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A WIFO Radar of Competitiveness for the Austrian Economy

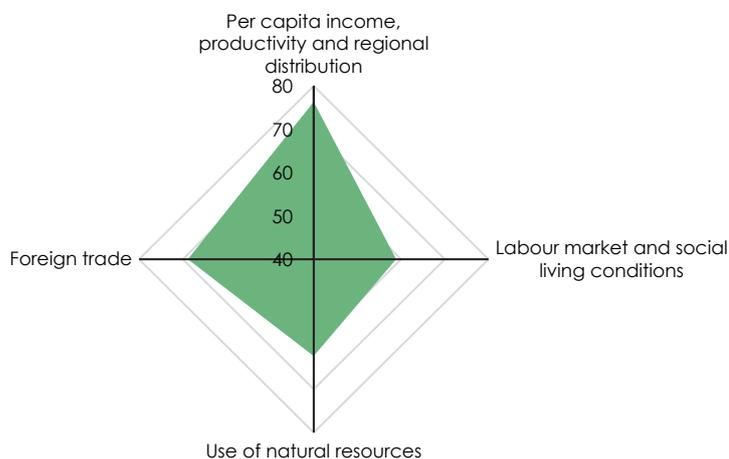
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A WIFO Radar of Competitiveness for the Austrian Economy

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- The WIFO Competitiveness Radar shows Austria's position in comparison with 31 European countries as a percentage rank. This corresponds to the share of countries with the same or less favourable values than Austria in the sample of comparison countries.
- On average across all indicators, Austria is just behind the top third of the 31 comparison countries with a percentage rank of 66.1.
- In the dimension of per capita income, Austria performs best with a mean percentage rank of 76.3.
- Austria also ranks in the top third in terms of foreign trade, with a mean percentage rank of 68.8.
- In terms of the use of natural resources, Austria achieves a mean percentage rank of 61.4.
- With a mean percentage rank of 58.9, Austria also shows only an intermediate performance in terms of the indicators on the labour market and social living conditions.

Austria's position in four dimensions of competitiveness



"On average across all 24 indicators, 66.1 percent of all European comparison countries have the same or less favourable values than Austria. Austria is thus just behind the top third overall."

The percentage rank indicates for each key figure the share of all countries with equal or less favourable values than Austria in the sample of the roughly 30 European comparison countries. Austria is above the European average in all four dimensions, but only in the upper third in terms of real income and foreign trade (Source: WIFO).

A WIFO Radar of Competitiveness for the Austrian Economy

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The new WIFO radar of competitiveness measures the performance of Austria using 24 selected indicators in four dimensions related to economic, social and ecological goals. Stable values in the top third are recorded for real per-capita income and foreign trade. In the dimensions of "labour market and social living conditions" and "use of natural resources", Austria is also above the European average, but does not rise beyond a medium position. After moderate but persistent losses of position in the past years, on average across all indicators Austria ranks slightly behind the best third of European countries.

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

The present contribution is based on an interdisciplinary cooperation of the WIFO thematic platform "Competitiveness": <https://www.wifo.ac.at/en/topics/competitiveness>.

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1. Introduction

High competitiveness of the economy should ensure high real incomes as well as the improvement of social and ecological living conditions.

WIFO works in all research areas on the topic of "competitiveness" and bundles this knowledge in a "thematic platform". WIFO defines "competitiveness" as the ability of an economic system to generate sustainably high real incomes and to improve social and ecological living conditions under continuous change and ongoing adaptation to and shaping of the framework conditions.

This article introduces the WIFO radar, a new instrument for a regular comparison, and presents a stocktaking of Austria's relative position with regard to the most important economic targets. Future contributions will focus on selected determinants (e.g. foreign direct investment, innovation, financing, productivity growth and other institutional factors). Current empirical findings on selected relevant topics are offered by *Astrov et al. (2020)*, *Bock-Schappelwein – Firgo – Kügler (2020)*, *Böheim – Bärenthaler-Sieber*

(2018), *Reinstaller – Friesenbichler (2020)*, *Janger – Strauss (2020)* and *Url – Kaniowski (2019)*.

For the WIFO radar, performance indicators were selected for Austria as a business location that summarise the variety of different dimensions of competitiveness as clearly as possible. The corresponding definitions and data sources are documented in Table 1. The main indicators are shown in Figure 1, while further supplementary indicators on particular aspects are shown in Figure 2 and Table 2. This article briefly explains the indicators, their most important determinants and Austria's position in comparison with European countries and over time. Numerous indicators are examined in more detail in other WIFO publications (see the list of publications on the thematic platform's homepage).

¹ <https://www.wifo.ac.at/en/topics/competitiveness>.

Table 1: Selected key figures of competitiveness

	Definition	Source	Last available 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	2019	31
Labour productivity	GDP per hour worked, nominal, EU 27 = 100, index 2020 = 100	Eurostat [nama_10_lp_ulc]	2019	31
Multifactor productivity	Growth contribution in percentage points, two-year average	TED – Total Economy Database, Conference Board	2019	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	2018	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	2018	31
Share of renewable energy	Percentage shares of renewable energy in final energy consumption ²	Eurostat [t2020_31]	2018	30
At-risk-of-poverty rate	Proportion of persons with an income of 60 percent or less of the median equivalised income in percent, after taxes and transfers	Eurostat [ilc_li02]	2019 ³	31
Unemployment rate	Percentage shares of unemployed in the 15 to 64 year old labour force	Eurostat [lfsa_urgan].	2019	31
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	Eurostat [ilc_di11]	2018	31
Employment rate	Share of employees in all 15 to 64 year olds	Eurostat [lfsa_ergan]	2019	31
Regional cohesion	Coefficient of variation of gross regional product per capita at income standards by NUTS-3 regions ⁴	ARDECO – Annual Regional Database of the European Commission	2017	26
Current account balance	Current account balance in percent of GDP	Eurostat [bop_gdp6_q]	2019	31
Complementary indicators				
Per capita income	GDP at income standards per capita (population) in 1,000 \$, at 2019 prices	Conference Board, TED - Total Economy Database	2019	31
GDP per capita metropolitan regions ⁴	Gross regional product at income standards per capita for Europe's metropolitan regions	ARDECO – Annual Regional Database of the European Commission	2017	26
GDP per capita non-metropolitan regions ⁴	Gross regional product at income standards per capita for the non-metropolitan regions of the EU	ARDECO – Annual Regional Database of the European Commission	2017	26
Full-time equivalent employment rate	Share of full-time equivalent employees in all 15 to 64 year olds	Eurostat, Labour Force Survey, special evaluation	2019	31
Gender Gap Employment	Difference in employment rate between men and women (25 to 44 year olds, full-time equivalents) in percentage points	Eurostat, Labour Force Survey, special evaluation	2019	31
NEET rate	Proportion of those not in employment who neither attend formal nor informal education or training as a percentage of all 18 to 24 year olds	Eurostat [edat_lfse_18]	2019	31
Lifelong learning	Proportion of people participating in formal or informal education and training as a percentage of all 25 to 64 year olds	Eurostat [trng_lfs_01]	2019	31
Energy dependence	Percentage shares of net energy imports in gross domestic energy consumption	Eurostat [sdg_07_50]; IEA.	2018	31
Modal split freight transport	Freight transport by rail in t-km in relation to other freight transport ⁵	Eurostat [tran_hv_fmod]	2018	30
Environmental patents	Percentage shares of patent applications on environmental technologies in all patent applications at the European Patent Office (EPO)	OECD	2016	31
Market share goods exports	Market share of global goods exports in percent	WDS – WIFO Data System, Macrobond	2019	31
Market share tourism exports	Market share of worldwide exports of travel services (excluding passenger transport) in percent	Macrobond, WIFO calculations	2019	31

Source: WIFO presentation. – ¹ EU 27, Switzerland, Iceland, Norway, the UK. – ² Excluding Switzerland. – ³ Ireland, Italy, Switzerland, Iceland, the UK: latest value 2018. – ⁴ Excluding Malta, Cyprus, Luxembourg, including the UK, Norway. – ⁵ Excluding Iceland and Switzerland.

The WIFO Competitiveness Platform

The "thematic platforms" bundle research at WIFO on common economically and socially relevant issues from different perspectives. As an information hub, they offer direct access to relevant WIFO publications and contact to the respective experts.

The thematic platform "Competitiveness" <https://www.wifo.ac.at/en/topics/competitiveness> pursues three goals:

- theoretical foundation and justification of the measurement concepts as well as possible economic policy interventions,
- The development of comprehensive, systematic and thus clear indicator systems and the identification of determinants of competitiveness as a basis of information for economic policy,
- Development of expertise on selected policy fields of competitiveness.

In addition to the continuously updated directories of relevant research projects, the thematic platform provides an overview of WIFO's key publications on the topic of "competitiveness" as well as contact information for all research areas.

The greatest challenge lies in taking into account a large number of dimensions while still presenting them in a clear and easily accessible way. In a first step, the focus was therefore placed on 25 key indicators² that are considered particularly relevant for the assessment of competitiveness. To make the indicators comparable across different units of measurement, only Austria's relative position is shown for each indicator and normalised to a **percentage rank**. Unlike simple ranking figures, these values are comparable even if the number of countries varies for the individual indicators. In addition, the percentage rank directly indicates the relative position within a distribution over countries³ and allows a simple aggregation of values into an average position.

The percentage rank indicates for each indicator the share of countries with the same or less favourable values than Austria in the sample of comparison countries. For this purpose, all indicators are defined in such a

way that the most favourable values with respect to competitiveness are on the outer side of the ray and thus correspond to a percentage rank of 100. The lower Austria's percentage rank, the less favourable is the relative ranking. For example, a percentile rank of 60 means that 60 percent of all countries in the sample perform equally well or worse and 40 percent perform better than Austria. In addition to a comparison for the latest available year t , the WIFO radar also presents Austria's relative position one year, three years and ten years ago, such that a short-, medium- and long-term comparison is possible.

In summary, the radar provides a concise direct ranking of the competitiveness of the Austrian economy relative to about 30 European countries, over four time horizons and for 25 performance indicators. In future analyses, the gradual expansion of the radar with regard to selected determinants of competitiveness is planned.

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

Austria was in the top third of the distribution in terms of real GDP per capita in 2019. In a comparison of non-metropolitan regions, Austria was at the top.

2. Indicators and results

2.1 Real income, productivity and regional distribution

Gross domestic product is the primary measure of the production output of an economy (Prettner – Leitner, 2019). Real GDP per capita as a measure of **economic output** is thus an indicator of material well-being in the overall economy. In 2019, Austria was in the top third of the distribution, ranking 9th among 31 countries. Expressed as a percentage rank, real GDP per capita was equal to or lower than in Austria in 74.2 percent of all comparison countries (Figure 1). Despite minor fluctuations, this value has

remained stable over the past 10 years. The European ranking in 2019 was led by Luxembourg, Switzerland and Norway.

Measured at uniform purchasing power standards, GDP per capita is an indicator of the average purchasing power in terms of real **per capita incomes**. Here, Austria belongs to the top quarter of the countries examined with a percentage rank of 77.4 (Figure 2). This position has been stable over the past 3 years, but it is much less favourable now than 10 years ago (87.1). Luxembourg, Ireland and Switzerland led the ranking in 2019.

² The figures 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.

³ Simple ranking figures must always be interpreted in the context of the number of comparison countries.

Therefore, the more differently defined indicators are included in such a multi-dimensional indicator system, the more advantageous it is to use the percentage rank.

Multiple dimensions and time horizons

Competitiveness encompasses several dimensions with economic, social, ecological and regional aspects, and the empirical findings can be correspondingly diverse – sometimes even ambivalent. From a regional perspective, the focus is on competitiveness at different levels of the locational hierarchy (between countries, regions or locations), each with different options for shaping economic policy. The differentiation of the relevant competitive environment as a "benchmark" of the analysis is becoming increasingly important, but also complex, because the progressive fragmentation of value chains requires successful positioning in both the sectoral and the functional division of labour.

Synergies or conflicting objectives may arise between these dimensions of competitiveness. To ensure that long-term goals are not neglected in favour of short-term aspects, the analysis of competitiveness requires the consideration of different time horizons:

In the short term, the focus is on the ability to **adapt** to changing conditions. Imbalances should be avoided and macroeconomic stability maintained. Typical indicators are, for example, real effective exchange rates, unit labour costs, the inflation rate or the current account balance. Monetary policy, fiscal policy and wage policy are among the most important macroeconomic policy tools.

In the medium term, it is about the **dynamics** of the economic system, which is expressed both in the increase in productivity and in high or rising employment, high market shares in exports or an improvement in energy and resource efficiency. Key determinants include investment (including social investment), innovation, internationalisation, as well as competition and regulation.

In the long term, the **quality of life** moves into focus, because competitiveness cannot be considered solely from an economic point of view. Priority goals are sustainably high real incomes, inclusion and social participation as well as the improvement of the natural environment and the prevention of irreversible climate change, whereby the focus is primarily on competition-relevant aspects (e.g. resource efficiency or the social system as a productive factor).

A particular challenge for economic policy is to advance the implementation of the above-mentioned goals simultaneously despite different time horizons.

The regional dispersion of real purchasing power within a country serves as an indicator of **regional cohesion** (Figure 1). Here Austria, with a percentage rank of 84.6, was in the top fifth of the ranking led by Finland and Sweden, much more favourable than 3 years ago (80.8) and 10 years ago (69.2). This indicates noticeable convergence processes between Austrian regions, whereas regional inequality increased within the majority of EU countries⁴.

As the comparison of **GDP per capita for metropolitan regions with non-metropolitan regions**⁵ in Europe, also measured at uniform purchasing power standards, shows (Figure 2), the regional convergence of per capita income in Austria is primarily due to a catching-up process of non-metropolitan regions: while the Austrian metropolitan regions, compared to those in the other EU countries, have remained stable within the top fifth of the ranking in the medium term, the position of the domestic non-metropolitan regions has improved continuously. Most recently, the non-metropolitan regions in Austria achieved a higher real purchasing power compared to all other EU countries

(percentage rank 100, after 96.23 years ago and 84.610 years ago).

Among all productivity indicators, **labour productivity** is most closely related to income. In 2019, nominal labour productivity in Austria was almost 16 percent above the average of the European comparison countries. Austria thus took 11th place and a percentage rank of 67.7. Productivity was slightly lower than in Germany and the Netherlands, but slightly higher than in Sweden and Finland. The highest productivity values, at 175 percent to 180 percent of the sample average, were found for Ireland and Luxembourg, ahead of Norway. Apart from minor fluctuations, productivity in Austria hardly changed relative to the other European countries during the sample period, and the ranking also shifted only slightly and without a clear trend.

In contrast, **multifactor productivity** corresponds to productivity in the narrowest sense. It is the residual after the contribution of all input factors has been subtracted from real value added⁶. In Austria, the contribution of multifactor productivity to growth has been low in recent years and was also below the median of European countries in

⁴ For current European evidence as well as in-depth evidence of convergence processes in Austria and the influence of EU cohesion policy on them, see Mayerhofer et al. (2020).

⁵ Eurostat (2019) defines metropolitan regions as all urban regions with a population of more than 250,000 in the agglomeration area. According to this definition, there are 289 metropolitan regions in the EU 28, including in Austria the five city regions Vienna, Graz,

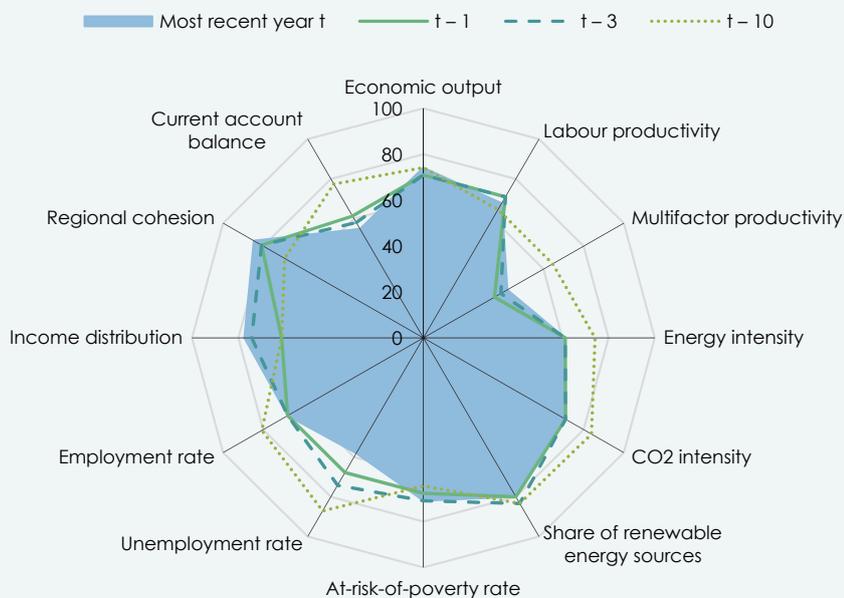
Linz, Salzburg and Innsbruck. Non-metropolitan regions are the remaining industrial and rural regions.

⁶ Comparisons based on the level of multifactor productivity are subject to numerous measurement problems and critical theoretical assumptions. Therefore, data from the Conference Board are used here, that are based on the method of growth accounting, which is more robust due to calculation of first differences (with two-year averages; see e.g. Peneder – Rammer, 2018).

2019 with a percentage rank of 41.9. The highest contribution to growth came from multifactor productivity in Latvia, Poland

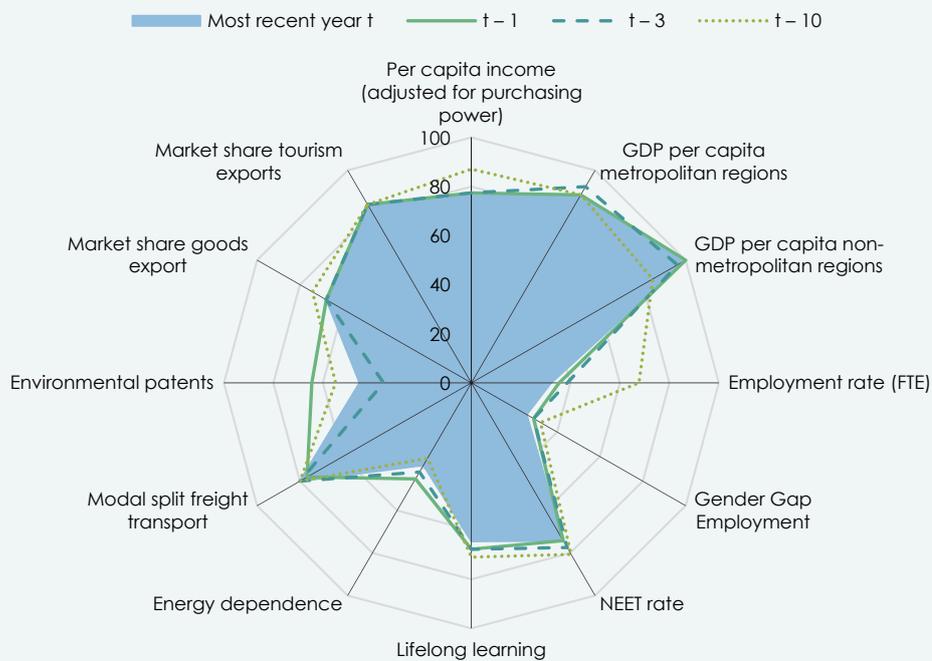
and Romania, with values between 1.7 and 1.9 percentage points.

Figure 1: Austria's competitiveness in a European comparison – percentage 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 percentage rank corresponds to higher competitiveness.

Figure 2: Austria's competitiveness in a European comparison – percentage 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 percentage rank corresponds to higher competitiveness.

2.2 Labour market and social living conditions

The volume of labour, together with the use of capital and productivity, determine the level of per capita income. The development of the labour market is important in a competitive analysis because it provides information about the degree of utilisation of the available labour resources in the economy. At the same time, key figures on labour force participation provide indirect insights into social inclusion and the spread of social risks. Here, the **unemployment rate** and the **employment rate** show Austria to be better than the average, but far below the top group, with a percentage rank of 67.7 for the employment rate and 58.1 for the unemployment rate⁷. The employment rate is depressed above all by the relatively low labour force participation of older people. In Austria, the unemployment rate (2019: 4.6 percent) is not much higher in absolute terms than in the countries with the lowest rates, such as the Czech Republic (2.1 percent), Germany (3.2 percent) and Poland (3.3 percent). In the longer term, however, Austria's position deteriorated for both indicators. For example, the unemployment rate (which was comparatively low) decreased only slightly since the financial market and economic crisis in 2009, and the employment rate increased less dynamically than in some other countries. Austria therefore fell from 7th to 11th place in terms of the employment rate and from 5th to 14th place in terms of the unemployment rate over the last 10 years. Labour market indicators developed better in Germany, the Netherlands, and several Central and Eastern European countries during this period.

In addition to the employment and unemployment rates, other indicators of the extent and distribution of labour force participation can be used. Measured in terms of the **employment rate in full-time equivalents**⁸ (FTE), Austria is only in 22nd place or in the lower third of the comparison countries with a percentage rank of 32.3. This low value is mainly explained by the high share of part-time employment in Austria (2019: 27.2 percent, EU average 18.3 percent). However, the deterioration in Austria's position over the last 10 years (from 11th to 22nd place) occurred despite a steady, albeit moderate, increase in the full-time equivalent employment rate (2009: 61.8 percent, 2019: 64.1 percent). The decline was primarily due to the strong increase in the

employment rates of the Baltic and several Central and Eastern European countries.

The **gender gap in the employment rate of 25 to 44 year olds** (in full-time equivalents) reflects a particularly pronounced difference between the employment behaviour of men and women for Austria (percentage rank 25.8). The employment rate of prime-age women, adjusted for working hours, was around 20 percentage points lower than that of men in 2019. Germany and the Netherlands, but also the Czech Republic and Switzerland showed similar values. In contrast, the gender gap was significantly lower in the Scandinavian countries, but also in Latvia and Lithuania.

Especially in the longer term, social inclusion, protection against poverty, and participation in education can contribute to a thriving economic and social environment. The indicators of poverty risk and income distribution have been relatively stable in Austria. With regard to the **at-risk-of-poverty rate**, which as a relative poverty measure is also related to income inequality, some Nordic countries (Iceland, Finland) and Eastern European countries (Czech Republic, Slovakia, Slovenia) show particularly low numbers.

The **income distribution** – expressed with the ratio between the average disposable income of the top income-quintile to the lowest income-quintile – gives Austria a percentage rank of 77.4 and the 8th place among the countries surveyed. Apart from minor fluctuations, this ratio has been constant over the last 10 years. Shifts in Austria's position in the ranking are mainly due to changes in the other countries⁹.

Education indicators cover another aspect of social participation and open up a view into the future with regard to competitiveness. For example, the **NEET rate**, the share of adolescents and young adults (15 to 29 years) who are not in employment, education or training (NEET), was above 9 percent in Austria during the financial market and economic crisis and declined slightly in recent years to between 8.3 and 8.4 percent. In 2019, this resulted in a percentage rank of 74.2. Over the last 10 years, Austria's relative position hardly changed. Especially in Switzerland, the Netherlands, Germany and Sweden, the NEET group is much smaller than in Austria.

Measured by labour market indicators, Austria's relative position among European countries deteriorated in the last 10 years.

The risk of poverty and the income distribution show a stable picture, with Austria performing above average in this area.

⁷ Since all indicators have been ranked so that a higher percentage rank reflects higher competitiveness, a high employment rate and a low unemployment rate both mean a high percentage rank.

⁸ The full-time equivalent is defined by Eurostat on the basis of the average working time of a person in full-time employment. It is therefore not a fixed figure, but can vary depending on the country and time.

⁹ The international comparison here refers to 2018, the most recent year with complete data for all countries. In 2018, the indicator for Austria fell noticeably compared to the previous year (from 4.3 to 4.0, which corresponds to a lower inequality of distribution), in 2019 it rose again strongly to 4.2. The improvement in the ranking in 2018 should therefore be interpreted with caution.

While educational deficits of younger cohorts mainly have an impact in the future, the participation in education and **lifelong learning** of the adult population (25 to 64 years) can be seen as an indicator of the qualification of the currently employed. Austria was most recently (2019) in 12th place in a European comparison with a lifelong learning rate of just under 15 percent. This corresponded to a percentage rank of 64.5. With regard to this indicator, Switzerland and the Nordic countries are also ahead with rates of 25 to 30 percent. Germany, on the other hand, has had a low adult learning participation rate for years (about 8 percent).

2.3 Use of natural resources

How efficiently an economy uses energy for the production of goods and services captured in GDP is expressed by the indicator of **energy intensity**¹⁰. The lower the energy intensity, the more productive this production factor is used. The energy intensity is influenced, among other things, by the economic structure of a country; in individual years, climate conditions such as a very cold winter can also have an impact. With the exception of Iceland, all countries in the sample show a long-term decline in energy intensity and thus a relative decoupling of energy use per unit of GDP. Nevertheless, there are very large differences between the countries: Bulgaria, for example, required 8.1 PJ of energy per unit of GDP in 2018, Switzerland only 1.2 PJ. In 2018, Austria was in the middle of 31 countries with a percentage rank of 61.3. The energy intensity was thus higher or the same as in Austria in 61.3 percent of the comparison countries. In 2008, Austria was – with 9th place – still in the best third of the distribution. In recent years, this position has remained stable, but compared to 2008 (percentile rank 74.2) it deteriorated by almost 13 points. Switzerland had the lowest energy intensity throughout all years, ahead of Ireland and Malta.

A reduction in **CO₂ intensity**, defined as emissions per unit of GDP, describes the success in decarbonising the economy and is also a macroeconomic productivity measure. Globally, CO₂ emissions must be reduced to net zero by the middle of the 21st century in order to limit global warming to well below +2 °C compared to the pre-industrial era according to the Paris Climate Agreement. The use of fossil fuels is the largest source of CO₂ emissions and a determinant of CO₂ intensity. Two channels of impact can contribute significantly to their reduction: on the one hand, a reduction in total energy demand and, on the other hand, a shift in the energy mix towards a higher share of renewable energy. As for energy

intensity, Austria's percentage ranking has been constant in recent years at 71.0, but has also deteriorated compared to 2008, when 83.9 percent of all reference countries had a higher or the same CO₂ intensity. Austria therefore dropped from 6th place in 2008 to 10th place in 2018. Even though CO₂ emissions per unit of GDP decreased over time, other countries were more successful in decarbonising their economies. Similar to energy intensity, this indicator has a wide range internationally (from 860 kt CO₂ per billion € in Bulgaria to only 57 kt CO₂ per billion € in Switzerland in 2018), in Austria it is 181 kt CO₂ per billion €. Switzerland leads the ranking, similar to energy intensity, ahead of the Scandinavian countries Sweden and Norway. Ireland moved up from 8th to 4th place between 2008 and 2018.

Measured by the **share of renewable energy** in final energy consumption, Austria was in the top quarter of the distribution in 2008, ranking 7th out of 30 countries. This also reflects the high share of electricity generation from hydropower. The EU's climate and energy policy attaches great importance to increasing the share of renewable energy in energy demand. Accordingly, Austria continuously promotes the expansion of renewables. Despite the success with regard to the use of renewable energy, however, Austria fell behind in the longer term measured by this indicator (from 6th to 7th place), also because the demand for energy is increasing overall. The Nordic countries Norway, Iceland, Sweden and Finland are the leaders here. Measured by the percentage rank, 80.0 percent of the comparison countries had an equal or lower share of renewable energy in final energy demand in 2018. In 2008, Austria's percentage rank had been slightly more favourable at 83.3. Other countries, such as Denmark, are apparently more successfully increasing the share of renewable energy than Austria, while the overall demand for energy is growing.

Austria relies to a considerable extent on energy imports, especially oil and natural gas. But also in trade with electricity, Austria has developed from being a net exporter to a net importer. The indicator **energy dependence**¹¹ expresses net energy imports as a share of gross domestic energy consumption. The energy system's dependence on imports can be reduced on the one hand by an overall decrease in energy consumption, i.e. an absolute decoupling between economic performance and energy use, and on the other hand by increased use of domestically available energy resources. In 2018, energy dependence, at just under two-thirds of gross domestic consumption, was lower than in 2005 (72 percent), but it

In terms of energy intensity, Austria is in the mid-field of the reference countries, and its position has worsened over the longer term.

¹⁰ For an analysis of current key indicators on climate change and energy economics, see Kettner-Marx et al. (2020).

¹¹ As a major exporter of crude oil and natural gas, Norway has a special position and was therefore as an outlier excluded from the country sample.

reflects the still high share of fossil energy sources in Austrian energy consumption. One determinant is the prevailing mobility system, which is essentially oil-based. Among 30 countries, Austria ranked 20th in 2018, falling behind 2015 and 2017. Austria is therefore among those countries that are highly exposed in terms of their energy supply. Measured by percentage rankings, 36.7 percent of the countries had a higher or equally high energy dependency as Austria in 2018.

Another critical aspect of decarbonisation and mitigation of other externalities such as air pollution, noise or congestion is the **modal split in freight transport**. Freight is transported by rail, road or water. The negative external effects in rail freight transport are lower than in road freight transport. The ratio of rail freight transport to other freight transport (road and waterways) is used here as an indicator of competitiveness. With increasing stringency of climate policy, this indicator could gain in importance. Austria was in the top quarter of the distribution in 2018, ranking 7th among 30 countries, and had a fairly stable high percentage rank of 80 over the long term. Latvia, Lithuania and Estonia were ahead in 2018 in terms of this indicator.

The position in terms of technological solutions to environmental problems is measured by the share of patent applications for environmental technologies in total patent applications at the European Patent Office. The data on **environmental patents** available up to 2016 show Austria in 18th place among 31 countries. The percentage rank is correspondingly low at 45.2. Over time, the indicator values fluctuate considerably (2015: 12th place with percentage rank 64.5).

2.4 Foreign trade

Key figures on a member countries' competitiveness in foreign trade are also the focus of the European Commission's "Macroeconomic Imbalance Procedure Scoreboard" to prevent macroeconomic imbalances¹². With the current account balance, the change in market shares in goods and travel exports and the change in the real effective exchange rate, the WIFO Competitiveness Radar uses similar indicators to assess Austria's position.

Austria's **current account balance** remained slightly positive in 2019 at 2.6 percent of GDP (percentile rank 54.8). Economic policy does not fundamentally aim for a surplus in foreign trade, but rather for a balanced account. In this respect, an increase in the positive balance (a movement outwards in Figure 1) is not per se a sign of a successful

economic policy oriented towards aggregate welfare. From a competitiveness perspective, the long-term positive balance nevertheless reflects Austria's comparative advantage in foreign trade. The current account balance is almost constant in both the short and long term (2009 +2.6 percent of GDP). Nevertheless, the position vis-à-vis the comparison countries in this dimension of the radar deteriorated because the current account balance of commodity exporters such as Iceland and Norway, of small open economies such as Lithuania, Malta and Slovenia, and of countries recovering from a severe economic crisis (Bulgaria, Italy) increased more rapidly and now amounts to between 3 and 10 percent of GDP.

The long-term advantageous competitive position in foreign trade is also shown by the comparatively stable rank in the distribution of **market shares in global goods exports** (around 180 countries). In recent years, Austria has been at the lower end of the long-term range with about 1 percent. In its MIP Scoreboard, the European Commission already pointed to Austria's loss of market share in 2012 (*European Commission*, 2012). However, as *Hahn et al.* (2012) showed, this development was due to the dynamic expansion of intra-Asian trade. The market share in goods exports deteriorated by 2 ranks compared to 2009, whereby Austria had occupied a one-time top position in 2009 with a percentage rank of 74.2 and had already fallen back to the current percentage rank of 67.7 by 2010.

The **market share in global tourism exports** (around 180 countries) has also declined in recent years (2009: 2.4 percent, 2019: 1.8 percent). Nevertheless, Austria held the 6th place among the 31 European countries surveyed.

In the short term, changes in the exchange rate between the euro and the national currency of a trading partner influence the prices of Austrian exports on the foreign market and thus price competitiveness. An appreciation of the euro tends to increase export prices in foreign currency, while a depreciation tends to make Austrian exports cheaper abroad. The transmission of exchange rate fluctuations into export prices will remain incomplete if there is high competitive pressure on the foreign market or if foreign demand responds strongly to price increases; in this case exporters' margins will decline. While in the short term bilateral exchange rate movements change Austria's price competitiveness, in the medium and long term the wage and price formation process of both trading partners plays an important role.

The current account balance, which has been positive for years, proves Austria's comparative advantages in foreign trade.

Austria's market shares in international trade in both goods and services are stable in the short and medium term.

¹² [https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-economic-governance-monitoring-prevention-](https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-economic-governance-monitoring-prevention-correction/macroeconomic-imbalance-procedure/alert-mechanism-report_en#Year2012)

[correction/macroeconomic-imbalance-procedure/alert-mechanism-report_en#Year2012.](https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-economic-governance-monitoring-prevention-correction/macroeconomic-imbalance-procedure/alert-mechanism-report_en#Year2012)

Austria's recurrent nominal effective appreciations in the short term are fully offset in the medium and long term by comparatively low domestic price and cost increases.

From a macroeconomic perspective, it is the overall effect of the change in bilateral exchange rates vis-à-vis all trading partners that is important, not just the change in a single parity. Therefore, bilateral exchange rates of the most important trading partners are combined with their import and export weights from the trade balance into the nominal effective exchange rate index. Taking all major trading partners into account is crucial because bilateral exchange rate movements may cancel each other out.

An indicator of price or cost competitiveness must additionally combine the movement of relative prices or costs between the home market and each external market with the respective exchange rate change. The **real effective exchange rate index** provides a good estimate of competitiveness if it adequately reflects country-specific trade patterns and if it is based on meaningful and internationally comparable price and cost indices¹³. An increase in the real effective exchange rate index signals a loss of price competitiveness relative to trading partners; conversely, it improves with a decrease of the index.

The development of exchange rate indices for the total trade in goods and services reflects the change in price competitiveness

as measured by consumer prices or unit labour costs¹⁴ (Table 2). To measure competitiveness in trade in industrial goods, the exchange rate indices are deflated with consumer prices or producer prices. Since the price and cost indices are not available to the same extent for all trading partners, the number of comparison countries varies. The consumer price index is available for most of the countries in our sample, while the fewest number of countries can be used for the computation of the real effective exchange rate index on the basis of producer price indices.

In the short term (compared to the previous year), Austria's competitive position improved by about 1 percent in 2019 – irrespective of the price or cost index used (Table 2). In the medium term, the real exchange rate indices based on consumer prices indicate a deterioration in competitiveness of about 0.5 percent, while the indices using a price or cost index which is closer to production rather than consumption indicate no change in price competitiveness. In a long-term comparison, Austria's competitive position remained unchanged (consumer price basis) or improved slightly, i.e. Austria's partly significant nominal appreciations were almost completely offset by a restrained price or cost development.

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

	2018-19	2016-2019	2009-2019
	Average year-to-year percentage changes		
Overall index			
Deflated with harmonised consumer price indices	- 1.0	+ 0.5	- 0.0
Deflated with unit labour costs	- 0.8	- 0.1	- 0.0
Industrial goods index			
Deflated with harmonised consumer price indices	- 1.0	+ 0.6	- 0.1
Deflated with producer price indices	- 1.0	- 0.0	- 0.4

Source: WDS – WIFO Data System, Macrobond.

3. Summary

The WIFO radar of competitiveness, presented here for the first time, summarises selected findings on the strengths and weaknesses of Austria as a business location and place for living. The focus is on achieving high real incomes and improving social and ecological living conditions. In the future, the ongoing analysis of the WIFO Radar will focus on selected determinants of competitiveness and their spatial characteristics. In this first edition, the focus is on the description of performance indicators and an international comparison.

The presentation of the results using percentage ranks as a normalised measure ultimately allows the simple aggregation of indicators into average values. On average across all 24 indicators of the radar, 66.1 percent of all European comparison countries had the same or less favourable values than Austria in the last available year (mostly 2019, some 2018). In the overall analysis, Austria was thus shortly behind the top third of countries. Three years earlier the mean percentage rank had been 66.7, and ten years

Across all 24 indicators, Austria ranks shortly behind the top third of the European comparison countries.

¹³ WIFO calculates real effective exchange rate indices in cooperation with the OeNB (Köhler-Töglhofer – Uri – Glauning, 2017), which differ according to the type of trade flows and the price or cost indices considered. Due to the specific measurement method,

they are presented separately (Table 2) and not shown as a percentage rank.

¹⁴ On the development of unit labour costs see also Hölzl – Leoni (2020).

before it was at 71.8. These aggregate values summarise very different developments:

With a mean percentage rank of 76.3, Austria performed best in the dimension of **real income, productivity and regional distribution**. The position for these indicators is stable over time and has even improved slightly. Austria's 1st place for GDP per capita in the non-metropolitan regions (percentile rank 100) is remarkable. On the other hand, the below-average value for multifactor productivity has a negative effect in this dimension.

In the average of the indicators for **labour market and social living conditions**, Austria only belonged to the midfield of the comparison countries with a percentage rank of 58.9. This value was mainly depressed by the relatively low employment rate (in full-time equivalents) and the relatively high gender gap in the employment rate. Positive factors were the low at-risk-of-poverty rate compared to the rest of Europe, the low proportion of young people not in education, employment or training, and a more even distribution of disposable income.

In the indicator group on the **use of natural resources**, Austria achieved an overall percentage rank of 62.3. The high dependence on energy imports and the low share of environmental technology patents weigh on this average, while the relatively high share of renewable energy sources and rail freight transport improve the CO₂ balance.

In **foreign trade**, Austria belonged to the top third of the comparative countries with an average percentage rank of 68.8. Austria's position in terms of market share in tourism exports was the best and most stable, with a percentage rank of 83.8, ahead of the market share in global goods exports (67.7). In terms of the current account balance, Austria was just above the European average. Due to the specific measurement concept, this average does not take into account the development of the real effective exchange rate index (Table 2), which remained unchanged in a long-term comparison, but improved by about 1 percent in 2019 compared to the previous year.

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