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The WIFO Radar of Competitiveness for the Austrian Economy 2022

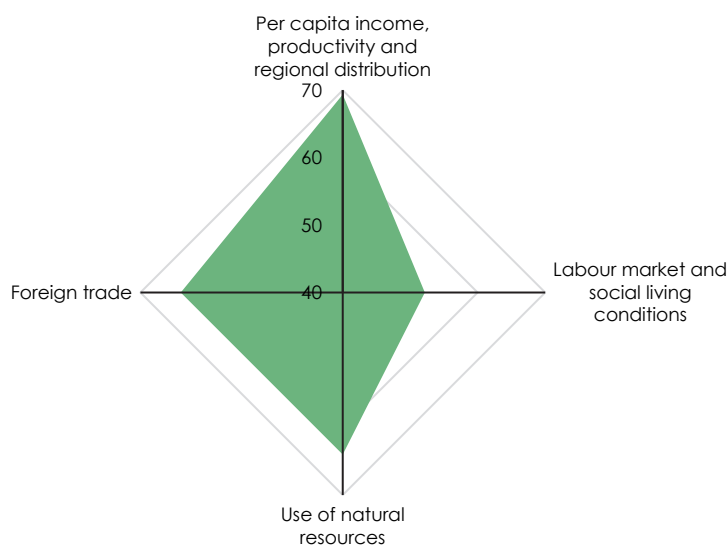
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- For the first time, the WIFO radar of competitiveness is available on the WIFO website as an interactive graphical application with the possibility of individual selection, e.g. of time periods or comparative countries.
- In the shadow of the COVID-19 crisis, Austria fell by an average of 4.3 percentage points across all indicators to a percentile rank of 61.6.
- With mean percentile ranks of 52.2 and 64.0 respectively, Austria is only in the European midfield in the dimensions "labour market and social living conditions" and "use of natural resources".
- Austria is also not in the top third in foreign trade, with a mean percentile rank of 64.0. It still performs best in terms of per capita income and its regional distribution (percentile rank 69.3).
- This year's focus topic highlights regional differences in competitiveness.

Austria's position in four dimensions of competitiveness



"With a mean percentile rank of 61.6, Austria fell further behind the top third of European comparator countries."

The percentile rank indicates for each indicator the share of all countries with equal or less favourable values than Austria in the population of the approximately 30 European comparison countries. Only in the areas of real income, productivity and regional distribution does Austria belong to the top third (source: WIFO).

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January 2023

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The WIFO radar of competitiveness measures the performance of Austria using 24 selected indicators related to economic, social and ecological goals: on average across 24 indicators, Austria is just behind the top third of European countries and has recently fallen further behind. This was partly due to a drop in the rankings for multifactor productivity and the indicators for employment and income distribution. Austria continues to achieve very high scores in regional cohesion. In other areas, such as energy dependency and environmental patents, it has improved relative to the other countries.

JEL-Codes: E22, E23, E24, O52 • **Keywords:** Competitiveness, locational quality, productivity, social living conditions, resource efficiency

This article is based on the interdisciplinary cooperation of the WIFO thematic platform "Competitiveness": https://www.wifo.ac.at/en/research_priorities/competitiveness/thematic_platform_competitiveness

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WIFO understands competitiveness as the ability of an economy to ensure sustainably high real incomes and to continuously improve social and ecological living conditions.

1. Introduction

The "WIFO radar" of competitiveness provides regular monitoring of the international competitiveness of the Austrian economy (Peneder et al., 2020). It is based on a selection of macroeconomic figures that depict four different dimensions of competitiveness: First, real incomes, productivity and regional distribution; second, the labour market and social living conditions; third, the use of natural resources; and fourth, foreign trade (see box "The WIFO radar of competitiveness").

The definitions of the indicators, the data sources, the number of comparator countries and the last available year of the respective data series are summarised in Table 1. The results for the main indicators are

shown in Figure 1, those for specific sub-aspects in Figure 2. In the majority of the indicators, the most recent data refer to the years 2020 or 2021 and thus often reflect the effects of the COVID-19 crisis. Changes compared to previous periods must therefore be interpreted with appropriate caution. For a more comprehensive picture, the website of the WIFO thematic platform "Competitiveness" for the first time offers the possibility of interactive use of the WIFO radar: interested parties can make specific queries online and according to the respective question and, for example, adjust the periods or the selection of the comparison countries¹.

¹ See https://www.wifo.ac.at/en/research_priorities/competitiveness/thematic_platform_competitiveness.

Table 1: Selected key figures of competitiveness

	Definition	Source	Last available bar year <i>t</i>	Number of countries ¹
Main indicators				
Economic output	Real GDP per capita in €, at 2015 prices	WDS – WIFO Data System, Macrobond	2021	31
Labour productivity	GDP per hour worked, nominal, EU 27 = 100 ²	Eurostat	2021	30
Multifactor productivity	Growth contribution in percentage points, two-year average	TED – Total Economy Database, Conference Board	2021	31
Energy intensity	Final energy use per unit of GDP, PJ per billion €, at 2015 prices	IEA World Energy Balances; WDS – WIFO Data System, Macrobond	2020	31
CO ₂ Intensity	CO ₂ emissions per unit of GDP, kt per billion €, at 2015 prices	UNFCCC GHG Data Interface; WDS – WIFO Data System, Macrobond	2020	31
Share of renewable energy sources	Percentage shares of renewable energy sources in final energy consumption ³	Eurostat	2020	30
At-risk-of-poverty rate	Proportion of persons with 60 percent or less of the median equivalised income in percent, by social benefits ⁴	Eurostat	2021	29
Unemployment rate	Percentage shares of unemployed in the 15 to 64 year old labour force ⁵	Eurostat	2021	30
Employment rate	Shares of employees in all 15 to 64 year olds ⁵	Eurostat	2021	30
Income distribution	Ratio of disposable income of the 20 percent of the population with the highest to the 20 percent with the lowest disposable income ⁶	Eurostat	2021	29
Regional cohesion	Coefficient of variation of gross regional product per capita at purchasing power parities by NUTS-3 region ⁷	ARDECO – Annual Regional Data base of the European Commission	2019	25
Current account balance	Current account balance as a percentage of GDP ⁵	Eurostat	2021	30
Complementary indicators				
Per capita income (adjusted for purchasing power)	GDP per capita at purchasing power parities, at 2021 prices	Conference Board, TED – Total Economy Database	2021	31
GDP per capita metropolitan regions	Gross regional product per capita at purchasing power parities for the metropolitan regions of the EU ⁷	ARDECO – Annual Regional Database of the European Commission	2019	25
GDP per capita non-metropolitan regions	Gross regional product per capita at purchasing power parities for the non-metropolitan regions of the EU ⁷	ARDECO – Annual Regional Database of the European Commission	2019	25
Full-time equivalent employment rate	Share of employees in full-time equivalents as a percentage of all 15 to 64 year olds ⁵	Eurostat, Labour Force Survey, special evaluation	2021	30
Gender gap employment	Difference in employment rate between men and women (25 to 44 year olds, full-time equivalents) in percentage points ⁵	Eurostat, Labour Force Survey, special evaluation	2021	30
NEET rate	Proportion of those not in employment who are not participating in education or training as a percentage of all 18 to 24 year olds ⁸	Eurostat	2021	30
Further education	Proportion of persons participating in education or training as a percentage of all 25 to 64 year olds ⁵	Eurostat	2021	30
Energy dependence	Percentage shares of net energy imports in gross inland energy consumption ⁹	Eurostat; IEA	2020	30
Modal split freight transport	Ratio of freight transport by rail in t-km to that by road ¹⁰	Eurostat	2020	30
Environmental patent applications	Percentage shares of environmentally and climate-relevant patent applications in all patent applications at the European Patent Office (EPO; average of the last 3 years)	Patstat, OECD definition	2019	31
Market share goods export	Market share of global goods exports in percent	WDS – WIFO Data System, Macrobond	2021	31
Market share tourism exports	Market share of worldwide exports of travel services (excluding passenger transport) in percent	Macrobond, WIFO calculations	2021	31

Source: WIFO presentation. – ¹ EU 27, Switzerland, Iceland, Norway, UK. – ² Excluding UK; Belgium, Switzerland: latest value 2020. – ³ Excluding Switzerland; UK: most recent value 2020. – ⁴ Excluding Iceland, UK; Norway, Switzerland: most recent value 2020. – ⁵ Excluding the UK. – ⁶ Excluding Iceland, UK; Slovakia, Norway, Switzerland: most recent value 2020. – ⁷ Without Cyprus, Malta, Luxembourg, Iceland, UK. – ⁸ Without UK; Switzerland: most recent value 2020. – ⁹ Without Norway. – ¹⁰ Without Iceland.

This year's focus topic is dedicated to differences in the economic core indicators of competitiveness between the Austrian regions. Further current analyses by WIFO on

selected aspects of competitiveness can be found in the list of publications of the WIFO thematic platform "Competitiveness"².

The percentile rank is the share of all countries with equal or less favourable values than Austria.

² Recent works include Bärenthaler-Sieber et al. (2022), Bittschi and Meyer (2022), Christen et al. (2022), Fritz et al. (2022), Glauninger et al. (2022), Huemer

(2022), Kettner et al. (2022), Peneder and Charos (2022), Pitlik and Schratzenstaller (2022) and Reinstaller et al. (2022).

The WIFO radar of competitiveness

The WIFO radar provides a concise classification of the competitiveness of the Austrian economy in comparison with around 30 European countries, over four time periods and for 24 performance indicators. To make the indicators measured in different units comparable, only Austria's relative position is shown for each indicator and normalised to a **percentile rank**¹. These values, unlike simple ranking figures, are comparable even if observations for the same number of comparison countries are not available for all indicators. In addition, the percentile rank directly indicates the relative position in a distribution and allows the simple formation of mean values for aggregating the results.

The percentile rank indicates for each indicator the share of countries with the same or less favourable values than Austria in the population of comparison countries. All indicators are defined in such a way that the most favourable values in terms of competitiveness are on the beam outside and correspond to a percentile rank of 100. The lower Austria's percentile rank, the less favourable the relative ranking. For example, a percentile rank of 60 means that 60 percent of all countries in the comparison group perform equally well or worse and 40 percent better than Austria. In addition to this comparison across countries for the latest available year t , the WIFO radar also shows Austria's relative position at the points in time $t-1$, $t-3$ and $t-10$. This enables a short-, medium- and long-term comparison.

¹ Figures 1 and 2 show the percentile ranks for 24 indicators, while in the foreign trade dimension another indicator (or a group of related indicators) is shown separately due to the specific measurement method.

2. Indicators and results

2.1 Real income, productivity, and regional distribution

As an indicator of a country's overall economic output, **real GDP per capita** measures the material prosperity of a society. In the last available year 2021, real GDP per capita was the same or lower than in Austria in 67.7 percent of the 31 comparison countries (Figure 1). Austria was thus still in the top third of the distribution but lost 3.3 percentage points compared to the previous year and 6.5 percentage points in a ten-year comparison.

If one measures GDP per capita in uniform purchasing power standards, one obtains an indicator of average purchasing power in terms of real **per capita incomes**. Austria achieved a percentile rank of 74.2, placing it in the top third of the 31 European comparison countries here as well (Figure 2). As with real GDP per capita, Austria's position has been relatively stable over time, most recently improving by one rank to 9th.

Nominal GDP per hour worked is a measure of **labour productivity**. In this indicator, Austria fell two ranks in 2021. Given a percentile rank of 63.3, more than a third (36.7 percent) of the comparator countries achieved higher labour productivity growth than Austria.

Multifactor productivity developed even more weakly. It expresses the technical efficiency of an economy and is the residual after the contribution of all input factors has

been deducted from the volume of value added³. This indicator is volatile over time and is often significantly revised in retrospect. In the COVID-19 crisis, production constraints and the decline in demand led to a decrease in multifactor productivity in almost all European countries. In 2020, Austria still managed to stay in the European midfield with a percentile rank of 51.6. In 2021, however, it fell from 16th to 27th place among 31 countries (percentile rank 16.1) despite weak positive growth. In terms of this metric, Austria appears to be overcoming the economic consequences of the COVID-19 crisis more slowly than other European countries.

The regional spread of purchasing power-adjusted per capita incomes within countries serves as an indicator of **regional cohesion** (Figure 1). In this respect, Austria remained in the top fifth of a ranking led by Finland and Sweden in 2019 (last available data), with a percentage rank of 84.0⁴. Position gains compared to the situation 3 and 10 years ago (percentile rank of 80.0 and 72.0 respectively) suggest that Austria has succeeded in achieving a better regional balance in the medium term than the European average. This year's Focus Topic (Chapter 3) goes into this in more detail.

As even a rough comparison of per capita **incomes** between **metropolitan** and **non-metropolitan regions**⁵ shows, this convergence process in Austria was due to a more favourable development in the non-

population of more than 250,000 in the agglomeration area. According to this definition, there are 254 metropolitan regions in the European countries considered, including the 5 Austrian metro-regions of Vienna, Graz, Linz, Salzburg and Innsbruck. The non-metropolitan regions include all other regions, i.e. industrial regions outside the agglomeration areas as well as rural areas.

In terms of multifactor productivity, Austria is overcoming the COVID-19 crisis more slowly than other European countries.

³ For the measurement of multifactor productivity using Austrian firm-level data, see e.g. Peneder and Prettnner (2021).

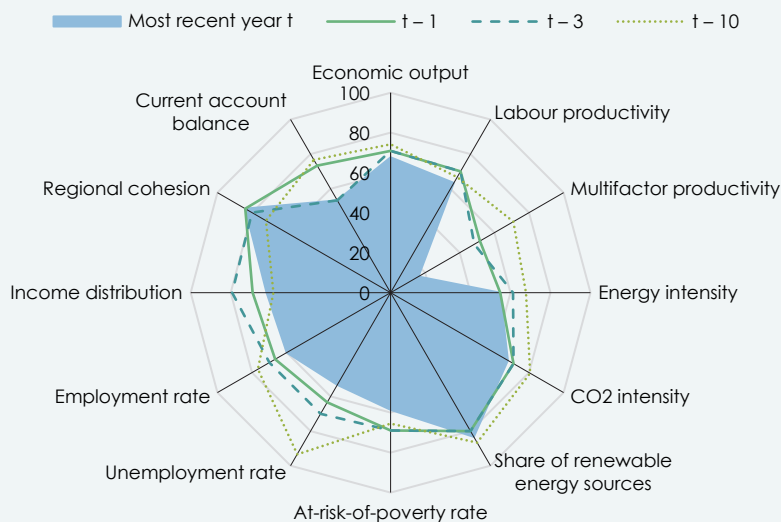
⁴ After the UK's departure from the EU, the analysis is based on data on 1,188 NUTS-3 regions in 25 countries. In Austria, 35 NUTS-3 regions are distinguished.

⁵ Eurostat (2019) defines metropolitan regions as all functionally delineated urban regions with a

metropolitan regions (Figure 2). While the purchasing power-adjusted gross regional product (GRP) per capita in Austria's metropolitan regions developed weaker in the medium term than in the urban regions of the comparator countries (percentile rank 2019: 84.0, 2009: 88.0), the position of the Austrian non-metropolitan regions improved

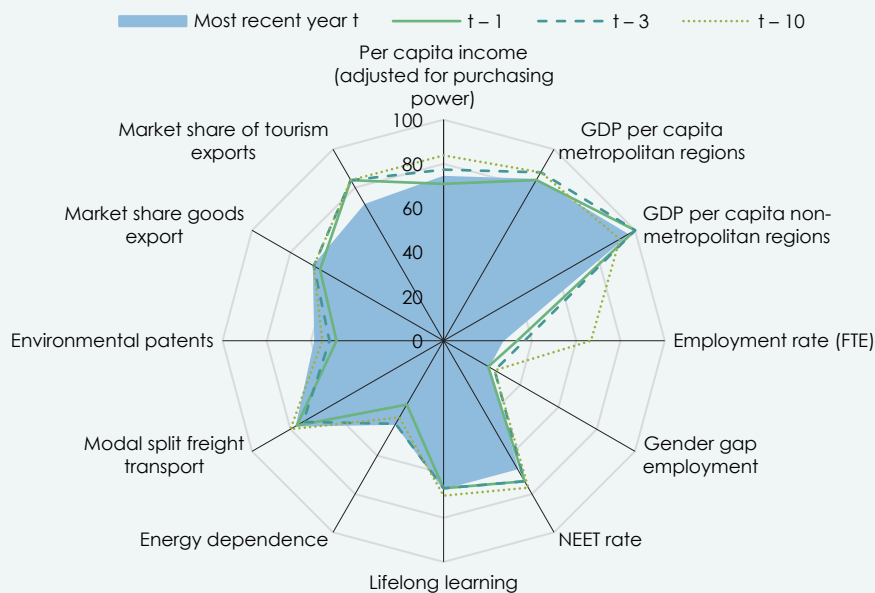
(2019: 96.0, compared to 92.0 in 2009). In 2019, average per capita GRP in the non-metropolitan regions was higher than in Austria only in Ireland. With regard to the metropolitan regions, Norway, Belgium and the Netherlands were ahead of Austria in addition to Ireland.

Figure 1: Austria's competitiveness in a European comparison – percentile rank of the main indicators



Source: WIFO. For the definition of the indicators, see Table 1. All indicators were ranked in such a way that a higher percentile rank corresponds to higher competitiveness.

Figure 2: Austria's competitiveness in a European comparison – percentile rank of the supplementary indicators



Source: WIFO. For the definition of the indicators, see Table 1. All indicators were ranked in such a way that a higher percentile rank corresponds to higher competitiveness.

2.2 Labour market and social living conditions

The use of the factor labour and the volume of labour determine the level of per capita incomes together with the use of capital and productivity. The development of the labour market is important in a competitiveness analysis, as it provides information on the utilisation of the available labour resources in an economy. In addition, key figures on labour force participation provide information on social participation and the spread of social risks. In the case of the **unemployment rate**⁶ and the **employment rate**, Austria, with percentile ranks of 53.3 and 60.0 (2021), respectively, is only in the European average and clearly behind the leading field. In the case of the unemployment rate (2021: 6.3 percent), Austria is on the one hand behind many Central and Eastern European countries, where it is much lower – also due to a rapid ageing of the labour force and the emigration of workers. On the other hand, Western European countries, such as Denmark or Switzerland, which had reported unemployment rates like Austria's in previous years, also recorded lower values in 2021. The employment rate in Austria in 2021 stagnated at the level of the previous year (72.4 percent). If the level of labour force participation corresponds to the preferences of employees, higher employment rates do not automatically translate into welfare improvements. However, as the other indicators also show, there is a connection between employment, social participation, and poverty risk. In this respect, a high employment rate facilitates improvements in other social indicators. In a European comparison, Austria ranked only 15th in terms of unemployment rate and 13th in terms of employment rate in 2021. In both cases, this implies a renewed slight deterioration compared to the previous year. In a long-term comparison, Austria has fallen back significantly (2011: rank 3 and rank 8, respectively). Despite strong economic growth after the COVID-19 crisis, Austria thus did not manage to reverse the trend in these indicators as in other European countries.

The labour market indicators show a steady deterioration of Austria's relative position within Europe over the last 10 years.

The indicators on poverty risk and income distribution deteriorated in 2021 compared to the previous year. Here, Austria is only in the European midfield.

In addition to the employment and unemployment rates, other indicators provide information on the extent and distribution of labour force participation. Measured by the **employment rate in full-time equivalents**⁷, Austria is only in 23rd place out of 30 comparative countries with a percentile rank of 26.7 (2021). This weak performance can be explained by the high part-time rate in Austria. In the last 10 years, there has been a considerable loss of position in this indicator (from 11th to 23rd place). Austria's

⁶ Since all indicators have been ranked so that a higher percentile rank corresponds to higher competitiveness, a high employment rate and a low unemployment rate both mean a high percentile rank.

employment rate in full-time equivalents has stagnated for more than 20 years (2000 or 2021: 62.6 percent), while full-time employment has steadily increased in most other European countries. Although the rates have also stagnated in the long term in some Scandinavian countries (Denmark, Iceland, Norway), they are at a much higher level than in Austria. Other European countries with equally low rates that have not been able to increase them significantly in the last 20 years are only Belgium, Greece, and Romania.

The **gender gap of the employment rate** of 25 to 44 year olds (in full-time equivalents) reflects a pronounced difference between the employment behaviour of men and women for Austria (percentile rank 23.3). In 2021, the working time-adjusted employment rate of prime-age women in this country was 20.4 percentage points lower than that of men. The differences were similarly large in Germany, the Netherlands and Switzerland. In contrast, the gender gap was significantly smaller in the Scandinavian countries, but also in most countries in Central and Eastern Europe.

Especially in the longer term, social equalisation, protection against poverty and, in particular, participation in education contribute to an efficient economic and living location. However, Austria has recently lost significant ground in terms of poverty risk and income distribution. In particular, the **at-risk-of-poverty rate**, which as a relative poverty measure is also related to the inequality of income distribution, was noticeably higher in 2021 than in the previous year. At 14.7 percent (after 13.9 percent in 2020), after a temporary improvement, it was again as high as in 2010 after the financial market and economic crisis. Measured by percentile rank (2021: 58.6), there was also a marked deterioration (2011: 65.5, 2018 69.0). In an international comparison, Austria ranked 13th among 29 comparative countries in 2021. The at-risk-of-poverty rate is particularly low in some Nordic countries (Finland, Denmark) and in East-Central Europe (Czech Republic, Slovakia, Slovenia).

The indicator concerning the **income distribution** – the quotient between disposable income of the quintile of the population with the highest income and that of the quintile with the lowest income – gives Austria a percentile rank of 62.1 and 12th place among 29 comparison countries. Apart from minor fluctuations, this indicator has stagnated over the last 10 years. However, some countries have managed to improve this indicator, which has led to a continuous deterioration in Austria's position in recent years. The

⁷ The full-time equivalent is defined by Eurostat based on the average working time of a full-time employee. It is therefore not a fixed figure but varies according to country and time.

still comparatively solid positioning is since most Southern European and Central and Eastern European countries are in a worse position than Austria. Frequently used comparison countries ("peers") in Scandinavia or the Benelux countries, on the other hand, are all ahead of Austria in this indicator.

Education indicators cover an important aspect of social participation and are a key determinant of future competitiveness. The **NEET rate** is the share of youths and young adults (15 to 29 years) who were not in employment, education, or training (NEET) completed at the time of the survey. It was over 9 percent in Austria during the financial and economic crisis and decreased to 8.3 percent by 2019. However, the COVID-19 crisis led to a significant increase to 9.5 percent in 2020. In 2021, the NEET rate remained at a similarly high level (9.4 percent). Austria's percentile rank (2020: 73.3, 2021: 66.7) and position (2020: 9, 2021: 11) deteriorated. Many comparative countries succeeded in significantly reducing the NEET rate in 2021, whereby Denmark (2020: 10.2 percent, 2021: 8.3 percent) and Finland (2020: 10.3 percent, 2021: 9.3 percent) recently recorded better values than Austria.

While educational deficits of younger cohorts mainly have an impact in the future, the participation of the adult population (25 to 64 years) in **continuing education** can serve as an indicator of the qualification of the currently employed. In 2020, the COVID-19 crisis and associated lockdown measures led to a decline in the CET participation rate from 14.7 percent (2019) to 11.7 percent. In 2021, the rate recovered significantly and at 14.6 percent almost reached the pre-crisis level again. However, this increase was also achieved by many comparative countries in addition to Austria, which did not result in an improvement in position. Austria's percentile rank and position (66.7 and 11th respectively) remained unchanged in 2021 compared to the previous year. In a long-term comparison, the position for this indicator is also stable (2011: percentile rank 70.0 and rank 10).

2.3 Use of natural resources

The Ukraine war shows how crucial a secure and sufficient electricity supply is for a national economy. The lower the **energy intensity**, the more productively energy is used. In addition to a country's economic structure, climate and weather conditions also influence energy intensity. In particularly hot summers, the energy demand for cooling increases, while that for heat generation depends largely on the outside temperatures in winter. Only a minority in the group of reference countries came closer to the goal of a long-term reduction in energy intensity in 2020. Only seven were able to reduce it slightly. In 13 countries, energy intensity

remained the same, and in eleven – including Austria – energy input per unit of GDP even increased slightly. The large level differences between the countries, which have been observed for some time, thus remained in 2020. The highest energy intensity in 2020 – and even higher than in the previous year – was in Bulgaria (8.3 PJ per billion € GDP). In comparison, Switzerland used only 1.1 PJ to produce 1 billion € of GDP and was thus also the European country with the lowest energy intensity in 2020.

Although Austria was able to maintain its 15th place in 2020, in the long term it has settled its position in the lower midfield of the group of reference countries. Measured by percentile rank, Austria deteriorated significantly in a ten-year comparison (2010: 67.7, 2020: 54.8). Switzerland also leads the ranking in the long term, ahead of Ireland, which improved considerably, especially in the ten-year interval (from 87.1 in 2010 to 96.8 in 2020).

The **CO₂ intensity**, defined as emissions per unit of GDP, is, in addition to the development of absolute emissions, a macroeconomic productivity measure that reflects structural changes with regard to the importance of fossil fuels in an economy. The use of fossil energy sources is the most significant cause of CO₂ emissions and thus a decisive determinant of the CO₂ intensity. A reduction in CO₂ intensity can be achieved on the one hand through a reduction in absolute energy consumption and on the other hand through a shift in the energy mix in favour of renewable energy sources.

Austria achieved a percentile rank of 67.7 in 2020 and thus deteriorated compared to the previous year. Although it still ranks in the top third of the countries of comparison, it has fallen back significantly in a ten-year comparison. In 2010, Austria was still in 7th place among 31 countries, it lost four places by 2020. Measured by the percentile rank, in 2010 80.6 percent of the reference countries still emitted more or the same amount of CO₂ per billion € GDP as Austria. Although the amount of CO₂ emitted per unit of GDP fell from 220 t (2010) to 178 t (2020), this can to a large extent be explained by the COVID-19 pandemic. Against the background of national and European climate targets, there is thus an urgent need for action. As in previous years, the CO₂ intensity in 2020 was lowest in Switzerland, ahead of Sweden and Ireland. Bulgaria came in last, behind Poland and the Czech Republic. The gap between the first and last ranked countries remained very large in 2020. Switzerland emitted about 51.3 t of CO₂ per billion € of GDP, while in Bulgaria it were 746.1 t (Poland 606.3 t, Czech Republic 501.7 t).

Renewable energy sources are used on the one hand for heat supply and on the other

In terms of energy input per unit of GDP, Austria is among the top half of the group of reference countries, but has lost competitiveness in the longer term.

hand for the generation of electricity. Austria's topography is favourable for electricity generation of hydropower, as shown by its the traditionally high share. In addition, photovoltaics, wind energy and electricity from biomass have been added in the recent past. In Austria, the share of **renewable energy sources** in total final energy consumption (electricity and heat generation) was 36.6 percent in 2020. This placed Austria in the top fifth of 30 reference countries and means a slight improvement compared to 2019. Measured by percentile rank, 83.3 percent of the comparison countries had an equally high or lower share of renewable energy sources than Austria. The longer-term comparison nevertheless shows a loss of competitiveness. In 2020, as in previous years, Iceland recorded the highest share of renewable energy sources in final energy consumption, not least due to the use of geothermal energy available there. Norway covers three quarters of its energy consumption from renewable sources and most recently achieved a percentile rank of 96.7, followed by Sweden with a percentile rank of 93.3.

Austria is heavily dependent on imports of fossil fuels. Austria has also been a net importer of electricity since 2001. The degree to which an economy depends on energy imports is measured by the **energy dependence** indicator⁸, which expresses net imports as a share of gross domestic consumption. In order to reduce dependence on energy imports, two levers can be used: firstly, a focus on efficiency in a system that provides energy services with a lower energy demand, and secondly, a substitution of imported energy sources with domestic ones.

Among the 31 comparison countries, Austria shows a relatively high dependence on imports in 2020, although its position improved compared to the previous year. While in 2019 about one third of the reference countries were equally or even more dependent on energy imports than Austria, in 2020 it was about 42 percent. A long-term comparison also shows an improvement in the position (percentile rank 2010: 38.7 and 2020: 41.9).

In addition to greenhouse gas emissions, transportation also causes other external effects such as air pollution, noise or congestion. Freight is mainly transported by rail, road and water, whereby the external effects differ according to the transport mode. Rail freight transport performs better than road freight transport⁹. Nevertheless, the majority of goods are transported by truck. The **modal split of land** transport, i.e. the ratio of rail freight transport to road freight transport, therefore serves as an indicator of the

⁸) As a major exporter of crude oil and natural gas, Norway occupies a special position here and was therefore not included as an outlier in the country comparison.

country-specific importance of environmentally friendly freight transport.

Measured by this indicator, Austria has lost competitiveness over time: whereas in 2010 it had a percentile rank of 80.0, in 2020 the value was only 76.7, which corresponds to a loss of one rank (from rank 7 to rank 8) in the group of 30 comparison countries. Lithuania was the best performing country in terms of modal split in 2020, displacing Latvia from first place in 2020. Estonia, another Baltic country, was in third place. Malta and Cyprus, which lack a rail infrastructure, thus showing the weakest performance. Freight transport by rail in Ireland and Greece also has no great relevance.

The share of **patent applications for environmental technologies in a country's** total patent applications to the European Patent Office serves as an indicator of a country's success in this area. Since 2021, the delimitation of environmental patents has followed the new OECD definition: in addition to technologies for reducing emissions, those for adapting to climate change and ICT patents with environmental relevance are also included. Since the indicator can fluctuate greatly from year to year, especially in small countries, a three-year average is used. Austria improved according to this indicator at the current margin and was most recently in the upper midfield of the comparison countries (percentile rank 58.1, 2009: 54.8). Denmark was the leader in 2019.

2.4 Foreign trade

The strong recovery from the COVID-19 crisis in 2021 was also reflected in foreign trade data: both exports and imports significantly exceeded their 2019 values. Imports of goods, in particular, increased strongly, as investments in equipment expanded noticeably and energy imports became more expensive. Trade in services did not yet reach its pre-crisis level in 2021. COVID-19-related restrictions continued to dampen tourism exports, while tourism imports recovered slightly. In sum, the **current account balance** contracted to 0.4 percent of GDP in 2021. This is more in line with the economic policy objective of a balanced foreign trade position; however, with a percentile rank of 53.3, Austria remained significantly behind values seen in previous years, and also behind the long-term comparative value from 2011 (Figure 1). Since this shift was based more on the business cycle and the outcome of the pandemic, it is, however, too early to deduce a deterioration in the competitiveness of the Austrian economy.

⁹) Road freight transport accounted for around 40 percent of total transportation emissions in 2020.

Particularly strong changes in the current account balance were recorded in 2021 by Norway (from 1.1 percent to 14.9 percent of GDP) and Ireland (from –6.8 percent to 14.2 percent of GDP) or – in the opposite direction – Lithuania (from 7.3 percent to 1.1 percent of GDP) and Latvia (from 2.6 percent to –4.2 percent of GDP). In the ranking, Austria was overtaken by Spain, Finland, Croatia, Ireland, Switzerland and Norway and fell back to 15th place.

The different response of merchandise trade and international tourism to the COVID-19 pandemic can also be seen in Austria's global market shares. While Austria's **market share** in global **goods exports** (to about 180 countries) declined only slightly (2021 by 0.1 percentage point compared to the previous year), its market share in global tourism exports declined significantly (by 1 percentage point). The former fluctuated around 1 percent over the long-term, although it has tended to deteriorate in recent years. The year-on-year improvement in the ranking was at the expense of Ireland, which was displaced from 11th place. The decline in Austria's **market share** of global **tourism exports** (to around 170 countries) was mainly due to the weak first quarter – at that time the lockdowns had led to poor capacity utilisation in winter tourism. Accordingly, lockdown-free Switzerland was able to overtake Austria in the ranking in 2021. Likewise, Greece, Croatia and Portugal benefitted from the increased demand for vacation in nearby destinations and also passed Austria. With the 10th place among 31 European comparison countries, Austria's percentile rank declined in comparison to the previous year (Figure 2).

In the short term, exchange rate fluctuations between the euro and the national currency of trading partners determine the

prices of Austrian exports denominated in foreign currency and thus price competitiveness. An appreciation of the euro tends to raise export prices, while a depreciation tends to lower Austrian export prices abroad. However, the pass-through of exchange rate fluctuations into export prices depends on competitive pressures in the foreign market and the price elasticity of foreign demand. In the medium term, the dynamics in the income and price formation processes within both trading partners dominate the short-term bilateral exchange rate effects; they are summarised in the **real effective exchange rate indices**. Table 2 shows the development of the overall index either deflated by the harmonised consumer price index or by unit labour costs, and the sub-index for industrial goods (deflated either by consumer or by producer prices) for Austria¹⁰.

The development of Austria's competitive position with respect to price levels showed a mixed picture in 2021. The real effective indices based on the consumer price index point to a further deterioration in competitiveness, although the inflation rate measured by the harmonised consumer price index (HICP) was lower in Austria than in its trading partners. At the same time, the increase of unit labour costs or producer prices in Austria was even weaker than that of the HICP of trading partners, so that the real effective appreciation turns into a depreciation when the price indicators are replaced (Table 2). The intensive use of short-time work in Austria, however, distorted the development of relative unit labour costs during the pandemic. In a long-term comparison (2011-2021), the overall index appreciated by an average of about 0.4 percent per year. Only when producer prices are used, does the real effective exchange rate remain almost stable in the long run.

Austria's market share in global goods exports hardly declined in 2021. Its share of the global tourism market, on the other hand, dropped significantly.

In 2021, the development of Austria's competitive position with respect to price levels showed a mixed picture.

Table 2: Real effective exchange rate indices for Austria in comparison

	2020-21	2018-2021	2011-2021
	Average year-to-year percentage changes		
Overall index			
Deflated with harmonised consumer price indices	+ 0.2	+ 0.3	+ 0.4
Deflated with unit labour costs	– 0.9	+ 0.5	+ 0.4
Industrial Goods Index			
Deflated with harmonised consumer price indices	+ 0.2	+ 0.3	+ 0.3
Deflated with producer price indices	– 0.2	– 0.1	– 0.1
	+ 0.2	+ 0.3	+ 0.4

Source: WDS – WIFO Data System, Macrobond.

¹⁰ WIFO calculates real effective exchange rate indices in cooperation with the OeNB. The properties, construction as well as the advantages and disadvantages of these indices, which differ according to the type of trade flows and the price or cost indices

considered, are described in more detail in Url et al. (2021). Due to the specific measurement method, the exchange rate indices are presented separately (Table 2) and not shown as a percentile rank.

3. Focus topic: Regional disparities in the level of economic development in Austria – status, evolution, influencing factors

In terms of regional cohesion, Austria is particularly well positioned according to the results of the WIFO radar, with a percentile rank in the top fifth of the comparator countries (Figure 1). This year's focus topic asks about the background of this success.

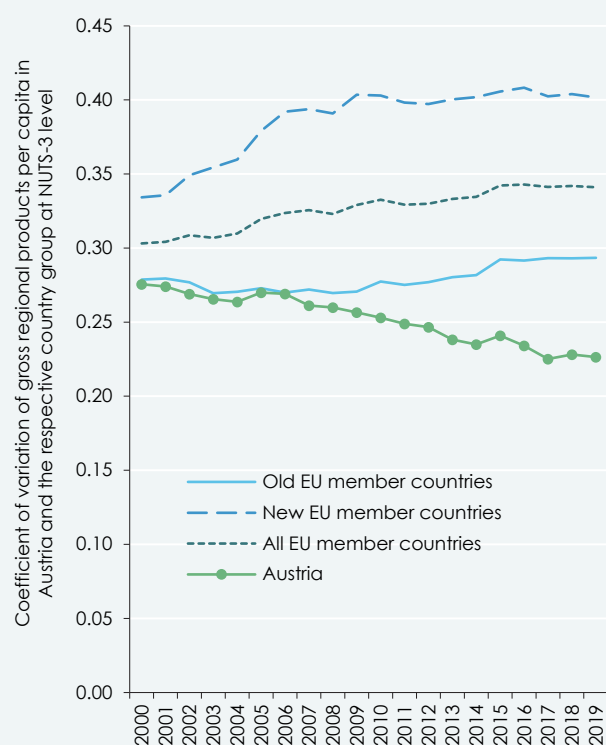
The basis for this is a noticeable decline in regional disparities since the turn of the millennium – a trend that could only be observed in a few comparator countries (Figure 3, left graph)¹¹. In fact, the regional dispersion in purchasing power-adjusted gross regional

product per capita did not decrease at all in the period 2000-2019 on average of the 25 reference countries, but rather increased noticeably. In the decade up to 2010, this was due to polarisation tendencies within the new EU member countries, but later to increasing disparities within the old EU member countries (including Norway). In Austria, by contrast, the differences in gross regional product per capita at PPP decreased largely steadily by a total of 18 percent during the observation period.

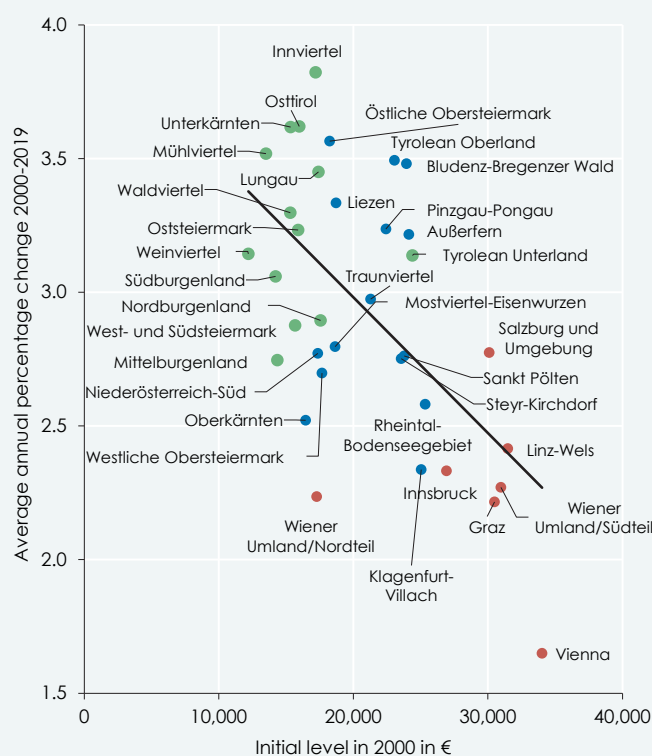
Figure 3: **Regional convergence in Austria**

Gross regional product per capita at purchasing power parities at NUTS-3 level, 2000 to 2019

σ -convergence



β -convergence



Source: ARDECO database (European Commission, Joint Research Centre); WIFO calculations. Old EU member countries . . . EU 14 (as of 2020), without Luxembourg, including Norway. New EU member countries . . . Accession countries as of 2004 without Cyprus and Malta. Red dots . . . Metropolitan regions, blue dots . . . capital-intensive non-metropolitan regions, green dots . . . rural regions.

Regional disparities in the level of economic development have decreased noticeably in Austria since the turn of the millennium – unlike in most European countries of comparison.

This decline in the dispersion between the Austrian NUTS-3 regions – referred to in economics as "convergence" – was primarily the result of stronger growth in regions initially lagging in per capita GRP ("β-convergence"). Figure 3 (right graph) shows a clear negative correlation between the initial level of the Austrian regions gross regional product per capita in 2000 (x-axis) and its development until 2019 (y-axis). This

correlation also proves to be statistically significant in econometric cross-sectional and panel regressions (cf. Mayerhofer et al., 2020). The differences by region type are striking – i.e. between NUTS-3 metropolitan regions (red), capital-intensive non-metropolitan regions (primarily intensive industrial and tourism regions; blue) and rural regions (green). Austria's metropolitan regions have developed more weakly than comparable

¹¹) Overall, the coefficient of variation of regional per capita incomes at the NUTS-3 level decreased in only 7 of the 25 European comparator countries in the

period 2000-2019. The decline was only stronger in Norway, Finland, and Portugal than in Austria.

regions in other European countries since the turn of the millennium (Figure 2)¹². The regional convergence in Austria was thus due to both the catching-up process of the non-metropolitan regions and a weak dynamic in the metropolitan regions.

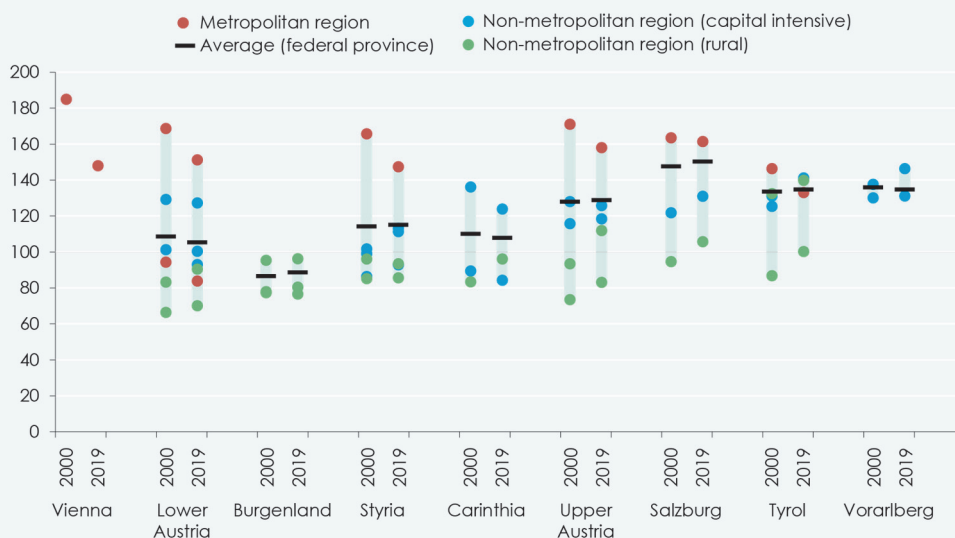
Austria's favourable position in terms of regional cohesion is thus the result of striking convergence processes since the turn of the

millennium, which admittedly also came about through a weak dynamic of the domestic metropolitan regions. This can also be seen in Figure 4, which compares the economic development levels of the domestic NUTS-3 regions sorted by federal provinces (NUTS-2) with the average of the European comparison countries.

Convergence processes in Austria resulted from catching-up processes of initially lagging regions, but also from a weak dynamic in the metropolitan regions compared to the rest of Europe.

Figure 4: **Disparities in economic development levels within Austria**

Gross regional product per capita at purchasing power parities, 35 NUTS-3 regions in the 9 federal provinces; average of the 25 European countries = 100



Source: ARDECO database (European Commission, Joint Research Centre), WIFO calculations. 25 European countries . . . EU 27 (as of 2020), without Luxembourg, Cyprus and Malta, including Norway.

According to this, the range of small-scale per capita incomes decreased in all larger federal provinces in the period 2000-2019, in some cases considerably. Catching-up processes of initially underdeveloped regions, but also significant losses of position of the leading regions, contributed to this. For example, the purchasing power-adjusted gross regional product per capita in Vienna was only 148.0 percent of the average of the European comparison countries in 2019, compared to 184.8 percent in 2009 (-36.8 percentage points). For Graz (in Styria; -18.2 percentage points), the Vienna surroundings (in Lower Austria; -14.0 percentage points), Innsbruck (in Tyrol; -13.2 percentage points) and Linz-Wels (in Upper Austria; -13.1 percentage points) similar losses in position can be seen. In contrast, 16 of the 35 Austrian NUTS-3 regions and 5 of the 9 federal provinces were able to maintain or improve their relative position compared to the reference countries in our observation period – a development that can be

considered a success in view of the striking catching-up processes in the new EU member countries. Overall, Austria's regions continue to be well positioned in a European comparison; most recently, 22 of the 35 NUTS-3 regions and 8 of the 9 federal provinces were above the European average.

Nevertheless, despite these convergence processes, there are still considerable disparities in the level of economic development within Austria, which are quite striking in view of the (small) size of the country. For example, the ratio in purchasing power-adjusted gross regional product per capita between the top and the bottom NUTS-2 region was recently 1.7 : 1 (Salzburg : Burgenland), and at NUTS-3 level even 2.3 : 1 (Salzburg and surroundings : Weinviertel). Therefore, a further regionally inclusive development remains the goal, all the more so because the "grand challenges" facing the economy and society – globalisation, digitalisation, and ecological transformation – are likely to have also centrifugal regional effects (cf. for

Despite catching-up processes in the new EU member countries, Austria's regions continue to be well-positioned in terms of GDP per capita in an European comparison.

¹² In the period 2000-2019, the purchasing power-adjusted GRP per capita in Austrian metropolitan regions decreased from 154.6 percent to 136.3 percent of the

(weighted) average of the European comparator countries, while it increased from 107.7 percent to 112.7 percent in the non-metropolitan regions.

example Dauth et al., 2016; Firgo et al., 2018; OECD, 2022). This calls for an economic policy that strives for high competitiveness by optimising locational conditions in **all** regions. Such a policy will have to be region-specific because the determinants that shape the position of individual regions in the location hierarchy are highly heterogeneous. This is shown in Table 3, in which the deviation of the economic development level of the federal provinces from the weighted average of our comparison countries is traced back to its main determinants on the basis of a methodology proposed by the OECD (2012) and elaborated here¹³.

According to this, Austria's GDP per capita (at exchange rates) was 40.3 percent higher

in 2019 than the average of the comparative countries. As much as 29 percentage points of this advantage were attributable to a comparatively high efficiency of the economy (labour productivity). Advantages in the labour market situation (measured by the employment rate; contribution +6.5 percentage points) and a more favourable age structure (measured by the share of working-age persons in the population; +3.9 percentage points) also made relevant contributions. In contrast, labour force participation (employment rate; +1.5 percentage points) and attractiveness as a labour market centre (net commuting rate; contribution –1.6 percentage points) had only a weak positive respectively dampening effect.

Table 3: Determinants of differences in the gross regional product per capita of the Austrian provinces compared to the European comparison countries in 2019

Result of a decomposition of gross regional product per capita at exchange rates and 2015 prices, NUTS-2 regions

	Gross regional product per capita			Economic efficiency	Attractiveness as labour market centre	Labour market situation	Labour force participation	Age structure
	Percentile rank	In €	Deviation from the average of comparison countries in percent	Contribution to the difference in gross regional product per capita in percentage points				
Salzburg	92.3	50,184	+ 67.2	+ 40.7	+ 7.5	+ 9.4	+ 5.5	+ 4.1
Vienna	91.5	49,530	+ 65.0	+ 42.4	+ 17.6	+ 0.7	– 4.2	+ 8.5
Vorarlberg	89.5	46,094	+ 53.5	+ 44.2	– 8.8	+ 8.2	+ 6.1	+ 3.9
Tyrol	87.4	44,580	+ 48.5	+ 28.8	+ 1.6	+ 9.5	+ 3.4	+ 5.3
Upper Austria	85.0	43,017	+ 43.3	+ 29.8	– 3.9	+ 8.9	+ 5.1	+ 3.4
Styria	78.1	38,506	+ 28.3	+ 18.0	– 2.4	+ 8.1	+ 1.5	+ 3.0
Carinthia	71.7	36,262	+ 20.8	+ 19.7	– 5.0	+ 6.2	– 0.6	+ 0.5
Lower Austria	68.4	35,110	+ 17.0	+ 24.2	– 17.6	+ 6.1	+ 2.8	+ 1.4
Burgenland	55.1	29,332	– 2.3	+ 8.5	– 16.0	+ 6.9	– 2.3	+ 0.6
European countries (25) ¹		30,019						
Old EU member countries ²		34,966	+ 16.5	+ 15.6	+ 1.1	– 1.7	+ 2.1	– 0.7
New EU member countries ³		13,461	– 55.2	– 53.4	– 2.4	+ 3.7	– 4.6	+ 1.6
Austria		42,124	+ 40.3	+ 29.9	– 1.6	+ 6.5	+ 1.5	+ 3.9

Source: ARDECO database (European Commission, Joint Research Centre), Eurostat, WIFO calculations. Federal provinces ranked by percentile rank. – ¹ EU 27 (as of 2020) without Luxembourg, Cyprus and Malta, including Norway. – ² EU 14 (as of 2020) without Luxembourg, including Norway. – ³ Accession countries as of 2004 without Cyprus and Malta.

¹³ This component decomposition makes use of the fact that the deviation of the real gross regional product per capita (at exchange rates) of a region from the average of a comparison group can be attributed in the form

$$\Delta \ln \left(\frac{BRP^{(AO)}}{BEV^{(WO)}} \right) = \Delta \ln \left(\frac{BRP^{(AO)}}{EWT^{(AO)}} \right) + \Delta \ln \left(\frac{EWT^{(AO)}}{EWT^{(WO)}} \right) + \Delta \ln \left(\frac{EWT^{(WO)}}{EWP^{(WO)}} \right) + \Delta \ln \left(\frac{EWP^{(WO)}}{BEV_{15-65}^{(WO)}} \right) + \Delta \ln \left(\frac{BEV_{15-65}^{(WO)}}{BEV^{(WO)}} \right)$$

to differences in labour productivity (as a measure of overall economic efficiency; first term on the righthand side), in the net commuting rate (as a measure of attractiveness as a labour market centre; second term), in

the employment rate (as a measure of the labour market situation; third term), in the labour force participation rate (as a measure of labour force participation; fourth term) and in the share of working-age persons in the population (fifth term). *BRP* is the (real) gross regional product, *EWT* the number of persons in employment, *EWP* the number of persons in the labour force, *BEV*_{15–65} the number of persons of working age and *BEV* the population. *(AO)* and *(WO)* indicate whether the respective indicator is measured at the place of work or residence.

Measured in terms of gross regional product per capita, all federal provinces except Burgenland (-2.3 percent) were above the average of the 25 comparison countries in 2019, with positive deviations varying between 17 percent (Lower Austria) and over 50 percent (Salzburg, Vienna and Vorarlberg). Higher labour productivity has a positive effect in all regions, although the extent of its contribution varies greatly (between 44.2 percentage points in Vorarlberg and 8.5 percentage points in Burgenland). Regional differences in attractiveness as a labour market centre have a very heterogeneous effect. For example, 17.6 percentage points of Vienna's lead over the European average are due to a high net commuting rate, which is mainly at the expense of the

other provinces in Eastern Austria (Lower Austria -17.6 percentage points, Burgenland -16.0 percentage points). In Vorarlberg (-8.8 percentage points), on the other hand, attractive jobs in nearby foreign countries (Switzerland, Liechtenstein) reduce the lead. A favourable labour market situation contributes positively to the overall result in all federal provinces, but its effect is weak in Vienna, where a substantial increase in population improves the age structure but dampens labour market situation as well as labour participation. Apart from that, it is precisely those regions in which the employable cohort in population is comparatively small that hardly benefit from higher labour force participation.

Regional disparities in the level of economic development as well as their determinants suggest region-specific measures to strengthen competitiveness.

4. Summary

The WIFO radar of competitiveness is now available for interactive use on the WIFO website for the first time. The WIFO Reports on Austria continue to summarise selected findings on the strengths and weaknesses of Austria as a business location on the basis of 24 indicators once a year.

In the average of all indicators, Austria most recently achieved a percentile rank of 61.6. Although Austria performed equally well or better than more than 60 percent of the European comparison countries, it fell further behind the top third. Three years earlier, the average percentile rank had been 67.2, ten years earlier even 71.7.

In the dimension of **real income, productivity and regional distribution**, Austria has clearly lost ground (percentile rank 69.3 and -6.6 respectively). The main reason for this is the weak growth in multi-factor productivity, which was still marked by the COVID-19 crisis more than in other European countries. The high percentile ranks in gross regional product per capita of the industrial or rural non-metropolitan regions (percentile rank 96.0) or the high regional cohesion continued to have a positive effect.

In the average of the indicators on the **labour market and social living conditions**, Austria was only in the middle of the comparison countries with a percentile rank of 52.2. The low employment rate (in full-time equivalents) and the high gender gap in labour force participation had a dampening effect. Compared to the previous year, Austria was not able to achieve an improvement in any indicator of this dimension and

was only in the top third of the European comparison countries in two indicators ("NEET rate" and "continuing education").

In the dimension of the **use of natural resources**, Austria achieved a mean percentile rank of 64.0. Compared to the previous year, Austria fell back somewhat in terms of CO₂ intensity, but improved in terms of energy dependence and environmental patents.

In terms of the current account balance, Austria's rank worsened due to a declining **foreign trade** surplus (percentile rank 53.3). Tourism exports suffered severely from the COVID-19 lockdowns in 2021, so that Austria's world market share decreased significantly (percentile rank 71). In contrast, the position in merchandise trade changed only slightly. With a world market share of just under 1 percent, Austria achieved a percentile rank of 67.7. The findings on price competitiveness based on the real effective exchange rate are strongly dependent on the selected deflator for 2021. When deflating the exchange rate index with the consumer price index an appreciation emerges, while the real indices based on the comparison of unit labour costs or producer prices signal a depreciation.

Competitiveness and its determinants vary greatly from region to region. Therefore, measures that take into account the regional context in their design and policy mix and take into account the specific preconditions and development potentials are superior to purely horizontal policies.

On average across all 24 indicators, Austria's competitiveness has deteriorated.

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