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30 years after the Berlin Wall Fall: are regional economic inequalities still based on the West-East divide in Germany?

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To my lovely mother and grandmother,
for all the sacrifices they made for me

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Introduction

In this work, we aim to provide an analysis of regional differences within Germany, mainly questioning whether – after 30 years of the demise of Berlin Wall – an economic gap between the western and eastern country is still visible.

After many years of being labeled as "the Sick man of Europe", Germany has established itself as a real economic power in Europe in the last years. Today the country is the largest market in Europe with the highest GDP and it stands out for its stable macroeconomic standpoint, its low rate of unemployment and its high volumes of export, which mainly rely on the strength of its innovative industry.

However, these positive national economic results have not been achieved evenly by the German Länder. Focusing on economic parameters related to productivity, labour market and innovation power, we will shed light on the distribution of regional inequalities across Germany, since they could constitute not only a threat to the economic progress but also a social problem that leads to the disenchantment with the political order and to antidemocratic and xenophobic attitudes. This investigation will be conducted mainly by making use of economic indicators collected at the level of NUTS 2 regions (nomenclature of territorial units for statistics in the EU) in Germany, since they are the ones considered for the application of regional policies.

Scholars agree that, in spite of the undeniable economic progress made in Eastern Germany, the establishment of equal living conditions throughout the federal territory – proclaimed after the collapse of Berlin Wall – has not been reached yet. Thus, we will try to give possible explanations for the regional imbalances between west and east Germany, in particular pinpointing not only the weaknesses but also the potential of eastern regions. Evidence suggests that East Germany suffers not only from the legacy of the past GDR's planned economy and from the loss of human capital due to outmigration flows towards

the west, but also from the lack of large companies and the fragmented corporate structures. Consequently, a high dependence on transfer from Federal Government is detected. However, renowned and cutting-edge economic clusters have been established lately in the east, which collaborate with excellent universities and research institutions in order to foster flows of information and diffusion of innovations. In addition to this, the promotion of cities should be considered as a potential key of further development for eastern regions too.

Nevertheless, recent research suggests that different economic development does not always follow the previous inner-German border (west-east divide). Indeed, regional variances emerge today also between the south and the north or between the cities and the countryside.

Germany: Economic Country's Profile

1.1 Brief historical background of the country: from the years after second World War until today

After the crushing defeat in the Second World War, Germany was divided into two separated national entities throughout the Cold War: The Federal Republic of Germany *(Bundesrepublik Deutschland, BRD)* on the West part and the German Democratic Republic *(Deutsche Demokratische Republik, DDR)* on the East side. While the latter was fully subjected to the logics and rigidity of the Soviet Union, West Germany, derived from the unification of the English, French and American domains, set its foreign policy on an interesting double track. On the one hand, its foreign policy was characterized by a strong Europeanism, main driver of the future European integration, and on the other hand was based on the solid relationship with the United States. Traces of sincere Europeanism from the BRD could be found also in the years prior to the country's division when it supported the creation of the European coal and steel community (1951) as well as the unfortunate "European defense community"[1] project in 1952 *(Atlante Geopolitico Treccani, 2018)*.

The 3rd October 1990 represents a crucial date in the German national history: the two Germanies came into being one single country. Consequently, the five ex-DDR Länder and Berlin were annexed to the Federal Republic of Germany and the foreign policy of the country experienced some changes. While the relations within the Atlantic alliance remained stable as well as the strong European orientation, the collapse of Soviet Union gave

[1] The project failed but represented an attempt to reconcile the rearmament of western Germany, necessary to face a possible military confrontation with the Soviet bloc, also guaranteeing the protection of the countries that had been victims of Nazi aggression during the war.

the possibility to Germany of establishing a connection with the Russian Federation. This relation was mainly powered by some common interests, especially in terms of energy supplies. In addition to that, Germany was aiming for a peaceful relation with Russian federation due to its proximity to oriental European countries, which were strongly connected to Russia *(Atlante Geopolitico Treccani, 2018)*. According to Rusconi *(2003)*, the period after the Berlin Wall fall (9th November 1989) was characterized by big uncertainties, indeterminacies, and involutions with an unpredictable outcome for the country: if today has become commonplace to associate the Berlin Wall fall to the end of the Cold War, to the actual conclusion of the Second World War and to the beginning of a new era, at that time the Germans did not perceive the same. However, after almost 30 years, we can surely state now that the Wall fall marked a "before" and "after" not only for German history but also for Europe and the whole World. Indeed, we should keep in mind that a border establishes an order which is not only of spatial nature, but also of a temporal nature, in the sense that it not only separates an "on this side" and a "beyond", but also a "before" and an "after" *(Elena Dell'Agnese and Enrico Squarcina, 2004)*.

During the nineties, the role of Germany was particularly decisive in the process of European integration. The country has in fact supported the birth of the European single currency, renouncing the mark, the strongest currency in Europe, also with the intent of dissolving the apprehensions of the main European chancelleries towards the German reunification process. In addition to that, Germany supported the enlargement of the European Union to the countries of central and eastern Europe, which are geographically close and with which it has important economic relations *(Atlante Geopolitico Treccani, 2018)*.

After the outbreak of the global economic crisis, Germany has been at the center of controversy and, in some cases, of strong tensions especially with some European partners. According to Bolaffi *(2013)*, Germany – deceived of having made peace with herself and with the world after a century's quarter from the Berlin Wall Fall – returned to the dock,

accused of wanting to impose her idea of economy and her model of society on the whole Europe. In short, Germany has been criticized for adopting austerity measures that provided financial aid to countries in difficulty only in exchange for clear progress on budgetary discipline and radical structural reforms *(Atlante Geopolitico Treccani, 2018)*.

Given the economic asymmetry that exists between the German Federal Republic and other European countries, Germany has been seen from other States with a mixture of hostility and envy in the last years: hostility because of the abovementioned fiscal impositions, envy due to the successes of its economy in contrast with those Eurozone countries struggling against slow economic growth and development *(Bolaffi, 2013)*.

1.2 Economic overview: from being the "Sick man of Europe" to the European locomotive

Germany has remained a divided country for almost 40 years and this separation was clearly visible not only from a political point of view but also from an economic one. If the federal Republic of Germany was a successful capitalist economy with a developed welfare state, East Germany was a socialist planned economy with relatively low income and productivity levels and strongly dependent on other socialist countries. After the fall of Berlin Wall, the East German economy collapsed due to an overvalued exchange rate when it adopted West Germany's deutschmark (DM), a rapid rise in wages beyond productivity and the disruption of traditional trade flows. As a result, West Germany had to finance about half of the consumption in East Germany – about 75/100 billion euros a year or 8 per cent of GDP – through transfer payments *(Dauderstädt, 2012)*. According to Carlo Bastasin (2013), the cumulative total net financial transfers from the west reached 700 billion euro between 1990 and 2000. Moreover, the German public debt has increased considerably from 41.5 percent of GDP in 1991 to 61.5 percent in 1997.

From 1998 to 2005 Germany has experienced a period of slow growth and has registered an alarming unemployment's increase (according to Word bank data, unemployment rate has grown from 9.2% in 1998 to 11.1% in 2005). Taken into account this gloomy scenario, Germany was widely regarded and perceived as the "Sick man of Europe"[2] in the late 1990s into the early 2000s. According to Dauderstädt, these perceptions were considerably evident within Germany since domestic demand — in particular investment, but also private consumption — stagnated in these years and net exports were the most important driver of growth.

Since 2005, Germany recovered from its economic sluggishness and per capita production tended to grow as much as the average of other G7 countries. Often cited reasons behind the rebirth of German economy have been not only the labor market reforms of 2003 to 2005 but also the resurgence of the export market *(Halle Institute for economic research)*. Indeed, a large body of literature[3] has investigated the effects of the aforementioned labor market reforms — widely known as "Hartz reforms" — and has proved empirically positive effects on the country's economy. Niklas Engbom, Enrica Detragiache, and Faezeh Raei *(IMF Working Paper, 2015)* described the Hartz reform package as a series of regulations designed, in a first step, to improve job search efficiency and employment flexibility and later to decrease the size as well as the duration of unemployment benefits. Also Dauderstädt *(2012)* cited these labor reforms as a trigger for the German economy's turnaround occurred in 2005: even if, in the short term, higher growth and lower unemployment – desired effect of the reforms – were not reported, export surplus and German price competitiveness registered a considerable increase which eventually led to a slow decline in unemployment.

[2] This epithet was coined by the weekly magazine "Economist" in year 2004. However, its origins are much older and date back to comments by Czar Nicholas I of Russia about the troubles faced by the Ottoman Empire in the mid-19th century.

[3] In particular, we refer to the studies of Krause and Uhlig (2012), Krebs and Scheffel (2013), and Launov and Waelde (2013).

However, not all the researchers have agreed on the actual efficiency of the Hartz reform package. For instance, Dustmann et al. *(2014)* offered another view on the German labor market success supporting that the threat of off-shoring jobs to central and eastern European countries in the early 1990s together with the decentralized nature of employer-union negotiations allowed German firms to successfully push for limited wage growth, thus increasing competitiveness.

As mentioned before, also the gradual strong internationalization of Germany – set in at the end of the nineties – has strengthened its economy. More opportunities arose, from both the supply and the demand side, to produce abroad and German firms' main interest shifted from the national market to the global one, where it had succeeded very convincingly with its nearby Eastern neighbors *(Carlo Bastasin, 2013)*. Besides, Germany could also benefit from the enlargement of emerging markets such as China.

Bastasin *(2013)* argued indeed that "German exception lies in having permanently transformed its economic model in line with the global challenge, showing that the opening of national economic systems can be an opportunity for prosperity".

However, it is reasonable to underline that this growing openness of Germany was allowed and, at the same time encouraged, by the European legislation designed for the EU single market's achievement.

Thus, we can assert that macroeconomic standpoint of Germany was in good shape by 2008 *(Dauderstädt, 2012)*, before the Great Recession occurred in 2009. In this occasion, Germany suffered the global crisis a lot and its GDP's drop was deeper than in other countries since its economy was basically relying on exports *(Dauderstädt, 2012)*. Despite this critical phase in 2009, Germany overcame the global crisis successfully and reached, in year 2010, the highest economic growth rate since unification of 4.1 percent *(Destasis data[4])*.

[4] Destasis is the Federal Statistical Office of Germany.

But while Germany was strengthening its economy and power in Europe, other peripheral countries (such as Greece, Spain, Portugal and Ireland) in the Eurozone were stuck in a severe sovereign debt crisis. For this reason, since 2010/2011 several prominent economists (such as Hans-Werner Sinn, Martin Wolf and Willi Semmler) raised questions about the role of Germany in the European crisis and often have been wondering if Germany was to blame for the imbalances within Europe.

Despite all the criticism, in the following and recent years Germany economy's performance – still characterized by a high dependence on exports – has continued to follow a positive trend and has establish itself as the largest market in Europe with highest GDP *(Destasis data)*.

1.3 Germany's economy today: Europe's largest economic hub with robust growth

As mentioned before, Germany's recovery from the Great Recession has been stronger than in the other countries of the Eurozone, which experienced financial or fiscal difficulties and, it has benefited from its status as a safe heaven *(OECD 2018, OECD Economic Surveys: Germany 2018, OECD Publishing, Paris,https://doi.org/10.1787/eco_surveys-deu-2018-en)*. In a recent issue of its publications, the GTAI[5] has described Germany as "the largest economy in Europe, which constitutes 21 percent of European GDP, and is home to the 16 percent of the European's Union population*" (Thomas Bozoyan, 2018, Economic overview Germany- Market, productivity, innovation- Germany trade and Invest, Berlin)*. Apart from the notable size of its market (see figure 1.0), Germany's economy has been reported also as

[5] Germany Trade & Invest (GTAI) is the economic development agency of the Federal Republic of Germany.

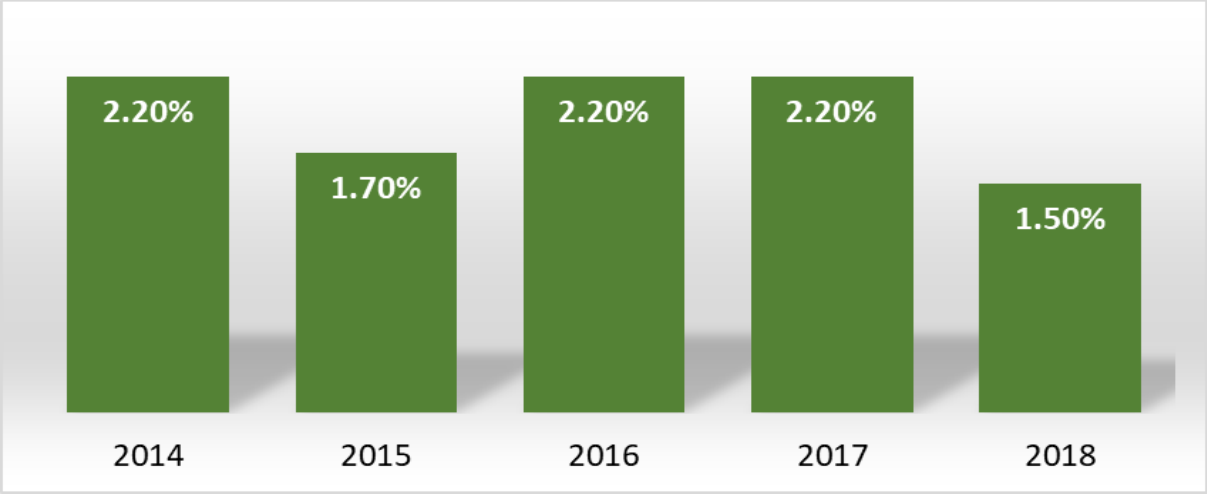
a stable one, characterized by a robust economic growth which is confirmed by giving a glance on the GDP's growth rate in the last years (see figure 1.1)

Figure 1.0 – Share of total GDP and Population in the European Union 2016

	GDP (EUR billion)	Share of total GDP (EU-28)	Population (in million)	Share of total population (EU-28)
Germany	3114	21 %	82	16%
UK	2393	18 %	65	13 %
France	2229	15 %	67	13 %
Italy	1680	11 %	61	12 %
Spain	1118	8 %	46	9 %
Netherlands	703	5 %	17	3 %
Poland	424	3 %	38	7 %

Source: Germany Trade & Invest from Eurostat and World Bank 2017

Figure 1.1 GDP growth Germany (price-adjusted)



Source: Federal Statistical Office (Destasis)

However, if year 2017 was flawless for German economy[6], it is not possible to assert the same for 2018 when, in the second and third quarters of the year, growth rate dropped sharply. Often cited reasons behind this slowdown are the following: "disruptions in car production related to the rollout of new emission tests following the new Worldwide Harmonized Light Vehicle Test Procedure (WLTP) and weak external demand, which hit Germany's export-dependent economy particularly hard" *(International Monetary Fund. European Dept., 10th July 2019, Germany: 2019 Article IV Consultation-Press Release; Staff Report; and Statement by the Executive Director for Germany, International Monetary Fund Washington, D.C.)*[7]. This scenario had already been foreseen by IMF experts' board which had warned also against the negative effects of short-term risks (such as considerable increase of global protectionism, hard Brexit, and reconsideration of sovereign risk in the euro area) on Germany's exports and investment that could have led eventually to a general slowdown in productivity *(International Monetary Fund. European Dept., 4th July 2018, Germany: 2018 Article IV Consultation-Press Release; Staff Report; and Statement by the Executive Director for Germany, International Monetary Fund Washington, D.C.)*.

Despite the evident reduced pace of growth's rate, Germany's economic performance throughout 2018 has been considered overall as a positive one: investment stayed strong, unemployment hit a new record low and wages grew moderately. Besides, the German government registered a fifth consecutive year of fiscal surplus *(IMF Country Report No. 19/213)*. Thus, given some signs of weakness and the risks posed by the global economy in recent years, the German economy still appears as the most efficient in Europe.

[6] According to Destasis data, GDP's growth was of 2.2 % in year 2017. Moreover, employment has risen, unemployment rate was considerably low as well as inflation and labor market strengthened (IMF data).

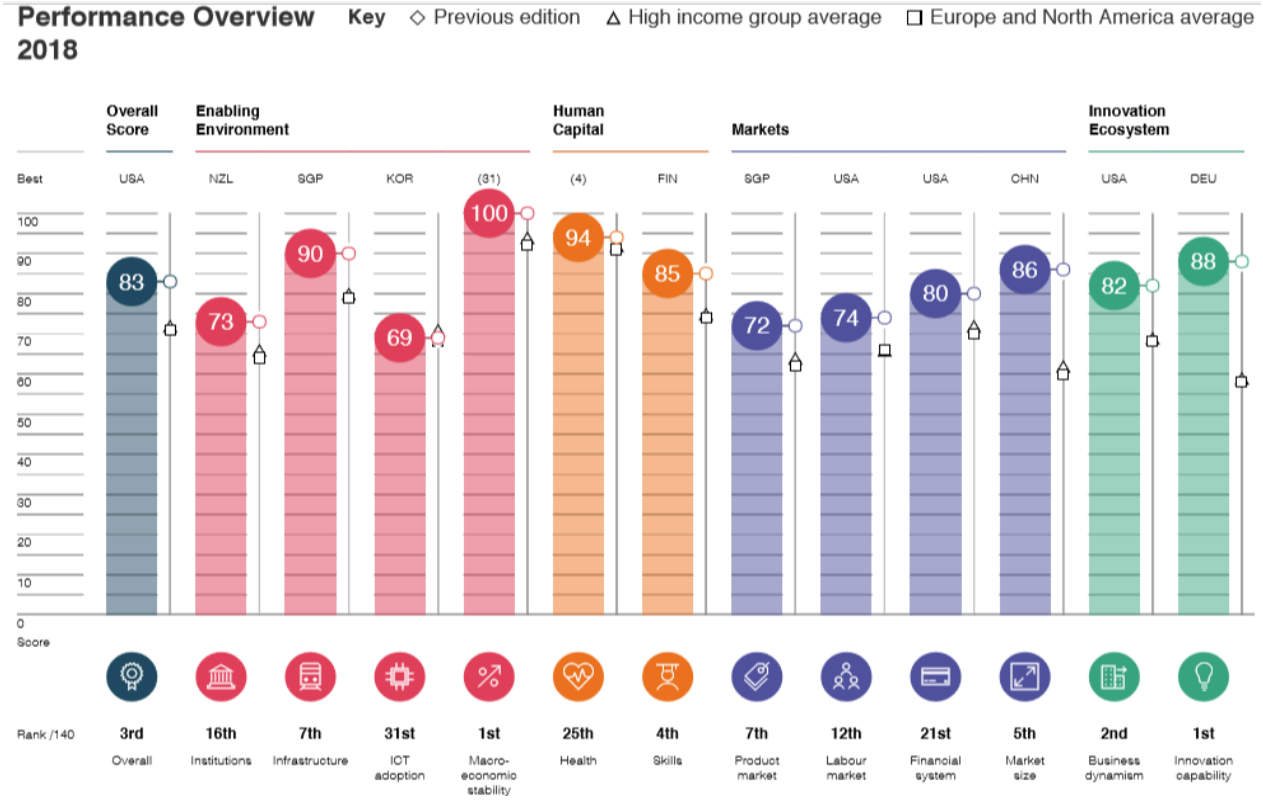
[7] Same reasons have been cited also by the deutsche Bundesbank (Deutsche bundesbank monthly report december 2018, Outlook for the German economy-macroeconomic projections for 2019 and 2020 and an outlook for 2021)

Further confirmation of the good performance of German economy in the last years can be found in other authoritative sources such as "Global Competitiveness Report 2018" edited by the World Economic Forum. In short, the Global Competitiveness Index 4.0 has been designed to evaluate the factors that collectively define the level of a country's productivity – still considered important driver of long-term improvements in living standards[8].

The computation of this index takes into account four categories of factors deriving from the analysis of twelve pillars: Enabling environment (pillars: institutions, infrastructures, ICT adoption, macroeconomic stability), Human capital (pillars: health and skills), Markets (pillars: product market, labor market, financial system, market size) and innovation ecosystem (pillars: business dynamism and innovation capability). According to the World Economic Forum's results, Germany ranked third globally (1st and 2nd positions have been awarded respectively by United States and Singapore) and proved to be the strongest European performer. The overall score reached by Germany is 82.8 (maximum is 100) and the country emerged for the notably brilliant innovation ecosystem, deriving from the quality and quantity of its patents, research publications and prominent research institutions. In addition to this, Germany's economy competitiveness resulted from stable macroeconomic environment as well as from high-skilled and healthy population (see figure 1.2).

[8] Economic literature recognizes productivity (total factor productivity) as the main factor explaining income differences across countries and growth perspectives. (See Mankiw, Romer and Weil, 1992; Hall and Jones, 1999; Barro, 1996; and OECD, 2016).

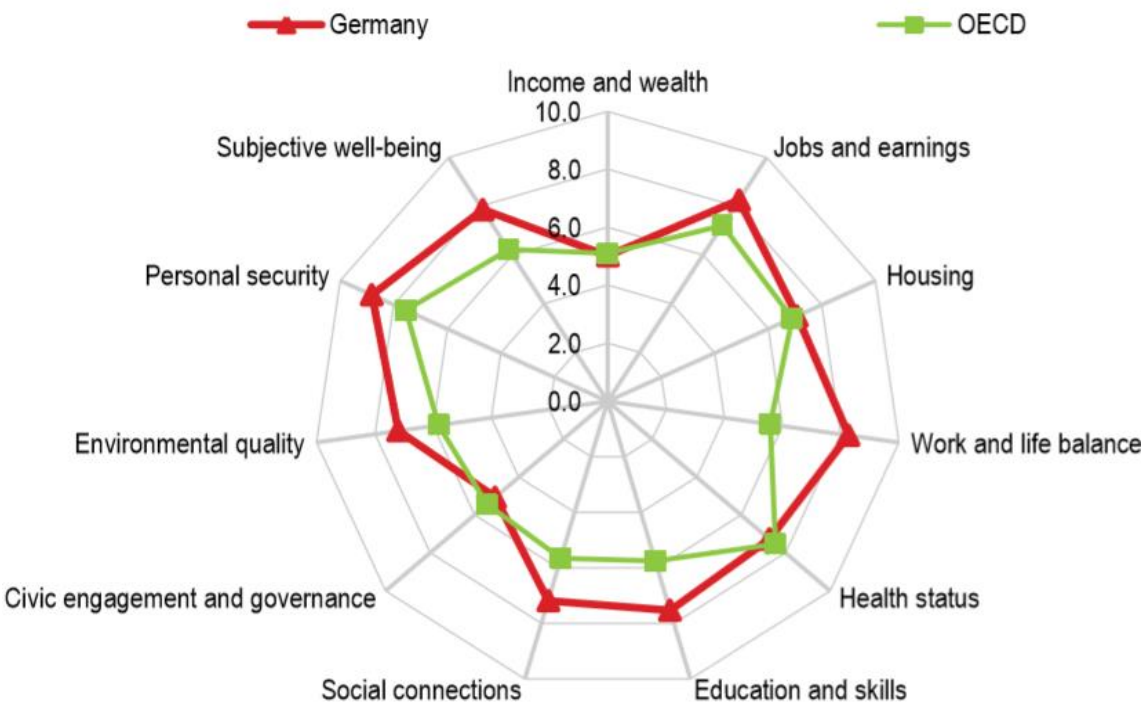
Figure 1.2 – Performance of Germany in the Global Competitiveness Report 2018



Source: World Economic Forum

Hence, the economic wellbeing of the country reflects also on the social wellbeing of its population that enjoy high standards of living. Taken into consideration OECD better life index 2017, Germany showed very good results in the following parameters: personal security, work-life balance, jobs and earnings as well as subjective wellbeing (see figure 1.3). Almost the entire population is educated to upper secondary level and PISA scores are in the upper range of OECD countries, though still at some distance from best-performing countries. Besides, health outcomes are relatively good overall *(OECD 2018, OECD Economic Surveys: Germany 2018, OECD Publishing, Paris)*.

Figure 1.3 – Better Life Index of Germany in comparison with average OECD countries, 2017



Source: OECD Economic Surveys Germany 2018

However, all these positive findings related to the country's economy should be interpreted with caution since new challenges must be tackled in the next years. The labor force is about to decline as the population ages and, productivity and investment growth, will be likely to diminish. Moreover, Germany will need to adapt to technological change as digitalization become increasingly important driver of value added. Regarding energy transition, Germany is on track to meet its renewable energy target. But building the necessary internal electricity transmission capacity remains a challenge. At the same time, there is still uncertainty about how the ambitious goals to cut greenhouse gas emissions will be met *(International Monetary*

Fund. European Dept., 10th July 2019, Germany: 2019 Article IV Consultation-Press Release; Staff Report; and Statement by the Executive Director for Germany, International Monetary Fund Washington, D.C.).

In addition to these challenges, OECD experts warned also against the slowdown in the productivity convergence in Eastern Germany and against the highly unequal distribution of wealth across German households *(OECD 2018, OECD Economic Surveys: Germany 2018, OECD Publishing, Paris).*

Thus, although Germany is today the most powerful and stable economy in Europe, policy makers are asked to guarantee the sustainability of the achieved social and economic outcomes also in the future, struggling to find solutions for the abovementioned issues.

1.4 Export nation as a result of large industries: Germany benefits from internationalization

The German economic development model has always relied on a strong export sector, which can be regarded as a "backbone" of the country's economy. According to Schulten (2014), already in the 1970s and 1980s German export industries accounted for between 20 and 30 percent of GDP, which was already a rather high value for a large economy such as Germany. After a sharp drop in the export sector during the reunification time, Germany established itself once again as a global player since 2000s. In years 2012 and 2013, exports constituted more than 45 percent of Germany's GDP. The high integration of Germany in the world economy has been remarked also by Dauderstädt *(2012)*: from 2003 to 2008 Germany was indeed the world's leader exporter, outpaced by China only in 2009.

Also Bastasin *(2013)* stressed the strong internationalization of Germany as a successful key of its economic development model, observing at the same time, that the exports' rise in the

last years had required a change in the economic culture of the country as well as impressive efforts from German firms to move into international markets.

Coming to more recent years, exports are still considered an undeniable driver of German economy and this is confirmed by World Bank data reporting that, in year 2018, German exports accounted for almost 47 percent of its GDP. In relation to the major trading partners of the country, great attention has been paid on the opportunities emerged from the German-Chinese economic relations in the last decade. Hans Kundnani and Jonas Parello-Plesner *(2012)* described the increase in trade between China and Germany as a perfect symbiosis between the two economies since Germany was looking for new emerging markets and, at the same time, China needed technology. Indeed, Germany is involved in industries considered from China as strategically important: automobiles, renewables and high-technology. The close link between the two countries has been pointed out also by Erber *(2014)* who confirmed that, Germany has profited from the fast-growing market in China, above all in the automotive and mechanical engineering sectors. In turn, China has eventually become an important market and supplier for Germany, especially in the ICT sector. However, Germany's emerging special relationship with China has been interpreted lately not only as an opportunity but also as a risk.

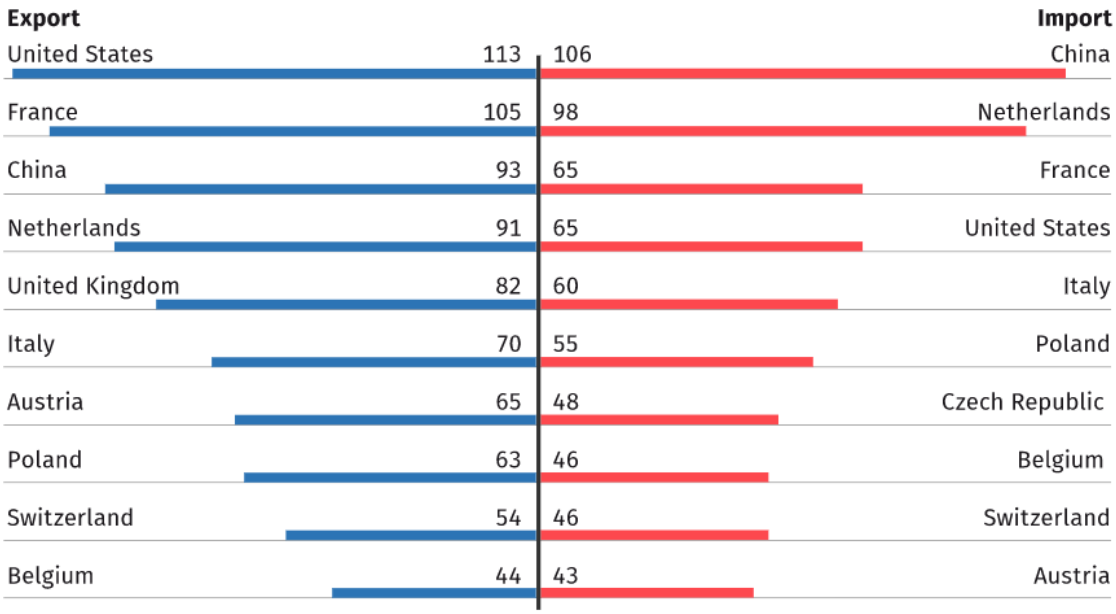
Hans Kundnani and Jonas Parello-Plesner *(2012)* warned against a conflict's potential between the two nations as a result of this overlap between the sectors of the economy in which Germany exceled (and still excel) and the sectors in which China wanted to excel as well. Growing risk from tension in economic relations between Germany and China have been expected also by Erber *(2014)* saying that, China will pose stronger competition for Germany in the future, due to the development and expansion of its own capital goods industry.

Apart from the attention to the increasing China-Germany commercial relations, great concern has been expressed also about the possible effects of Brexit on Germany.

According to the DIHK survey "Going International 2019"[9], only one in five German companies still reports good business in the United Kingdom and 70 percent of firms expect their business with the UK to deteriorate in 2019. These results point out not only that the imminent Brexit is already a burden for companies in Germany but also that concerns about tariffs and legal uncertainty are high. Moreover, they clearly suggest that the trade volume between Germany and the United Kingdom, which amounted to 119 billion euros in 2018 *(DIHK data)*, is under a high degree of risk.

In the figure 1.4 are reported the main trade-partners of Germany in year 2018.

Figure 1.4 – Germany's major trading partners in EUR billion (2018)



Source: German Federal Statistical Office (Destasis)

[9] DIHK is the "Deutscher Industrie und Handelskammertag" (German Industry and Chamber of Commerce). More than 2,100 foreign companies based in Germany took part in the survey in February 2019. The results of this special evaluation on Brexit are based on the responses of around 1,500 companies with business connections to the UK.

Parallel to the growth of exports, Germany also saw a strong increase in import which reached almost 40 percent of the GDP in 2013. But while exports and imports were almost balanced during the 1990s, at the beginning of the 2000s exports started to grow much faster than imports *(Schulten, 2014)*. As a result, Germany achieved a current account surplus of about seven and a half per cent of its GDP in 2017 *(Brossardt, 2018)*. This high surplus of Germany continues to trigger critics from inside and outside Europe: US administration, representatives of the European Union and of the International Monetary Fund. Basically, they blamed the German export success for prompting stagnant or slow economic development in other countries and, consequently, some of this criticism ask also for an intentional weakening of German high-competitive industry. Brossardt *(2018)* claimed instead that, since Germany is the most or second-most important export market for almost all EU member states, a weakening of German industry would be not only nonsense but also harmful in terms of economics. Indeed, according to his analysis, almost five million jobs in other EU member states are directly reliant on the demand for goods from Germany and so, an economic stagnation in Germany derived from less internationalization would be fatal not only for the country but for the whole European economy. Brossardt *(2018)* proved through his calculations that "If the German gross domestic product were to stagnate by 2020, the economic output of the other EU countries would decrease by a total of 13 billion euros compared to the baseline scenario, in which the German economy would expand by an annual average of 1.6 per cent from 2018 to 2020".

After an analysis of the increasing importance of import and export flows of Germany for its economy, it seems reasonable to shed some light on the drivers behind this export success. While some studies support the idea that a close "wage-price-competitiveness-nexus" (as a result of Hartz's labor market reforms that we have already mentioned) can be considered the trigger of the German economic development model *(Dustmann et al. 2014)*, several researches stress instead the role of non-price competitiveness such as the provision

of innovative and specialized products, an advanced standard in technology, the quality of goods and services, the accuracy and engagement of business relations *(Schulten, 2014)*. In a broader perspective, among the factors of non-price competitiveness must be recognized also the logistical infrastructure. According to the GTAI, Germany has indeed become Europe's prime logistic hub, thanks to its geographic location as well as to factors of quality and reliability. The excellence of the German infrastructure has been confirmed also by the 2018 Logistics performance index of the World Bank[10] (see figure 1.5), which ranked Germany first worldwide for its logistic proficiency. Germany has not only a dense network of airports (of which 22 are international) but also a well-known port infrastructure; Frankfurt airport is the largest in Europe in terms of cargo and Hamburg port is the Europe's second largest measured in container port traffic *(GTAI data)*.

Figure 1.5 – Quality of Infrastructure 2018

Rank	Country
1	Germany
2	Sweden
3	Belgium
4	Austria
5	Japan

Source: World Bank

[10] In short, the logistic performance derives from a weighted average of the country scores on the six key parameters: Efficiency of the clearance process by border control agencies, including customs, quality of trade and transport related infrastructure, ease of arranging competitively priced shipments, competence and quality of logistics services, ability to track and trace consignments, timeliness of shipments in reaching destination within the scheduled or expected delivery time (World bank).

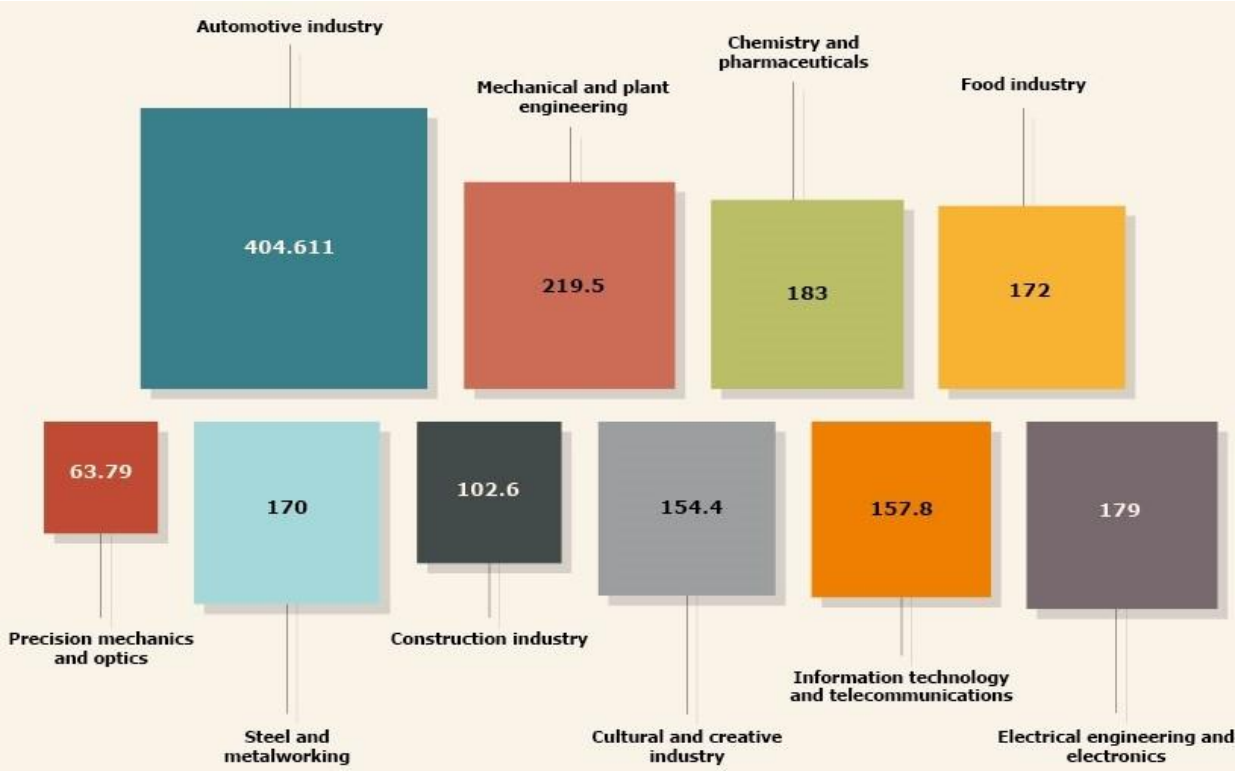
Also Bastasin *(2013)* underlined the impact of good infrastructures in Germany, when considering the export orientation of German economy. According to him, "the availability of good infrastructures enabled the industrial groups to organize production not by commodity type or single products, but by stages of production of the same product". Thus, groups such as Daimler, Siemens, Hoechst, BASF, BMW, Volkswagen and others became, in all respects, global groups during the 1990's. Bastasin *(2013)* remarked the nexus between industry and infrastructure claiming that "Due to their size and unique talent for rational organization, the great German industrial groups were able to place themselves in the center of production chains of intermediate goods, optimizing costs and production plants. In making this transformation, Germany gave further evidence of its ability to act as a single system. The transport and infrastructure network in fact expanded and adapted to the economy's interests". All in all, he pointed out that Germany exploited extensively and smartly its optimal geographic location, situated at the market crossroads of Europe.

As reported by the German Federal Ministry for Economic Affairs and Energy, Germany's current strength in international competition is largely based on the strength of its industry, which counts a share of 23 per cent in the gross value added. The power of its industry is strongly connected to the export leadership of the country: indeed, almost 92 percent of Germany's visible exports are industrial goods *(Federal Government Statistical Office Data)*. Germany's main export product in 2018 was motor vehicles, which accounted for 17.5% of the total exports *(Destasis data)*. This data confirm again the leader position of the automotive industry, which secures earnings also for other sectors, since it has close links with companies in the chemicals, electrical engineering, steel, metal and textile industries. Machinery (14.7%) and chemical products (9.0%) ranked respectively second and third among the most important export items.

Others industrial key areas in which the country already or still takes a leading position include the following: medical device industry, optical industry, steel, copper and aluminum

industry, aerospace industry, Additive production (3D printing) and the Greentech sector. Lately, great attention has been paid particularly to the last sector: the so-called green technologies and the sector of renewable energy are considered today a burgeoning industry for Germany. Indeed, according to the GTAI, the market of environmental-friendly products is expected to account for 20% of German GDP by 2025 and it is constantly growing every year of more than 5%, offering so promising opportunities.

Figure 1.6 – Turnover by sector of German industry in billion euros, whole year

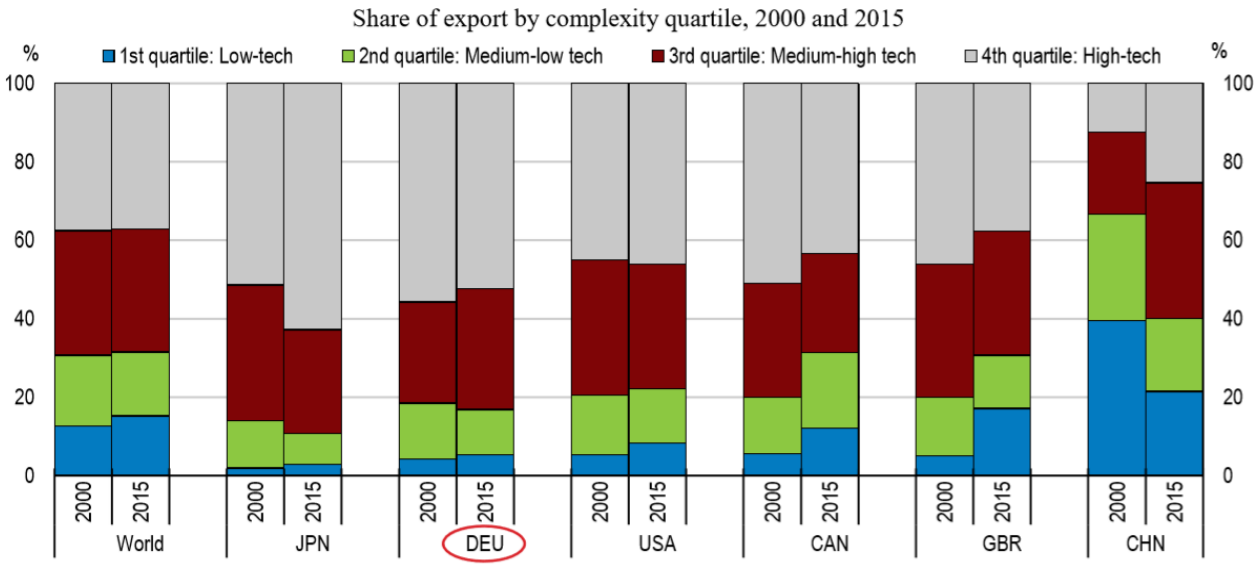


Source: Federal Ministry of Economics and Energy, BMWi (date February 2018), Illustration Djanhan Orth

Also the OECD Economic Surveys: Germany *(2018)* remarked the essential link between the strong export performance of Germany and the country's manufacturing sector, pointing out also the high degree of innovation of the German industries' products.

According to the OECD, Germany earns an unusually high share of value added from foreign final demand as a result of the manufacturing sector's integration in global value chains. Moreover, German firms specialize in highly complex, technology-intensive goods which compete less with exports in emerging economies, such as China (Figure 1.7).

Figure 1.7 – Germany's exports are strong in high-tech goods



Source: OECD (2018)

However, many economists call into question the sustainability of the German export-led development model. Dauderstädt *(2012)* warned against the vulnerability of German economy to global changes when he illustrated the strong export performance of the country.

Schulten *(2014)* discussed the dependence of Germany of an account surplus which makes it necessary for other countries to continue with their deficits.
In addition to that, he questioned the efficiency of the export-led growth strategy of Germany as it goes along with a systematic neglect of domestic sectors such as education, health, etc.

1.5 Germany is a strong innovator in Europe: the country stands out for firm investments and intellectual assets

Despite the objective difficulty in measuring countries' degree of innovation (confirmed by the existence of the Oslo manual, an OECD document carried out to provide guidelines for measuring key pillars of innovation), "the European Innovation Scoreboard" report offers a comparative assessment of the innovation and research performance of the EU Member States, pointing out the strengths and weaknesses of each country. On the basis of four main pillars – Framework conditions, Investments, Innovation activities, and Impacts[11] – which consider a total of 27 indicators, the report classifies the EU Member countries in four categories: modest, moderate, strong innovators and innovation leaders.
In the last edition of this report *(2019)*, which is prepared annually by the European Commission, Germany is recognized as a strong innovator in Europe and, until 2017, it has been considered even as innovation leader[12].

[11] Framework conditions capture the main drivers of innovation performance external to the firm and cover three innovation dimensions: Human resources, Attractive research systems, as well as Innovation-friendly environment. Investments capture public and private investment in research and innovation and cover two dimensions: Finance and support and Firm investments. Innovation activities capture the innovation efforts at the level of the firm, grouped in three innovation dimensions: Innovators, Linkages, and Intellectual assets. Impacts cover the effects of firms' innovation activities in two innovation dimensions: Employment impacts and Sales impacts.

[12] An innovation leader presents an innovative performance above the 120% of EU average, while a strong innovator's performance is between 90% and 120% of the EU average.

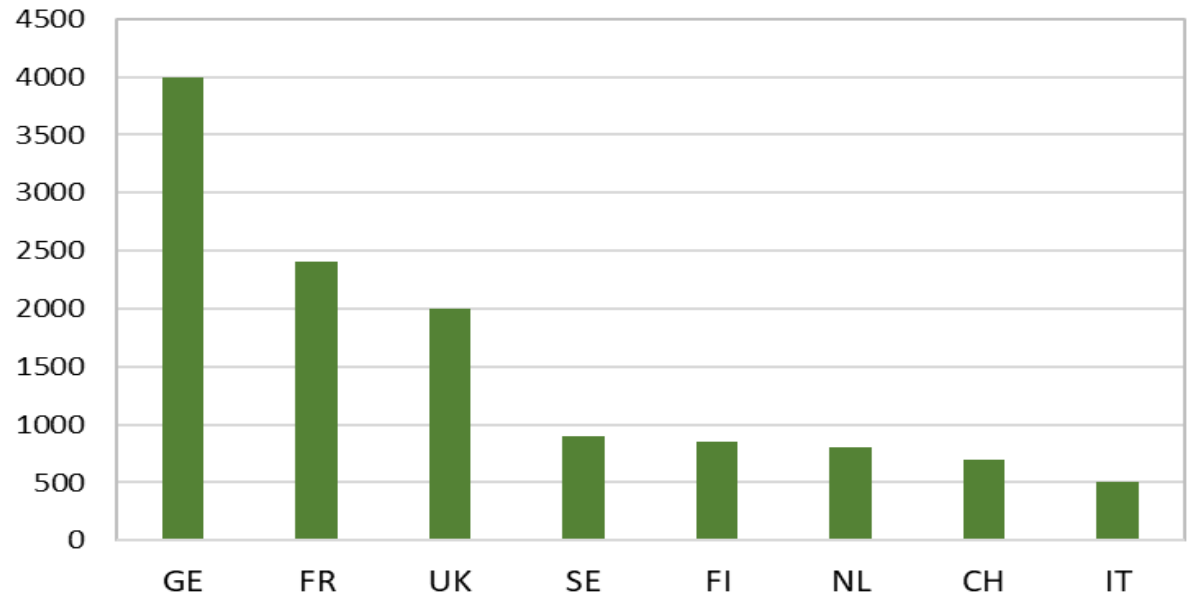
In the last years, the federal government of Germany has followed the instructions of the OECD, putting innovation at the core of its growth agenda and realizing that economic success cannot be driven only by efficiency and cost-cutting strategies. Indeed, according to the global competitiveness report 2018 *(OECD)*, innovation is an essential driver of productivity growth and value creation in the present era of the Forth Industrial Revolution. Analyzing the results collected by the European Innovation Scoreboard 2019, Germany stands out in particular in three dimensions: firms' investments (i.e. R&D expenditures in the business sector, non R&D innovation expenditures, enterprises providing training to develop or upgrade ICT skills of their personnel), sales impact (i.e. medium and high-tech product exports, knowledge-intensive services exports, sales of new-to-market and new-to-firm product innovations) and intellectual assets (i.e. patent, trademark, design applications). If the high innovation rate of Germany in the sales impact was surely expected in accordance with what we showed in the paragraph 1.4, the other two aspects may need to be clarified further.

In relation to the firms' investment, the Germany Trade & Invest (GTAI) proved evidence of the diverse innovation landscape guaranteed by the German industries: six of the EU's top R&D companies are German enterprises, with car manufacturer Volkswagen leading the ranking *(2016).* Moreover, domestic companies invested almost 63 billion euros in developing new technologies for competitive products in year 2016. In addition to that, GTAI stressed also the key role of German SMEs for the innovation ecosystem of the country, counting a group of 1200 companies that show an outstanding performance in their R&D investments (their range of R&D expenditures is often between 10% and 18% of total sales volume).

Concerning the intellectual assets, Germany takes the lead in Europe for patents. According to the GTAI, Germany obtained almost 19.000 patents granted at the European Patent Office in 2016, reaching a share of nearly the twice that of UK and France combined. This

result proved the commercial viability of "made in Germany" innovations. Also, WIPO[13] data confirm the supremacy of Germany in Europe for patents; in year 2017 Germany has counted 176.235 filings for patents and the total patents in force in the country in the same year are 657.749. Germany establishes itself also as a European patent leader for the inventions in the fourth industrial revolution (Europe Patent Office data). As depicted by figure 1.8, Germany's share of approximately 4.000 inventions was the largest in Europe, followed by the other two big European countries, France and the United Kingdom, with more than 2 400 and 2 000 patent applications respectively.

Figure 1.8 – 4IR Patent Applications at the EPO by Member State 1978-2016



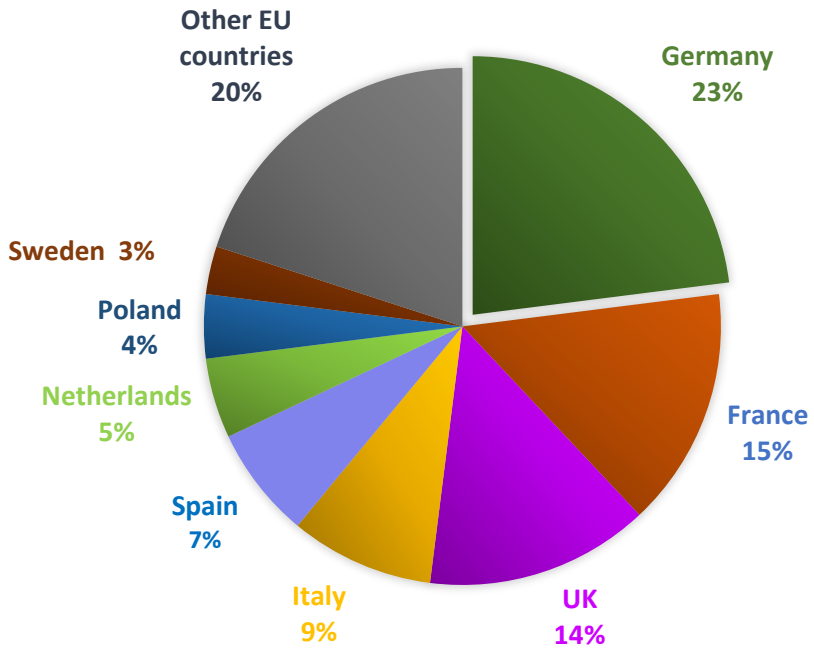
Source: European Patent Office

[13] WIPO: World Intellectual Property Organization.

Also on the research front, Germany has a reputation of a cutting-edge country being home to the largest population of researchers in Europe: 23% of all EU scientists live and work in Germany *(Eurostat Data 2017)*. In this context, it seems reasonable also to mention also the BMWI "go cluster" program, designed by the Federal Government, to provide financial stimulus to support the industrial and technological clusters of the country.

The aim of the initiative is to bring together the broad knowledge of universities and non-university research institutes with the needs emerging for the companies, creating a strong link and cooperation between them. According to the GTAI, Germany can rely on several prominent non-university research institutes such as The Max Planck Society, Fraunhofer-Gesellschaft, Helmholtz Association and Leibniz Association, which provided an overall research budget of nearly 10 billion euro in 2015.

Figure 1.9 – National Share of Researchers in EU-28 2016



Source: Eurostat (2017)

1.6 Germany's enviable labour present some risks in the medium-term: Shrinking labour supply will weigh on growth

In all the previous paragraphs we have remarked the capability of Germany to emerge as a powerhouse in Europe after many years the country had been labeled as the "Sick Man of Europe". In this context, we have also investigated the causes behind the German economy's turnaround, mentioning also the impact of the labor reforms (the so-called "Hartz reforms") introduced in the years 2003-2005. If some scholars *(such as Dauderstädt, 2012)* regarded them as an important driver of the country economy's resurgence, others *(Dustmann et al., 2014)* have cast doubt on their actual efficiency. Also Reisenbichler and Morgan *(2014)* put into question the effects of the Hartz reforms, arguing instead that "this startling turnaround and continued success of Germany can be explained by successful adjustments in business and labor relations and wage moderation, which reinvigorated the competitiveness of Germany's export-driven industries". However, beyond the no consensus whether the Hartz reforms really improved the German labor market situation, its exceptional shape in the last years is a matter of fact, especially if compared with other European countries: the country's unemployment rate is half of what it was a more than a decade ago, dropping from 11.3 percent in 2005 to 5 percent in 2014, far below the European Union (EU) average of 10.2 percent *(Reisenbichler and Morgan, 2014)*[14]. In addition to that, the positive labor market performance also strengthened the country's fiscal situation, including the ability to borrow money at very low cost, generate tax revenues, and attract immigrants from abroad[15] *(Reisenbichler and Morgan, 2014)*. However, a recent study conducted by Tudela, Launov and Robin (2018) shows a "dark aspect" behind the fall of German unemployment in the

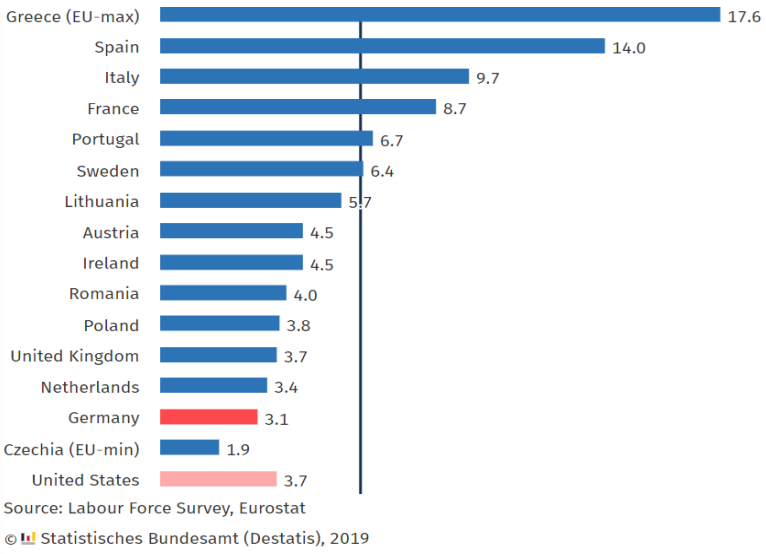
[14] Also scholars such as Rinne and Zimmermann (2013) confirmed the success of German labor policies and market.

[15] According to Reisenbichler and Morgan (2014), net immigration numbers spiked to over 428,000 in 2013 as a result of economic stagnation elsewhere in Europe.

last years: labor force participation actually increased because many unregistered-unemployed workers ended up accepting low-paid, part-time work, all kinds of low-quality jobs that were offered in quantity in absence of a minimum wage bound[16].

Looking at 2018's data related to unemployment rate, we can prove evidence of the positive labor market performance: in 2018, the unemployment rate in Germany declined for the ninth year in a row and Germany showed the second lowest unemployment rate in the European Union, outpaced only by Czech Republic. The Federal Statistical Office reported that only 3.4% of the 15 to 74 years old labor force had no job in Germany. Same scenario can be confirmed in year 2019 since Germany presents again the second lowest unemployment rate in EU (look at figure 1.10[17]).

Figure 1.10 – Unemployment rate, June 2019



[16] According to Tudela, Launov and Robin (2018), a greater fraction of unemployed workers to no longer register as jobseekers was a consequence of the Hartz reform IV. Ruoff (2016) described the Harz reform IV as "largest reform concerning the new regulation of unemployment benefits". Since the Hartz IV reform the ability to work (three hours per workday) is the basis for access to active labour market policy schemes (Jacobi and Kluve 2007).

[17] Note that values for Greece and United Kingdom are related to April 2019, seasonally adjusted, in %.

What is particularly remarkable is that, according to the results of figure 1.10, German labor market is exceptional when compared not only with its European counterparts but also with the United States.

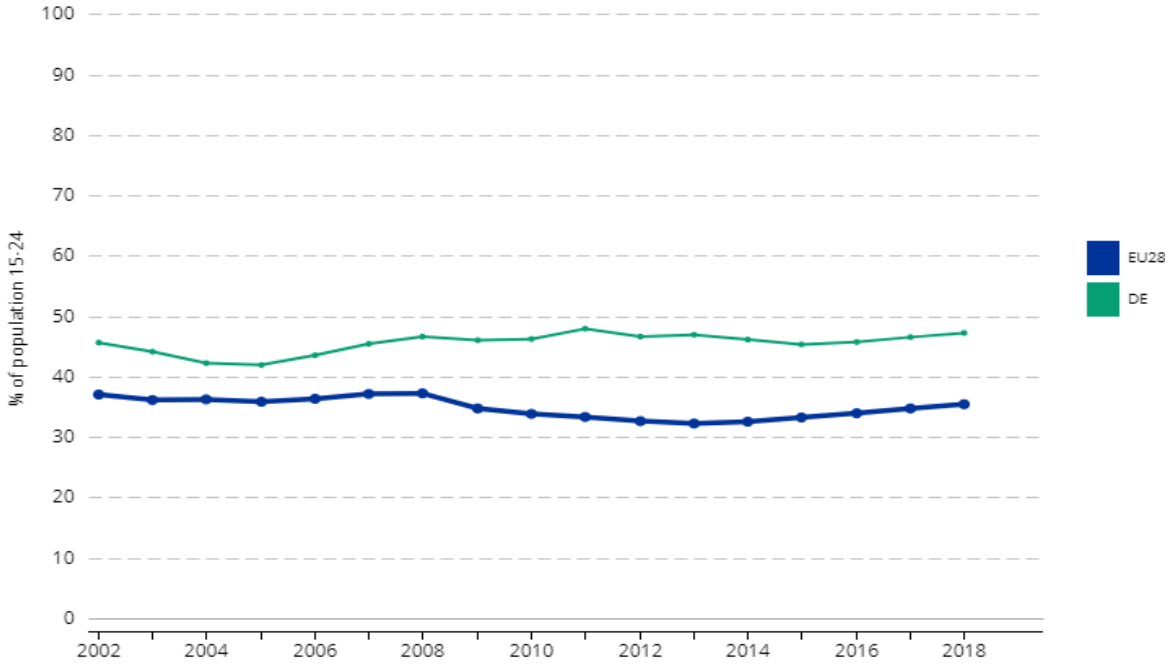
However, a growing body of scholars *(Palier Bruno and Kathleen Thelen, 2010 and Cathie Jo and Duane Swank, 2012)* objected that Germany's economic transformation has come at the expense of labor market dualization, a cleavage between those with well-protected jobs and others in "atypical" work. These scholars emphasized this dualization as dangerous because, according to them, has created winners and losers in the labor market. On the contrary, Reisenbichler and Morgan *(2014)* stated that these characterizations may no longer fit a dynamically evolving labour market in Germany because dualization may not be an endpoint, but rather a stop along the way to a robust labor market that should then become more inclusive. Indeed, previously disadvantaged segments of the population (such as female, old and young workers) are now much more involved in the German labor market. This assertion can be proved, looking at Eurostat data which show that female employment in Germany has constantly increased especially since 2006 till today but also that youth employment rate in Germany is much higher in comparison with the EU average (see figure 1.11).

Moreover, policymakers have introduced noticeable policy measures in order to reduce dualization in recent years. For instance, on 1st January 2015 Germany adopted a statutory general minimum wage of 8.50 EUR per hour. Consequently, an experts' commission (Mindestlohnkommision) was born for recommending adjustments of the minimum wage, based on comprehensive analysis of the labor market. Following the recommendations of the commission, the Federal Government increased to 8.84 EUR per hour the minimum wage since the 1st January 2017. Generally speaking, the minimum wage is applicable in all branches of activity and all regions, with exceptions for apprentices, certain interns, people

aged below 18 years and long-term unemployed people during their first six months of employment *(European Commission working document – Country report Germany 2018)*. Returning now back to young people in Germany, another encouraging data come from the OECD, which pointed out the low rate of NEETs[18] in the country (see figure 1.12). This result implies that the most German youth are either in employment, education or training *(OECD 2017, "Education at a glance: Educational attainment and labour-force status")*. According to the OECD, the vocational education and training system in Germany ensures excellent integration of young people in the labour market. Also the economic development agency of Germany *(GTAI)* recognized the German vocational training as a powerful tool of the country to guarantee the economy's demand for highly qualified personnel and, thus, establishing a strong connection between education and the labor market. The success of the German vocational education relies on the so-called "Dual system" which combines the benefits of taught-classes with on-the-job training for a period of 2/3 years. One in five German companies take part in the dual system, enabling apprentices to become specialists that fit labor market's needs and trends, and in most of the cases, offering them an employment contract after the training *(GTAI)*.

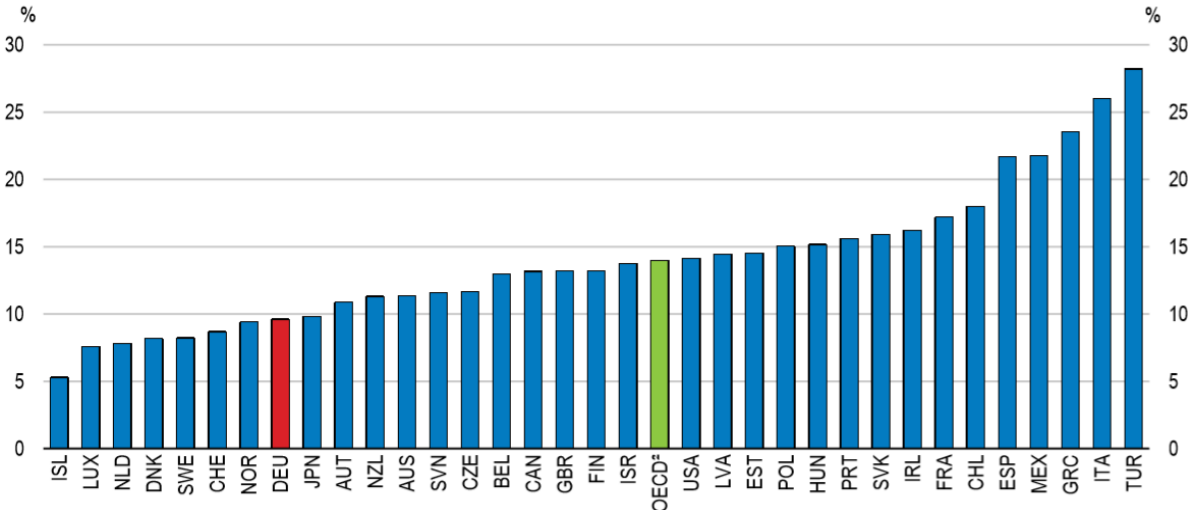
[18] Eurostat, the ILO and other organizations such as OECD have adopted the following definition of the NEET rate: the percentage of the population of a given age group and sex who is not employed and not involved in further education or training. The "NEET" concept is associated with its potential to address vulnerabilities among youth, touching on issues of unemployment, early school leaving and labor market discouragement (Sara Elder, 2015, "What does NEETs mean and why is the concept so easily misinterpreted", ILO, Geneva).

Figure 1.11 – Youth employment (as % of the population aged 15 to 24)



Source: Eurostat, 2018

Figure 1.12 – Rate of NEETs, per cent of 15-29, year 2016



Source: OECD (2017), "Education at a glance: Educational attainment and labour-force status", OECD Education Statistics (database)

So far, we have focused our analysis of the German labor market emphasizing its strong elements such as the low unemployment level, the low rate of NEETs and the growing participation of the traditional labor market outsiders (e.g. the women and youth people). Now, it seems appropriate to shed light on the weak elements or, being more precise, on the risks which are likely to affect the positive labor market performance in Germany in the next years.

Firstly, labour market tightness will increase in the medium term: in a growing number of industries and professions, employment is no longer being constrained by demand, but rather by the supply of qualified labor *(Deutsche Bundesbank Dept., monthly report December 2018, Outlook for the German economy – macroeconomic projections for 2019 and 2020 and an outlook for 2021, Deutsche Bundesbank Press, Frankfurt am Main)*. According to Deutsche Bundesbank experts, demographic ageing of the population as well as the fall of immigration in the country will shrink the labor supply. Indeed, net immigration to Germany has already dropped in years 2017 and 2018. The drop of migration (especially of qualified workers) from foreign countries constitutes a critical issue for German labor market since it would help to alleviate the decrease in the number of people of employable age in the coming years *(Halle Institute for Economic Research – IWH, 2019)*.

OECD *(2018)* warned instead against the slow diffusion of new technology in the country, which can be accelerated by reinvigorating entrepreneurship and strengthening high speed digital infrastructure. According to OECD experts, new firm creation has been declining in 2018 and talented individuals are less willing to become entrepreneurs for the following reasons: setting up a business in Germany takes more procedures and time than in other advanced OECD economies *(The World Bank, 2018)*, entrepreneurship is mainly associated with higher income risk and, in the case of women, female entrepreneurship is not encouraged enough by enabling it more compatible with giving birth. Consequently, only 8% of all active female workers are self-employed, less than in the average of European

Union countries (13%). Moreover, only 13% of high tech start-ups are led by women *(OECD, 2017)*.

Thus, given that entrepreneurship is the key to faster technology diffusion and higher productivity among SMEs *(OECD)*, Germany's economy could suffer from its shortage of entrepreneurs in the coming years.

Analysis of economic inequalities across Germany

2.1 Reconsider the economic development in Europe: convergence across European nations is not always accompanied by a similar process of convergence of regions within countries

After the Second World War, Europe's economy started a long period of rapid economic expansion *(the 'Golden Era')*, which slowed down in the 1970s but nevertheless continued till today. This expansion was accompanied by a process of integration across states, notably with the formation of the European Economic Community and, later, the Eurozone. More recently, the project of European integration has been fundamentally questioned, partly in consequence of the Global Financial crisis and the European Debt crisis that followed in its wake *(Rosés and Wolf, 2018).* As a result, tendencies of nationalism and populism are on the rise and make the European Union's "ever-closer-union" trajectory no longer realistic. These tendencies towards disintegration are not only emerging at an EU level, but also within nation states, as today's populism is also promoting more individualist attitudes *(EEAG Report on the European Economy, 2019)*.

In the past, we were used to treat European economy as a group of national economies focusing on the role of national governments. On one hand, this approach has its advantages: it naturally ties in with the political history of Europe, based on the emergence of territorial national states during the early modern period and it is surely appropriate if we consider that the quantitative evidence was collected and described mainly by national statistical offices, which developed during the 19th century *(Rosésand Wolf, 2018).*

On the other hand, many scholars and institutions argue that such approach is neither reasonable nor sustainable in the present era of globalization. According to Murray *(2006),* globalization has radically changed the way people, commodities and information flow and interact and this has inevitably created new and complex geographies.

Thus, although national boundaries still play an important function in terms of regulating and containing politics, culture and economy, spaces of flows have become increasingly important: accelerated globalization has created new networks of inclusion/exclusion which, in many cases, transcend the national boundaries. These networks reflect the inequalities in levels of well-being and development that the process of globalization can generate.

The inequalities are spread at various geographic scales – globally, within and between nation-states and localities and, more recently, on and off the networks *(Murray, 2006).* As a result, differences of income per capita (and labour productivity) within countries are today larger, and sometimes more resilient, than differences across countries *(Rosés and Wolf, 2018).* All in all, in this context where the globalized world looks like a network, local and regional scales within countries are increasing their importance and they are replacing the nation-state as the most appropriate unit for comparative purposes.

Given that accelerated globalization has accentuated unevenness in the last years, casting a net across the world instead of smothering the earth like a blanket *(Murray,2006),* we focus now on the importance to balance these inequalities within European countries.

In response to the process of globalization and its current megatrends — such as the digital transformation, climate change, migration or ageing — whose consequences can be highly diverse across regions and cities within a given country, policy makers are asked to find solutions adequate to the specific realities of where people live. This firstly mean revealing differences and diverse trends within countries that are often be masked by national averages *(OECD Regions and Cities at a Glance 2018)*. It is true that many aspects of quality of life have improved in several European regions, but it equally true that income and job opportunities are increasingly concentrated in specific areas, like in the case of Eastern Germany.

But why uneven regional development within European countries matter? According to Ballas et al. *(2017)*, the rise in territorial inequalities in Europe — especially within-country inequalities — has provoked several issues, including virulent social, economic and political tensions and reactions. Moreover, as we already mentioned at the beginning of this paragraph, economic discrepancies have been a key factor behind populist tendencies all over Europe. Clear evidence of regional inequalities' consequences can be found in the British vote in favour of Brexit, which is jeopardizing the factors behind development in the UK in recent years *(Jessop, 2017; McKinnon, 2017; Toly, 2017)*. Thus, regional imbalances matter because they have become a threat to economic progress, social cohesion and political stability in Europe.

For all these reasons, the European economic development needs to be analyzed and reviewed from the perspective of European regions as pioneered by Pollard *(1981)*. In this context were born the modern regional units (see information box "What is the NUTS classification?"), which are useful tools for making comparisons among regions, metropolitan areas and cities in terms of economic development, avoiding general national macroeconomic indicators. In this chapter, we will aim to offer an analysis of Germany's inequalities considering as parameters mainly European NUTS 1 and NUTS 2 regions of

the country. We will see that, despite its undeniable economic power at a national level — which is very often envied by other countries in Europe — Germany shows great regional economic inequalities that create concern also because they are not merely based on the West-East divide of the past.

In sum, Europe today is becoming increasingly similar to the late Habsburg Empire, a powerful symbol of the problems of integration in a multicultural, multi-linguistic, and multi-ethnic society. The Habsburg Empire was divided and appeared to be doing less well (i.e. growing less successfully) than rival states and also after its collapse, the problems of social division and low growth remained unsolved. Like the Habsburg Empire, the European Union appears today incomplete and unstable *(EEAG Report on the European Economy, CESifo, 2019)*. In the context of globalization and fast technological change, local and regional dimension count even more than national entities. Indeed, regional inequalities within a country can be wider than the ones across states. According to *Murray (2006)*, the study of imbalances has political overtones since it widens gaps, creates unevenness and creates winners and losers. Accordingly, regional inequalities should be considered priorities in the political-economic agendas of European countries, also of those ones that, at a national level, present exceptional macroeconomic indicators like Germany. According to the European Commission *(2017)*, countries in Europe have to tackle a double challenge.

On one hand, they need to constantly sustain the prosperity of its most rich and active regions, which are mostly city-regions, considered today economic fundamental motors. On the other hand, they need to struggle for connecting peripheral and economically weak regions to the globalized world which follow the new paradigm of the "network". These areas demand attention and adequate policies because their declining prosperity can generate dangerous consequences also socially and politically *(European Commission, 2017. Why Regional Development matters for Europe's Economic Future. Working paper WP 07/2017, Publications Office of the European Union, Luxembourg)*.

Therefore, Europe's economic future now is, more than ever, the future of its regions.

2.2 Regional differences in Germany: three decades after the collapse of Berlin Wall

Over the past 30 years, regional development issues in Germany have been constantly studied and analyzed on the basis of the former inner-German border, which had separated the country for almost 40 years. Despite the political unity occurred on the 3th October 1990, Germany showed a visible economic rift between its western and eastern side, after the collapse of the Berlin Wall and the GDR's centralized economy: in 1991 the nominal GDP per capita of eastern Germany was just 43 percent of the average western German value[19] *(Ragnitz, 2009)*. Yet, this was hardly surprising because four decades of German separation would inevitably leave traces. Given the gap in the economic strength between eastern and western Germany, a vast body of literature has monitored the process of convergence related to East Germany since reunification, mainly investigating if, at some point in the future, that GDP per capital in eastern regions could have achieved parity with the western ones.
After all, the German constitution, article 72, section 2 requires the establishment of "equal living conditions" throughout the federal territory *(Ragnitz, 2009)*.
On the eve of the thirtieth anniversary of the Berlin Wall Fall, the East-West divide is still subject of continuous discussions within the country, since, according to Ragnitz *(2009),* it constitutes also a social problem that can lead to disenchantment with the political order and to antidemocratic tendencies. On one hand, scholars have agreed that the situation in East Germany has improved greatly: Ragnitz[20] *(2015)* pointed out the growth of the price-

[19] In this calculation, eastern Germany included the city of Berlin.
[20] Prof. Dr. Joachim Ragnitz is managing director of ifo Dresden and teaches economics at Dresden University. Founded by the ifo Institute in 1993, the Dresden branch conducts empirical economic research geared to the special

adjusted GDP per person employed in the "new Laender"[21] (more than double between 1991 and 2004) but also the undeniable progress made in renewing and expanding infrastructure as well as in housing and urban development. Also Land *(2015)* emphasized that the economic condition of Eastern Germany is much better than it used to be in the past, considering that the previous GDR economy was characterized by ailing production facilities, a run-down infrastructure and unsustainable production concepts.

On the other hand, scholars agree that, although German unity has eliminated the grave problems of the GDR economy, it has not achieved the aim – proclaimed after the dissolution of the former inner-German border – of creating self-sustained upswing in the new Laender and of providing equal living conditions throughout the country *(Land, 2015 but also Halle Institute for Economic Research, 2019)*. Same finding has been confirmed by the analysis of Heimpold and Hölscher *(2015)* which describes the "economic reconstruction of the East" *(Aufbau Ost)* as incomplete, warning also against the slowdown in the catching-up process since 2000s. In short, there are still several challenges to be faced by Eastern Laender of Germany in order to foster their economic activity: the high dependence on transfer from Federal government, the fragmented corporate structures and the lack of large companies which result also in a lower level of exports in comparison with the West, the weakness of the labor market characterized by lower wages and higher unemployment, and the decline in working age population which will be more pronounced than in the Western side in the next years *(Halle Institute for Economic Research, 2019)*. Thus, this chapter aims to point out the gap between East and West Germany, analyzing

needs of the new federal states. At the same time, ifo Dresden offers economic policy advice and is a meeting place for scientists, politicians and entrepreneurs.

[21] German definition for the new states, which were dissolved by the East German government in 1952 and were re-established in 1990(Brandenburg, Mecklenburg-Vorpommern, Saxony, Saxony-Anhalt and Thuringia).
The city of Berlin, result of a merger between East and West Berlin, is usually not considered one of the new states, although many of its residents are former East Germans.

economic parameters of NUTS 2 regions[22] mainly related to productivity, labor market and innovation ecosystems.

However, if in the period following the Berlin Wall Fall the gap between East and West dominated the perceptions of territorial differences in Germany, today regional disparities emerge also between the south and the north and between cities and countries, apart from the west-east divide. On the basis of these findings, it seems appropriate to shed light on regional differences in Germany, taking into account also these recently emerged development's patterns, even though without disregarding and underestimating the still persistent economic rift between East and West.

2.2.1 Regional differences in German productivity: the west-east divide is still visible

In this section, we aim to analyze regional differences in Germany relying on some economic parameters. We will start our analysis from the Gross Domestic Product.

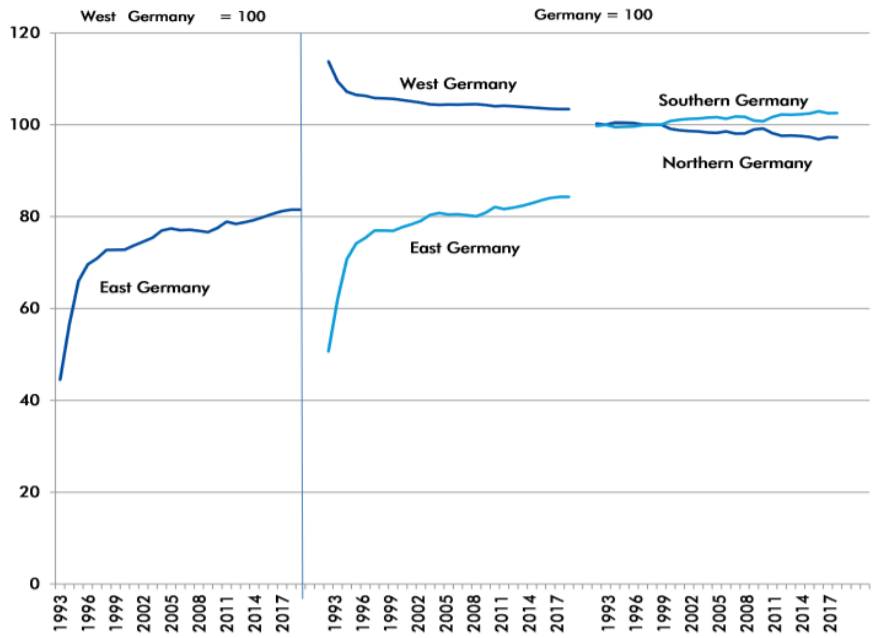
After the reunification, the variance in productivity was the most evident expression of the west-east discrepancy in economic performance. Taken into account the GDP per person employed, productivity in former East Germany in 1991 was only 45% of Western Germany (Figure 2.1). The catching-up process of Eastern Germany[23] started from 1991 and, till 2003, productivity in the new Laender increased faster than in the western side of the country *(Halle Institute for Economic Research, 2019)*. According to Land *(2015)*, already in the mid-1990s, production in East Germany reached the level of 1989 again, but with higher productivity and therefore with significantly lower numbers of employees.

[22] For some economic parameters data are related only to NUTS 1 regions, which correspond to the federal states in Germany.
[23] Berlin included

Yet, since the 2000s the pace of productivity convergence had gradually fallen, eventually progressing in tiny steps (if at all) in the last years *(Halle Institute for Economic Research, 2019)*. Several scholars involved in studies of German region economy such as Ragnitz, Heimpold, Land, Schroeder *(2015)* have indeed confirmed this alarming slowdown of the catching-up process, when they have been asked to study the East-West divide and its recent evolution.

Consequently, 2017 productivity levels in former East Germany (including Berlin) are just 82% of the West German average. None of the East German states, excluding Berlin, can match the least productive state in West Germany, namely Saarland. These findings have been revealed by the Halle Institute for Economic Research (2019), analyzing productivity levels on the basis of the German Federal States, which are aligned with the European areas of NUTS 1 (See the information box: what is the NUTS classification? At page 47).

Figure 2.1: Gross domestic product in current prices per employee



Sources: Regional Accounts VGRdL, Statistical Office of the Federal State of Baden-Wuerttemberg, Stuttgart 2018; north-south categorisation based on The Economist as of 19.08.2017 (online); urban rural categorisation based on: Laufende Raumbeobachtung des BBSR, Bonn 2017; explanation of the spatial categories: Bundesinstitut für Bau-, Stadt- und Raumforschung im Bundesamt für Bauwesen und Raumordnung, Bonn 2018; calculations and diagram by IWH.

The productivity discrepancy between East and West emerges also if we take into account the so-called NUTS 2 regions, which are the ones considered for the application of regional policies (see figure 2.2)

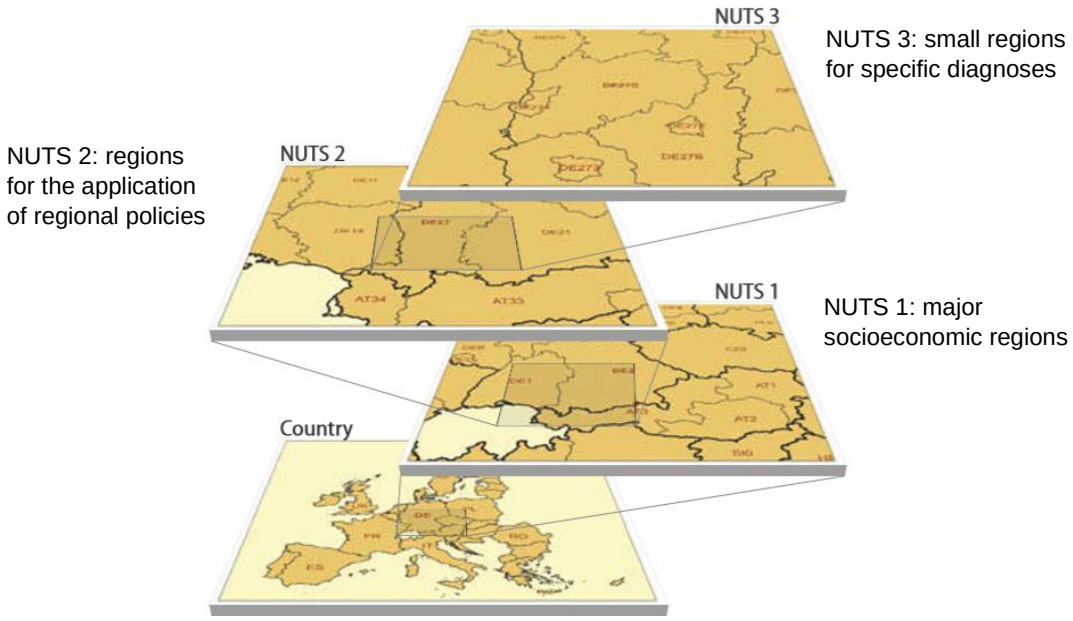
What is the NUTS classification?

NUTS, the classification of territorial units for statistics, is a geographical classification subdividing the territory of the EU into regions at three different levels – NUTS level 1, level 2 and level 3 (moving from larger to smaller territorial units).

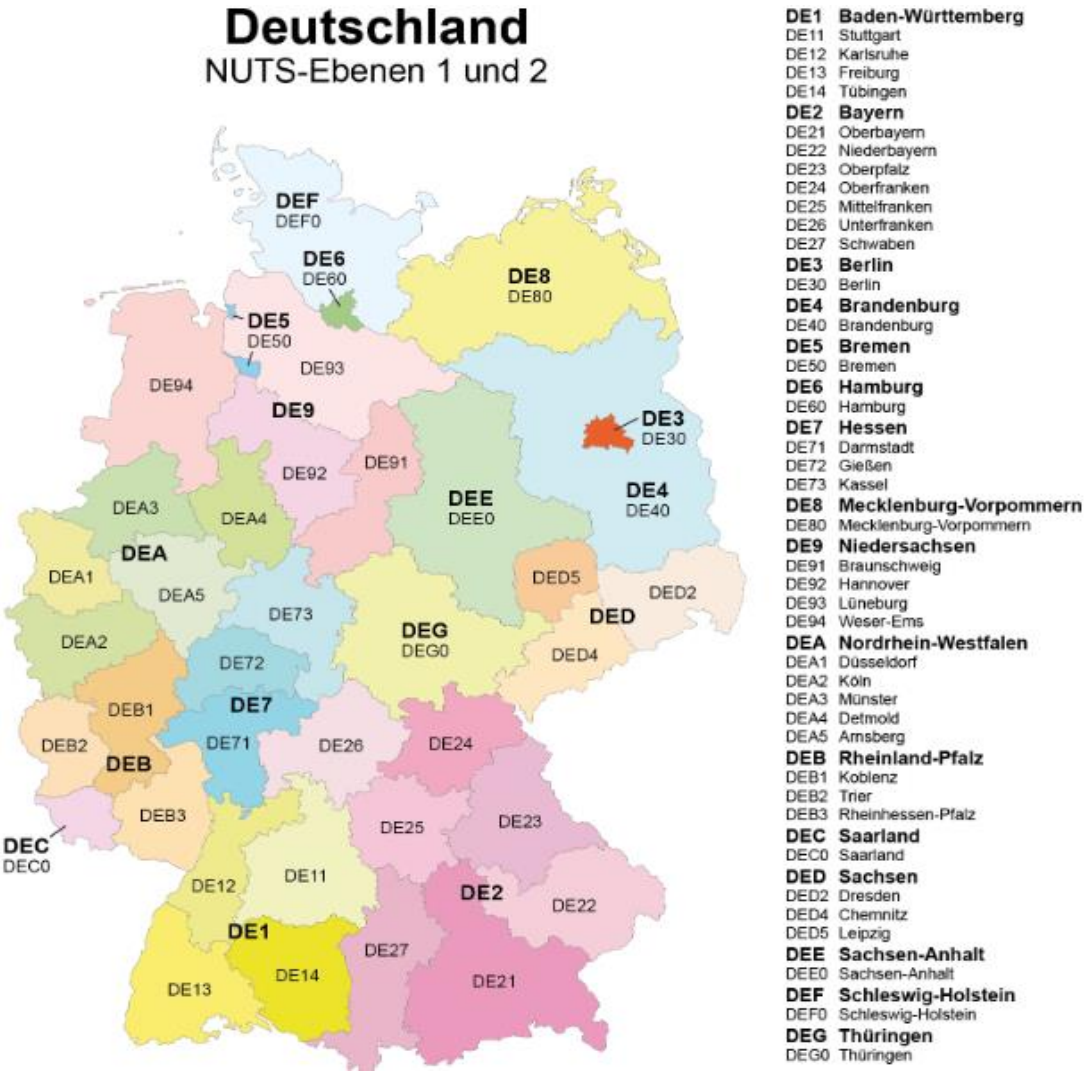
This hierarchical system for dividing up the territory of the EU is essential for the following reasons:

- Framing EU regional policies
- For the collection, development and harmonization of EU regional statistics
- Socioeconomic analyses of the regions

Purpose of NUTS classification



The legal basis for NUTS is provided for Regulation *(EC)* No 1059/2003, hereafter referred to as the NUTS Regulation. At NUTS level 1, the German regions are aligned with the Länder, for example, Baden-Württemberg (DE1) and Bayern (DE2). Each NUTS level 1 region is subsequently subdivided into NUTS level 2 regions, for example, Bayern is split into Oberbayern (DE21), Niederbayern (DE22), Oberpfalz (DE23), Oberfranken (DE24), Mittelfranken (DE25), Unterfranken (DE26) and Schwaben (DE27). In a similar vein, NUTS level 2 regions may be subdivided into the most disaggregated regional units, as defined by NUTS level 3.



DE1 Baden-Württemberg
DE11 Stuttgart
DE12 Karlsruhe
DE13 Freiburg
DE14 Tübingen
DE2 Bayern
DE21 Oberbayern
DE22 Niederbayern
DE23 Oberpfalz
DE24 Oberfranken
DE25 Mittelfranken
DE26 Unterfranken
DE27 Schwaben
DE3 Berlin
DE30 Berlin
DE4 Brandenburg
DE40 Brandenburg
DE5 Bremen
DE50 Bremen
DE6 Hamburg
DE60 Hamburg
DE7 Hessen
DE71 Darmstadt
DE72 Gießen
DE73 Kassel
DE8 Mecklenburg-Vorpommern
DE80 Mecklenburg-Vorpommern
DE9 Niedersachsen
DE91 Braunschweig
DE92 Hannover
DE93 Lüneburg
DE94 Weser-Ems
DEA Nordrhein-Westfalen
DEA1 Düsseldorf
DEA2 Köln
DEA3 Münster
DEA4 Detmold
DEA5 Arnsberg
DEB Rheinland-Pfalz
DEB1 Koblenz
DEB2 Trier
DEB3 Rheinhessen-Pfalz
DEC Saarland
DEC0 Saarland
DED Sachsen
DED2 Dresden
DED4 Chemnitz
DED5 Leipzig
DEE Sachsen-Anhalt
DEE0 Sachsen-Anhalt
DEF Schleswig-Holstein
DEF0 Schleswig-Holstein
DEG Thüringen
DEG0 Thüringen

European Commission, 2019. Methodological manual on territorial typologies, edition 2018. Manuals and Guidelines (Eurostat), Luxembourg.

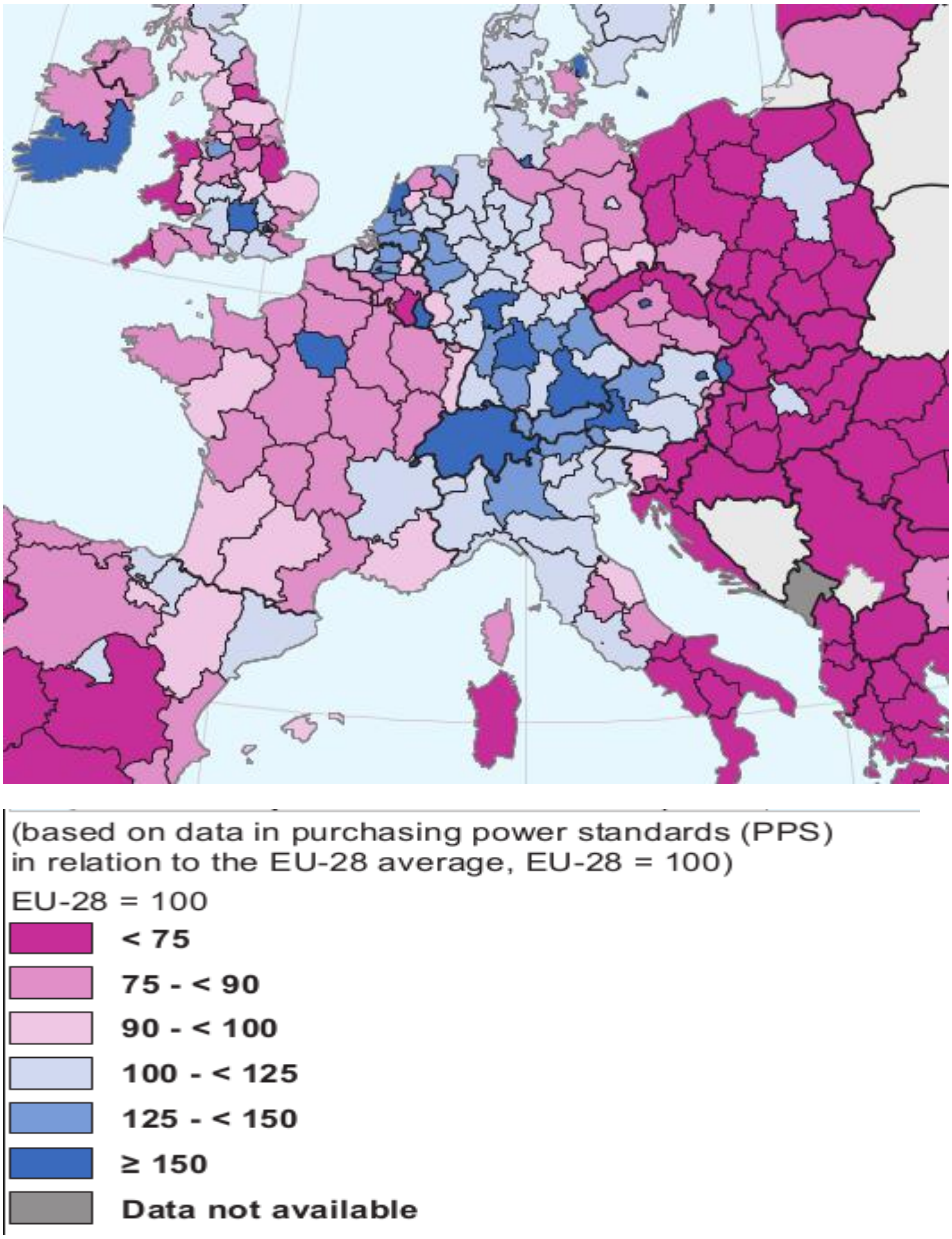
In this context, Eurostat has analyzed the gross domestic product per inhabitant based on data in purchasing power standards (PPS) in relation to the EU-28 average[24] (EU-28= 100) because it is the key variable for determining the eligibility of NUTS 2 regions in the framework of the European Union's structural policy *(Eurostat)*. Berlin turned out to be the only exception in the Eastern Germany, showing a GDP per inhabitant perfectly in line with the EU-28 average. Indeed, all those NUTS 2 regions, which in the past belonged to the former GDR economy, perform lower levels of GDP in comparison with the EU-28 average. However, some differences have to be recognized among them: Leipzig (DED5), Dresden (DED2) and Thüringen (DEG0) performance is better than others Eastern Germany's NUTS 2 regions (see figure 2.2)

But apart the East-West divide, what catch the eye in the figure 2.2 is also the regional variances in productivity between the North and the South. In fact, excluding Hamburg (DE60), Düsseldorf (DEA1) and Köln (DEA2), the north has been depicted weaker than the South. The richest NUTS 2 regions belong indeed to the South: Oberbayern (DE21) and Stuttgart (DE11).

According to Halle Institute for economic research *(2019)*, a widening difference between productivity in the north and the south of Germany does become evident also when we make comparisons between northern NUTS 1 regions and southern ones, which correspond with the German federal states (See figure 2.1). Thus, in this case, the states of Bavaria, Baden-Wuerttemberg, Saxony, Thuringia, Hesse, Rhineland-Palatinate and Saarland are counted as the south and the other states are assigned to the North. Nevertheless, the north-south gap is still far smaller than between west and east.

[24] The volume index of GDP per capita in Purchasing Power Standards (PPS) is expressed in relation to the European Union (EU28) average set to equal 100. If the index of a country is higher than 100, this country's level of GDP per head is higher than the EU average and vice versa. Basic figures are expressed in PPS, i.e. a common currency that eliminates the differences in price levels between countries allowing meaningful volume comparisons of GDP between countries (Eurostat).

Figure 2.2: Gross domestic product (GDP) per inhabitant, by NUTS 2 regions, 2016



Source: Eurostat

Now, we will focus on another aspect that characterized the regional development in Germany apart from the South-North and West-East divide: the differences in productivity between urban and rural areas.

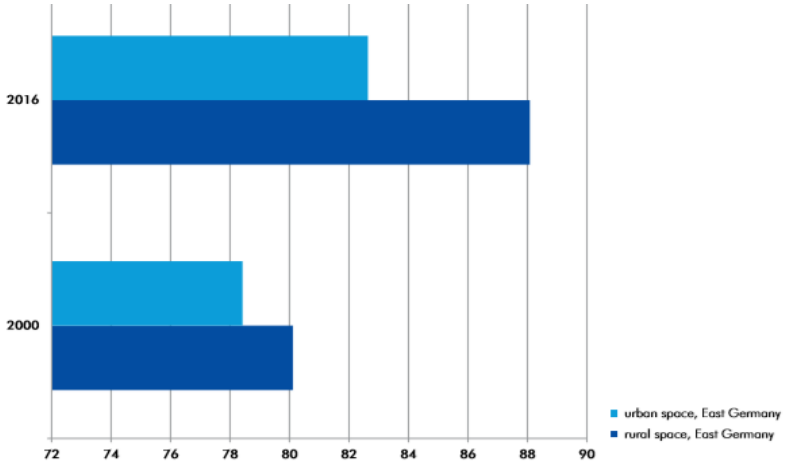
According to Halle Institute for Economic Research *(2019)*, productivity in the urban regions outperforms the rural areas in the West as well as in the East. But this is hardly surprising since built-up areas enable external economies of scale which have a positive impact on productivity as well. What is interesting to remark instead is the greater similarity between productivity in the rural regions of West and East Germany, compared to the relative productivity between cities in the two halves of the country (see figure 2.3). Thus, we can assert that rural areas in the new Laender are not intrinsically structurally weak but that, the economic power of eastern cities is not as big as the one of western cities (this aspect will be analyzed further in section 2.3 "Metropolitan cities in Germany"). Suffice is to say that, while in the West three quarters of employed people work in urban areas, the equivalent number in the eastern part is 50% of employed people *(Halle Institute for Economic Research, 2019)*. The reason behind a tiny discrepancy between rural areas in the both sides of the country stem from the time after reunification: many investors decided to put money into locations outside of the cities, where they found a favorable range of industrial and commercial land or locations near to a motorway. In addition to this, they were given suitable subsidies to do so. Prime examples of these phenomena could be considered the metalworking industry in Eisenhüttenstadt and the chemicals industry in the south of Saxony-Anhalt.

Given that, the "East Germany" is still weaker in comparison with the West considering the GDP parameter, we compare now the economic performance of the new Laender with other transition economies, which changed from central planning to free markets and faced similar severe short-term difficulties and longer-term constraints on development. Expressed as per capita gross domestic product, the East Germany regions exhibit a remarkable lead over the majority of transition areas in central and eastern Europe *(Halle Institute for Economic*

research, 2019). This result should not be surprising if we take into account that several scholars consider the eastern German experience unique among transition economies, due to the availability of western German support which guaranteed the most favorable fundamentals for a rapid transition. Dornbusch and Wolf *(1992)* stressed that eastern Germany's fortune lied in the inheritance from the Federal Government of institutions appropriate to advanced industrial countries, but also in the access to experienced administrators to run those institutions. Among these imports are a legal system, including a body of commercial law, a system of property rights, and a set of courts; a social system, including unemployment compensation and a pension system with immediate entitlements for qualified recipients; a hard currency, a system of public finance, and a banking system with branches that opened virtually immediately after unification; decentralized government authority; accounting systems; free trade access throughout Europe; and strong political parties *(Dornbusch and Wolf, 1992).*

All the same, Eastern Germany grew on average much more slowly than the four Visegrad states Poland, Slovakia, the Czech Republic and Hungary (see figure 2.4). In terms of purchase power, we can notice that Czech Republic is already very close to the economic power of East Germany *(Halle Institute for economic research, 2019).*

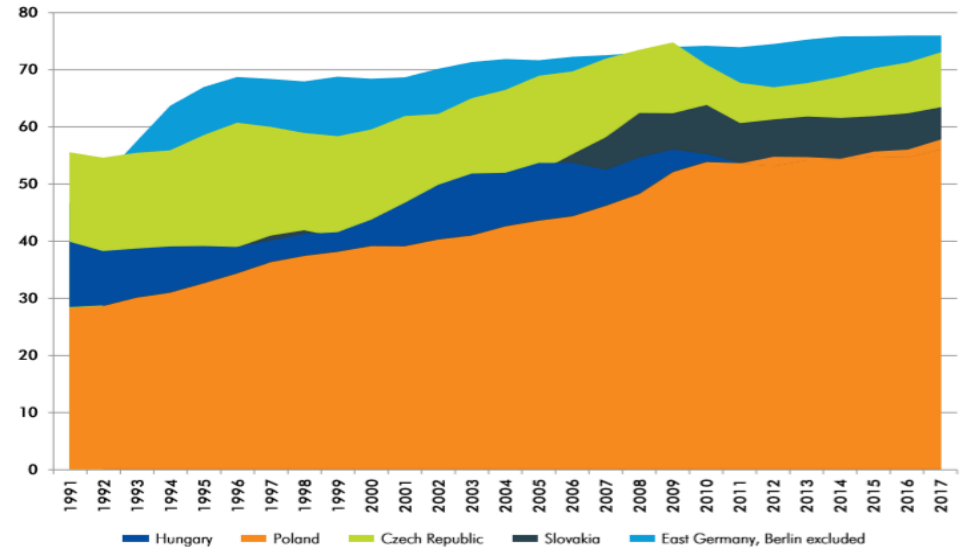
Figure 2.3: Gross domestic product per employee in urban and rural spaces in East Germany including Berlin, spatial category in West Germany = 100



Urban space: independent large cities and urban districts; rural space: rural districts with agglomeration tendencies and sparsely populated rural districts.

Sources: Regional Accounts VGRdL, Statistical Office of the Federal State of Baden-Wuerttemberg, Stuttgart 2018; urban rural categorisation based on: Laufende Raumbeobachtung des BBSR, Bonn 2017; explanation of the spatial categories: Bundesinstitut für Bau-, Stadt- und Raumforschung im Bundesamt für Bauwesen und Raumordnung, Bonn 2018; calculations and diagram by IWH.

Figure 2.4: Gross domestic product per capita in purchasing power parities relative to Germany, in %



Sources: World Bank; calculations by IWH based on Regional Accounts VGRdL and assessments of the price level in East Germany published in H. Vortmann, J. Goebel, P. Krause, G. Wagner (2013): Zur Entwicklung des Preisniveaus in Ost- und Westdeutschland, DIW Discussion Paper 1269; diagram by IWH.

2.2.2 Regional differences in the German labour market: significant wage gap between the west and the east as well as south and north

After our analysis of regional differences in Germany taking GDP as parameter, it is apt to turn now to some economic indicators related to the labor market. We decided to proceed in this way since the majority of scholars agreed on the unsatisfactory conditions of the labour market in the new Laender, Berlin included.

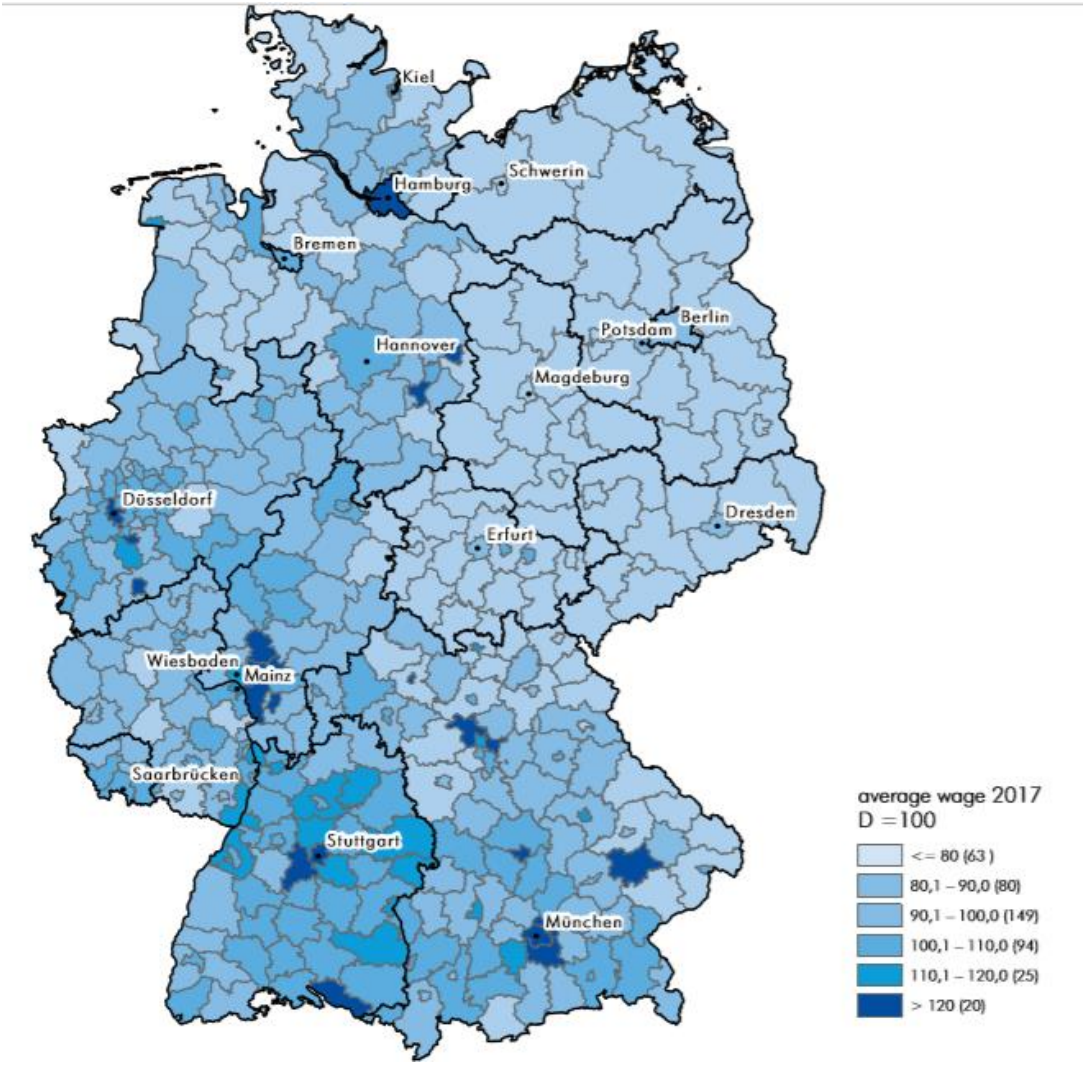
The variance in productivity between eastern and western German regions that we analyzed in the previous section (section 2.2.1) is strictly connected to the wage gaps across the country. Indeed, according to Halle Institute for Economic Research *(2019)*, the productivity deficit in East Germany is of a similar magnitude to the gap in wages. The median wage in Eastern federal states is still far below the national average: it is just 81% of the average wage in Germany. This imbalance cannot come as a surprise if we consider that already Ragnitz *(2009)* warned against the urgency of finding a suitable wage development policy for East Germany: if on one hand, the official wage contracts in eastern Germany reached 97 percent of the western German standard, the adjustment of the effective wages per hour lied only at 78 percent at that time.

This situation improved in the last years but it still unsatisfactory if we consider the labour market of Berlin: in this case, the median pay in the capital city is 97.4% of the average wage of the country. But what catch the eye in figure 2.5 is that, apart from Berlin and other few eastern cities such as Dresden and Erfurt, there are no places in East Germany that offer a comparable wage to the western standards.

However, wages differences emerge also between the south and the north of the country, in particular when we examine districts and towns: the median pay in Erlangen and Ingolstadt (both towns of Bayern in the south) is at 144.4% of the national average while average wage in Cloppenburg (north) is just 81.3% when compared to the German national wage.

In the case of Cloppenburg, we need to add that this is the West German district with the lowest median pay.

Figure 2.5: Median of monthly gross wages of full-time employees (31.12.2017) Germany =100



Source: Federal Employment Agency, calculations and map by IWH; mapping by Michael Barkholz (IWH).

Nevertheless, the situation in the north is not as dramatic as in the east since the performance of Hamburg and of few regions of North-Rhine-Westphalia with regards to wage is far above than the national one (>120%). In the East, not even Berlin, reached the values of the national average. Also in this context, the performance of the south is the best across the country: apart from Munich and Stuttgart, other four areas in the south show an average pay higher in comparison to the national one.

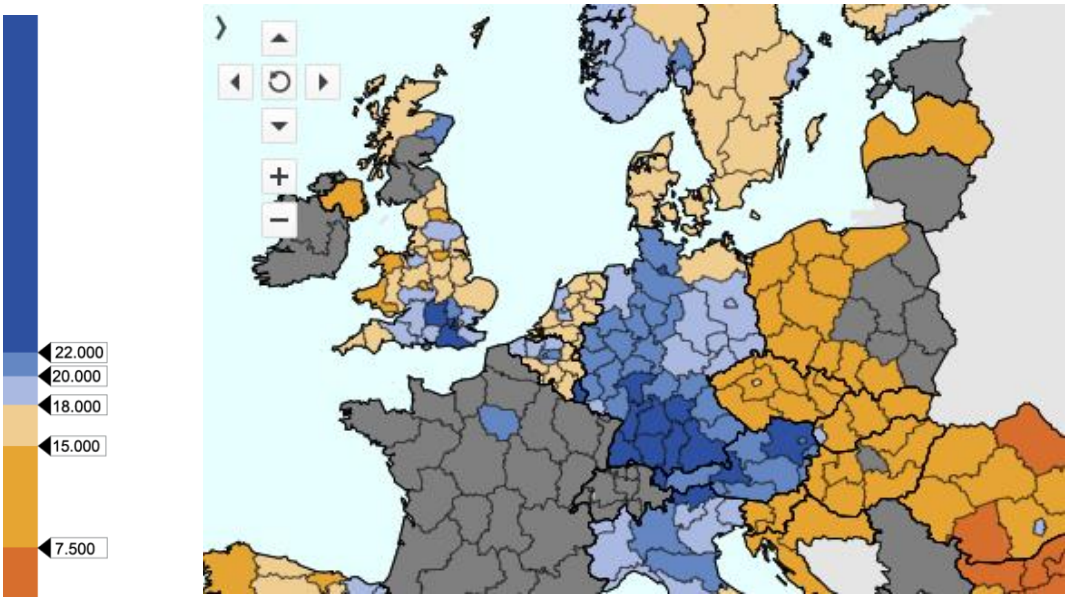
Logically, this overall picture of the wages variances reflects its patterns on the disposable income'[25]s differences across Germany. Looking at figure 2.6 we can see that there is a still evident divide between the West and the East with regards to disposable income in year 2016. In eastern Germany, all the NUTS level 2 show a disposable income's value between 18.000 and 19.100 with the exception of Mecklenburg-Vorpommern (NUTS DE 80), which present a disposable income of just 17.700. The best performing NUTS level 2 region in the east is also in this case Berlin (DE30).

Once again, the highest values can be recognized in the south of Germany: there is no NUTS 2 region with a disposable income lower than 20.000. The highest disposable incomes values are presented by Stuttgart (DE11) and Oberbayern (DE21) with respectively 23.900 and 25.900. A comparable value to Stuttgart is almost reached in the north only by Hamburg (DE60) with a disposable income of 23.700.

Despite the largest gap is between the west and the east, differences emerge also between the south and the north. Indeed, all the NUTS 2 regions in the north-west show a disposable income whose range is from 20.000 to 22.000, excluding Saarland (DEC0) and Weser-Ems (DE94).

[25] Eurostat definition: The disposable income of private households is the balance of primary income (operating surplus/mixed income plus compensation of employees plus property income received minus property income paid) and the redistribution of income in cash. These transactions comprise social contributions paid, social benefits in cash received, current taxes on income and wealth paid, as well as other current transfers. Disposable income does not include social transfers in kind coming from public administrations or non-profit institutions serving households.

Figure 2.6: income of households by NUTS 2 regions, disposable income, net, (PPS), 2016



Source: Regions and Cities Illustrated (RCI), Eurostat

But the weakness of the eastern labour market emerges also if we consider another economic parameter: the unemployment rate by NUTS 2 regions of people from 20 to 64 years old (see figure 2.7). However, in this case it is not possible to generalize since the unemployment rate in the new Laender could not be considered even among them: if Berlin (DE30) and Sachsen-Anhalt (DEE0) report highest percentages of unemployment in the country, respectively 6.1% and 5.3%, Dresden (DED2) and Chemnitz (DED4) show values similar to some NUTS 2 regions of the West. In particular, Dresden presents an unemployment rate of 3.9% which is lower than in the western Arnsberg (DEA5), and Chemnitz with its unemployment rate of 3.4% outperforms several NUTS 2 regions of the west.

Also in this context, the best performing regions are located in the south of the country: Oberpfalz (DE23), Mittelfranken (DE25), Tübingen (DE14) and Unterfranken (DE26) show an unemployment rate inferior to 2%. At the same time, all the other NUTS 2

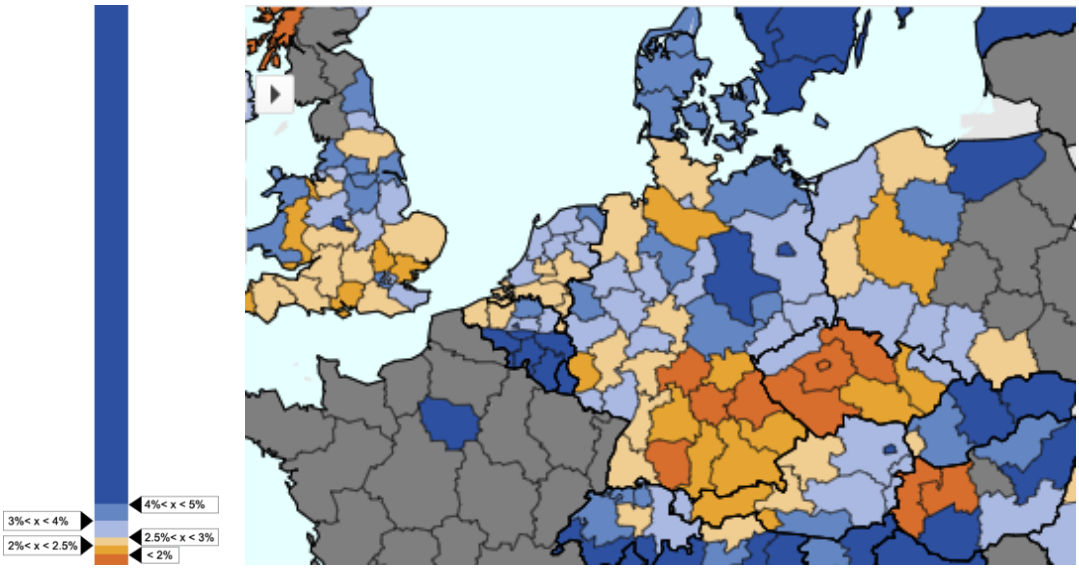
regions of the south (with the exception of Darmstadt, Freiburg and Karlsruhe) report unemployment rate ranging from 2% to 2.5%.

The best results collected in the north come from the NUTS 2 regions of Lüneburg (DE93), Schleswig-Holstein (DEF0) and Weser-Ems (DE94). Surprisingly, Hamburg does not appear among the best performing regions in the north.

However, in addition to the unemployment rate, it is reasonable to analyze the differences across the country with regards to the long- unemployment rate i.e. 12 months and more (as percentage of unemployment). In figure 2.8, we can notice that the worse performing NUTS 2 regions are in the East and that, even Dresden and Chemnitz, which showed the lowest unemployment rate in figure 2.7, are characterized by high levels of long-term unemployment. Indeed, Dresden, Chemnitz, Brandenburg and Sachsen-Anhalt show a long-term unemployment rate above 50%.

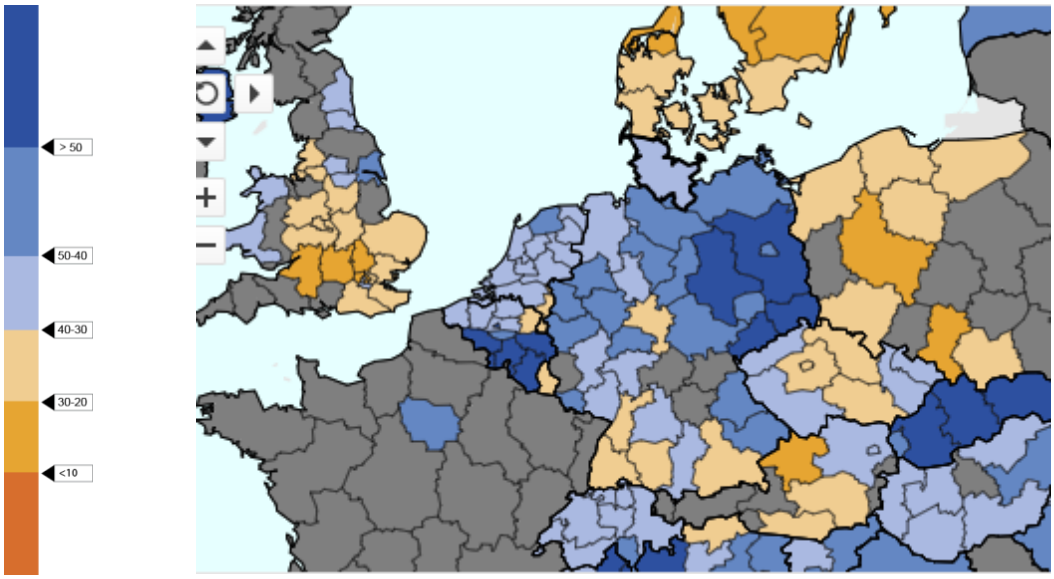
These results are in contrast with the ones of the south where four of NUTS 2 regions show levels of long-term unemployment inferior to 30% and the other regions' maximum percentage of long-term unemployment is equal to 40%.

Figure 2.7: unemployment rate by NUTS 2 regions, from 20 to 64 years old, 2018



Source: Regions and Cities Illustrated (RCI), Eurostat

Figure 2.8: Long-term unemployment (12 months and more) by NUTS 2 regions (percentage of unemployment), 2018



Source: Regions and Cities Illustrated (RCI), Eurostat

So far, we have realized that, generally speaking, the conditions of the labour market in the East of the country are outperformed by the ones offered in the south. However, if the divide is always evident between the new Laender and the southern regions, we cannot claim the same about the differences between regions in eastern Germany and north-western ones. For instance, the long-term unemployment rate of Thüringen (East) and Arnsberg (West) are quite similar (respectively 47.2% and 47.7%) or, again, Dresden and Chemnitz unemployment rate is similar to several regions of the north-west of Germany. Nevertheless, recent research suggests that the real challenge for eastern Germany in the next years is the drop in persons of employable age which will have dramatic consequences on its labour market. As already mentioned in the first chapter, the demographic issue will affect the whole Germany but the projections are much more negative for the new Laender: "Compared to the reference year 2015, the number of persons of employable age will drop by almost two fifths in the regions of East Germany (not including Berlin) by 2060, and by just under one fifth in west Germany. It follows, therefore, that the decline in the east will be twice as acute as in the west"[26].

These results are strongly connected to the patterns of qualified workers' migration flows from foreign countries, particularly from the EU. Indeed, the regions of the country benefit from foreign migration to a different degree: EU migration gains in the new Laender are not even half the national average with the exception of the capital city Berlin. Remarkably low EU migration gains are reported in Saxony-Anhalt and Saxony. On the contrary, the federal regions which benefit more from EU migrants are: Bavaria and Baden-Wuerttemberg, Hesse (located in the South), Bremen (North) and Berlin (the only exception of the East).

[26] Halle Institute for Economic Research- Member of the Leibniz Association: United Country-three decades after the wall came down. Haale, Saale, 2019).

Regional disparities are visible in Germany also if we focus on migrations flows from outside-EU, analyzing the areas in the country where blue cards[27] are issued. Berlin is again the only exception in the East. Here, the number of people in gainful employment who own the blue card is three times higher in comparison to the national average. The other new Laender perform all below-average in this regard and, consequently, they do not find a solution to their shortage of skilled workers, remaining trapped in a vicious cycle. On the contrary, Hamburg, Bremen, Hesse, Bavaria and Baden-Wuerttemberg show a proportion of blue card approvals above national wage *(Halle Institute for Economic Research- Member of the Leibniz Association: United Country-three decades after the wall came down. Haale, Saale, 2019).*

2.2.3 Regional variances in innovation across Germany: eastern regions offer strong innovative ecosystems due to high public R&D expenditure

In the first chapter (section 1.5), we discovered that Germany as a whole is a strong innovator in Europe (innovative performance between 90% and 120% of EU average) and, until 2017, it was even an innovation leader (European Innovation Scoreboard 2019, Publications Office of the European Union, Luxembourg).

Now, we investigate if the levels of the innovative ecosystems across the country are comparable at a regional dimension. In order to unveil the regional differences with regards to innovation, we will proceed relying on the Regional Innovation Scoreboard 2019 realized by the European Commission (RIS). The RIS report provides regional innovation

[27] the EU blue card offers highly educated skilled workers of non- EU- States the chance and the right to work and stay in the European Union.

benchmarks, which are usually less frequent and less detailed due to an overall lack of innovation data at a regional level.

The methodology is similar to that applied in the European Innovation Scoreboard: also in the RIS, regions have been classified into similar groups of regional Innovation Leaders, regional Strong Innovators, regional Moderate Innovators and regional Modest Innovators. In addition to this, the parameters considered are the same in both reports and are grouped in four main categories: framework conditions[28], investments[29], innovation activities[30] and impact[31]. Nevertheless, it is necessary to underline that some national indicators do not have their respective regional ones or that, for some regional parameters slightly different definitions have been applied *(Regional Innovation Scoreboard, 2019. Publications Office of the European Union, Luxembourg)*.

In the context of innovation, the country does not show evenness across its regions as well but, nevertheless, more comforting data come from the new Laender under this aspect.

All the eastern NUTS 2 regions are considered strong innovators and Berlin (DE30) and Dresden (DED2) have established themselves as leader innovation regions (see figure 2.9). If we consider only Berlin, this is not a surprising result since, many times in our analysis, it turned out to be an exception in the East. But for Dresden and Leipzig (DED5) – on the edge for being the next leader innovation region of the east – these results were not automatically foregone.

[28] For the category framework conditions, we will make comparisons among German regions considering only the following indicators: Percentage of population aged 25-34 having completed tertiary education and International scientific co-publications per million population.

[29] For the category investments we rely on the following parameters: R&D expenditure in the public sector as percentage of GDP and R&D expenditure in the business sector as percentage of GDP.

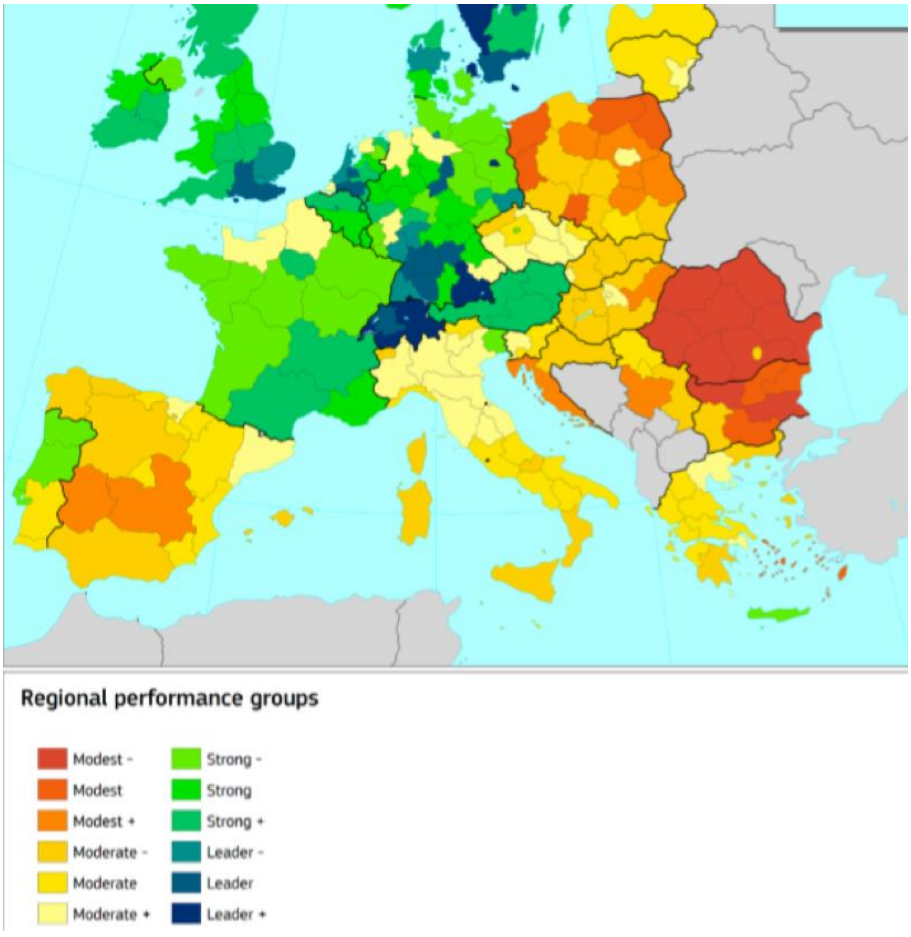
[30] For the innovation activities category, we will take into account the following parameters: Innovative SMEs collaborating with others as percentage of SMEs and number of intellectual assets' applications (patents, trademark, design).

[31] For this category only this parameter is considered: Employment in knowledge-intensive activities (manufacturing and services) as percentage of total employment.

However, the figure 2.9 shows again a visible discrepancy between the south and the north of the country. The majority of the NUTS 2 regions are classified as leader innovators and the highest score is reached once again by Oberbayern (DE21) – the regional area where Munich is located – followed by Karlsruhe (DE12), Stuttgart (DE11), Tübingen (DE14) and Mittelfranken (DE25).

In relation to the north of the country, the best performing regional areas are Braunschweig (DE91) and Hamburg (DE60).

Figure 2.9: Regional Innovation Scoreboard, overall innovative performance, 2019



Source: European Commission – Regional Innovation Scoreboard 2019

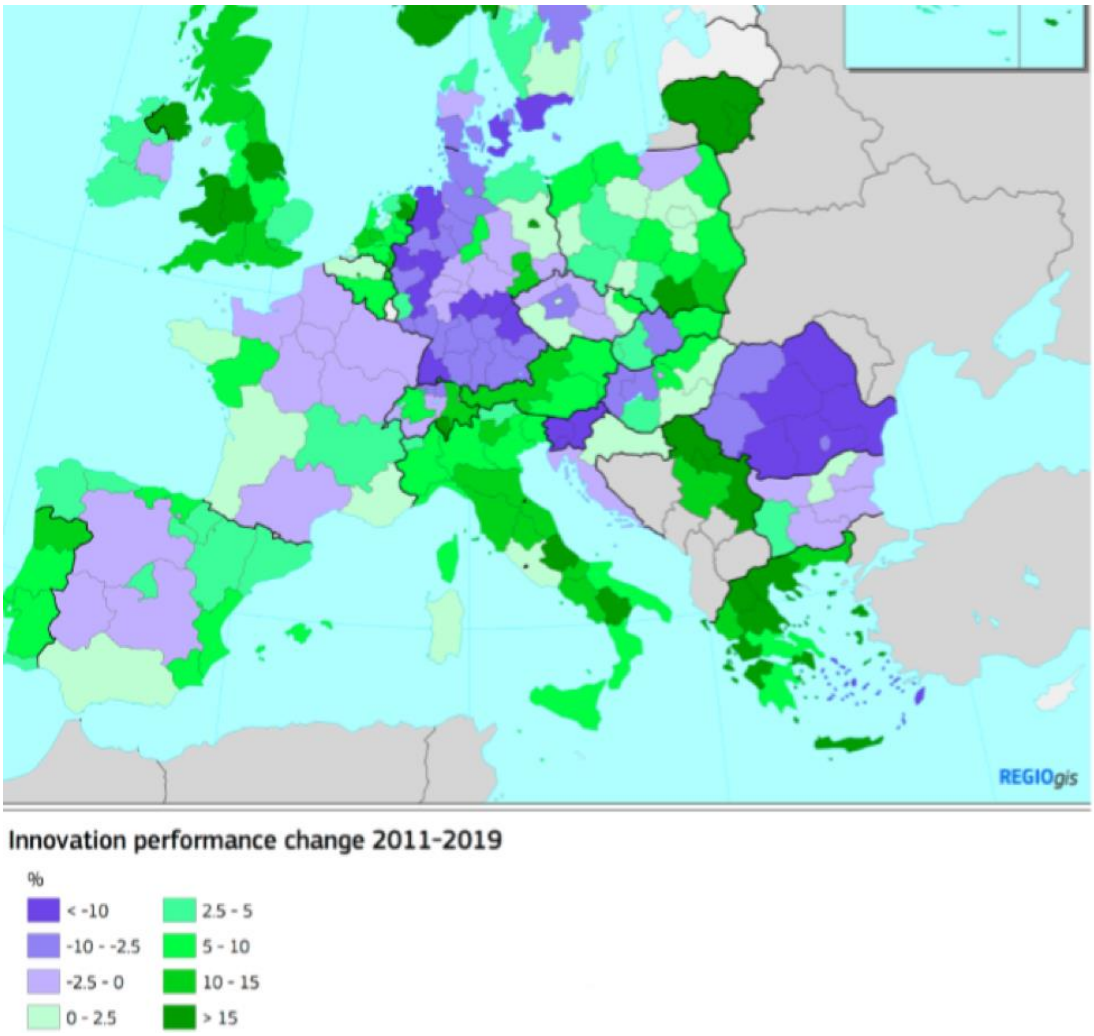
In total, there are 12 innovation leader regions, 22 strong innovators regions and only 4 moderate innovators across Germany.

At this point, it is interesting to see also the innovation performance change between the year 2011 and 2019. In this circumstance, it is clearly visible the fast development of eastern regions in the last years: apart from Dresden (DED2), Thüringen (DEG0), Sachsen-Anhalt (DEE0), all the other regions show a positive change in terms of innovative performance. Berlin is the best-performing NUTS 2 area of the country and the only region that shows a positive change of above 15%. Other positive results come from the regions of Chemnitz (DED4) and Leipzig (DED5) – whose innovation performance change has been between 10% and 15% – and from Mecklenburg-Vorpommern (DE80) which shows a slighter positive rate between 2.5% and 5% (See figure 2.10).

Apart from Braunschweig (DE91) and Hamburg (DE60), we have to underline that there is no region in the West that shows an innovative performance change comparable to eastern regions such as Leipzig and Chemnitz. Indeed, performance has decreased for 30 regions, and most strongly for Oberpfalz (DE23), Oberfranken (DE24), Unterfranken (DE26), Weser-Ems (DE94), Koblenz (DEB1), Arnsberg (DEA5), Freiburg (DE13) and Düsseldorf (DEA1).

So far, we offered an analysis of the innovative ecosystems across the country based on an average indicator which summarizes the performance of the regions on 17 parameters. For this reason, it seems apt now to consider the performance of NUTS 2 regions taking into account just some given parameters. In this way, we will shed light on the weaknesses and the strengths of eastern regions that, otherwise, would not be revealed by average calculations.

Figure 2.10: innovative performance change between 2011 and 2019, in percentage



Source: European Commission – Regional Innovation Scoreboard 2019

According to the Regional Innovation scoreboard (2019), the framework conditions for innovation in eastern regions are not optimal yet. In particular, alarming signals come from the human resources: considering the percentage of population aged 30-40 having completed tertiary education, the majority of the new Laender are considered low

performers[32] (excluding Berlin and Leipzig). On the contrary, positive results are reported in terms of research system's attractiveness: the number of international scientific co-publications per million population[33] is particularly high in the regions of Berlin, Leipzig and Dresden (high performers). But also the regions of Brandenburg, Thüringen and Mecklenburg-Vorpommern perform well, being included in the list of strong performers.

Analyzing the investments dedicated to innovation, the situation is ambivalent in the new Laender. On one hand, eastern regions show the highest levels of R&D expenditure in the public sector as percentage of GDP[34] across the country (see figure 2.11), but on the other hand their R&D expenditure in the business sector[35] is quite low when compared to the regions of the south.

Considering merely the public expenditure, two eastern German regions rank highly among the top 10 best-performing regions in Europe: Dresden (4th position) and Berlin (6th position). Notably high scores have been reached also by other eastern NUTS 2 regions: Leipzig (11th position), Brandenburg (28th position), Sachsen-Anhalt (31st position) and Thüringen (33rd position). These results prove the efforts of the German Federal Government to create and incentive innovation ecosystem also in the east of the country and, in this aspect, there is no noticeable discrepancy between eastern and western Germany.

On the contrary, huge imbalances are detected with regards to R&D expenditure in the business sector as percentage of GDP between eastern and western regions within the country. Six German regions – Stuttgart (DE11), Braunschweig (DE91), Tübingen (DE14), Oberbayern (DE21), Karlsruhe (DE12), Rheinhessen-Pfalz (DEB3) – make up the majority

[32] Measurement scale of the performers from the worst to the best: low performer, moderate performer, strong perform, high performer.

[33] Indicator: Number of scientific publications with at least one coauthor based abroad / Total population.

[34] Indicator: All R&D expenditures in the government sector and the higher education sector / Regional Gross Domestic Product.

[35] Indicator: All R&D expenditures in the business sector / Regional Gross Domestic Product

of the top 10 in Europe. But, as we can notice, none of these regions belong to the East which still suffers from paucity of innovation investments by the private sector. In this context, the largest variances are between west and east but differences are reported also between the south and the north: while southern regions are considered high performers, in the north there are only strong or moderate performers[36].

Among the indicators supplied by the RIS *(2019),* there are also the innovation linkages and the numbers of intellectual assets' applications (Patents, trademarks, design) created by the innovative activities in a specific region. Surprisingly, in the first aspect, the new Laender's performance is better than the one of western regions. Indeed, there is a higher number of SMEs with innovation co-operation activities[37] in the east in comparison with the west. In this perspective, eastern regions are more willing to embrace the opportunities offered by the concept of open innovation.

On the contrary, the numbers of intellectual assets applications of eastern German regions are not comparable to the ones in western regions (in particular to southern regions of the west). This discrepancy is particularly notable in the case of patent applications[38]: while in the south almost every region is a high performer, in the east the majority of regions belongs to the low performers' category (see figure 2.12). The only two exceptions of the east are represented by Berlin and Dresden (almost high performers). The best-performing regions of the country are located in the south and their performance is the best also at a European level: Oberpfalz (2nd position), Stuttgart (5th position), Mittelfranken (6th position) Oberbayern (8th position). The superiority of the south under this aspect is confirmed also

[36] Excluding Braunschweig that is the only region of the north considered a high performer with regards to the R&D expenditure in the business sector.

[37] Indicator: Firms with co-operation activities are those that have had any cooperation agreements on innovation activities with other enterprises or institutions / Total number of SMEs.

[38] Indicator: Number of patents applied for at the European Patent Office (EPO), by year of filing. The regional distribution of the patent applications is assigned according to the address of the inventor / Gross Domestic Product in Purchasing Power Standard.

by the data collected by the European Patent Office: Oberbayern is the second-leading European region with regards to the forth Industrial revolution's inventions but also other southern areas such as Stuttgart and Darmstadt rank in the European top 10 regions. Oberbayern stands out for its contribution to vehicles, but is also well represented in a number of other core technologies (Software, Connectivity), enabling technologies (Security, Position determination) and application domain fields (Manufacture, Infrastructure). The regions of Stuttgart and Darmstadt have leading positions in Vehicles and, in the case of Darmstadt, Artificial intelligence and 3D systems.

Also in the case of trademark applications[39], western regions perform better than eastern ones with the only exception of Berlin. The capital city shows a number of trademark applications higher than in Hamburg and Oberbayern, high performers NUTS 2 regions of the country under this aspect.

We discovered similar patterns of differences also in relation to the number of design applications[40]. The performance of western regions is better than in the east and, also in this circumstance, Berlin is the only exception.

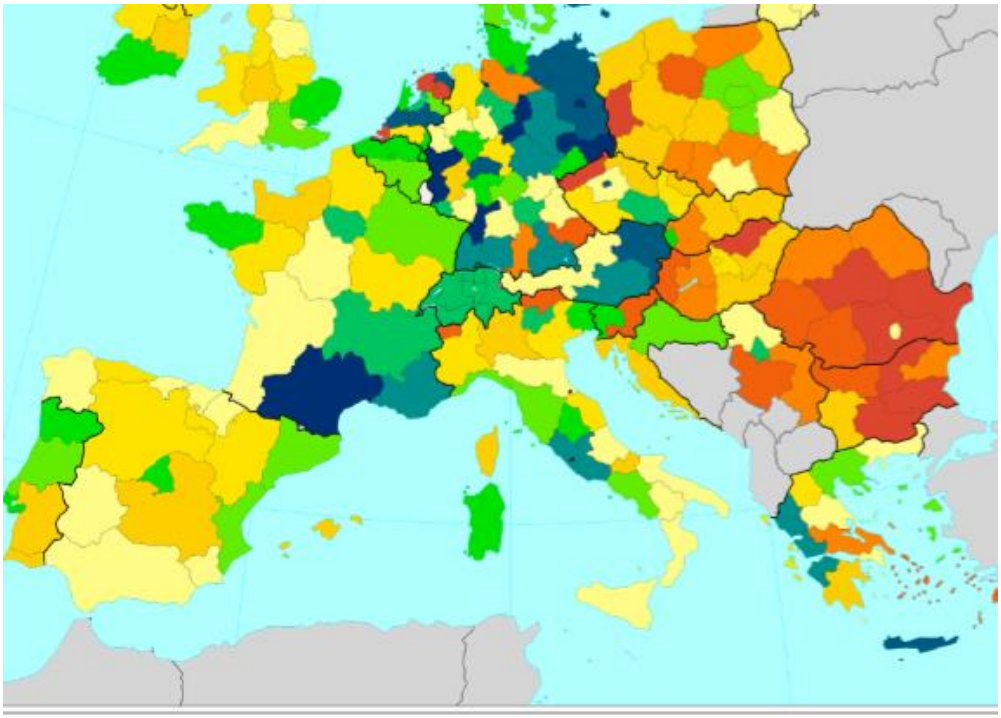
The supremacy of the south innovation ecosystem is revealed also by considering its impact on employment. Almost every region of the south is a high performer in relation to the employment in medium-high/high-tech manufacturing and knowledge intensive services as percentage of total workforce. In contrast with the south, 3 eastern regions are moderate performers, 4 strong performers and the capital city Berlin is again the only high performer in the East. Germany is well represented in the top 40 European regions with 13 regions but all of them belong to the south of the country, apart from Braunschweig and Hamburg in the north. These results show once again that some imbalances are registered also between

[39] Indicator: Number of trademarks applied for at EUIPO / Gross Domestic Product in Purchasing Power Standard.

[40] Indicator: Number of designs applied for at EUIPO / Gross Domestic Product in Purchasing Power Standard.

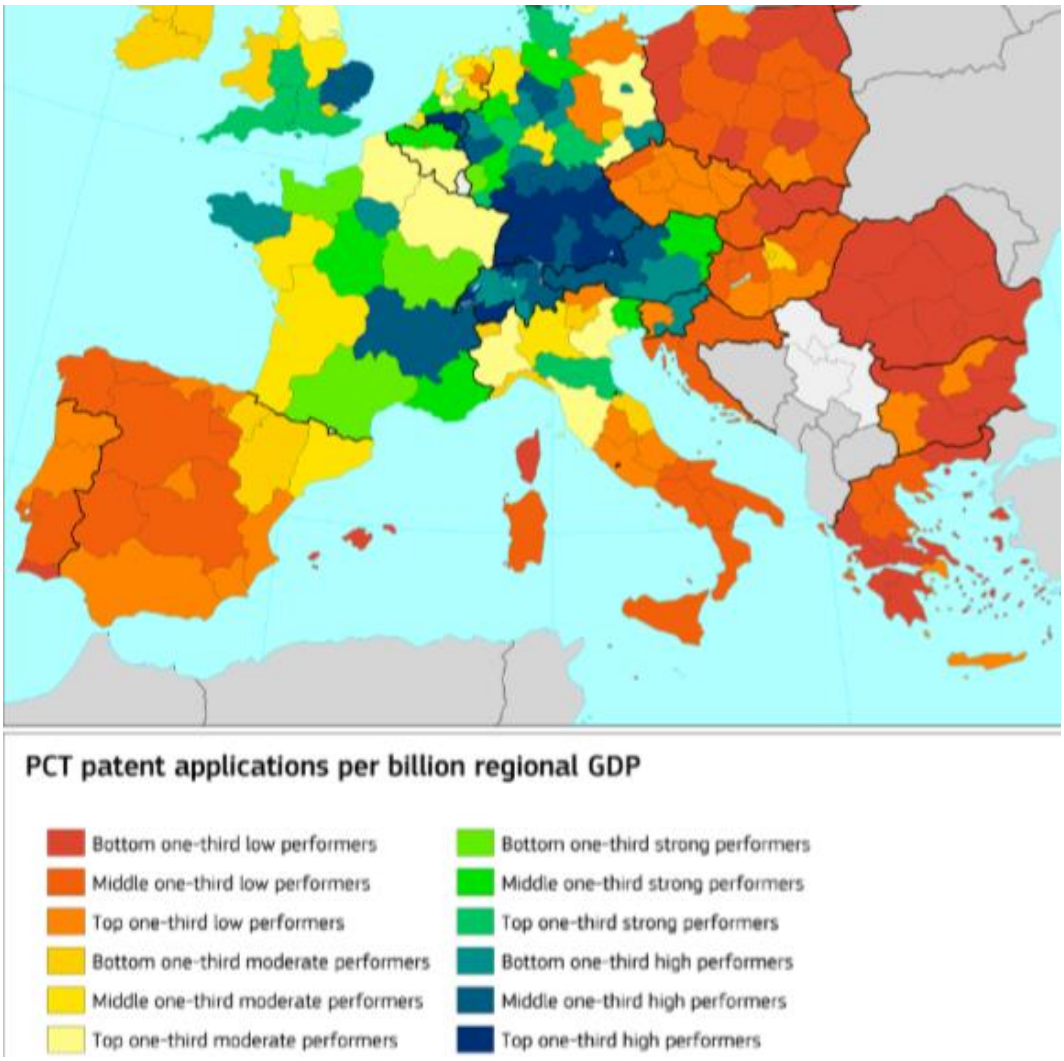
the south and north across the country. This gap between the south and the north is confirmed also by the fact that the best-performing eastern regions (Berlin excluded) are the ones belonging to the Saxony federal state (Chemnitz, Dresden, Leipzig) and Thüringen, regarded by several scholars as southern areas of the country.

Figure 2.11: R&D expenditure in the public sector as percentage of GDP



Source: European Commission – Regional Innovation Scoreboard 2019

Figure 2.12: Patent applications per billion regional GDP



Source: European Commission – Regional Innovation Scoreboard 2019

2.3 Metropolitan regions in Germany: Berlin-Brandenburg and the Saxon triangle lag behind metropolitan areas in the west

As previously mentioned at paragraph 2.1, cities and their surrounding areas are gaining more and more relevance in our globalized world and they are considered true engines of economic growth and innovation *(OECD Regions and Cities at a Glance 2018)*. Among scholars there is a general consensus that larger spatial agglomerations provide positive externalities that basically stem from the dynamism of large cities and regions *(European Commission, 2017)*. In short, cities represent today not only the main interconnected nodes of global physical infrastructure but also pools of human capital and skills and thus, places where new innovation incubators arise and take shape (e.g. Fujita et al., 1999; Fujita and Thisse, 2003; Duranton and Puga, 2001, 2004; Martin and Ottaviano, 2001; Ellison et al., 2010). According to Glaeser (2011), "Urban density provides the clearest path from poverty to prosperity". In his view, in development terms, equity derive from greater efficiency and such efficiency results mainly from big agglomerations power and from the synergies created across them.

In the last years, prominent economic organizations such as the OECD and the EU have urged to find a definition for these active urban agglomerations, on the base of the remarkable role they play for economic growth and development within countries. In this context, OECD *(2018)* defined these large agglomerations as "functional urban areas that consist of densely populated urban centers (at least 1500 inhabitants per square kilometre) and adjacent municipalities with high levels of commuting (travel-to-work flows) towards the densely populated municipalities". These functional urban areas can be divided in four categories on the basis of their size, in accordance with the book Redefining "urban",

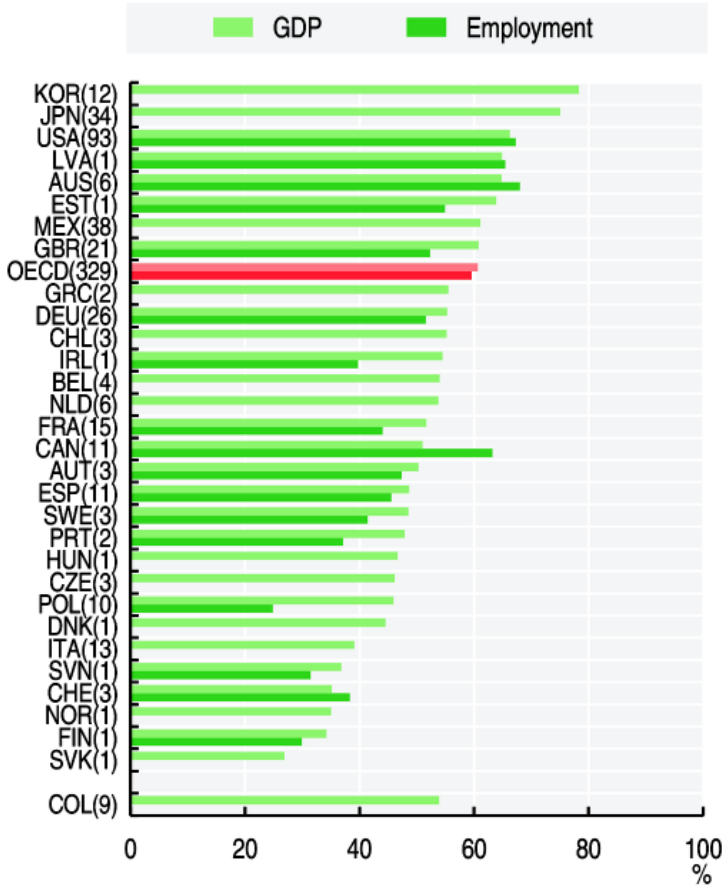
A new way to measure metropolitan areas, OECD Publishing 2012:

- Small functional urban areas → population between 50,000 and 100,000
- Medium-sized functional urban areas → population between 100,000 and 250,000
- Metropolitan functional urban areas → population between 250,000 and 1.5 million
- Large metropolitan functional urban areas → population above 1.5 million

This classification is in line also with the one provided by the EU. Indeed, also the European Union defined metropolitan regions as urban areas of at least 250.000 inhabitants. Metropolitan regions correspond to NUTS 3 regions or a combination of NUTS 3 regions *(Methodological manual on territorial typologies, edition 2018, European Commission).*
Since we aim to offer an analysis of the regional development patterns related to Germany, it seems appropriate to shed light on the relevance and the distribution of the metropolitan spatial dimension within the country. It appears worthy doing so not only because urban areas are considered today motors of economic development but also due to their contribution to national economies: in Germany, GDP and employment of metropolitan areas constitutes respectively 55.27% and 51.59% of the national value (see figure 2.13)[41]. These results are a bit above the average of European countries: OECD states that metropolitan regions represent on average less than half (48%) of total GDP in European OECD countries, while they generate on average 66% of national GDP in countries in continents such as America and Asia.
Taking into account the weight that metropolitan regions have on the German national economy, it seems reasonable now to see how metropolitan areas are spread over the county.

[41] In these calculations metropolitan regions are considered those ones with at least 500.000 inhabitants (on the basis of this threshold, there are 26 metropolitan areas in Germany).

Figure 2.13: GDP and employment in metropolitan areas as a % of the national values, 2016



Source: OECD Regions and Cities at a Glance 2018, OECD Publishing

According to BBSR[42] *(2011),* The European discussions about the urgency of a connected European urban system and its consequences for national urban systems have also remarkably encouraged the discussion in Germany. The Germans also had lively discussions in the 1990s about the role of globally oriented German cities and city regions and the challenges they tackled.

[42]German Federal Institute for Research on Building, Urban Affairs and Spatial Development.

In this context, 1995 was a crucial year for Germany in terms of special development policies. In this year, the Political Framework for Regional Planning (HARA) was established and so, a spatial planning concept of European metropolitan regions in Germany was laid down and defined as follows:

"The Standing Conference of Ministers responsible for Spatial Planning considers European metropolitan regions to be spatial and functional locations whose outstanding functions on an international scale have an impact beyond national borders. As engines of societal, economic, social and cultural development, they are to maintain the efficiency and competitiveness of Germany and Europe and to contribute to speeding up the European integration process".

At that time, the criteria for being considered a metropolitan area were not only general ones such as large population and high population density, relevant economic power and the impact of their economy in external countries but also the following parameters:

- political and economic decision-making nodes with registered seats of internationally important authorities, of large companies, umbrella organizations;
- research and innovation centre with internationally important institutions in the fields of science, teaching and research and development;
- large transport hub with a very favourable location within the European transport and communication network, international airports, seaports;
- cultural supply in the private and public sector internationally oriented.

On the basis of the above-mentioned parameters, Berlin/Brandenburg, Munich, Rhine-Main, Stuttgart, Hamburg, Rhine-Ruhr as well the Halle/Leipzig Saxon Triangle were established as the first European metropolitan regions of the country.

However, we must wait year 2005 to see the Federal Government analyzing determined and more specific indicators in order to deal properly with the new spatial development concept *(BBSR, 2011).* This time, the Government distinguished metropolitan areas analyzing parameters gathered in three main areas, the so-called functional areas:

- decision-making and control function → relevance of the city as a political and economic center. Examples: seats of governments, registered offices of large enterprises and other important institutions, banks, insurance companies or stock exchanges;
- innovation and competition function → significance of an area as a science and research center. Examples: the availability of top-quality cultural institutions and number of scientific and research institutions and of their publications;
- gateway function → the involvement of this city in an international context. Examples: good international accessibility and opportunities to exchange knowledge and information (number of congresses, conventions, trade fairs and so on), high-quality transport infrastructure.

According to BBSR *(2011),* these three metropolitan functions were underpinned with a total of 24 parameters. As a result, other 4 regions were included in the list of the large metropolitan cities of Germany: Nuremberg, Hannover-Braunschweig-Wolfsburg, Mannheim-Ludwigshafen[43] and Bremen-Oldenburg.

[43] More recently this area is defined also as "Rhein-Neckar"

Thus, Germany today counts a total of eleven large metropolitan cities (see figure 2.14). In accordance to GaWC[44], five of these areas are the most frequently compared with other European metropolitan areas for investment and market development and for this reason they are called also the "Big Five": Munich, Frankfurt, Rhine-Ruhr region, Berlin, Hamburg.

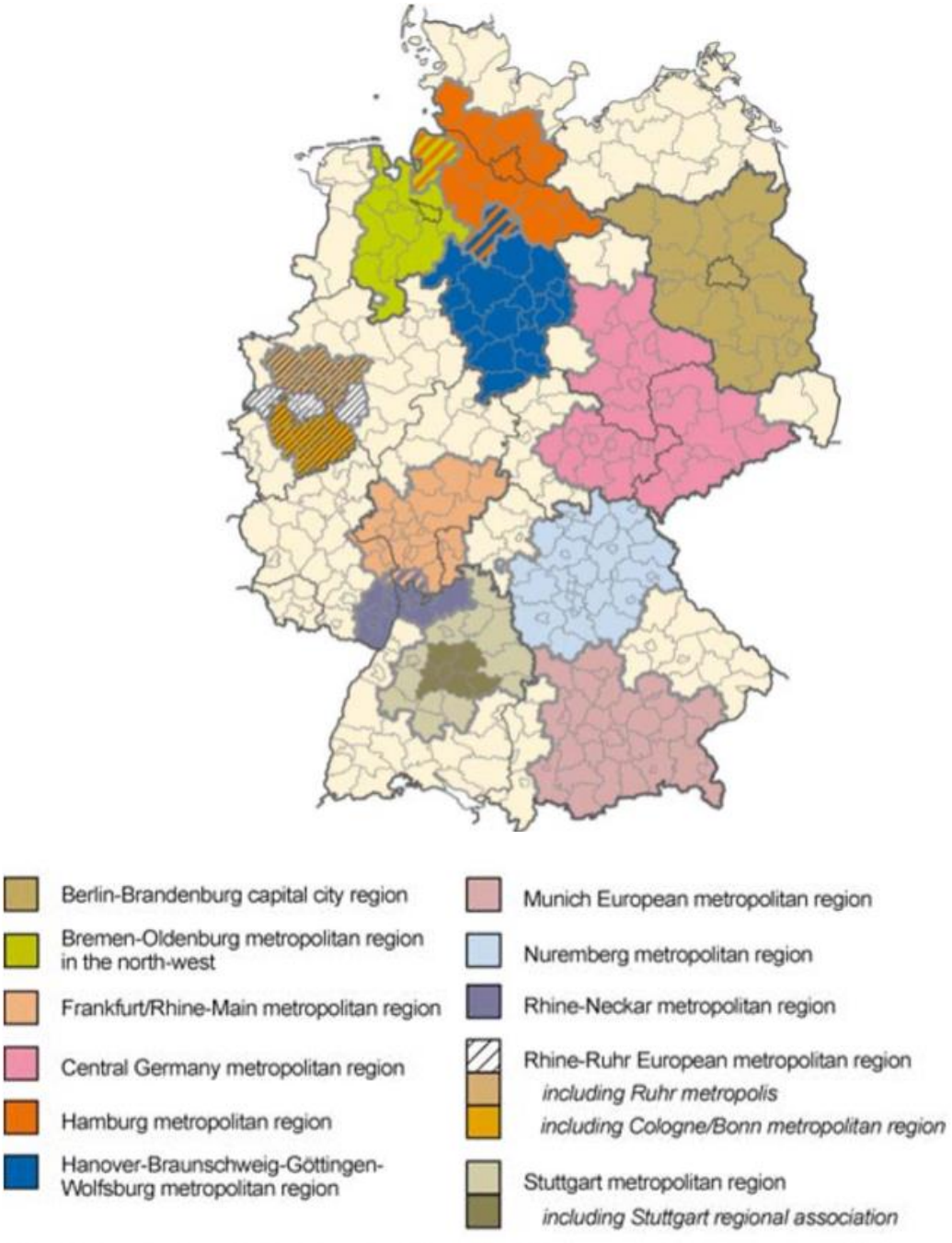
In short, we can claim that Munich is largely considered the richest area in Germany and it is known for its science, technology and business community while Berlin is famous for its creative industry and for its political relevance. Moreover, Frankfurt area is known instead for its financial economy and its large transport hub, Hamburg for the role it plays for global logistics and Rhine-Ruhr region for its technology and industry.

But the eleven metropolitan regions within the country present many differences among them, especially in terms of their economic impact. First of all, we can notice that just two metropolitan areas are present in the Eastern side of the country: Berlin and the Saxon Triangle (Mitteldeutschland).

Despite Berlin is the capital of the country, it has not the largest economic impact on Germany. Indeed, OECD recognizes Munich as the metropolitan area with the highest GDP per capita compared to the national average *(OECD Regions and Cities at a Glance 2018, OECD Publishing)*.

[44] GaWC is an abbreviation for Globalization and World Cities Research Network. It is a think tank that studies the relations between world cities and globalization.

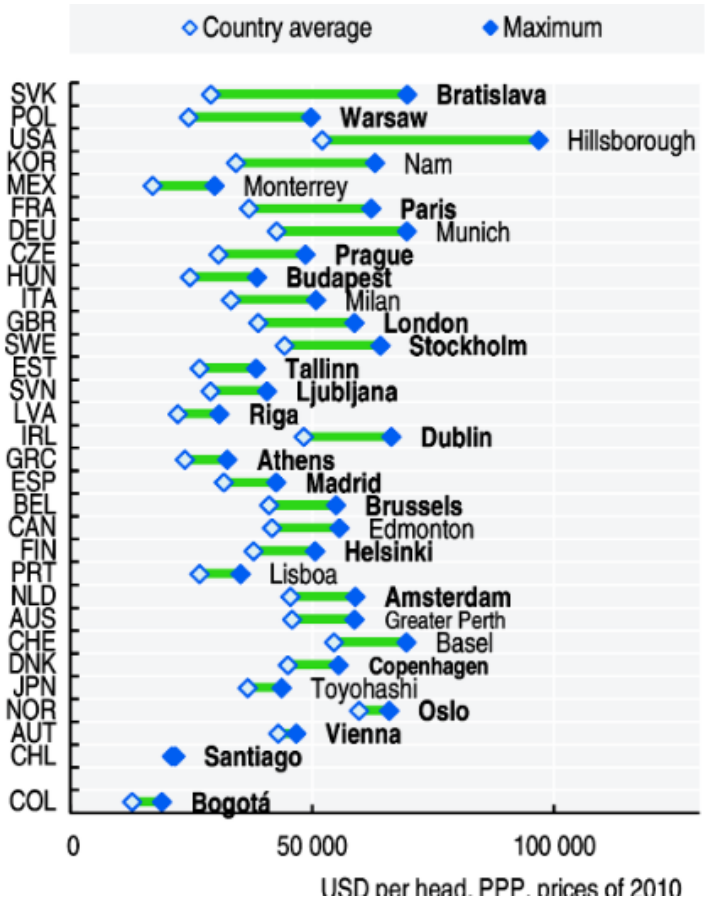
Figure 2.14: metropolitan regions in Germany



Source: BBR/IKM: Regionales Monitoring – Daten und Karten zu den Europäischen Metropol regionen in Deutschland

According to the OECD, Capital metropolitan areas (i.e., metropolitan areas that include the capital of the country) are the richest metropolitan areas in the majority of world's countries. In the report "OECD Regions and Cities at a Glance 2018", capital metropolitan areas are the richest ones in 22 out of 31 countries analyzed but this is not the case of Germany (see figure 2.15).

Figure 2.15: metropolitan areas with the highest GDP per capita compared to the national average, 2016



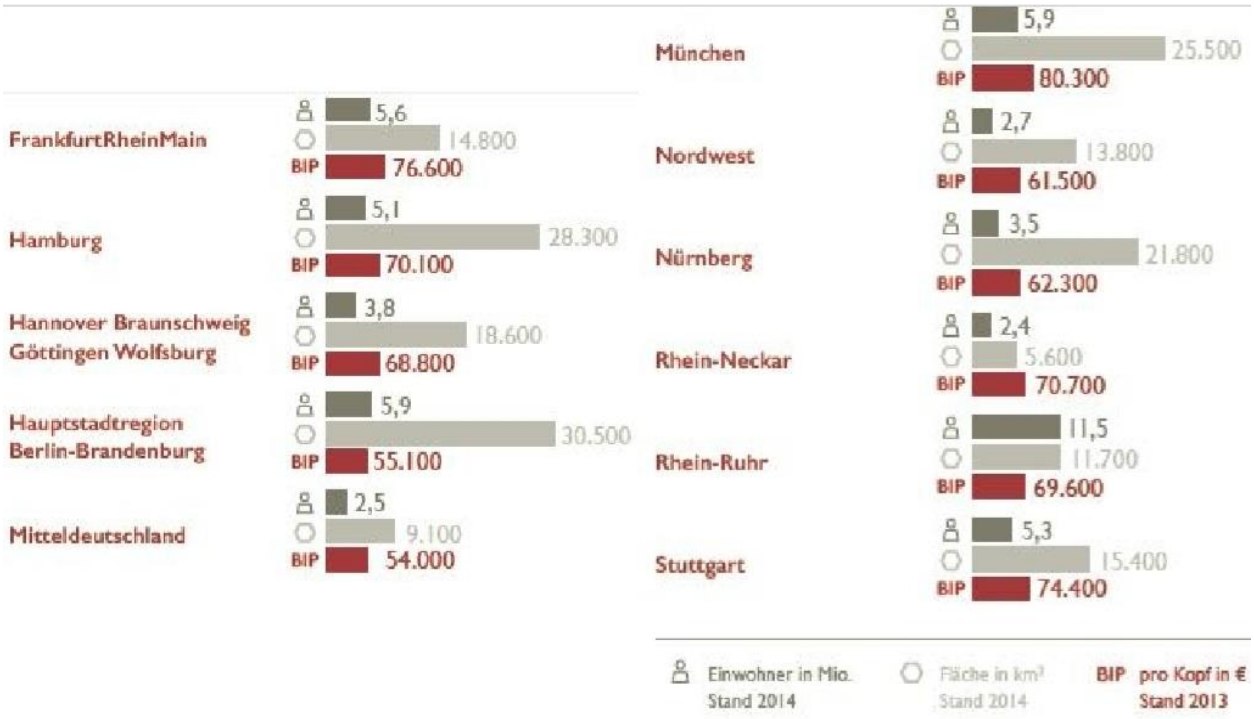
Source: OECD Regions and Cities at a Glance 2018, OECD Publishing, Paris

Also the Initiativkreises Europäische Metropolregionen in Deutschland (IKM)[45] highlighted the economic imbalances of German metropolitan regions, showing again that Munich is the richest area taking GDP per capita as parameter. In figure 2.16 for each metropolitan region have been captured three indicators: inhabitants in million, land area in square km and GDP per capita in euro. What catch the eye for our west-east analysis is that, the only two metropolitan regions located in the eastern side of the country (Berlin-Brandenburg and Mitteldeutschland), show the lowest GDP per capita among all the other areas. Accordingly, a brief further analysis concerning these two metropolitan regions is necessary.

According to the BBSR, Berlin-Brandenburg lags behind metropolitan regions in western Germany in terms of business decision making and control functions, while demonstrating strong political decision making. In particular, Berlin has the edge on other German metropolitan regions by reason of its capital city status. Moreover, if on one hand, Berlin has established itself as a flourishing cluster for the ICT, Media and creative industries, on the other hand it still lacks the big and profitable industries present in the south of the country *(Germany Trade & Invest, 2015)*.

[45] Translation: initiative committee for European metropolitan regions in Germany. Since 2001, the eleven metropolitan regions have been cooperating within this organism in order to present themselves as large growth and innovative regions and to position themselves within the European context. Since then, forms of organisation and strategies have been developed by lively exchange, projects implemented and occasionally difficult debates on the relationship of this new policy model to established actors and concepts tackled. The initiative committee has also actively joined the discussion about the integration of metropolitan regions into the new Concepts and Strategies for Spatial Development. It has also improved the acceptance of metropolitan regions on the European level and thus considerably influenced their perception within policies, programmes and discussions of the European Commission and other institutions (BBSR: Metropolitan areas in Europe. BBSR-Online-Publikation 01/2011. Eds.: Federal Institute for Research on Building, Urban Affairs and Spatial Development within the Federal Office for Building and Regional Planning, Bonn, January 2011).

Figure 2.16: German metropolitan regions in numbers, 2014



Source: Initiativkreis Europäische Metropolregionen in Deutschland

In relation to the Saxon triangle, it originally consisted of the cities of Leipzig, Halle, Dresden, Chemnitz and Zwickau but it has expanded recently in search of new partner-cities in the Laender of Saxony-Anhalt and Thuringia. According to BBSR, the polycentric structure of this area is quite interesting because it represents an exception in the context of the German metropolitan regions. Indeed, the Mitteldeutschland metropolitan region is the only one that present such a decentralized structure, when excluding the Rhine-Ruhr area. This polycentric structure can be considered ambivalent: On one hand, it is favourable in terms of framework structures i.e. there are fewer disadvantages of conubartions, on the

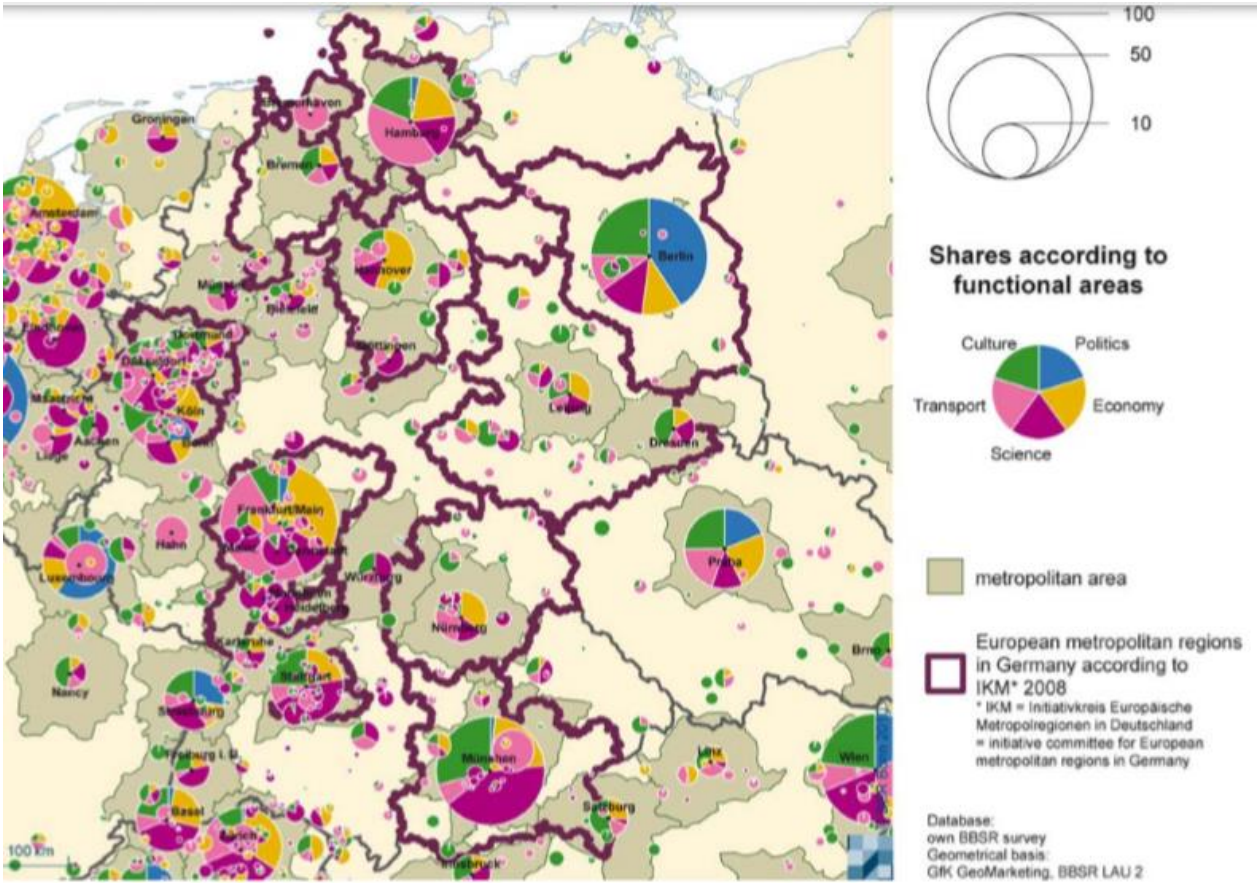
other hand, it can be adverse if we consider the efforts related to the governance of such a heterogeneous area i.e. the complex interrelationships between the all involved stakeholders. However, the two eastern German metropolitan regions are in an exceptionally good shape when compared nationwide with regards to capability of generating knowledge. In addition to this, positive results come from their gateway function: Berlin-Brandenburg as well as Mitteldeutschland provide excellent transport infrastructure and a wide offer of trade fair facilities and conferences *(BBSR, 2011).*

All in all, we can claim that eastern metropolitan regions are still weaker in terms of economic power when compared with those in western Germany, but they have grown a lot in the last years and they represent an unmissable and, probably, the only one chance for the East to further develop in the era of globalization. Indeed, according to the Halle Institute for Economic Research *(2019)* the promotion of cities in the eastern side of the country should be on the political agenda of the new Laender: it must be accepted that eastern cities are the only source to drive economic convergence with the west. Therefore, investments should be addressed to increase their potential because "this is the only way to entice qualified immigrants, develop high-quality service offers and provide an adequate environment for further public research establishment"[46].

However, it is fundamental to keep in mind that the differences and imbalances among metropolitan regions in Germany largely depend on the function that we consider. From figure 2.17, it is possible to gain information about networking opportunities of locations of specific functions within German metropolitan regions.

[46] Halle Institute for Economic Research (IWH)- Member of the Leibniz Association (ed.): United country- three decades after the wall came down. Halle (Saale) 2019. Pag. 23.

Figure 2.17: metropolitan functions in Germany



Source: Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR), BBSR-Online-Publikation 01/2011

Weaknesses and Strengths of East Germany

3.1 The long shadow of the GDR's centralized economy: transfer dependence from Federal Government has diminished but still persist

In order to understand the "economic reconstruction of the East", it is necessary to remember that history matters and has its weight. According to Ragnitz *(2009),* it is important to keep in mind that in the late fall of 1989, the GDR was not only politically, but above all economically, ruined. In this respect, the mass protest of 1989 not only mirrored the popular outrage caused by the deprivation of their personal and political rights of freedom but also the general dissatisfaction with the lacking supply of goods and services. The dramatic economic backwardness of the GDR was confirmed in a confidential study of the governmental planning authorities which claimed that the GDR's economy was close to insolvency *(Schürer et al. 1989)*. However, when we speak in general terms of a bankrupt economy, we are not just referring to its debt situation. In the specific case of GDR, reference is mainly made to a low labor productivity, to structural inefficiency, and to a general backwardness of the productive apparatus. In particular, the low labor productivity was undeniable: it was 45/55 % lower than the labor productivity in West Germany *(Giacché, 2013).*

According to Giacché, the causes of this backwardness can be grouped into three main reasons: reasons related to the starting conditions and to the historical context in which the GDR developed, reasons attributable to the economic system, reasons related to wrong economic policy guidelines.

Analyzing the first aspect, we should mention that the weight of the war reparations decided between the winners and due to the Soviet Union fell almost entirely on the GDR, while West Germany could take advantage of the aid of the Marshall Plan provided by the United States. In addition to this, the huge migratory flows from the East to the West of the country caused also damages to the GDR's economy since, until 1961, eastern Laender lost almost 20% of their labour force. Another unfavorable element for the GDR was its integration with the Comecon[47], which was mainly composed of historically more backward economies than the western ones, but above all from economies that were excluded from the global market. This relative segregation from the global market was worsened by the introduction of the "Hallstein doctrine" from the Federal Republic of Germany (FRG). In short, any foreign government (with the exception of the Soviet one) that had recognized the GDR would automatically have broken off relations with FRG *(Atlante Geopolitico Treccani, 2018)*.

Coming now to the reasons related to the economic system, Giacché *(2013)* mentioned the thesis, formulated in 1946, by a leading Sed[48] exponent such as Anton Ackermann, of a "particular German way to socialism". This project was soon shelved and the East German economy was reorganized by adopting the Soviet model, which foresaw a rigid economic centralization and administrative management of the economy. The attempt to "transform the predominantly administrative system of planning and direction into a mostly economic system, in a profit-oriented economy" was also proposed by Walter Ulbricht, then secretary of the Sed. But also in this case, the proposal ended up being a failure mainly for two reasons. First of all, prices were set in an administrative and arbitrary manner and were not based on the meeting between supply and demand. Secondly, the project put at risk the

[4747] This organization was established in January 1949 to facilitate and coordinate the economic development of the eastern European countries belonging to the Soviet bloc. The German Democratic Republic became a member in September 1950.

[48] Sed = Sozialistische Einheitspartei Deutschland. It was the East Germany Communist party.

essential architecture of the system, including the leading role of the party in addressing economic activity.

The third aspect could be summarized saying that, throughout the history of the GDR errors related to voluntarism and political subjectivism have been constantly repeated. This means the claim to be able to determine the economic orientations, forcing the laws of the economy, through political decisions *(Giacché, 2013).*

In view of the situation we have just described, once the Berlin Wall Fall occurred in 1989, eastern German enterprises would not have had a real opportunity against western German competitors, even if the conditions of unification had been more favorable *(Ragnitz, 2009).* In response to the backwardness of eastern Germany, the concept of a currency and economic union, was first introduced by Federal Chancellor Kohl in early February 1990, aimed at three results: the containment of resettlement[49], the short-term stabilization of the GDR and the support of the CDU party in the forthcoming election campaign *(Schroeder, 2015).* But, according to Ragnitz *(2009),* the dramatic situation of East Germany was worsened by the currency union. The rate of conversion was of 1 Mark to 1 DM (for flow variables) in return for a nearly complete acceptance of the western German social market economy. For eastern German companies this meant the equivalence of a 400 percent upward revaluation, with the result that products from the GDR were virtually impossible to sell abroad.

However, possible attempts to implement a transition model step by step were avoided from the very beginning since German politicians acted on the assumption of a second Wirtschaftswunder and thus, they strongly supported the prompt achievement of the German unity *(Willgerodt, 1990).* But the price for this was the overcoming of several

[49] This means that economic and monetary union was created also to prevent the continuous flows of migration from East to the West of the country. Alone with the announcement of the union, the emigration was a bit contained. Indeed, while in February 1990 just under 64,000 and in March just over 46,000 people left the GDR, in April there were only just 25,000 (Schroeder, 2015).

challenges on which scholars agreed *(Ragnitz, Heimpold, Hölscher, Land, Schroeder and, 2015):* the transformation of a centrally managed planned economy into a social market economy could not be based on historical models and therefore had to be carried out from scratch, the acceptance of the transfer of western institutions and their principles, the urgency to find an adequate wage policy in order to guarantee a rapid harmonization of the eastern and western German wage system.

The first challenge was entrusted to the so-called "Treuhandanstalt", a newly founded privatization agency whose aim was to privatize the state-owned eastern German companies into private firms as fast as possible. This task was really complicated since, according to the Halle Institute for Economic Research *(2019),* investors were not interested in the old organizations and structures that had emerged from the centralized economy. For this reason, they preferred instead to keep their headquarters in West Germany or abroad. The Treuhandanstalt was able to find new proprietors to a total of 14.600 companies[50] and part of companies within four years but the privatization process finished with a total loss of more than 100 billion euro. Accordingly, criticism arose with regards to Treuhandanstalt, suggesting that many different privatization strategies would have been possible and could have been more effective if only managed with less haste and more time *(Sinn and Sinn, 1992).*

The second challenge can be easily explained if we take into account that population of East Germany was not familiar to the institutions, principles and values of the West side. In this view, the complex legal system of the West was included. Moreover, relaxed regulations for eastern Germany were provided merely in determined areas.

The last aspect related to the wage development in eastern Germany is still today very controversial. However, if it is true that eastern wages were far lower in comparison with the

[50] The Treuhandanstalt indicated also that the proportion of enterprises that would were currently making profit and were adequate for privatization was less than 10 % (Halle Institute for Economic Research, 2019).

ones in the FRG, it is equally true that they increased notably from 1991 to 1995 and so, in this sense, unification was useful to foster the overall process of convergence between the two sides of the country. In 1991, the hourly wage in the eastern Laender was just 55% of a western wage. This value rose in 1995 to 70% *(Ragnitz, 2009).*

In order to overcome all these challenges, enormous transfer payments have passed from west to the east, from reunification time until today. In 1993 the German federal government and the Laender agreed on the creation of the so-called "Solidarpakt"[51] (translation: Solidarity Pact), a special funding package to provide support to eastern Federal states. The Solidarity Pact came into force in 1995 and expired at the end of 2004. The eastern Leander have received a total of 94.5 billion euros through the financial equalization from the federal government and the old federal states, earmarked mainly to modernize the infrastructure, to rehabilitate housing and to create new industrial plants *(Mäding, 2003).*

But this first funding package was not sufficient to rescue eastern regions from their structural economic deficits. Consequently, a new agreement *(Solidarity Pact II)* was reached in order to guarantee new funds to eastern Laender. Starting from 2005, the new Laender (including Berlin) receive payments from the federal government for 15 years to reduce division-specific special burdens (infrastructural pent-up demand and disproportionate communal financial resources) for a total of 206 billion DM. But in the case of the Solidarity Pact II, the financial assistance is gradually decreased: for instance, an annual amount of DM 20.6 billion is set for year 2005 but already from 2009 the degression amounts to around DM 1.5 billion annually. Unlike in "Solidarity Pact I", the funds are left to the recipient regions for free disposal; the earmarking obligation previously stipulated for a part of the benefits *(Investitionsförderungsgesetz Aufbau-Ost*[52]*)* ceases with immediate effect. However, eastern

[51] It should not be confused with the solidarity surcharge payable by all taxpayers and not earmarked for the construction of the East.

[52] Translation: legal investment act for the reconstruction of the East.

Laender are committed to file annual reports on the use of funds and their fiscal situation. In this way, with the Solidarity Pact II, the German federal government gives a part of the responsibility for the economic development of the east directly to its Laender. In this respect, due to the degressive nature of the funds, eastern regions should pursue a growth-oriented policy from the beginning, which can contribute to an improvement in their tax revenues *(Ragnitz, 2001)*.

In this respect, Ragnitz *(2005)* remarked that only the Free State of Saxony was able to demonstrate a proper use of funds in year 2004 – in accordance with the proclaimed aim of the "Solidarity Pact"[53] – through continuous investments. The other eastern regions used the financial assistance for purposes other than investments, mainly for their own expenditure. Thus, the analysis of Ragnitz *(2005)* revealed that, the transfer of competences related to Solidarity Pact II to local eastern actors, implies a huge risk: the improper use of transfer payments for covering the eastern regions' expenditure instead of upgrading and modernizing their infrastructures, through massive investments.

But beyond the criticism about the effective use of funds from Federal Government, a further negative factor for the future economic development in eastern Germany is a narrowing of the fiscal scope: the Solidarity Pact II will expire in year 2019 and other subsidies from the EU[54] will shrink remarkably after 2020[55] *(Ragnitz and Bauer, 2018).*

In conclusion, the economic development in eastern Germany has not been and is still not "self-supporting". Thus, after 30 years from the Berlin Wall Fall, the transfer dependence

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[53] The proclaimed aim is: to cover special divisional needs arising from the existing strong infrastructural pent-up demand (§ 11 Finanzausgleichsgesetz - FAG).

[54] For instance: the European Structural and Investment Funds (ESI Funds) European Union's main investment policy instrument. The ESI Funds includes also the European Regional Development Fund (ERDF) and the European Social Fund (ESF), which have been addressed to several regions of eastern Germany.

[55] Many scholars are studying in the last years strategies for the best possible use of funding after 2020. For more details, see also Bauer, D., Ochsner, C., and Ragnitz J., 2018. Strategien für die bestmögliche Ausstattung mit und Nutzung von Fördermittel nach 2020. Ifo Dresden Studie 82, ifo Institut, München/Dresden.

from the Federal Government has diminished, but eastern Germany is still not financially independent.

3.2 Net migration from East Germany to the West has halted today, but the enormous migration flows of the past have left traces

In public debate, a relevant outflow of population is quite often associated with a loss of human capital and interpreted as a negative signal for the future development of a regional area *(Glorius, 2012)*. East Germany has experienced many years of outmigration flows, which had clearly an impact on its human capital and consequently on its economic performance. For this reason, it seems appropriate now to look at some figures regarding the migration flows from the GDR/ex-GDR regions to the "old" Federal Republic of Germany in the months before and after 9th November 1989.

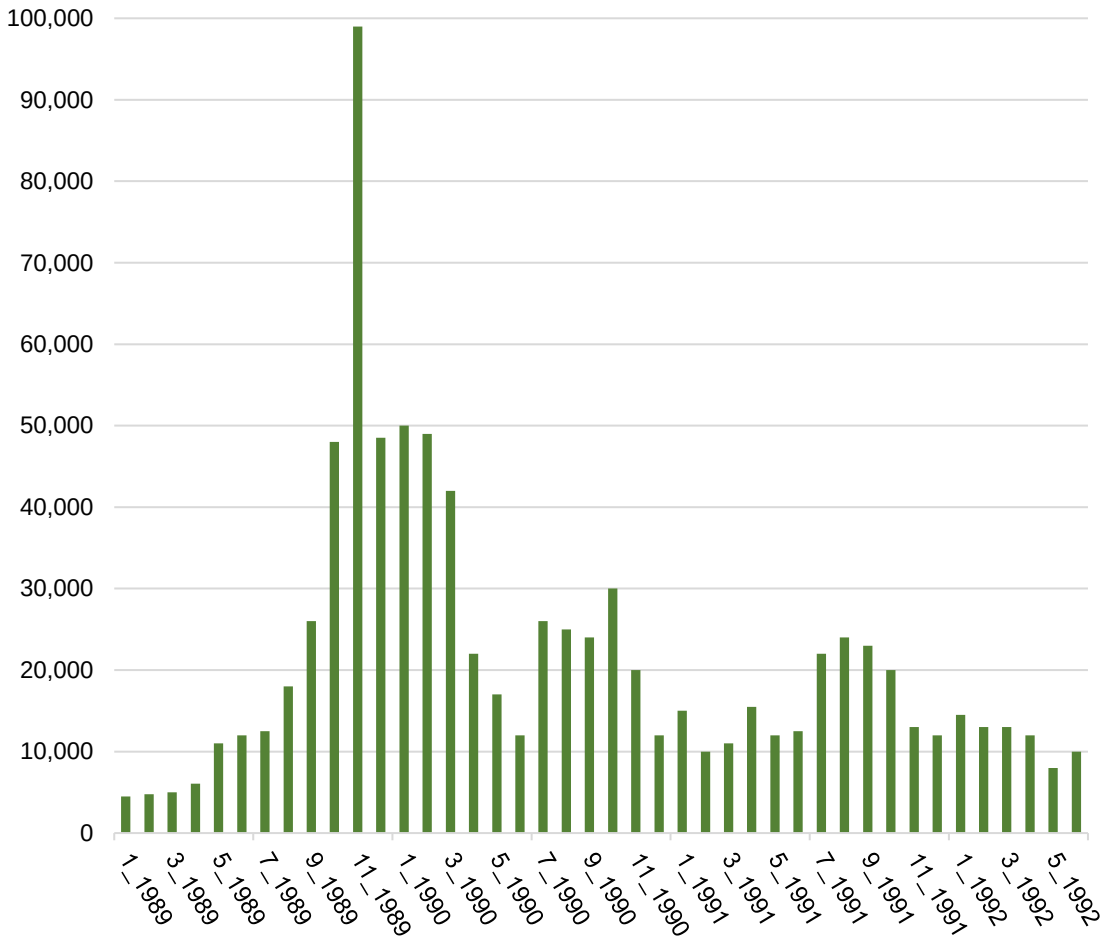
Before the summer of 1989, emigration from the GDR was severely restricted. During the summer of 1989, a decline in patrol at the Hungarian border allowed East German tourists enter West Germany through Austria. This can explain the increasing number of East-West migrants even before the fall of the iron curtain (see figure 3.1).

Ongoing protests from the East German public asking for political and economic reforms led eventually to the fall of the Berlin Wall in November 1989, which made migration from East to West Germany possible. As a result, the peak of migration streams has been registered in November 1989 (almost 100.000 migrants)[56].

[56] The only existing population-level data set that covers the period before the Reunification is from the Residence Department of the German Democratic Republic (GDR), Zentrales Einwohnerregister Berlin-Biesdorf (ZER). The ZER ceased collecting data in the summer of 1992.It should be also remarked that, according to ZER data, the number of East-West migrants was lower than according to data from the Federal Statistical Office. The ZER data have first been discussed in Grundmann (1998).

This outcome could be completely obvious since the wall fell down in that month but it is important to provide an additional appropriate justification for such a large number of migrants: at that time the opening of the border and the removal of travel restrictions was not seen as an irreversible situation.

Figure 3.1 number of migrants from GDR(east-Germany) to West Germany



Source: Datenbasis, ZER Berlin Biesdorf (Siegfried

The volume of migrations has already slowed down from December 1989, but it was still very high until March 1990 with a monthly average of 50.000 migrants from East to West Germany. In the following months, a drop in the number of migrants has been

reported due to the evolution of the political scenario in the East Germany (first free people's chamber elections on 18th March 1990) and to the economic and monetary union (achieved on 1st July 1990).

For these flows, the researchers have pointed out that the causes were more connected to economic reasons instead of political ones. Thus, the social and economic gap between East and West Germany has gradually replaced the mere political circumstances as driving factor for East-West migrations *(Grundmann, 1998).*

All in all, between 1989 and 1990, almost 600.000 East Germans, roughly 3.7% of the population in the region of the former GDR, emigrated to West Germany[57] *(Heiland, 2004).* From 1991 until the mid-1990s, the pace of East to West migration decreased substantially due to the speedy wage convergence in the early 1990s that translated into rising living standards for many in the East *(Heiland, 2004).* In addition, after the reunification, the West German economy followed western Europe into a recession that lasted from late 1992 to 1994.

However, a second wave of migrations towards West Germany occurred since 1997 and peaked in 2001. These streams resulted mainly from a substantial improvement in West labor markets after 1997. In addition to that, the halt in wage convergence between East and West since 1995 and the increasing unemployment rate between 1995 and 2002 in the East Germany forced many people to leave. [58]

According to Heiland *(2004),* East Germany was tackling hard challenges, common of regions in transition from centralized to market economies. It is possible to comprehend the declining economic conditions in the East at that time taking into account that wage increases

[57] Former GDR excluding East Berlin. While West Germany including West Berlin.

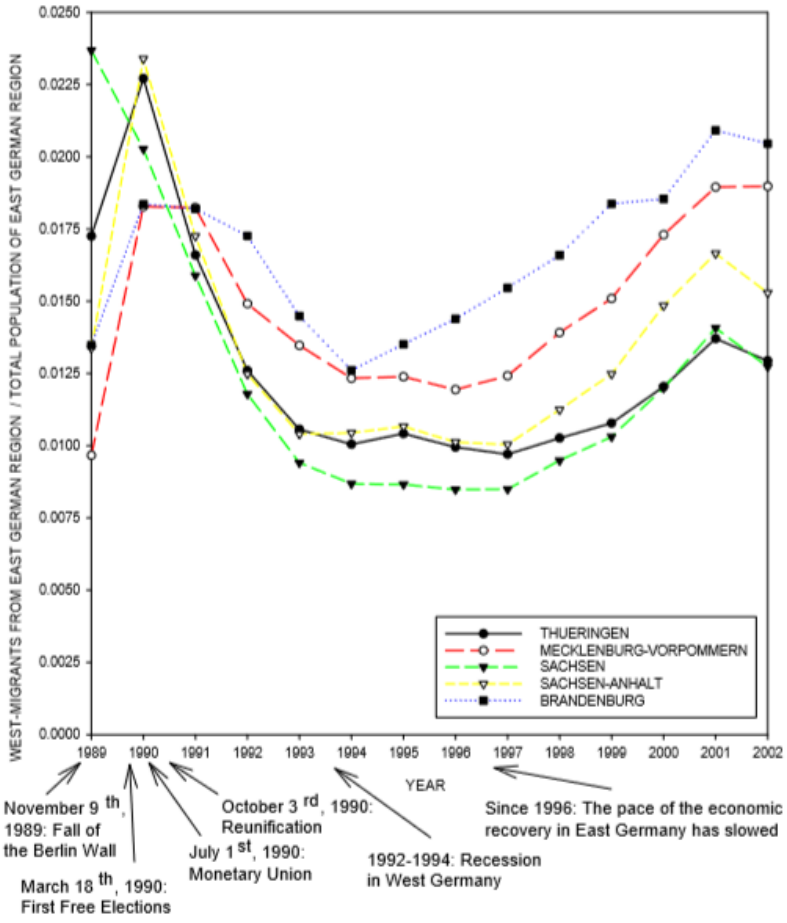
[58] From 1995 to 2002 the average unemployment rate in East Germany (East Berlin included) increased from 14.9% to 18,0%. Unemployment rate in West Germany was the half of East Germany level. (Heiland,2004).

were not offset by increases in labor productivity. Moreover, East German firms suffered from a crisis since salaries had to be in West German currency after July 1990.

So far, we shed some light on the reasons behind these waves of migrations, but we did not provide any information about the migration's distribution across source and destination region. In the first stream of migrations (1989-1990), Sachsen, Sachsen-Anhalt and Thüringen showed a higher outmigration rate in comparison with the other two Eastern regions. According to Grundmann *(1998)*, in year 1989 the region of Sachsen lost 2.360 Germans for every 100.000 inhabitants. This situation experienced a reversal during the second wave of migrants when Brandenburg and Mecklenburg-Vorpommern outmigration rate was higher than those other three Eastern Region since 1991. The slow start of Mecklenburg-Vorpommern was explained by Grundmann *(1998)* as a consequence of its remote location but its persistent weak job market, proved by the fact that it was the second East-region with the highest unemployment rate[59], caused the strong outmigration since 1991. However, at the aggregate level, the migration distribution of Eastern regions (except for Brandenburg) showed a similar trend: outmigration was highest in 1989-1991, slowed down in 1996-1997, and rose again until 2001. Brandenburg did not follow this pattern and displayed an increase in outmigration already from 1995. The underlying reasons for such deviation had to be sought not in the region itself but in its proximity to Berlin. In the year 1991, the capital of Germany was moved from Bonn to Berlin. Henceforth Berlin started expanding as an administrative and political center, boosting its popularity and attractiveness year by year. Therefore, migration from Brandenburg to Berlin has steadily increased and Brandenburg outmigration rate passed from being one of the lowest to one of the highest among eastern regions (see figure 3.2).

[59] The first region with the highest unemployment rate in 1991 was Sachsen-Anhalt.

Figure 3.2: Total outmigration rates to west Germany by region of origin



Source: Heiland, 2004

After analyzing the outmigration rates distribution by region of origin, we look now at some figures in relation to the final destination of East-West migrants, giving some explanatory notes.

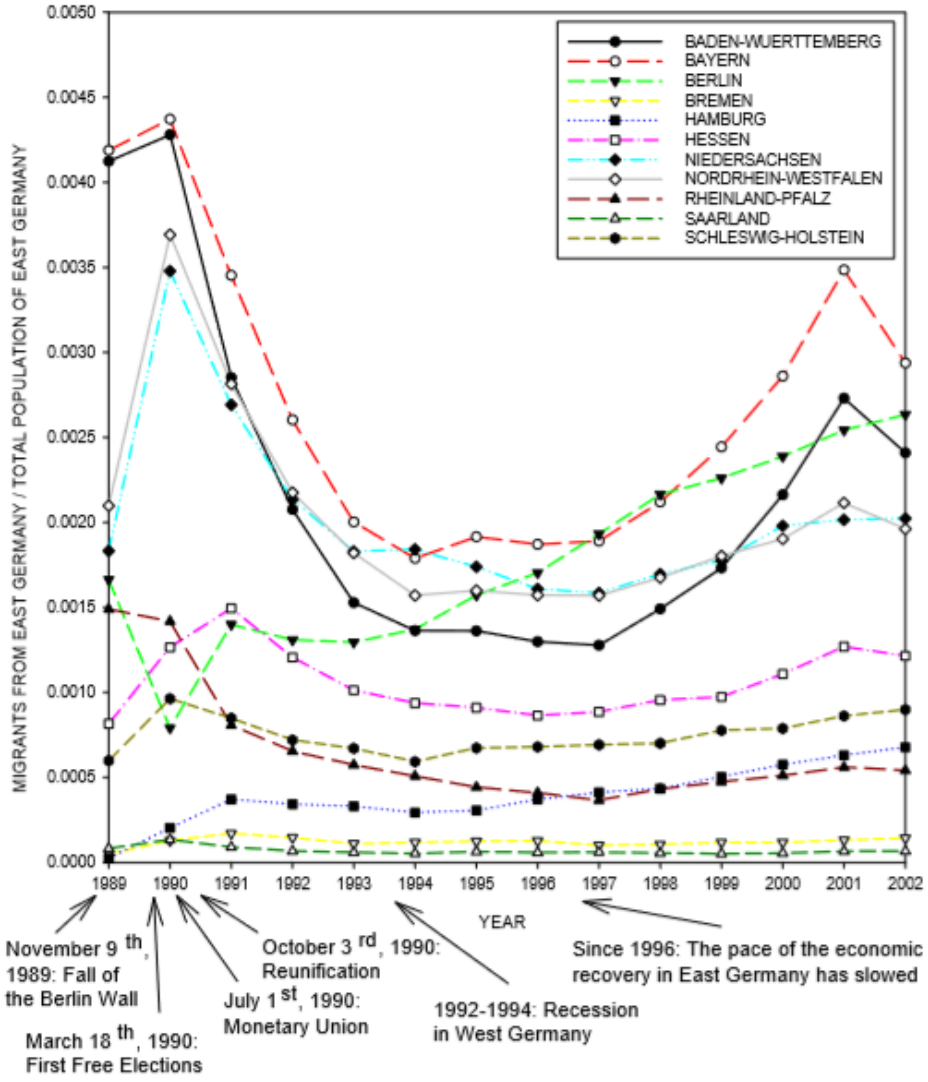
As depicted by the graph below (see figure 3.3), Bayern has always been the most favorite region by East-migrants, followed by the region of Baden-Württemberg in the years related to the first wave of migrations. From 1992 until 1999, this trend has a little bit changed since

Niedersachsen and Nordrhein-Westfalen registered more migrants in comparison with Baden-Württemberg. However, Baden-Württemberg was one of the richest region in West Germany and it was again the second most preferred destination for Eastern migrants since 2000. Outmigration distribution by destination region can be explained, examining mainly three crucial factors:

- The proximity of the source to the destination region: former inhabitants of Mecklenburg-Vorpommern preferred moving to the nearest regions of Niedersachsen and Nordrhein-Westfalen instead of to the economically strongest regions. At the same time, outmigration rates from Thüringen to Bayern were higher than to Baden-Württemberg despite the similarities of the two regions in term of macroeconomic indicators (Indeed, Bayern is a bit closer to Thüringen than Baden-Württemberg). Again, it was a matter of distance.
- The population's size in the source region: for instance, Nordrhein-Westfalen was more frequently preferred by migrants from Thüringen rather than from Niedersachsen. This result was due to the fact that a larger population size most of the times implies more job opportunities. Indeed, Niedersachsen was the fourth largest province in terms of population's size.
- Relative employment conditions and wages: Baden-Württemberg and Bayern, the Länder with the lowest unemployment rates and leaders of the German manufacturing sector, got a large number of East-West migrants also from distant regions.

All in all, the distribution of migrants from Eastern to Western Germany was stable from the Wall fall until 2002 because, in general terms, their preference was oriented towards large industrial areas, in particular in Bayern, Baden-Württemberg, Nordrhein-Westfalen and Niedersachsen.

Figure 3.3: Outmigration rates by destination for east Germany



Source: Heiland, 2004.

As so far discussed, the second wave of migrants was triggered merely by economic circumstances such as labor market factors in source and destination region. It is not a coincidence that Maria Kelo and Bernd Wätcher in their work "Migration in the European Union after enlargement" *(2004)* said about voluntary migration that: "When reviewing the

literature for the most often cited push and pull factors[60], economic and labour-market-related aspects are in a top position".

This has also been proved for the migrations within Germany by a study conducted by Birgit Glorius in year 2012 where she analyzed the results of a telephone based survey, addressed to those migrants, who left the region of Sachsen-Anhalt between 1998 and 2002 at ages 18 to 35 (the sample was composed of 1161 valid answers). According to the results, the majority of the interviewees moved mainly due to economic issues such as unemployment or the fear of it (40%)[61], the desire for career advancement (20%) and expectation of better income (7%). The rest of the sample declared family reunification as the main motive to migrate to the West.

This study shed some light also on the direction of the migrants' flows, giving results consistent with our previous analysis: nearly half of the interviewees favored the largest West German agglomerations over rural areas. In particular, highly qualified people tended to move to large agglomerations. Accordingly, this phenomenon contributed to generate increasing disparities between urban and rural areas. However, a relevant regional selectivity occurred in the destination region as well as in the source region: this research proved again that the largest outflows of migrants came from peripheral rural regions of eastern Germany, where educational and labor possibilities were scarce. Interesting fact emerged from the analysis is also the increasing population of some urban areas in the East such as Leipzig and Dresden, which benefited not only from East-East but also from West-East-migration.

Another aspect taken into account by Glorius in her study was the quality of flows: in fact, the biggest concern regarding east-west-migration is the issue of human capital loss, also

[60] Push factors are those ones connected to the origin's country and are represented by the unfavorable conditions. On the contrary, pull factors are the alluring conditions which the migrant expects to find in the destination's country.

[61] 38% of the interviewees were unemployed before leaving Sachsen-Anhalt.

known as "brain drain"[62] phenomenon. While 43% of the interviewees (migrants from Sachsen-Anhalt, who moved to the West) held a university entrance certificate, their age peers in Sachsen-Anhalt performed worse (25%). Assessing in a second step the work position of the interviewees, Glorius presented the following results: almost half of the people were working in the health services and administrative jobs, whereas one quarter worked either in low occupational position or in highly qualified jobs. Comparing this labor market structure with the East, Glorius remarked that highly qualified workers were indeed overrepresented among the interviewees, meaning that source regions were certainly suffering from brain drain.

However, this was not a surprising result since already Schneider (2005) showed that outmigrants of the years 1999-2003 were positively selected with regards to education: 32% of them held an "Abitur" or "Fachabitur"[63], whereas this share bottomed at 18% in Eastern Germany population. Moreover, he provided evidence that the majority of the East-West migrants always in years 1999-2003, before leaving for Western Germany were involved in a study or training program (see chart 3.4). In particular, 20,1% of migrants between 25 und 30 years old were students (without a professional qualification), who moved to West-Germany searching for better education or job opportunities. Another clear fact emerging from the chart below is the massive lost of young Eastern Germans, regardless their level of qualification. In fact, almost the half of the migrants in years 1999-2003 are young between 18 and 30 years old.

[62] The expression "brain drain" was used for the first time by the Royal Society. The term was used in their documentation, whose topic was the emigration of British scientist to the US in the early 1960s. In the following years, "brain drain" expression boost its popularity in the development policy context when the debate became more based on moral grounds: while poor areas will remain poor losing their "highly qualified people", rich countries will become even richer since they will receive human capital as a gift.

[63] German university entrance certificates.

Figure 3.4: East-West migrants for every eastern region according to age and professional/study qualification-1999-2003, annual average

	18-25	25-30	30-50	50-65	over 65
without work qualification	4.10%	5.90%	4.00%	0.60%	0.10%
in a study/training program	3.20%	20.10%	-	-	-
work	6,00%	2.60%	0.90%	0.30%	0.20%
Fachschule/Hochschule	-	8.60%	1.60%	0.50%	0.50%

Source: adaptation from Halle Institute for Economic Research (Schneider)

All in all, these massive outmigration flows from east to west Germany had two implications from an economic perspective: the deterioration of human capital due to the loss of young and qualified people and a smaller proportion of working-age population than the one that is going to retirement. Thus, the result has been a general shrinkage of the labour force *(Ragnitz, 2009)*.

3.3 The economic structures are different from the west: east Germany lacks large companies

The economic performance of German regions also depends on their prevailing economic structures. Although East Germany's transformation from a planned to a market economy was completed a long time ago, the decisions on corporate structures taken in the GDR's time have left consequences in the economies of the post-transformation era. As mentioned in section 3.1 of this chapter, the category of small and medium enterprises was remarkably spoilt due to relocation, forced nationalism and incorporation. Consequently, east Germany lost a huge portion of its entrepreneurial class due to outward migration *(Halle Institute for Economic Research, 2019)*.

It follows, that several scholars agree on identifying the fragmented corporate structures in eastern Laender as a cause for the continued productivity gap between west and east Germany *(Heimpold, Hölscher, Land, 2015)*. In East Germany, as in other regions of advanced economies, the business sector is characterized by the dominance of small and medium-sized enterprises. This is equally true for the western Germany but a consideration is imperative in this respect: the largest company of the west are far bigger than their counterparts in the east. This implies that also the proportion of labour force employed in big companies, relative to total employment, is much higher in western Germany.

The paucity of large companies in the East of the country is also confirmed by the fact that, hardly any group headquarters is located in eastern regions. Of the top 500 German companies listed annually by Die Welt[64], only 34 are based in eastern Laender in year 2013[65]. The situation has not changed in more recent years: in year 2016 were just 36 the eastern companies included in the list of the top 500 German companies. According to Heimpold and Hölscher *(2015),* this distribution is mainly the result of the group headquarters' relocation from the east to the west, after the Second World War. In this respect, firms' headquarters of west Germany or based overseas, will hardly ever relocate to East Germany and, accordingly, eastern Laender should make efforts in order to foster the growth of existing small and medium enterprises, because they can become the future headquarters of the east *(Halle Institute for Economic Research, 2019).*

The small size of the East German's enterprises and a lack of corporate headquarters of large companies are mentioned among the reasons behind the backwardness of eastern regions also by the German Federal Government *(2018).* In line with the research conducted by scholars, the Federal Government highlighted the fact, that many east German companies

[64] Die Welt is an authoritative daily newspaper in Germany.

[65] For more details, see: Die 500 größten Unternehmen in Deutschland 2013, Die Welt (electronic version: http://top500.weld.de./).

are also part of west German or foreign corporations. Moreover, there is not a single east German company listed in the stock market index DAX-30.[66]

Consequences of the lack of large companies in the East are also: the low private-sector expenditure on research and the low export intensity of eastern firms, which represent a huge limit for the further development of eastern regions.

The first aspect emerged also from our analysis in section 2.2.3 (Chapter 2) when we discovered that, public expenditure of eastern regions on R&D is massive but, on the contrary, private R&D expenditure in business sector is scarce in comparison to the west of the country. If in east Germany the public expenditure outstrips largely the private one[67], in west Germany the situation is exactly the opposite (see figure 3.5). Companies in west Germany spend eleven times more on R&D than in East Germany: of the total 61 billion euros spent by German companies in year 2015, just nearly five billion euros are attributable to eastern firms. In accordance to the scholars, these results are mainly due to the size of companies *(Halle Institute for Economic Research, 2019)*.

However, if we consider the total expenditure of German regions (both private and public) on R&D, proportionate research spending no longer mirrors a discrepancy between the west and the east: the capital city of Berlin ranks among those German regions that spend above-average amounts on R&D in Germany but also the region of Saxony perform well, outstripping several regions of the west. From figure 3.5 it emerges that, differences in this sense are larger between southern and northern Germany than between western and eastern Germany (including Berlin). Also in this context, the best-performing regions belong to the south of the country: Baden-Wuertemmberg (1st position) and Bayern (4th position) show both higher total expenditure than the national average.

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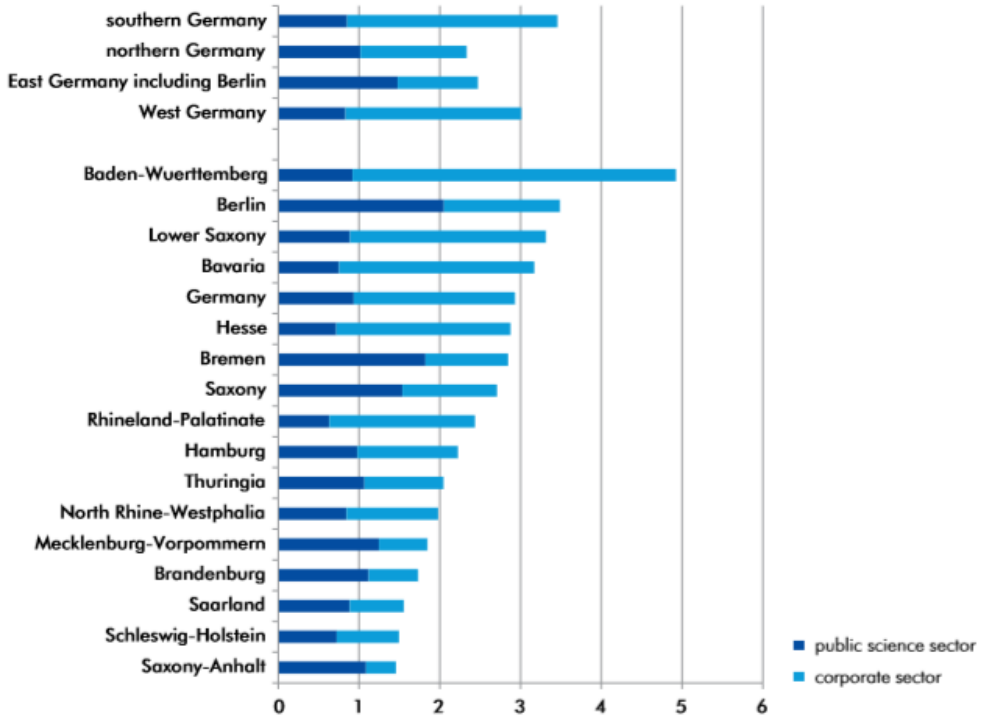
[66] See "Jahresbericht der Bundesregierung zum Stand der Deutschen Einheit 2018" by Bundesministerium für Wirtschaft und Energie (BMWi), Berlin, pp.10.

[67] In eastern Laender, Thuringen is the only region with a balanced ration between public and private R&D spending.

Figure 3.5: Share of internal R&D expenditures 2016 in gross domestic product by federal states and regions, current prices, in percentage



Northern Germany: Berlin, Brandenburg, Bremen, Hamburg, Lower Saxony, Mecklenburg-Vorpommern, North Rhine-Westphalia, Saxony-Anhalt, Schleswig-Holstein; southern Germany: Baden-Wuerttemberg, Bavaria, Hesse, Rhineland-Palatinate, Saarland, Saxony, Thuringia.

Source: Federal Statistical Office, Wiesbaden; Stifterverband Wissenschaftsstatistik, Essen; Regional Accounts VGRdL, Statistical Office of the Federal State of Baden-Wuerttemberg, Stuttgart 2018; north-south categorisation based on: The Economist as of 19.08.2017 (online); calculations and diagram by IWH.

The low export intensity is another structural peculiarity of east Germany, which is mostly connected by research to the paucity of large companies and, partially, to the legacy of the past as well.

According to Zeddies *(2009),* unlike in the western industrialized countries, the foreign trade structures of the GDR were not the result of a market-based division of labor. Instead, foreign trade relations resulted from political objectives, such as the removal of deficiencies in the GDR and the other socialist countries, and were heavily concentrated within the Comecon. On the basis of this background, the political and economic upheaval in Eastern Europe after the Berlin Wall Fall presented big challenges to the East German export industry and, eventually, East German exports collapsed after German unification by more than 60%. But after overcoming the initial shocks, since the mid-1990s exports from the New Laender have been growing annually more than twice as much as West German exports. The adjustment processes to which East German foreign trade was subject after German unification mainly concerned the regional orientation of export flows. Indeed, the partitioning of the GDR against the western world also interrupted foreign trade relations, especially with the large Western European markets with high sales potential.

A re-orientation of the exports from the new Laender states to western countries took place very rapidly and, already in 1998, the regional export structure of eastern regions hardly differed from that of west Germany (see figure 3.6): 56,3% of export flows were addressed to western Europe (against the 62.1% of west Germany) and 8.5% were directed to North America (against 13.2% of west Germany). On the contrary, Central and Eastern European countries (CEECs) and the CIS[68] countries accounted for only 22% of East German goods exports, compared to 76% at the time of German unification. Similar patterns of export flows from east Germany can be detected in year 2008. However, we can notice just two little differences from year 1998: the Asian trading partners have gained in importance for east Germany and also the trade relationships with central and eastern Europe have slightly increased *(Zeddies, 2009).*

[68] CIS is an abbreviation for Commonwealth of Independent States. It is a regional intergovernmental organization of originally ten post-Soviet republics in Eurasia formed following the dissolution of the Soviet Union.

This slight growth of exports to central and eastern Europe can be explained by the eastern EU enlargement[69] occurred in 2004. A recent study conducted by Hansen and Heisig *(2018),* has indeed demonstrated that, the eastern enlargement of the EU had statistically significant, positive effects on trade between Germany and the new member states. However, the study suggests that East Germany could benefit much more from EU enlargement and its trade relations with the Eastern European countries[70] than west Germany in the last 15 years.

But despite the gratifying and rapid reorientation of export flows from east Germany towards western countries and their notable growth since the reunification time also due to EU enlargement, significant differences remain in the distribution of export volumes across the regions of Germany. Hansen and Heisig *(2018)* highlighted that the imbalances with regards to export volumes between the west and the east Germany are still huge and highly correlated not only to the slowdown of convergence process between the two sides of the country in the last years but also to the absence of large industries in the east. The variances in exports across Germany's regions are described also by the Halle Institute for Economic Research *(2019):* the proportion of revenues connected to revenues in the East German industrial sector is around one quarter below the national average. Even if the export ratio in the East Germany's industrial sector has increased by around 4% since 2010, it has grown by almost the same magnitude in western Germany. As a result, the imbalances in terms of export revenues have stayed unaltered in recent years. Figure 3.7 shows that, on average, the industrial sector (excluded Berlin) in all east German regions reaches a lower export ratio relative to total revenues compared to the German average in 2017. In addition to them,

[69] Currently, the European Union consists of 28 member states. Since its founding in 1999, the EU has been extended more times through the inclusion of new member states. The eastward enlargement represents the most extensive enlargement so far: Poland, the Czech Republic, Slovenia, Slovakia, Hungary, Latvia, Lithuania, Estonia, Cyprus and Malta became part of the European Union in year 2004.

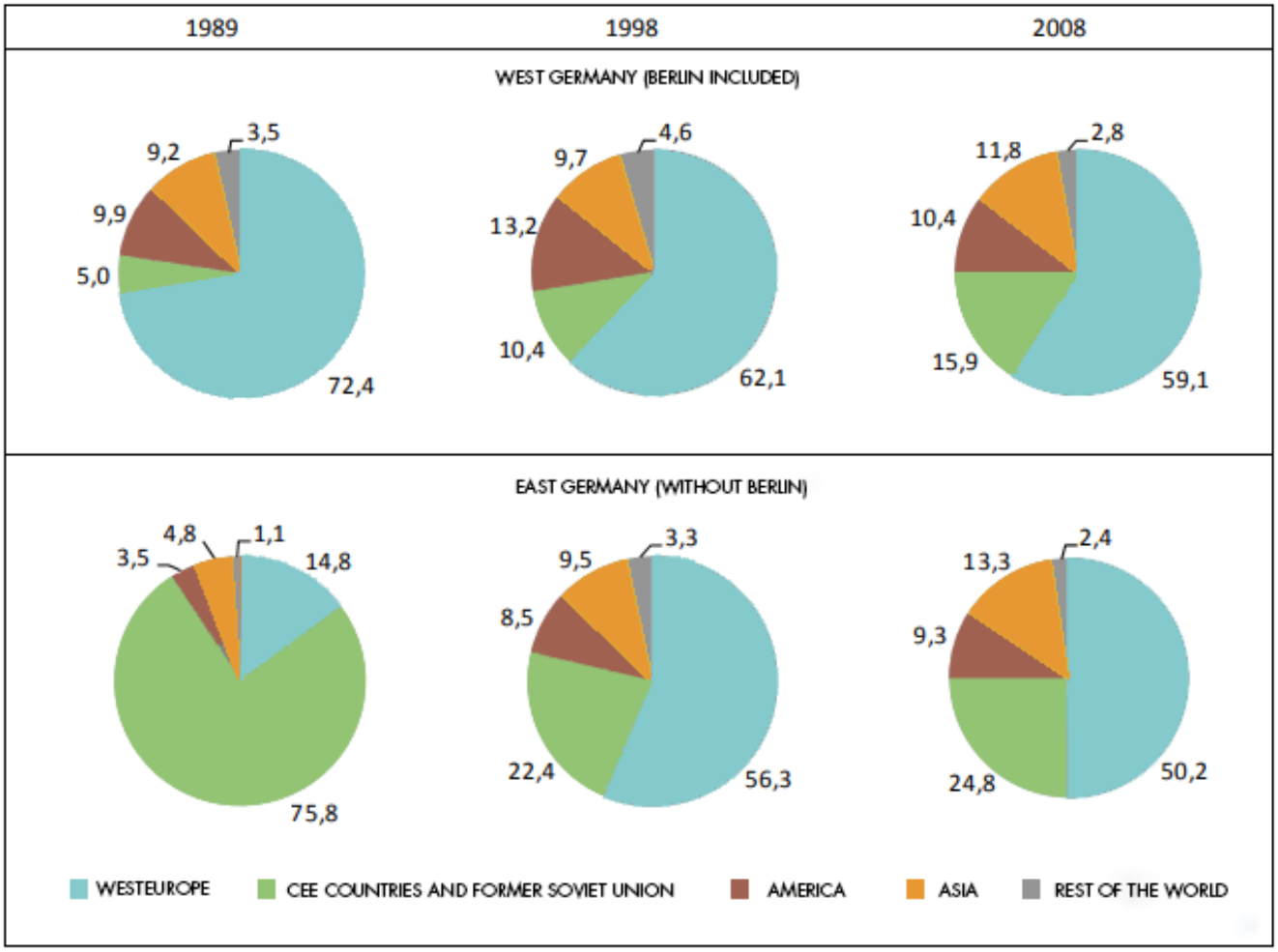
[70] Eastern regions of Germany have benefited in the last years particularly from commercial relationships with Poland and Czech Republic, the economically strongest eastern European countries. This shows that, the development of foreign trade and the economic convergence of the countries are in one close correlation (Hansen and Heisig, 2018).

other regions of the north show weaknesses under the export aspect: in particular, Schleswig-Holstein and North Rhine-Westphalia. However, in this case, the biggest gap is detected not between southern and norther Germany but still between the West and East of the country[71]. In conclusion, it is important to notice that, the correlation between companies or business size and export activity is not a one-way street *(Halle Institute for Economic research, 2019).* On one hand, it is true the absence of big companies has negative impacts on exports but, on the other hand, empirical research on productivity shows that exporters — compared to non-exporters — exhibit greater productivity. In short, it is also possible the contrary way: firstly, companies operate on international markets and are confronted with more efficient requirements, secondly, spill-overs from other exporters have positive impacts on levels of productivity itself[72].

[71] Nevertheless, it is fair to notice that, in some cases eastern German companies operate as corporate subsidies and thus, they contribute to the export rates of the consolidate group, based in West Germany. This contribution does not appear in the industrial statistics.

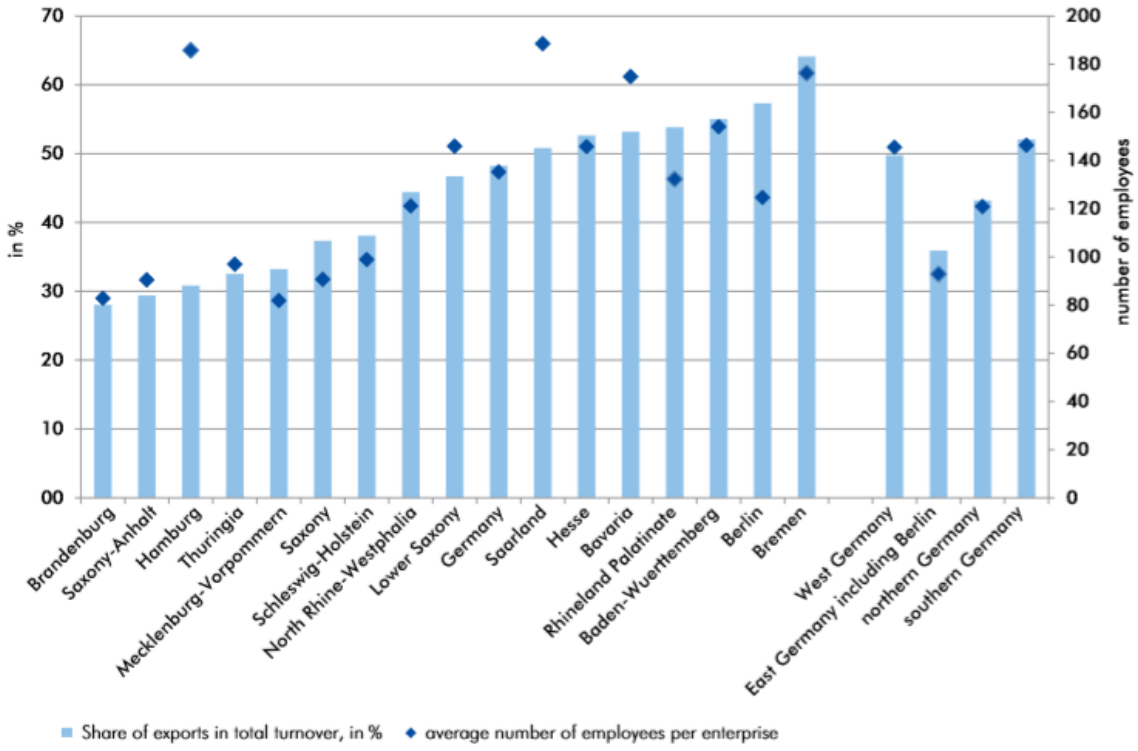
[72] European Central Bank, Eurosystem, CompNet. The Competitiveness Research Network (2016): European Firms after the Crisis. New Insights from the 5th Year of the CompNet Firm-level-based Database. For more details, see also: Bernard, Andrew B, and Jensen (1997) and Bernard, Andrew B, and Wagner(1997).

Figure 3.6: Exports of west and east Germany by world's regions



Source: Statistical Yearbook 1990, special evaluations of the Federal Statistical Office; Calculations and representation of the IWH.

Figure 3.7: Employees per enterprise, share of exports in total turnover, 2017 (enterprises belonging to firms of the manufacturing sector, mining and quarrying of 20)



Northern Germany: Berlin, Brandenburg, Bremen, Hamburg, Lower Saxony, Mecklenburg-Vorpommern, North Rhine-Westphalia, Saxony-Anhalt; Schleswig-Holstein; southern Germany: Baden-Wuerttemberg, Bavaria, Hesse, Rhineland-Palatinate, Saarland, Saxony, Thuringia.

Source: Federal Statistical Office (Destatis), Wiesbaden, 2018; north-south categorisation based on: The Economist as of 19.08.2017 (online); calculations and diagram by IWH.

3.4 Mitigate the lack of headquarters by the growth of existing SMEs: economic clusters in East Germany are a resource

To overcome the existing structural weaknesses described in the previous section, the Federal Government aims to incentive those instruments that can promote a faster alignment of the East German economic power with the West German level. In this respect, the focus lies on the promotion of SMEs, the strengthening of research and innovation potential and the safeguarding of skilled workers. In view of the lack of major companies, East German SMEs are indeed not only the backbone of the economy, but also the bearers of hope for the further convergence process.

The funding programs of the German Federal Government support SMEs through a wide range of measures that can be divided into the areas of promoting investment, innovation and internationalization. A concrete financial support come currently from the Solidarity Pact II, which includes a basket fund earmarked for "Innovation, Education, Research and Development". But the goal of the regional economic promotion of the federal government remains – even after the expiry of the Solidarity pact II in the end of 2019 – that the regions can economically preserve and develop their own strength. Thus, regional structural policy plays an important function for enabling structurally weak regions to actively participate in the local competition. In this regard, the GRW[73] funding is an important instrument to mention because it will be valid also in the next years[74].

The GRW funding is dedicated to those regions that are structurally weak. Since 1969, it is provided in the form of grants or low-interest loans and is financed half and half

[73] GRW is an abbreviation for Gemeinschaftsaufgabe Verbesserung der regionalen Wirtschaftsstruktur (translation: Joint Task for the Improvement of the Regional Economic Structure).

[74] The current fund will expire on 31st December 2020 but another funding from 2021 is already set. On the contrary, Solidarity pact II will expire in the end of 2019 and no other funds are planned.

by the Federal Government and the regions. The task of administering and managing GRW funding is reserved to the regions i.e. each single region decides for itself which funds should be addressed to certain areas and the specific amount of money[75]. The areas of the GRW funding cover: investments by trade and industry, investments in local commerce-related infrastructure, measures designed to encourage networking and cooperation between local players. For the current receiving funding period (July 2014 – 30 December 2020), around 80 percent of GRW funds are earmarked for eastern German regions *(Bundesministerium für Wirtschaft und Energie – BMWi, Jahresbericht der Bundesregierung zum Stand der Deutschen Einheit 2018, Berlin).*

Other noteworthy measures to foster small and medium enterprises lie in the cluster policy of the country, which has its roots in the mid-1990. Since then, many programs[76] have been developed in order to support the industry networks and clusters across the country, and eastern Germany has become home to 16 of them. But before showing some examples of successful leading-edge clusters in east Germany, it is reasonable to provide some definitions of clusters and to highlight why they matter for the regional development of the east.

The term cluster was introduced by Porter (1990) and it was described as a phenomenon linked to geographic agglomerations of industries which origin from vertical or horizontal relationships among companies. A trait of the cluster is its regionality: this bundle of firms is located in a single city or region within a nation. According to Porter *(1990),* the value-added of a cluster is represented by the competition within it, which forces the enterprises to elevate their standards of performance. In addition to this, the connections among firms foster flows

[75] In accordance with the legal framework established by the Federation and the Laender.

[76] "BioRegio"competition, High-tech strategy (launched in 2006), New High-tech strategy, Leading-edge Cluster competition (launched in 2007) and Go Cluster from 2012 (For more details see: Macdougal, W., 2015. Industry clusters in Eastern Germany. Trade & Invest, Economic Development Agency of the Federal Republic of Germany, Berlin).

of information and diffusion of innovations. In the context of clusters, Arboníes and Moso *(2002)* suggested also the inclusion of universities since they can play a crucial role for creating a knowledge source within these networks. According to Clarkson et al. *(2007),* knowledge have become today the panacea of success, and consequently, regional development agencies should be looking for ways to attract cluster of innovative knowledge-based activities.

Thus, the all players of a cluster have something in common but, above all, have something to offer which can benefit other cluster members. All the cluster's actors are bound together by the overall economic self-interest. In this way, clusters have the effect of improving the capability of members firms to innovate and to enhance their potential for productivity growth *(Porter, 1998).*

Clusters in Eastern Germany are crucial because regions which have undergone or are still undergoing transformation[77] are asked to display innovative traits in order to gain a competitive advantage. Economic regeneration in regions experiencing demographic shrinkage and economic decline must be fueled by innovation, otherwise, they will ultimately not survive the upheaval of economic and social change *(Koistinen, 2002).*

In view of these findings, Germany's federal government embraced the cluster concept in the mid-1990s when attempting to promote its inexperienced biotechnology industry which was estimated to lag twenty years behind the U.S. and ten years behind the UK at that time *(Cooke 2001).* Accordingly, the BioRegio contest was launched to identify and promote Germany's most promising potential biotech clusters in 1995 *(Dohse, 2007).* This contest was followed by other similar experiences such as the InnoRegio contest. But while BioRegio aimed to the mobilization of regional assets for improving national competitiveness, the InnoRegio contest was designed to reduce the gap between the eastern and the western

[77] E.g. regions that passed from a centralized economy to a capitalist market economy.

regions. The new contest was not only limited to eastern regions, but also open to all industries and technologies. After the success of this context, other initiatives were promoted by the Federal Government through a bundle of programmes called "Entrepreneurial Regions" to guarantee a support for innovative clusters in east Germany.

Today, eastern Germany displays not only supraregional clusters (i.e. they encompass more than one eastern region) but also several clusters within single regions that can lead by example for the establishment of future industrial networks. Five examples of supraregional clusters are the following:

- ACOD (automotive cluster Ostdeutschland) was established in 2004 and links the east-Germany-based automotive manufacturers, suppliers, service providers, research institutes, associations and institutions. Daimler, Opel, VW, Porsche and BMW all produce also in East Germany. Daimler has recently built one of the world's most modern battery factories in Kamenz, Saxony[78]. Four regional initiatives — automotive BerlinBrandenburg e. V., automotive Mecklenburg-Vorpommern, MAHREG Automotive, and Saxony Automotive Supplier Network (AMZ) — directly interact with ACOD through the Cluster Hub coordination platform.
- CeChemNet (Central European Chemical Network) is the result of the cooperation among five of Eastern Germany's chemical site operators: BASF Schwarzheide GmbH, ChemiePark Bitterfeld-Wolfen GmbH, DOW Olefinverbund GmbH, InfraLeuna GmbH and Infra-Zeitz Servicegesellschaft GmbH. The partnership was implemented by the inclusion of the north-east regional association of the Verband der Chemischen Industrie e. V. ("German chemical industry association").
- Cleantech Initiative Eastern Germany was set up by the Federal Ministry of the Interior (BMI) in February 2011, and it was created in order to gather the significant

[78] For more details, see www.acod.de

potential in the "clean technology" sector within a sustainable network of companies and research institutes.

- Solarvalley Mitteldeutschland is a cluster in the field of the sustainable energy solutions. Today, the eastern regions of Saxony, Saxony-Anhalt and Thuringia enjoy the highest density of photovoltaics (PV) companies in Europe. Solarvalley Mitteldeutschland is composed of 35 companies, nine research facilities and four universities. Internationalization is high on this cluster agenda, with collaborations put in place with 15 partners from nine European countries as part of the EU SOLARROK ("Solar Regions of Knowledge") initiative.
- BioEconomy cluster's core competence is the development, scaling and application of innovative technical processes for the sustainable use of bio-based raw materials from the non-food sector for the production of valuable products for various industrial sectors. The mission of this cluster is to establish the world's first bioeconomy on a regional scale, through the promotion of close links between the core wood, chemicals and plastics industry sectors. The result is that a cross-industry value chain is created. The members of BioEconomy Cluster include more than 50 companies and research and education institutes such as the Fraunhofer Center for Chemical-Biotechnological Processes CBP, the DBFZ (German Biomass Research Center), the Helmholtz Centre for Environmental Research Leipzig and companies such as Linde Engineering, Ante-Holz and Homatherm. All these partners are mainly located between Saxony and Saxony-Anhalt *(MacDougall, Germany Trade & Invest, 2015).*

In addition to these supraregional networks, other leading-edge clusters are spread within the boundaries of eastern regions. We will consider two of them: the "Silicon Saxony" and the "OptoNet" (Photonics Network) in the region of Thüringen:

- Silicon Saxony was born in 2000, by the initiative of a group of 20 companies related to the semiconductor industry. Today, it counts as the biggest high-tech network for the microelectronics, smart systems, photovoltaic, software, and applications sectors in Europe. Its success lies in the promotion of new technologies, including for example, cyber-physical systems like those used in Industry 4.0. In 2012, the cluster was awarded the gold label of the European Cluster Excellence Initiative (ECEI) for excellent cluster management. The cluster is located in Saxony, in particular in the city of Dresden (head office), Leipzig and Chemnitz. According to MacDougall *(Germany Trade & Invest, 2015)*, Silicon Saxony displays a network of 2200 companies, 58000 skilled workers and of 28 research institutions (university and non-university) for a total turnover of 13 billion euro. Recently, the prominent technology company Bosch decided to build a chip factory in Dresden, proving the excellent framework conditions offered by the cluster.
- OptoNet is a well-known cluster in the lighting technologies sector worldwide. It is located in the eastern region of Thüringen, in particular in the cities of Jena, Erfurt, Ilmenau and Gera. The cluster offers not only classical optics manufacturers but also measuring and sensor technology, laser technology and laser material processing, optoelectronic component and systems providers and manufacturers as well as companies from the medical technology and life sciences sectors. In addition to international companies like Zeiss, Jenoptik, Schott and Jena-Optronik (Airbus Group), the network encompasses several SMEs whose products and services play a decisive role. Research community of OptoNet relies on three Fraunhofer Institutes and the Leibniz Institute of Photonic Technology *(MacDougall, Germany Trade & Invest, 2015).*

These successful innovative clusters[79] demonstrate not only the efforts from the Federal Government to foster the competitiveness of east Germany's small and medium enterprises at a national and international level but also that the lack of large firms can be mitigated by the growth of existing firms because, if the framework conditions are adequate, these can become the future headquarters of the east *(Halle Institute for Economic Research, 2019).*

Figure 3.8: Research and Development-Intensive Industry Sectors in Eastern Germany

[79] It is fair to notice that we have considered the most renowned clusters of East Germany. Other clusters can be detected also in the area of Berlin (ICT, Media and creative industries), of Brandenburg (transport, mobility and Logistics), of Saxony-Anhalt (Mechanical engineering) and of Mecklenburg-Vorpommern (life sciences and health economy).

3.5 Expand further universities and research establishment in the east: the importance of creating a knowledge economy

In the last decades, there has been a large consensus among economists on the importance of non-material endowment for economic growth. Romer *(1990)* has been one of the first economist who questioned the validity of Solow model ("Neoclassical Theory"), proposing instead a growth model based on the power of externalities in knowledge's accumulation ("New or Endogenous growth model"). In his view, the total economic output is not only the results of traditional inputs, such as capital and labour, but it is also highly dependent on a "stock of knowledge". But what do we mean with the word externality? The main idea is that information, competences and skills can be repeatedly exploited by people as well as by firms without being consumed (or in economic terms; without being depreciated). Consequently, enterprises and individuals will not be excluded from the use of information that becomes automatically public and the advantages of new knowledge will be not restricted to its original creators. Because of these externalities, there will be aggregate increasing returns to scale and the growth rate will not slow down *(Miles, Scott, Breedon, 2012).*

The other founding father of the endogenous growth theory is Lucas. While Romer emphasized the importance of externalities in the accumulation of knowledge, Lucas suggested the accumulation of human capital in offsetting the decreasing returns to scale in factor accumulation. In short, he proposed a new point of view, which is mainly oriented toward specialized human capital: the higher is the sector-specific stock of human capital and the labor force employed by this sector, the higher is the sector's economic output. In this approach, Lucas emphasizes that the sector-specific learning-by-doing process plays a fundamental role in the country's human capital accumulation and growth and considered human capital as a measure of skills that can expand without limit, while other researchers' concept of human capital was only connected to years of schooling in the past *(Helpman,*

2009). On the basis of these findings, scholars agreed that regional competitiveness, and consequently regional growth, is no longer dependent on the traditional production resource endowment, capital and labor *(Capello, Olechnicka and Gorzelak, 2013).*

Ragnitz *(2007)* questioned to which extent the lower level of productivity in East Germany can be explained by deficits in human capital and knowledge-resources. It resulted that eastern Germany not only exhibited lower human capital intensity in comparison with the west but also that the human capital endowment would have been deteriorated further in the following years due to selective migration flows and due to not favorable education attendance of young population. Accordingly, he suggested adequate policies and investments strategies earmarked to the improvement of human capital endowments.

At the same time, differences also in universities and academic environment were detected between the east and the west of Germany almost two decades ago. Pasternack *(2000)* shed some light on the different patterns of the distribution of academic staff and students within the country: only one-third of the highest-ranking professorships (C4) in East Germany were held by East-Germans, and an East German professor in a west German university was a rare occurrence. In regard to students, only 2 percent of those who were born in west Germany were studying at east German universities, while 14 percent of students who grew up in east Germany study in west Germany.

Apart from these imbalances, Pasternack *(2000)* remarked also the potential in eastern German universities, pointing out two aspects. Firstly, the equipment at eastern German universities is more modern than that in many western German universities, having been almost completely updated in the years following the reunification. Secondly, the staff-to-student ratio was very favorable in many disciplines. Nevertheless, the percentages of students, who decided to continue their studies after secondary school was very low in eastern Germany. Whereas in west Germany nearly 30 percent of students took up studying at the university level, in eastern Germany only 20 percent did so.

Today, the situation is decisively improved: public research has become one of the strengths of the East thanks to the massive use of funds by the federal Government, Laender and European Union *(Heimpold and Hölscher, 2015)*. The share of public research expenditures in gross domestic product is, on average, significantly higher in eastern regions than in west Germany (as shown in section 2.2.3 in the second chapter).

Positive results in term of universities' excellence can today be collected also in eastern Germany. In autumn 2018, 57 excellence clusters were selected for funding as part of the "Federal and State Excellence Strategy". In the coming years, they will receive financial support in order to engage in high-tech research. Among the east German Laender, Saxony and Thüringen will benefit from the funding, as well as Berlin. However, there is not a single excellence cluster in the eastern German territorial area of Brandenburg, Mecklenburg-Vorpommern and Saxony-Anhalt. In this respect, we can affirm that eastern regions in the south perform much better than eastern regions in the north.

In this context, Berlin deserves a further analysis. The capital city was once mainly a manufacturing city, but now its economy is reliant on the service sector with a strong emphasis on education, research, cultural and creative industries. Universities and research institutes are a key sector of the capital city's economy and the sector accounted for 4.4% of the city's GDP in 2010. Berlin is now a magnet which draws students, researchers and business in search of talent: in the autumn of 2008, a total number of 133 594 students were enrolled in Berlin, accounting for 6.74% of all students in Germany. This number is very impressive if we take into account that Berlin's share of population only amounted to 4.14%. Berlin is recognized as one of the best locations for science in Germany as well as in the European Union, where it has established itself among the top three innovative regions. In the last years, Berlin has projected a science-led strategy for its economic development by individualizing key areas of strength in research and the development of technologies with notable commercial potential. The strategy focuses on "competence fields" – medical

technology, biotechnology, health, traffic engineering, ICT/media, optics and power engineering especially renewable energies. These fields constitute backbones for the three industrial clusters in health, communication and media and transport systems that enabled the transformation of Berlin into a knowledge-intensive innovative region. Public institutions in the city encompasses: three research-intensive universities (Technical University of Berlin, Humboldt University and the Free University of Berlin), Four universities of applied sciences, four schools of art, drama and music, two universities of applied sciences run by the Protestant and Catholic churches but primarily publicly funded, with a special focus on social work and nursing. Moreover, Berlin displays more than 70 publicly funded R&D institutes, a number of national laboratories and 40 technology parks and incubators. About 40 000 people, 3% of Berlin's workforce, are involved in R&D activities *(OECD 2010. Higher Education in Regional and City Development: Berlin, Germany 2010, Higher Education in Regional and City Development, OECD Publishing, Paris).*

Also in the research and innovation field, many improvements can be noticed in Eastern Germany (and not only in Berlin) through the establishment of many research institutes independent from universities, which are jointly funded by the Federal government and the Laender. In this respect, 4 main institutions deserve to be mentioned, according to the German Trade & Invest *(2014):*

- The Fraunhofer-Gesellschaft is Europe's largest application-oriented research organization and it has institutes and research establishments in all six eastern German regions. Today, the Fraunhofer-Gesellschaft counts 20 institutes as well as numerous branch offices in the new Laender. One project promoted by the Fraunhofer-Gesellschaft has been particularly successful in the East: four Fraunhofer Institutes in Dresden have joined forces with the Technical Universities of Dresden and Chemnitz and around 20 companies in the field of microelectronics and

microsystems to set up a High Performance Center for functional nano and microelectronics integration.

- Helmholtz Association is dedicated to pursuing the long-term research goals of society, and to maintaining and improving the quality of life of the population. Its research work encompasses six strategic sectors: Earth and Environment, Energy, Key Technologies, Health, Space and Transport, Aeronautics. This association has enriched the research landscape of eastern Germany by the presence of Helmholtz centers, especially in the cities of Potsdam, Berlin, Dresden and Leipzig.
- The Leibniz Association is a non-profit association that counts 89 basic and applied science and research institutions in Germany as well as a workforce of around 18 thousand (including more than nine thousand researchers) in 2014. One of its successful projects in eastern Germany is the Leibniz Institute for Plasma Science and Technology (INP Greifswald, Mecklenburg-Vorpommern), which is the largest non-university institute in the field of low-temperature plasmas, their basics and technical applications in Europe.
- The Max Planck Society (MPG) is an independent, publicly funded research organization focused on basic research, which consists of 83 institutes and research facilities (including one Max Planck Institute in the USA and four institutes are located in other European countries). One successful project in eastern Germany is represented by the Max Planck Institute for Evolutionary Anthropology in Leipzig *(MacDougall, W., 2015. Industry clusters in Eastern Germany. Trade & Invest, Berlin).*

In conclusion, the "relaunch" of universities and research centers – by means of large public fund – testifies the will to rebuild the east of the country on the basis of new approaches linked to the importance of knowledge accumulation. According to Camagni *(1991)*, knowledge creation is a local process, rooted in the historical development of an area,

accumulated over time through experience, local culture in local labor market and context, and therefore difficult to transfer to somewhere else. In this respect, Eastern Germany exhibits potential that can be further expanded.

3.6 The promotion of eastern cities can reduce the gap with the west: the re-growth of Leipzig lead by example

The location of people and activities determines the nature and the quality of our lives. Several economists have shared this central conviction about the importance of space and, thus, have proved that spatial concentration is associated with economic productivity.[80]
In this respect, the new economic growth theory suggests that cities must be interpreted as centres of ideas' creation and transmission, which can continue to grow only if their role of intellectual poles is recognized. Indeed, cities today are the main protagonists of the flow of ideas between individuals and firms. As a result, cities are the places where technology and intellectual spillovers as well as human capital externalities – emphasized by the new economic growth theory – occur. In dense and urban agglomerations, proximity allows workers to acquire human capital by imitating a vast array of role models and to learn by doing *(Glaeser, 2000)*.
These findings have been confirmed also by Chatterjee and Lakshmanan *(2009)* convinced that, in the new era of globalization, "the relevant socioeconomic actors come from three interdependent and complementary sectors – market, government and social sectors – and

[80] Prominent economists such as Smith, Marshall and Krugman conducted researches exploring the relation between space and economy. For instance, Smith emphasized the concept of productivity as an effect of the social, technical but also spatial division of labor.

have become major agents of change, shaping the structure, geography and composition of the world economy and its component urban regions".

In this context, the paradigm of "entrepreneurial city" has been introduced in the competitiveness agenda of local authorities in recent years, radically changing the urban governance. According to the OECD, urban entrepreneurialism has the three following characteristics. Firstly, the city's governance should initiate and foster economic growth rather than control and manage it. Secondly, while the former approaches were mainly led by the public sector, the new approaches are becoming increasingly market-driven. In short, this means that a full use of market mechanisms to achieve public goals is encouraged, reducing public intervention. Lastly, urban entrepreneurialism involves a stronger cooperation between the public and private sector, which is essential for cities to compete in the global market *(OECD, 2007. Competitive Cities: A New Entrepreneurial Paradigm in Spatial Development. Paris: OECD).* Thus, entrepreneurial cities display the typical traits connected to entrepreneurship: discovery, risk-taking, inclination to innovations, promotional and profit motivation *(Knight 1921, and Schumpeter, 1961).* All in all, today cities are asked to become more and more entrepreneurial, identifying and exploiting new potential deriving from such policies as cultural policy and event-hosting, which traditionally were merely pursued as a welfare service for citizens.

Based on the concept of the entrepreneurial city, Leipzig is an example of a completed "transformation from a declining, polluted and run-down Communist city, to a historically restored, desirable, growing and more prosperous city" (*Power, A., Herden, E., 2016. Leipzig City Story).*

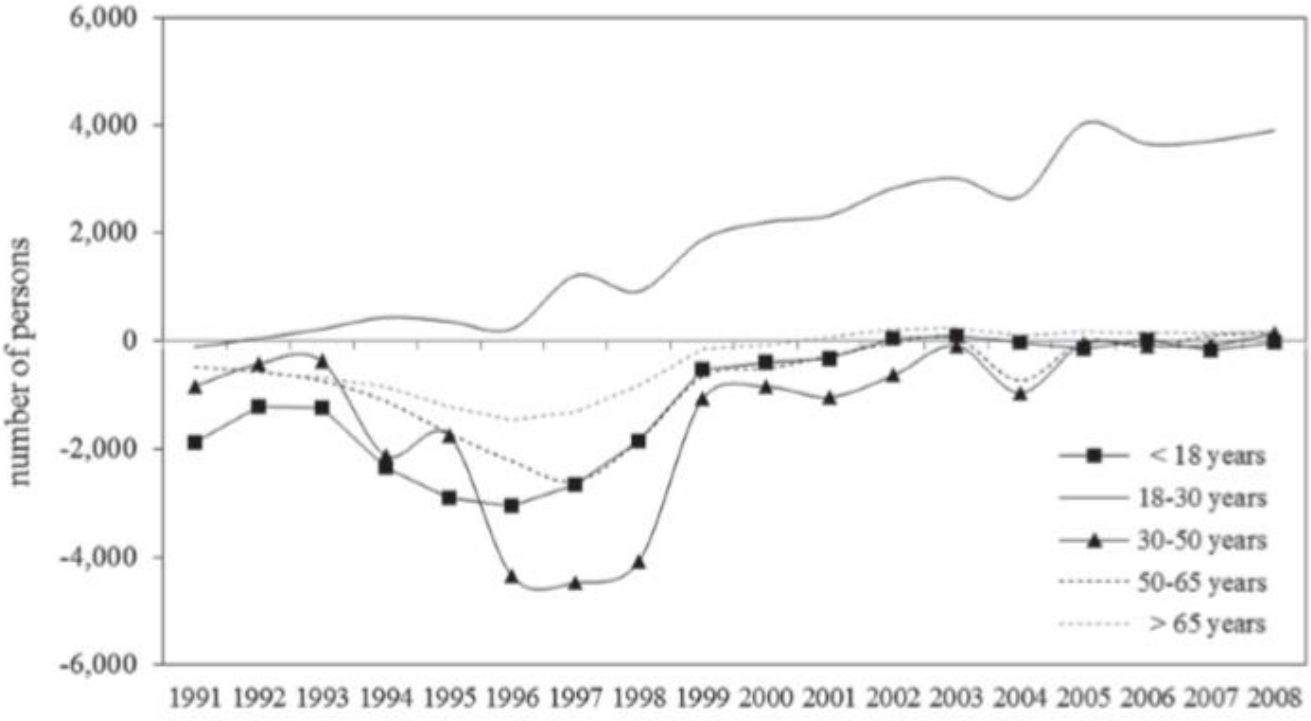
Historically, Leipzig was a city of commerce and trade, which benefitted from its location at the crossroads of two traditional European routes of commerce during the nineteenth century. During the GDR's time, the city was completely isolated from its former markets and lost economic relevance. If before the division of the country, the famous Leipzig fair

was renowned in the whole Europe, it was reduced to a fair mainly for the Comecon countries in the GDR's time. Due to the less attractive living conditions in the GDR in comparison with the west, the city experienced a massive loss of young and qualified people till 1961[81], accompanied by the drop of birth rate. As a result, the city showed clear signals of decay such as housing vacancies and shabby technical infrastructures *(Rink, Haase, Grossmann et al., 2012)*.

After the Fall of Berlin Wall, the trend of outmigration flows accelerated from 1990 and reached an historic low in 1998. Accordingly, the city became infamous as shrinking city *(Florentin, 2010).* Moreover, once the German reunification was completed, the city experienced a peerless deindustrialization and the loss of 85% of industrial jobs within just few years. The unemployment rate increased from almost 0% to more than 20% in the mid-1990s and early 2000s *(Rink et al.,2011).* The turnaround from this dramatic situation occurred since 2000s when the population started to growth again thanks to in-migration flows whose main carriers were young people aged from 18 to 30 (see figure 3.9). According to Rink et al. *(2011)*, the number of students has doubled from almost 18000 in 1990 to nearly 36000 in 2008. But what have triggered the re-growth of this city? What are the drivers behind its reversal? And why Leipzig has become a desirable destination for young people?

[81] Year of Berlin Wall's erection

Figure 3.9: Leipzig in- and out-migration per age group 1991-2008



Source: Rink D, Haase A, Grossmann K, et al., 2012 (on the basis of data from UFZ database).

The successful transformation of the city has made possible through vast public and private investments. In this regard, massive transfers from west Germany as well as European programmes[82] must be mentioned. However, scholars agreed that these funds must be recognized as a starting-point and not as a panacea for the recovery of the city. Indeed, scholars remarked the role of an active city administration for the new development of Leipzig.

The core of Leipzig's growth-policy was oriented on a double track: on one hand, the local authorities aimed to create a location of paramount importance for vocational and higher education, a culture pole characterized by inexpensive living but high-quality life, on the other

[82] European programmes such as EFRE and URBAN.

hand, to settle large investors in the industrial and service sectors *(Rink, Haase, Grossmann et al., 2012).* Economic development strategies have been designed mainly relying on five economic sectors: media and creativity, logistics, energy and environment, health and biotechnology and automotive industry and suppliers. The city has been successful at attracting large investments from well-known companies such as Porsche, BMW, DHL and Amazon.

At the same time, the city displays today a consolidated research hub that offers excellent science and research facilities and draws qualified students and researchers, whose work is presented and supported by many conferences and trade fairs hosted in Leipzig *(Power, A., Herden, E., 2016. Leipzig City Story)*. According to Miljak and Heidenreich *(2004)*, the transformation of the city must be considered exceptional if we take into account that Leipzig's economic structure was built from the scratch since very few of the state companies survived the economic transformations. On the contrary, other eastern cities such as Dresden and Jena were built again relying on a former existing industry.

Other focuses of the development plans for the city have been on restoring its urban environment, on house renewal and on infrastructural investments such as the Leipzig-Halle airport, motorways and railways.

Credits for the successful development of the city have been attributed to the cooperation among political parties, private sector and citizen involvement *(Garcia-Zamor, 2014)*, in particular under the leadership of the Majors Hinrich Lehmann-Grube (1990-1998) and Wolfgang Tiefensee (1998-2005). Apart from the urban renewal of the city through infrastructures and new houses, re-industrialization and the creation of a knowledge economy, another strand of their agenda was the organization of large-scale events[83] in order

[83] Leipzig participated at the EXPO 2000, it co-hosted the Soccer World Cup in 2006 and it was the German applicant city for the Olympic Games in 2012.

to position Leipzig as an economic and cultural centre among German and European cities *(Plöger, 2007).*

Currently, Leipzig employs the urban strategy named SEKo 2020: Integrated City Development Strategy, inspired by the European Union's Charter on Sustainable European cities. This strategy encompasses eleven themes: housing, economy and employment, environment and green spaces, education, civil society, culture, historic preservation, sports and higher education, research institutions and traffic and infrastructure. The main objectives of SEKo 2020 are: improve economic competitiveness, maintain and strengthen the quality of life and social cohesion *(City of Leipzig, 2012).* In order to achieve these goals, special programmes have been dedicated to reduce unemployment, especially through the reintegration of some categories of people into the labour market.

In collaboration with the Saxony's government and private entities, specific initiatives for young people[84] and for long-term unemployed have been set. Efforts to increase employment were shown already in 2001, when the city of Leipzig set up a job agency to attract BMW to choose the city for its new plant. BMW agreed to give one third of the jobs to people who were formerly unemployed and the job agency, in exchange, provided the pre-selection of the workforce as well as a relocation service for the managers moving to the city *(Grossman et al., 2014).*

Today, Leipzig faces the typical challenges of a growing city such as the rising rents in popular areas and a reduction in spare capacity and, thus, the signs of the past decay are just a distant memory. For the first time after reunification, Leipzig had a positive migration balance with the west side of the country in 2010 *(6281 in-migrants and 5822 outmigrants, see Stadt Leipzig, 2011).* Leipzig's new industries seem now strong but no one knows whether the city's current flowering is sustainable and will continue *(Power, A., Herden, E., 2016.*

[84] An example of a special program dedicated to young people is called Joblinge; Joining Forces to Address Youth Employment (for more details, see: www.joblinge.de).

Leipzig City Story). Nevertheless, the turnaround in its growth trajectory as well as its vision of entrepreneurial city can lead by example for the re-flourishing of other eastern cities.

Conclusions

On the 30th anniversary of the Berlin Wall fall, this work aimed to investigate if the economic gap between the west and the east still dominates and affects regional imbalances within Germany.

We started our research offering a profile of the country and, thus, pinpointing the strengths of its economy as a whole. In the "Global Competitiveness Report 2018", edited by the World Economic Forum and designed to evaluate the factors that collectively define the level of a country's productivity, Germany ranked third globally and proved to be the strongest European performer. The country has emerged not only for its stable macroeconomic environment but also for its strong internationalization which is largely recognized as a successful key of Germany's economic development model. While macroeconomic stability has been ensured by GDP's robust growth in the last years as well as by the low unemployment rate, especially among young cohorts, the high integration of the country in the world economy is testified by the impressive level of German exports, which accounted for almost 47 percent of the country's GDP in 2018. The export leadership of the country is strongly connected to the strengths of its industry (almost 92 percent of Germany's visible exports are industrial goods) and to the availability of high-quality and reliable infrastructures, which enabled Germany to become Europe's prime logistic hub.

But, as largely known, economic growth today is no longer merely dependent on traditional inputs such as capital and labor, and thus, economists agreed on the importance of non-material endowment such as knowledge accumulation. Keeping in mind this, the Federal Government of Germany has set the promotion of innovation and research activities at the core of its political agenda. Accordingly, Germany has established itself as a cutting-edge country: apart from being home of the largest population of researchers in Europe, it stands

out for its number of intellectual assets and for the massive firm's investments in R&D activities. In particular, Germany takes the lead in Europe for the number of patents and, the 19.000 patents granted at the European Patent Office in 2016, give evidence of the commercial viability of "made in Germany" innovations as well.

In addition to this, positive results can be collected also in terms of labour market performance: unemployment rate declined for the ninth year in a row in 2018 and the country exhibits a growing participation of traditional labour market outsiders (such as women and young people) in the last years. However, the demographic ageing of the population as well as the fall of immigration will shrink the labour supply in themedium-term, and consequently, preventive measures should be taken in order to face this challenge.

After providing an overall picture of German economy, we turned to reveal the patterns of economic regional differences across the country, which are often masked by the aforementioned national averages and records. We offered an analysis of regional inequalities, taking into account mainly economic indicators related to productivity, labour market, and innovation power. In order to do so, we chose primarily those indicators collected at the level of NUTS 2 regions in Germany, since they are the ones considered for the application of regional policies. However, it should be noted that, in some cases, we carried out comparisons among regional areas in Germany also at NUTS level 1 regions, which are aligned with the German Länder.

In terms of productivity, inequalities remain dominated by the divide between the west and the east of the country: none of the regions who belonged to the former East Germany is able to match the least productive region in west Germany, considering GDP's level. However, evidence suggests that some eastern NUTS 2 regions perform better than others, in particular: Berlin, Leipzig, Dresden and Thüringen. In addition, a discrepancy in productivity is detected also between the south and the north of the country but it is far

smaller than between the west and the east. Another aspect emerged from the analysis is that the economic power of eastern cities is not as big as the one of western cities.

In relation to the labour market, the highest unemployment rates are found in two NUTS 2 regions of the East: Berlin and Sachsen-Anhalt. However, it is fair to highlight that some eastern regions such as Dresden and Chemnitz (respectively, 3.9% and 3.4% unemployment rate) outperforms several NUTS 2 regions in the west. All in all, the best working conditions are offered in the south of the country where almost every region shows unemployment rates lower than 2.5% and wages are noticeably higher. Indeed, a significant gap in wages exists between the west and the east as well as the south and the north. In regard to the decline of persons of employable age that will affect the German labour market in the medium-term, it is foreseen to be in the east twice as acute as in the west.

Considering the innovation potential, the country does not show evenness across its regions as well but, nevertheless, very comforting data comes from eastern regions, which offer today innovative ecosystems whose R&D expenditure in the public sectors is even higher than in the west. Indeed, two eastern German regions rank highly among the top 10 best-performing regions in Europe under this aspect: Dresden (4th position) and Berlin (6th position). Excellent results in the east have been reported also with regards to research system's attractiveness — proved by the high number of international scientific co-publications per million population — especially in Berlin, Dresden and Leipzig. Nevertheless, a low performance of the east can be notice in terms of R&D in the private business sector and, consequently, in the lower number of intellectual assets applications in comparison to the west.

Therefore, our results support the hypothesis that, regional differences are still mainly based on a west-east gap within Germany but also outline widening imbalances between the richest south and the north of the country, considering productivity and labour market's parameters. These differences between the west and east can be only partially justified today by the damages of the past GDR's planned economy and by the loss of human capital due to the

considerable outmigration flows towards the west, in the years following the fall of the Berlin Wall. Indeed, economists agree to point out also the paucity of large firms as cause of the east Germany's backwardness. The lack of group headquarters implicates low export intensity of eastern firms as well as low private expenditure on research, which constitute a limit for the further development of this area. Considerable progress has been made instead in the field of research and innovation at a public level in eastern regions, that represents the intent of the Federal Government to foster convergence between the west and the east through the creation of innovative ecosystems.

On the whole, we need to remark that – for the majority of the parameters we considered throughout the analysis – the best results in the east are associated with the capital city of Berlin and the south-eastern regions of Leipzig, Dresden and Thüringen. To the best of our knowledge, reason for this lies in a better use of the financial assistance, received from west Germany, which has been earmarked for a growth-oriented policy, i.e. for massive investments rather than for own expenditure of eastern regions. These positive results from the east highlight that it would be inappropriate today to refer to Germany as two separate entities – the West and the East – like in the past.

In conclusion, the potential of east Germany lies in the establishment of economic regional clusters which can bring together the broad knowledge of universities and research institutions with the need emerging from companies, creating a strong link and cooperation between them. In this way, the lack of large companies can be mitigated by the growth of existing SMEs. Thanks to the financial stimulus provided by the German Federal Government, east Germany displays today some excellent clusters such as the Silicon Saxony, biggest high-tech network for the microelectronics, smart systems, photovoltaic, software, and applications sectors in Europe (2200 companies, 58000 skilled workers and of 28 research institutions are involved in this cluster). Moreover, the promotion of eastern cities should be recognized as a key driver to catch up with the west and, consequently, it

should be placed at the core of eastern regions' political agenda. Cities are today are the main protagonists of the flow of ideas between individuals and firms and, thus, places where technology and intellectual spillovers as well as human capital externalities occur. In this context, the successful transformation and reborn of Leipzig – on the basis of the "entrepreneurial city" paradigm – can lead by example for the re-flourishing of other cities in the East.

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