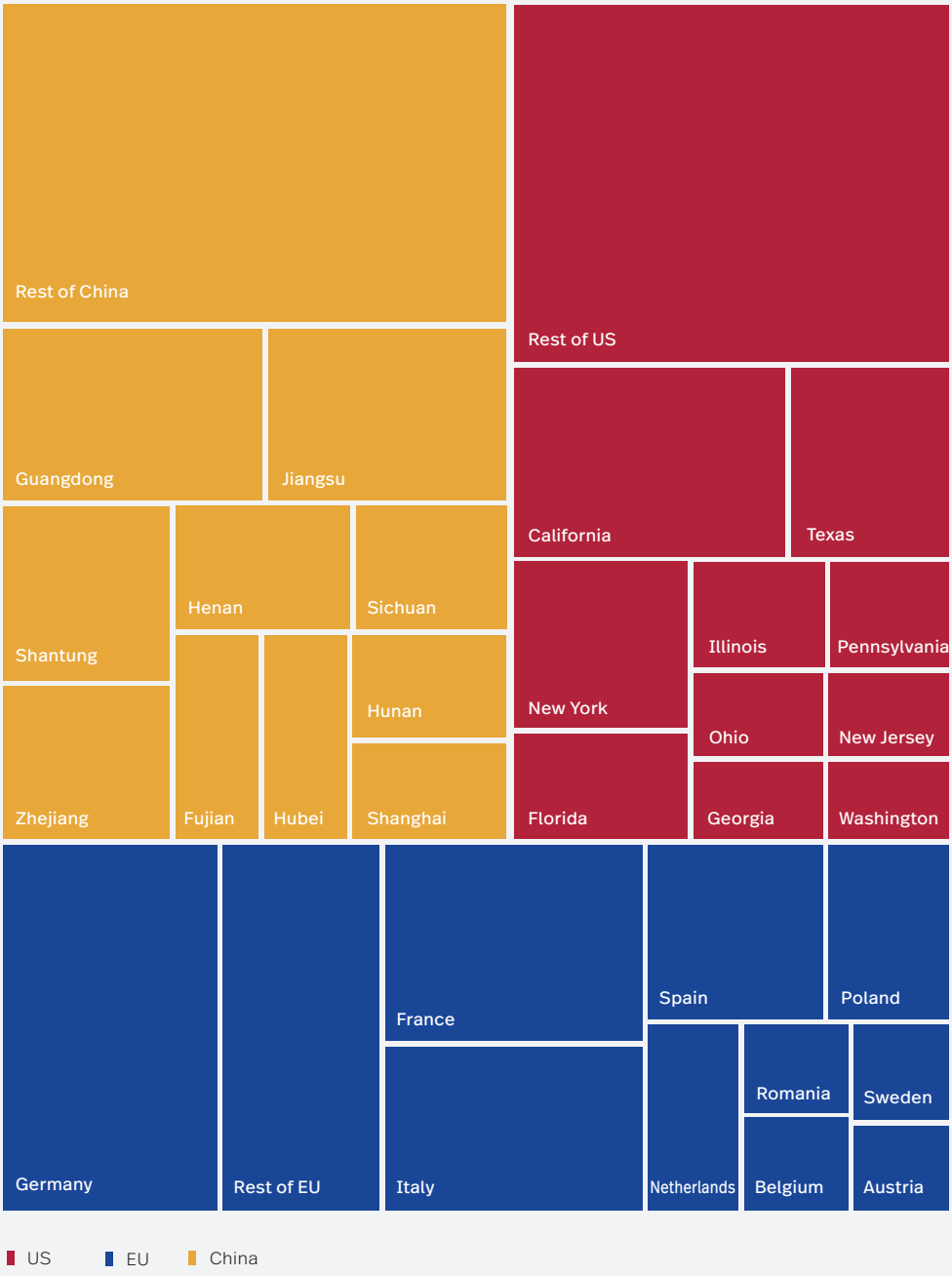
The ranking in terms of GDP *per capita* is almost the same – the absolute dominance of the West, with two exceptions: Beijing, which is ahead of Spain, among other countries, and Shanghai, which is one place ahead of Poland. The income gap in the Chinese provinces is much more visible, and the coefficient of variation is five times higher than in 2020.

The ranking is practically reversed when it focuses on the role of industry in the economy of a given region. The ranking is opened by the provinces where the share of industry in GDP is around 45%: Fujian, Shaanxi and Jiangsu. The top 30 only includes two EU countries: Ireland in 21st place (38%) and the Czech Republic in 28th place (35%). Poland (32%) is in 35th place, ahead of Germany (30%) and just behind the highest-ranking state in the US, Indiana (32%). The next places are distributed between the US and the EU, with the US and small EU countries at the bottom of the ranking.

It turns out that two factors have the greatest impact on the development of regions compared to others: reducing or increasing industrial activity, and the development of tech. Central Europe is becoming a centre of economic growth, with increasing value added in industrial manufacturing. Meanwhile, Southern Europe, the Rust Belt in the US and the Northeast of China are suffering from a decline in the importance of industrial production. The West Coast, especially California, is a region of strong growth driven by tech and services. Similarly, the eastern Chinese provinces first benefited from attracting manufacturing activity, and later successfully got more involved in tech.

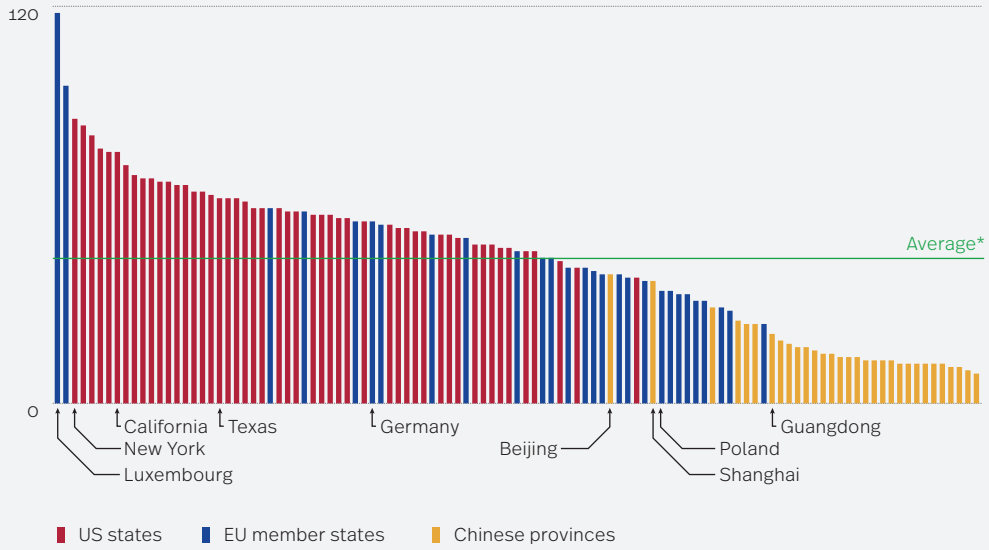
One sign of countries' technological advancement is the development of "unicorns", tech start-ups valued above USD 1 billion. In 2020, as many as 39% (227 out of 586) of them were in China. An even larger number (233) came from the US (Hurun Unicorn Index, 2020). Unicorns from these two great powers accounted for 78% of the global market. Six of the ten largest global unicorns were from China (Ant Group, ByteDance, Didi Chuxing, Lufax, Kuaishou and Cainiao). All of them had their headquarters in the east of China, in three cities: Beijing, Shanghai and Hangzhou. Beijing and Shanghai account for 20% (12% and 8% respectively) of the world's unicorns, which shows these metropolises' technological development and potential for further development.

↘ Chart 26. GDP PPP of the Chinese provinces, US states and EU member states (in billions of USD)



Source: prepared by PEI based on IMF, BEA, NBS.

↘ Image 2. GDP PPP *per capita* of the US states, EU member states and Chinese provinces in 2020 (in thousands of international dollars)



* All EU countries and US states are above the average level of PPP per capita GDP for the regions of the three powers. Only six Chinese provinces have surpassed this level: Beijing, Shanghai, Jiangsu, Fujian, Zhejiang and Tianjin.
Source: prepared by PEI based on IMF, BEA, NBS.

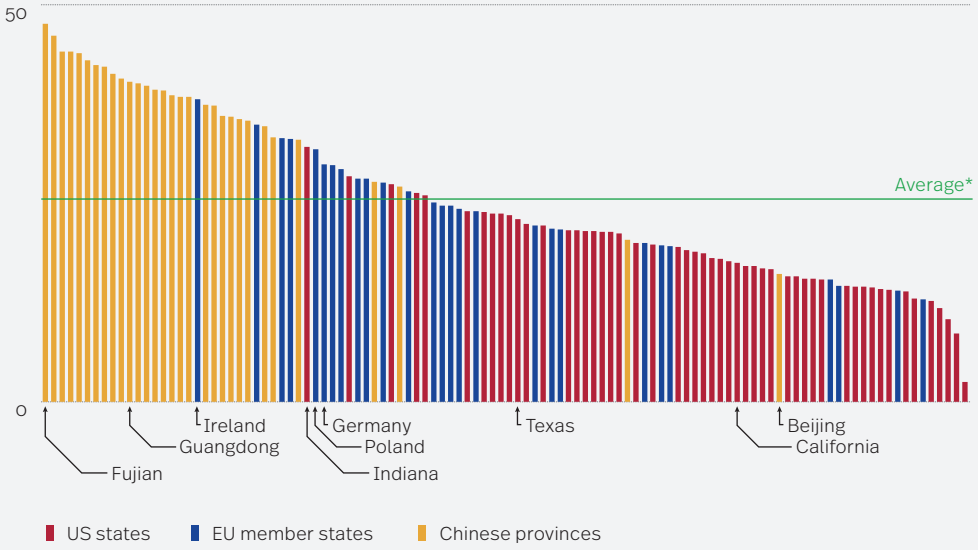
Despite Central Europe's "golden age", it can hardly be called the EU's engine of growth. Ambitious structural changes and investments in machines, modern technologies and ICT will be a precondition for catching up with Northern Europe. Progress in automation and the loss of the advantage of low production costs will put Central Europe's further development into an industrial centre at risk. Another challenge will be to fit into new trends relating to low-carbon development: competition on the electric car market with manufacturers from the US and Asia, the development of low-emission solutions in industry, and ensuring green, stable and cheap sources of energy.

Regions with developed sectors with a high level of technological advancement have the best development prospects. This could increase inequalities within the great powers, especially in the US and China. Southern Europe has the worst rate of growth in the EU, although, individually, the economies of French and Italian are still larger than those of all the countries that have joined the EU since 2004 combined. Convergence in Europe is taking place at their expense, not that of Northern Europe, the richest and most innovative region. Unless this trend reverses, and Central Europe increases its potential in high-tech sectors, inequalities within the EU will also start to increase after a period of increasing cohesion.

Demographic conditions are a challenge. All three economic powers face the problem of negative birth rates, which will put

a strain on their economies. In Europe and the US, the population is growing thanks to immigration, but this is causing social resistance. The pandemic has worsened the problems on the labour market, causing huge labour shortages.

↘ Image 3. **Share of gross value added in industry as a percentage of GDP in a given US state, EU member state or Chinese province**



* In terms of the share of industry in the gross value added of a given region, Chinese provinces ominate - only two, Beijing and Hainan were below the average for all regions of the three powers. In turn 13 EU member states and four EU states were above the average..

Source: prepared by PEI based on IMF, BEA, NBS.

The consensus in the US on the need to contain China's growth indicates that trade and political conflicts will escalate. This new "cold war" will again divide the world into two closely cooperating camps. Russia, which is trying to restore its image as a superpower, will try to take advantage of this competition. It is promoting economic and political integration in the former USSR, developing its military potential and cooperating more closely with China. The Kremlin is likely to continue its revisionist foreign policy, which poses a challenge to the West, and especially to the EU, which is dependent on imports of raw materials from Russia. Meanwhile, Russia will be increasingly threatened by China's policy, which aims to subordinate the former Soviet space and Arctic to its own interests and use them as a base in terms of the supply of raw materials. The EU's continued position as a great power will depend on the coherence of the EU countries' policy towards China and Russia, and ability to overcome development challenges.

China's slowing growth and the mounting economic conflict mean that the tree powers' share in the world economy will begin to decline. So far, China has primarily taken over the positions of the EU and the US in global GDP, but with attempts to remodel China's growth model and curb the increase in debt, as well as declining returns on investment, this trend may slow down. Towards the end of this decade, it is expected that India may start to put pressure on these three powers and reduce their share in the world economy. Despite this, they will still be the most developed centres, not just in terms of GDP, but also in other categories of development. The formation of alliances, networks of cooperation with these centres, and the development prospects of the regions within them depend on cooperation between them or the intensification of competition.

Bibliography

Ash, T.G. (2020), *Europe (including Britain) can still be a superpower*, ECFR, https://ecfr.eu/article/commentary_europe_and_yes_that_includes_britain_can_still_be_a_superpower/ [accessed: 3.10.2021].

BCI Global (2020), *Fast growth of New Silk Rail Routes*: https://bciglobal.com/en/fast-growth-of-new-silk-rail-routes-proves-that-rail-connections-between-china-and-europe-are-a-solid-third-transport-alternative- [accessed: 3.10.2021].

Białowąs, T. (2014), *Inwestycje a wzrost gospodarczy Chin w latach 1980-2012*, https://bazhum.muzhp.pl/media//files/Annales_Universitatis_Mariae_Curie_Sklodowska_Sectio_H_Oeconomia/Annales_Universitatis_Mariae_Curie_Sklodowska_Sectio_H_Oeconomia-r2014-t48-n2/Annales_Universitatis_Mariae_Curie_Sklodowska_Sectio_H_Oeconomia-r2014-t48-n2-s19-29/Annales_Universitatis_Mariae_Curie_Sklodowska_Sectio_H_Oeconomia-r2014-t48-n2-s19-29.pdf [accessed: 3.10.2021].

Bin, P., Chen, X., Fracasso, A., Tomasi, Ch. (2018), *Resource allocation and productivity across provinces in China*, "International Review of Economics & Finance", Vol. 57, https://www.sciencedirect.com/science/article/pii/S1059056018301473 [accessed: 4.10.2021].

Bloomberg (2021), *China targets 55 million jobs in new plan*, https://www.bloomberg.com/news/articles/2021-08-30/china-targets-55-million-jobs-better-worker-rights-in-new-plan [accessed: 3.10.2021].

Brandt, L., Litwack, J., Mileva, E., Wang, L, Zhang, Y., Zhao, L. (2020), *China's Productivity Slowdown and Future Growth Potential*, Policy Research Working Paper; No. 9298, World Bank, Washington, DC, https://openknowledge.worldbank.org/handle/10986/33993 [accessed: 12.10.2021].

BEA (2021), Regional Economic Accounts, https://www.bea.gov/data/economic-accounts/regional [accessed: 10.10.2021].

Busse, C., Loss, R., Puglierin, J., Zerka, P. (2020), *The crisis that made the European Union: European cohesion in the age of covid*, ECFR Policy Brief, https://ecfr.eu/publication/the-crisis-that-made-the-european-union-european-cohesion-in-the-age-of-covid/#european-cohesion-before-covid-19 [accessed: 3.10.2021].

Cai, P. (2016), *The Li Keqiang Index is dead, long live the new Li Keqiang Index*, https://www.lowyinstitute.org/the-interpreter/li-keqiang-index-dead-long-live-new-li-keqiang-index [accessed: 4.10.2021].

Castro, D., McLaughlin, M., Chivot, E. (2019), *Who Is Winning the AI Race: China, the EU or the United States?*, Centre for Data Innovation, https://s3.amazonaws.com/www2.datainnovation.org/2019-china-eu-us-ai.pdf [accessed: 3.10.2021].

Chen, H., Lin, H., Zou, W. (2020), *Research on the Regional Differences and Influencing Factors of the Innovation Efficiency of China's High-Tech Industries: Based on a Shared Inputs Two-Stage Network DEA*, "Sustainability", No. 12.

Cox, M. (2017), *Europe – Still between the Superpowers*, "Global Policy", t. 8, No. S4, https://doi.org/10.1111/1758-5899.12427.

EIS (2021), *European Innovation Scoreboard 2021*, https://ec.europa.eu/docsroom/documents/46013 [accessed: 10.10.2021].

Eurostat (2021), https://ec.europa.eu/eurostat/databrowser/view/tps00001/default/table?lang=en [accessed: 12.10.2021].

Gorman, (2020), https://www.theatlantic.com/ideas/archive/2020/01/5g-where-china-and-west-finally-diverge/604309/ [accessed: 3.10.2021].

Eurostat Regional Yearbook (2021), Publications Office of the European Union, Luxembourg, https://ec.europa.eu/eurostat/documents/3217494/13389103/KS-HA-21%E2%80%91001-EN-N.pdf/1358b0d3-a9fe-2869-53a0-37b59b413ddd?t=1631015640640 [accessed: 20.09.2021].

HDR (2021), *Human Development Reports*, http://hdr.undp.org/en/content/human-development-index-hdi [accessed: 15.10.2021].

Hurun Unicorn Index 2020 (2020), https://www.hurun.net/en-US/Info/Detail?num=E0D67D6B2DB5 [accessed: 3.10.2021].

IMF (2018), *Article IV: People's Republic of China*, https://www.imf.org/en/Publications/CR/Issues/2018/07/25/Peoples-Republic-of-China-2018-Article-IV-Consultation-Press-Release-Staff-Report-Staff-46121 [accessed: 3.10.2021].

IMF (2021), *Global Debt Database*, https://www.imf.org/external/datamapper/datasets/GDD [accessed: 19.10.2021].

Joshua, J. (2015), *The Contribution of Human Capital towards Economic Growth in China*, Palgrave Macmillan, London.

Kerola, E., Mojon, B. (2021), *What 31 provinces reveal about growth in China*, BIS Working Papers 925, Bank for International Settlements, https://www.bis.org/publ/work925.pdf [accessed: 3.10.2021].

Kuznetsov, A. (2015), *Theory and Practice of Paradiplomacy*, Routledge, Abingdon-on-Thames.

Liao, F.H., Wei, Y. (2016), *Regional Inequality in China: Trends, Scales and Mechanisms*, Working Paper Series, No. 202, Rimisp, Santiago, Chile, https://www.rimisp.org/wp-content/files_mf/1473279216202_FH_Liao_YD_Wei.pdf [accessed: 13.10.2021].

Macrotrends (2021), *Crude Oil Price History*, https://www.macrotrends.net/1369/crude-oil-price-history-chart [accessed: 13.10.2021].

Moravcsik, A. (2017), *Europe Is Still a Superpower. And it's going to remain one for decades to come*, "Foreign Policy", https://foreignpolicy.com/2017/04/13/europe-is-still-a-superpower/ [accessed: 5.10.2021].

Moodys (2019), *China's Provincial Economies: Growing Together or Pulling Apart?*, https://www.moodysanalytics.com/-/media/article/2019/china-provincial-economies.pdf [accessed: 9.10.2021].

NBS (2011), *Communiqué on National Expenditures on Science and Technology in 2010*, http://www.stats.gov.cn/english/NewsEvents/201110/t20111010_26508.html [accessed: 26.09.2021].

NBS (2020), *Communiqué on National Expenditures on Science and Technology in 2020*, http://www.stats.gov.cn/english/PressRelease/202109/t20210923_1822410.html [accessed: 28.09.2021].

NBS (2021), https://data.stats.gov.cn/english/easyquery.htm?cn=E0103 [accessed: 22.09.2021].

NSF (2021), *National Patterns of R&D Resources: 2018-19 Data Update*, https://ncses.nsf.gov/pubs/nsf21325 [accessed: 10.10.2021].

OECD (2019), *OECD Economic Surveys: China 2019*, https://doi.org/10.1787/eco_surveys-chn-2019-en [accessed: 2.10.2021].

Orsmond (2019), *China's Economic Choices*, https://www.lowyinstitute.org/publications/china-s-economic-choices [accessed: 4.10.2021].

Owyang, M., Shell, H. (2017), *China's Economic Data: An Accurate Reflection, or Just Smoke and Mirrors?*, "The Regional Economist", Vol. 25, Iss. 2, No. 6-12.

Pettis, M. (2020), *China's Economy Needs Institutional Reform Rather Than Additional Capital Deepening*, https://carnegieendowment.org/chinafinancialmarkets/82362 [accessed: 18.10.2021].

Piątkowski, M. (2019), *Europejski lider wzrostu. Polska droga od ekonomicznych peryferii do gospodarki sukcesu*, Poltext, Warszawa.

Statista (2021), *Car Production in China by Province*, https://www.statista.com/statistics/279241/car-production-in-china-by-province/ [accessed: 8.10.2021].

Taube, M., Ogutcu, M. (2002), *Main issues on foreign investment in China's regional development: prospects and policy challenges*, https://www.oecd.org/investment/investmentfordevelopment/1939560.pdf [accessed: 5.10.2021].

Trading Economics (2021), *FDI's in China*, https://tradingeconomics.com/china/foreign-direct-investment [accessed: 2.10.2021].

"Tygodnik PIE" (2020), *Czy chińska gospodarka naprawdę urośnie w 2020 r.?*, https://pie.net.pl/wp-content/uploads/2020/11/Tygodnik-Gospodarczy-PIE_47-2020.pdf [accessed: 4.10.2021].

USA Trade Online (2021), https://usatrade.census.gov/ [accessed: 4.10.2021].

Wang, L., Zhang, B., Xie, R. (2020), *The drivers of export value-added in China's provinces: a multi-regional input–output model*, "Applied Economics", No. 52.

World Bank (2021a), *Exports of goods and services (% of GDP) – China*, https://data.worldbank.org/indicator/NE.EXP.GNFS.ZS?end=2020&locations=CN&start=2000 [accessed: 4.10.2021].

World Bank (2021b), *Fertility rate in China – total*, https://data.worldbank.org/indicator/SP.DYN.TFRT.IN [accessed: 4.10.2021].

World Bank (2021c), *Population growth in China (annual %)*, https://data.worldbank.org/indicator/SP.POP.GROW?locations=CN [accessed: 4.10.2021].

Xiea, Y., Zhou, X., 2014, *Income inequality in today's China*, https://www.researchgate.net/publication/261956580_Income_inequality_in_today%27s_China [accessed: 15.10.2021].

(www1) *The Long View How will the global economic order change by 2050?*, PwC 2017, https://www.pwc.com/gx/en/world-2050/assets/pwc-the-world-in-2050-full-report-feb-2017.pdf [accessed: 10.09.2021].

(www2) https://www.rp.pl/opinie-ekonomiczne/art124141-leon-podkaminer-nie-mamy-szans-na-dognanie-niemiec [accessed: 10.09.2021].

List of maps, images, charts and boxes

LIST OF MAPS

LIST OF IMAGES

LIST OF CHARTS

LIST OF BOXES

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