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ÖSTERREICHISCHES INSTITUT FÜR WIRTSCHAFTSFORSCHUNG

Monitoring and Nowcasting Sustainable Development Goals

A Case Study for Austria

Jürgen Bierbaumer-Polly, Sandra Bilek-Steindl, Thomas Url

Research assistance: Astrid Czaloun

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Final report to the "Jubiläumsfonds der Oesterreichischen Nationalbank", Grant No 17404
(Project Co-ordinator: Marcus Scheiblecker)

Internal review: Claudia Kettner-Marx • Research assistance: Astrid Czaloun

Abstract

With the UN Sustainable Development Goals (SDGs) launched and the Agenda 2030 set out in 2015, awareness for sustainable development was raised on a global and national level. Taking actions towards these goals needs measures that allow a timely assessment not only of the past but also of the present developments and provide an indication if the path towards goal achievement is on track. Using the EU SDG indicator set and data for Austria, we build dynamic factor models for key indicators of most SDGs to nowcast the indicator values up to the year 2019. Based on these estimates, we provide an up-to-date monitoring of sustainable development in Austria, which follows the methodology of Eurostat.

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2019/389-1/S/WIFO project no: 4816

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Verkaufspreis: 50 € • Kostenloser Download: https://www.wifo.ac.at/wwa/pubid/66635

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Financial support from the Jubiläumsfonds der Oesterreichischen Nationalbank (OeNB, grant number 17404) is gratefully acknowledged. We thank Christian Glocker for his helpful advice regarding the econometric framework, Claudia Kettner for her precise and comprehensive comments on the draft version of the final project report and Astrid Czaloun for her valuable research assistance.

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1. Introduction

The Sustainable Developments Goals (SDGs) and the Agenda 2030 are nowadays in everyone's mouth. The SDGs reflect that the economic viewpoint in describing people's well-being, prosperity and quality of life falls far too short and other elements like environmental and social aspects are important dimensions alike. With the 2030 Agenda for Sustainable Development agreed at the UN Summit in New York in 2015 (*UN*, 2015), a new global sustainable development framework was adopted. In its core it consists of 17 Sustainable Development Goals (SDGs) related to 169 targets. They apply to all countries, both developed and emerging, and all 193 member states of the UN have committed themselves to efforts for their implementation.

With the development of the EU SDG indicator set, comprising 99 indicators along the SDGs, the European Commission (EC) focuses on aspects which are relevant for the EU countries. The EU SDG indicator set serves as the basis for the annual monitoring report of Eurostat. The first report, "Sustainable Development in the European Union" was published in September 2018 (*Eurostat,* 2018A). Therein, indicators are assessed on the base of the most recent available five-year average. For indicators with quantitative EU policy targets (e.g. the Europe 2020 strategy[1]), the progress towards these targets is monitored.

The evaluation of the SDGs is published on the EU level only, and not for individual member countries. For Austria, an assessment is provided by Statistics Austria in "*Wie geht's Österreich?*", launched in 2012 (*Statistik Austria*, 2012), with a set of 30 key indicators and additional indicators covering welfare and progress in Austria in a comprehensive manner. In 2017, the set was adjusted to take the indicators of the UN 2030 Agenda into account. The short- and medium-term past development of the key indicators is assessed and reported on an annual basis (*Statistik Austria*, 2019).

With the view on an international comparison, the Bertelsmann Stiftung and the Sustainable Development Solutions Network (SDSN) publish every year SDG indices and Dashboards for individual countries (*Bertelsmann*, 2019). By constructing an aggregated index, they summarize and rank countries' current performance and trends in accordance with the 17 SDGs.

All these monitoring initiatives suffer from the shortcoming of the delayed publication of data, especially of environmental indicators. The series are published with a lag of one to two years. The aim of this research project is to close this "publication delay". The assessment of the performance on the SDGs in the most recent past requires nowcasts of the indicator series. With this research, our contribution to the literature is twofold: First, we develop nowcasts for a set of EU SDG indicators for Austria. Second, we provide a monitoring of sustainable development in Austria following the approach of *Eurostat* (2019). Therein we assess the progress towards SDGs in Austria for the most recent point in time.

[1] Measured by nine headline indicators, which are also part of the EU SDG indicator set, Europe 2020 is a strategy for smart, sustainable and inclusive growth (https://ec.europa.eu/eurostat/web/europe-2020-indicators).

A brief overview – From the Club of Rome in 1972 to the SDGs in 2015

Ideas of a comprehensive measure of progress in a society are going back to the 1970s. In 1972, the Club of Rome referred to shortcomings in the concept of conventional GDP measures (especially in the field of sustainability) and opened the discussion regarding alternative progress measures (*Meadows et al.*, 1972). Since the end of the 1980s the concept of sustainable development has guided the discussion towards a more environmental consciousness. Further, it implied a possible complementary relationship between the environment and economic development. Questions on how to deal with economic policy decisions in this respect or how to achieve economic growth without harming the environment have become relevant. This fact was also considered in defining guidelines for a sustainable development in the so-called "Brundtland report" (*WCED*, 1987) in the following way: "*Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs*." Thus, the sustainable development path is geared towards regional as well as inter-temporal equity. Hence, in addition to pure economic goals in a narrow sense, sustainability targets should include also others, such as ecological and social goals. The move towards this broader perspective was supported by the launch of the Human Development Index (HDI) in 1990 by the United Nations (*UNDP*, 1990). The HDI shifted attention to other outcomes besides income, such as education and health, and allowed comparison between countries (*Kanbur et al.*, 2018). The Agenda 21, set out in 1992 (Earth Summit in Rio de Janeiro), provided a comprehensive plan of action to build a global partnership for sustainable development to improve human lives and protect the environment. During the 1990s the UN continued to emphasize and to promote the multi-dimensional aspects on well-being, which led to the Millennium Development Goals (MDGs) in 2000. The MDGs consist of eight goals (e.g. eradicate extreme poverty and hunger or promote gender equality and empower women[2]) and contain measurable and timebound objectives (up to the year 2015) within each goal. They have become incorporated in global policy debates and national policy planning as well as in the work of non-governmental organizations (*Sachs*, 2012).

In the late 2000s the report by the Stiglitz-Sen-Fitoussi Commission (*Stiglitz et al.*, 2009) reinforced this awareness with a focus on human well-being and quality of life. Finding a way to measure people's current well-being rather than simply focus on the production side was given increased attention. The EC took on the recommendations of the Stiglitz-Sen-Fitoussi report and incorporated them in their Beyond GDP initiative, which was launched in the year 2007. The aim of this initiative was about developing indicators that are as clear and appealing as GDP, but more inclusive of environmental and social aspects of progress (*EC*, 2009). These indicators should cover aspects of material living standards (income, consumption and wealth), health, education, personal activities including work, political voice and governance, social connections and relationships, environment (present and future conditions) and security of an economic as well as a physical nature. Moreover, the Beyond GDP initiative should conform with the EU Sustainable Development Strategy (EU SDS) which had been renewed in 2006. Progress towards the EU SDS objectives had been evaluated using a set of sustainable development indicators (SDIs). In the framework of the EU SDIs, the EC identified a set of more

[2] For an overview of the MDGs see https://www.un.org/millenniumgoals/.

than 130 indicators for sustainable development, grouping them into ten thematic areas.[3] The SDIs provided a multidimensional picture of whether member countries of the European Union had achieved progress towards sustainable development in terms of the objectives and targets defined in the EU SDS (*Eurostat*, 2015). Following the formulation of the Sustainable Development Goals, the European Commission, adapted the EU SDS and the SDIs and fully committed to the SDGs, both in its internal and external policies (*EC*, 2019; *Eurostat*, 2019).

The report is structured as follows: Section 2 describes the dataset. Section 3 outlines the assessment method and the dynamic factor models used for the nowcasting procedure. Section 4 presents the empirical results for the different SDGs with respect to the Austrian economy. Section 5 concludes.

2. Data coverage and sources

In the analysis we consider the EU SDG indicator set. It consists of 99 key indicators along the 17 SDGs, where each goal is described by a maximum of six indicators (Table 1). For better assignment which indicator belongs to which SGD, the indicators are labelled by NN_MM where NN refers to the SDG number and MM to a two-digit consecutive index within each goal. For example, the key indicator 07_30 (*energy productivity*) refers to Goal 7 and is the third indicator in the list. Some key indicators are also assigned as multipurpose indicators to other SDGs (41 in total) in order to complement the monitoring of the objectives and to signal the interrelation of the goals. The time series were extracted from the Eurostat database by the end of September 2019 and supplemented with corresponding data from other sources (Statistics Austria, OECD, World Bank, ILO, EPO, BMF). The most recent observations for environmental indicators (belonging to SDG 7, SDG 12 and SDG 13) included the year 2017. For series representing other goals, coverage in some cases extends until 2018. In order to run a timely monitoring and assessment of the indicators, we provide a nowcast of 25 indicators (Table 1). In the case of indicator 05_50 (*seats held by women in national parliaments and governments*), data is already available for 2019. For objectives 08_10 (*real GDP per capita*) and 08_11 (*investment share of GDP*) 2019 data were taken from the WIFO Economic Outlook (*Ederer*, 2019), for 09_10 (*gross domestic expenditure on R&D*) from the Statistics Austria R&D Global Estimate[4], and for 10_10 (*purchasing power adjusted GDP per capita*) from the European Economic Forecast by the European Commission[5].

[3] These themes are: (i) socio-economic development, (ii) sustainable production and consumption, (iii) social inclusion, (iv) demographic changes, (v) public health, (vi) climate change and energy, (vii) sustainable transport, (viii) natural resources, (ix) global partnership and (x) good governance.

[4] http://www.statistik.at/web_de/statistiken/energie_umwelt_innovation_mobilitaet/forschung_und_innovation/globalschaetzung_forschungsquote_jaehrlich/index.html#reiter_pressReleaseList

[5] https://ec.europa.eu/economy_finance/ameco/user/serie/SelectSerie.cfm

Table 1: Characteristics of the EU SDG indicator set and the indicators covered by the study

	Indicators per goal		*Nowcasted indicators per goal*	
	Key indicators	*Multipurpose indicators*	*Key indicators*	*Multipurpose indicators*
Goal 1. End poverty in all its forms everywhere	6	4	5	–
Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture[1])	6	3	–	–
Goal 3. Ensure healthy lives and promote well-being for all at all ages	6	5	1	–
Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	6	1	5	–
Goal 5. Achieve gender equality and empower all women and girls	6	3	1	3
Goal 6. Ensure availability and sustainable management of water and sanitation for all[1])	6	1	–	–
Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all	6	1	4	–
Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	6	3	2	1
Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	6	1	1	1
Goal 10. Reduce inequality within and among countries	6	3	3	1
Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable[1])	6	4	–	–
Goal 12. Ensure sustainable consumption and production patterns	6	3	2	3
Goal 13. Take urgent action to combat climate change and its impacts	5	4	1	3
Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development[1])	5	–	–	–
Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss[1])	6	4	–	–
Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels[1])	6	1	–	–
Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development[1])	5	–	–	–
Sum of indicators	99	41	25	12

Source: Eurostat (EU SDG indicator set 2019), WIFO. – [1]) Not covered in the assessment.

Nowcasting was possible for indicators where suitable, early available high-frequency data are disposable. Moreover, special effort was taken for series monitored in a European policy target context (e.g. Europe 2020), and for indicators having a country specific relevance for Austria. We attach importance to achieving a balanced view of the three pillars, representing economic, social and ecological aspects. Against this background certain indicators and even some goals are not covered in the assessment and nowcasting approach.

The nowcasting approach relies on a set of early available high-frequency indictors. Their recent fluctuations are expected to be seen in the imminent realizations of the annual SDG indicator series, too. The high-frequency indicators are obtained from different data sources and cover different time spans and frequencies. Table A.8 in the Appendix gives an overview. The variables are on a monthly or a quarterly basis, with the most recent observations extending to the third quarter of 2019. However, due to different release statuses, other indicators are lagging, and so we are facing an unbalanced data set with "ragged edges".

3. Methods for monitoring and nowcasting SDGs

Monitoring SDGs

To assess the development of the indicators over time we follow the method of *Eurostat* (2019). Therein we consider the underlying direction (towards or away from the sustainable development objective) and the pace of the development of the indicator series. Indicators, for which a quantitative EU policy target was set (either the national or the Europe 2020 target), are assessed regarding the achievement of that target.

The base for the assessment is the short-run development of the indicator series. Consistent with *Eurostat* (2019), we consider the five-year average rate of change, where the latest published release (which covers in most cases 2017 or 2018) marks the end of the considered time span. Moreover, in a second stage we enrich the time span up to the most recent past (i.e. until 2019) by incorporating our nowcasted values where applicable.

The communication tool for the assessment are arrows. Their direction does not necessarily correspond to the direction of the development of the underlying series, but rather marks the progress towards the sustainable development objective. For example, both, an increase in *tertiary educational attainment* and a decline in *long-term unemployment* correspond to an upward arrow. In order to set the arrows for indicators without quantitative target, *Eurostat* (2019) defines a simple threshold rule by evaluating the extent of the increase or decrease. A change of 1 percent or more in the desired direction represents a significant progress. A stagnation or a change below 1 percent in the desired direction is evaluated as a moderate progress towards SD objectives. Contrary, changes in the opposite direction signal a movement away from the SD objectives, where a change of less than 1 percent indicates a moderate movement, a change of more than 1 percent a significant movement away from SD objectives.

For indicator series where quantitative EU policy targets exist, the recent average rate of change is set in relation to a required theoretical rate to meet the target. To construct this theoretical rate, we use the realized value of the starting year of the short-term assessment as base (2012 or 2013) and calculate the required growth rate to meet the target in the year 2020. If the recent short-term average rate of change is 95 percent or more of the theoretical required rate, the indicator shows a significant progress towards the target. If the ratio is between 60 percent and 95 percent the development is characterized by moderate progress.

A ratio of at least 0 percent, but less than 60 percent means a moderate movement away from the target, a negative ratio means that the recent realized development even moves significantly away from the target value. The threshold values and the corresponding symbols are shown in Table 2.

Table 2: Assessment categories and associated symbols

Without quantitative target			*With quantitative target* ⊙	
Growth rate in relation to the desired direction	Meaning	Symbol	Ratio of actual and required growth rate	Meaning
≥ 1%	Significant progress towards SD objectives	⇧	≥ 95%	Significant progress towards target
< 1% and ≥ 0%	Moderate progress towards SD objectives	⇗	< 95% and ≥ 60%	Moderate progress towards target
< 0% and ≥ –1%	Moderate movement away from SD objectives	⇘	< 60% and ≥ 0%	Moderate movement away from target
< –1%	Significant movement away from SD objectives	⇩	< 0%	Significant movement away from target
–	Calculation of trend not possible (for example, time series too short or not included in investigation)			

Source: *Eurostat*, 2019.

Dynamic Factor Models

We use a dynamic factor model (DFM) for nowcasting SDG indicators. The basic idea behind DFMs is to represent the variation in a group of observed variables with one or more latent variables, so-called factors. DFMs are frequently used in business cycle analysis assessing short-term GDP developments (nowcasting) on the base of various high-frequent available macroeconomic indicators. Originally introduced by *Geweke* (1977), *Stock – Watson* (2002) relied on DFMs proposing a monthly coincident index of the US economic activity. In the last decade the models were extended in several ways and are nowadays a frequently used tool for nowcasting purposes (see for example *Camacho – Perez-Quiros*, 2010). The model extracts common factors from several early available high-frequent economic indicators. These factors are constructed to explain a large fraction of the variance in GDP series and are used to predict the current state as well as the near-term future of the economy.

We consider a standard two-level dynamic factor model (*Stock – Watson*, 2011), represented in state space form. It looks as follows:

$$X_t = \lambda_F(L)F_t + e_t,$$

$$\psi_t(L)F_t = \varepsilon_{F_t},$$

where X_t refers to the observed series in the data set at time t. F_t is the common factor, $\lambda_F(L)$ is the corresponding lag distributed factor loading and ε_t are the idiosyncratic disturbances. The latter are assumed to be uncorrelated with the factor innovations ε_{F_t} at all leads and lags and $\varepsilon_{F_t} \sim N(0, \sigma_F^2)$. The factor loading λ_F shows the relation between the factor and the observed variables. The common factor F_t follows an AR(1) or AR (2) process.

We consider this model framework to obtain nowcasts of the annual SDG indicator series using information of early available indictors of higher frequency. These indicators are collected from different data sources and cover different samples and frequencies[6]. For some cases, variables are available even on monthly base, but in order to generalize the approach, we use their quarterly conversion. Other series are reported at an annual frequency only. To deal with these different data coverages (ragged edges) and mixed frequencies, we follow *Glocker – Wegmüller* (2017) and incorporate both quarter-on-quarter (qoq) and year-on-year (yoy) growth rates in the model. While for the quarter-on-quarter growth rates of the observed variable a direct relationship with the factor f_t is assumed, variables x_t^{yoy} are set in relation to the factor in its lag order. The dynamic factor model is specified as follows:

$$\begin{pmatrix} x_t^{yoy} \\ x_t^{qoq} \end{pmatrix} = \begin{pmatrix} \gamma_{yoy} \sum_{j=0}^{3} f_{t-j} \\ \gamma_{qoq} f_t \end{pmatrix} + \begin{pmatrix} u_t^{yoy} \\ u_t^{qoq} \end{pmatrix},$$

$$y_t^a = \gamma_a f_t + u_t^a,$$

where $u_t^{qoq}, u_t^{yoy}, u_t^a$ are the idiosyncratic disturbances and $\gamma_t^{qoq}, \gamma_t^{yoy}, \gamma_t^a$ are the factor loadings. As y_t^a is not observed on a quarterly basis, it has to be interpolated according to the following frequency conversion:

$$y_t^a = \tfrac{1}{4} y_t^{qoq} + \tfrac{2}{4} y_{t-1}^{qoq} + \tfrac{3}{4} y_{t-2}^{qoq} + y_{t-3}^{qoq} + \tfrac{3}{4} y_{t-4}^{qoq} + \tfrac{2}{4} y_{t-5}^{qoq} + \tfrac{1}{4} y_{t-6}^{qoq},$$

where y_t^a is the annual growth rate of the observed SDG indicator, and y_t^{qoq} represents its latent quarterly growth rate. Using a geometric mean, the approach follows *Mariano – Murasaswa* (2003). The model is estimated using the Kalman filter.

In our setting of short annual time series (small *T*), the method in *Glocker – Wegmüller* (2017) creates a computational limit for the possible number of high-frequency variables used to estimate the nowcast of SDG indicators. We therefore also try a less data intensive nowcasting model by applying the popular two-step estimator of *Doz et al.* (2011). This approach uses the fact, that the parameters of a dynamic factor model can be estimated by using principal components method. The advantage of a principle components-based estimator is easy computability and consistency under quite general assumptions as long as both the cross-section and time dimension grow large. The principle components approach, however, requires a balanced data set, i. e. the start and end dates of the sample must be identical for

[6] A list of the indicators and sources used can be found in the Appendix in Table A.8.

all high-frequency variables. In practice, data are often released at different dates producing the ragged pattern at the end of the sample. We follow *Solberger – Spanberg* (2017) and transfer the dynamic factor model into a state space representation. The estimation is then based on the Kalman Filter, which allows to fill unbalanced data by using the outcome of the Kalman smoother. The state space representation contains a signal equation, which links observed SDG indicators to latent states, and state equations, which describe how the states evolve over time. The Kalman Filter and smoother provide mean square optimal projections for both the signal and state variables. We combine the principal components estimator for the coefficients of the factor model with a state space model for the SDG indicator and estimate this system by using the Kalman Filter and smoother. For this purpose, we extend the Eviews-subroutine developed by *Solberger – Spanberg* (2017).

After estimation we use the Kalman smoother yielding estimates of the missing observations and the latent factor including their *k*-period ahead forecasts. To obtain nowcasts for 2019 we run a one or two period ahead forecast ($k = 1$ or $k = 2$), depending on the last available observation of the SDG indicator series (2017 or 2018). In the Kalman filter framework the forecast is constructed as missing observations at the end of the sample period. After destandardizing and reformulating the series in the DFM, we obtain the nowcasts for 2018 and 2019 of the SDG indicator series.

Preliminary data transformations

Before applying the DFM, the data have preliminary been transformed. The dataset consists of early available quarterly series (see Table A.8) and the annual SDG indicators. Considering the quarterly series, seasonality – where necessary, and not already removed in the original series – was adjusted for, using the Tramo/Seats procedure (*Gomez – Maravall*, 1996). Additionally, non-stationary series were de-trended. We checked for stationary by performing an Adjusted Dickey-Fuller (ADF) test. In order to obtain stationarity, we compute first differences of the seasonally adjusted series. In the case of annual data, we compute yearly differences. Finally, we standardize all observed variables before they are used in the DFM.

4. Indicator description and empirical results

Goal 1. End poverty in all its forms everywhere

"*SDG 1 calls for the eradication of poverty in all its manifestations. It envisions shared prosperity, a basic standard of living and social protection benefits for people everywhere, including the poorest and most vulnerable.*" (*Eurostat*, 2019)

A well-known interpretation of fairness in welfare economics is based on the criterion developed by *Rawls* (1971). His concept of the "original position" is the starting point for thinking about justice in a society. The original position is a hypothetical scene for a group of persons, who are stripped off their personal observable characteristics (gender, race intelligence, etc.). The original position is motivated by a hypothetical veal of ignorance for each person, i. e. no

one knows about his or her characteristics and abilities in advance. Nevertheless, in order to decide about the rules governing society everyone is endowed with the capacity to fully participate in society. Under the assumption that each person can form, pursue and revise a plan for a good life and that each one has a sense of justice and is willing to follow it, *Rawls* (1971) shows that a reflective equilibrium will emerge for the set of proposed rules to achieve justice. Under the veil of ignorance, each group member maximizes his or her personal advantage, by suggesting to improve the position of the worst off member of the group, simply because oneself might end up in this position after revealing personal characteristics and abilities.

Besides philosophical reasoning about the result of an optimal decision under ignorance, poverty will reduce social cohesion and it is related to unequal access to public services. Moreover, poverty is often associated with poor health and low educational outcomes of children, thus perpetuating itself over generations. Poverty is a multidimensional phenomenon and comprises *income poverty*, *material deprivation*, *very low work intensity* and *in-work poverty*. Eradicating poverty is an objective of the Europe 2020 strategy, which sets a target to lift at least 20 million people out of the risk of poverty and social exclusion by 2020 compared to the year 2008. The key indicators put emphasis on the fact that other dimensions of poverty than low income also put people at a disadvantage to the rest of society. A multidimensional approach also recognizes the extent to which parts of society are at the risk of exclusion and marginalization.

The EU developed a couple of programs to improve the situation of deprived persons. These are

- European Pillar of Social Rights
- Social Scoreboard
- Youth Guarantee Program
- European Accessibility Act
- European Social Fund
- Fund for European Aid to the Most Deprived.

The set of indicators for the evaluation of SDG 1 concentrates on measures for poverty. As a summary indicator the number of persons subject to the risk of poverty combines *income poverty*, *severe material deprivation*, and *low work intensity* into one single measure. *Income poverty* affects people who, after accounting for social transfers, still have an equivalized disposable income of less than 60 percent of the national median. Another form of poverty considers labour market participation. *People with a very low work intensity* have few chances of acquiring a reasonable wage income and therefore they are subject to risk of poverty. Finally, *severe material deprivation* includes people, who cannot afford four or more items out of a list of nine desirable or necessary items to pursue an adequate life. The following list of indicators for SDG 1 is regularly evaluated by Eurostat:

- People at risk of poverty or social exclusion, percent of population and 1,000 persons (01_10)
- People at risk of income poverty after social transfers, percent of population and 1,000 persons (01_20)
- Severely materially deprived people percent of population and 1,000 persons (01_30)
- People living in households with very low work intensity, percent of population aged less than 60 and 1,000 persons (01_40)
- In work at-risk-of-poverty rate, percent of employed persons aged 18 or over (01_41)
- Population living in a dwelling with a leaking roof, damp walls, floors or foundation or rot in window frames or floor, percent of population (01_60)

Additionally, four multipurpose indicators are assigned to Goal 1.

People at risk of poverty or social exclusion (01_10)

The number of *people at risk of poverty or social exclusion* is published since 2003 but the time series has a structural break in 2008, shifting the number of affected people upward by 323,000 persons.[7] Earlier records are therefore not comparable to current numbers. For this reason, we present only data from 2008 onwards. Since 2008 the number of *people at risk of poverty* declined by roughly 190,000 persons with no obvious cyclical swings. This resulted in a remarkable reduction in poverty numbers, particularly, in comparison with the peak observation in the starting year, cf. Figure 1. Between 2008 and 2018 the number of *people at risk of poverty or social exclusion* declined by 1.2 percent per year, topping the EU-2020 target of a 1 percent reduction per year.

The nowcasting model for *people at risk of poverty or social exclusion* is based on a variety of high-frequency variables describing the number of persons receiving means tested benefits, several unemployment figures (particularly long-term unemployment), the amounts payed out for social transfers, the number of economically active persons with foreign origin or only marginally employed persons. Finally, sickness and invalidity are often associated with poverty and therefore we also use variables from the pension and accident insurance.

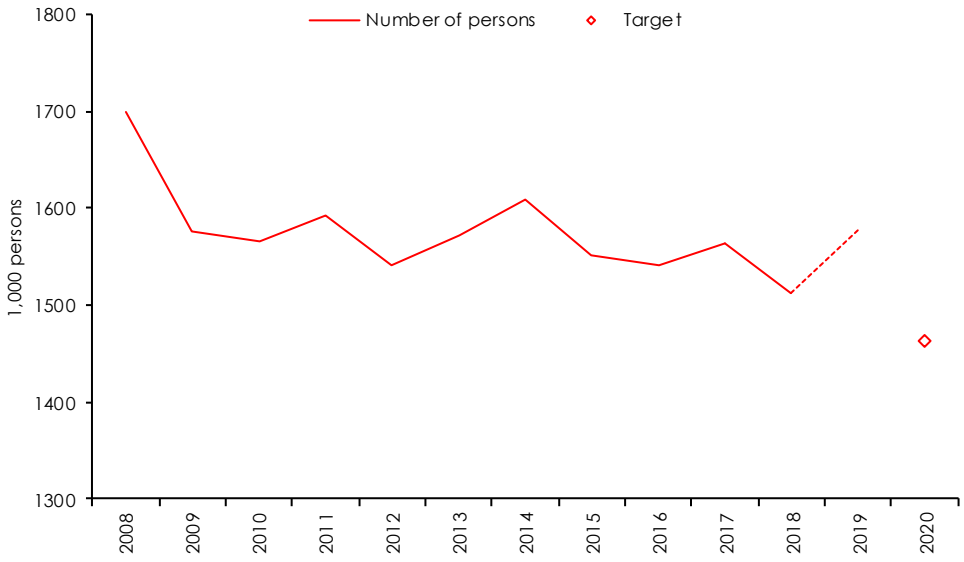
On the other hand, figures on economically active persons indicate whether business conditions facilitate or hamper the transition from the out-of-labour-force status or from unemployment status into a gainful activity. Furthermore, data on educational attainment point at either decreasing probability of being subject to poverty risk, e. g. if the prevalence of higher school degrees becomes more widespread. It may also indicate increasing probabilities of poverty, e. g. if the share of persons with a mandatory schooling degree increases. The root mean squared forecast error over the period 2016-2018 indicates that a model of the *Doz et al.* (2011) type with two factors and only one lag for both factors has the best predictive power.

[7] The structural break resulted from a change in collecting income information from a pure survey-based approach towards a combination with data from tax records in 2012. To achieve comparability with previous publications, Statistik Austria recomputed income data in the EU-SILC survey back until 2008.

The factor loadings shown in Table A.1 in the Appendix are sorted in declining order with respect to the loadings for factor 1. This gives a quick impression of the correlation of factor 1 with high-frequency variables. The first factor has a positive and high loading on unemployment data and the number of persons receiving means tested benefits. On the other hand, employment data and the number of economically active persons from non-EU member countries show strongly negative loadings. Given the positive coefficient of factor 1 this implies that a deterioration in the labour market tends to increase the number of *people at risk poverty or social exclusion*. The second factor also has a positive coefficient for the risk of poverty indicator. The number of persons receiving a pension due to reduced employability with a means tested transfer ("Hilflosenzuschuss") has the highest positive loading. Negative loadings are concentrated on variables associated with youth unemployment. Thus, whenever the number of pensions for reduced employability or youth unemployment increases, factor 2 tends to have a high value and this translates in an increase of the number of *people at risk of poverty or social exclusion*.

Given the realizations of high-frequency variables for either the first or the second quarter of 2019 the nowcasting model predicts an increase in the number of people at risk of poverty or social exclusion by 66,000 persons towards 1,577,800 people in 2019. This implies that Austria will move away from the national EU-2020 target of 1,464,000 people.

Figure 1: People at risk of poverty or social exclusion, 2008-2019



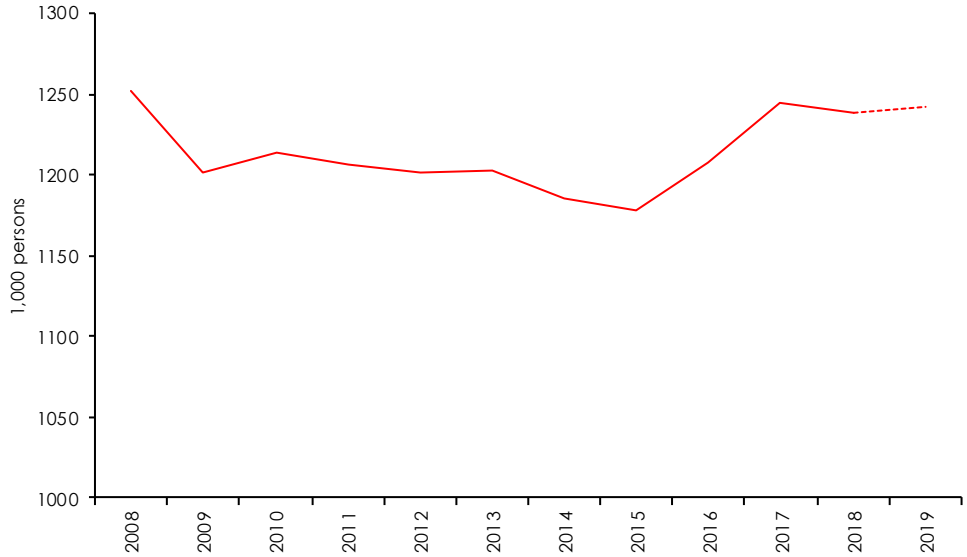
Source: Eurostat, WIFO.

People at risk of income poverty after social transfers (01_20)

The number of *people at risk of income poverty after social transfers* is published since 2003 but the time series has a structural break in 2008, shifting the number of affected people upward by 270,000 persons.[8] Earlier records are therefore not comparable to current numbers. For this reason, we present only data from 2008 onwards. Since 2008 the number of people at risk of income poverty remained quite stable, showing a small deterioration recently, cf. Figure 2.

The nowcasting model for *people at risk of income poverty after receiving social transfers* uses the same set of high-frequency variables as the model for the number of *people at risk of income poverty*. The root mean squared forecast error over the period 2016-2018 indicates that a model of the *Doz et al.* (2011) type with one factor and two lags has the best predictive power.

Figure 2: People at risk of income poverty after social transfers, 2008-2019



Source: Eurostat, WIFO.

The factor loadings shown in Table A.1 in the Appendix are sorted in declining order with respect to the loadings for factor 1. This gives a quick impression of the correlation of factor 1 with high-frequency variables. The first factor has a positive and high loading on unemployment data and the number of persons receiving means tested benefits. On the other hand, employment data and the number of economically active persons from non-EU member countries show strongly negative loadings. Given the positive coefficient on the first lag of factor 1, this implies that a deterioration in the labour market tends to increase sharply

[8] The structural break resulted from a change in collecting income information from a pure survey-based approach towards a combination with data from tax records in 2012. To achieve comparability with previous publications Statistik Austria recomputed income data in the EU-SILC survey back until 2008.

the number of *people at risk of income poverty after social transfers*. This change for the worse tends to be corrected in the following period because the coefficient on the second lag has the opposite sign and almost the same size.

Given the realizations of high-frequency variables for either the first or the second quarter of 2019 the nowcasting model predicts a small increase in the number of people subject to income risk by 4,400 persons towards 1,242,000 persons.

Severely materially deprived people (01_30)

The number of *severely materially deprived people* is published since 2003 but the time series has a structural break in 2008, shifting the number of affected people upward by 216,000 persons.[9] Earlier records are therefore not comparable to current numbers. For this reason, we present only data from 2008 onwards. Since 2008 the number of *severely materially deprived people* declined substantially by 242,000 people, cf. Figure 3.

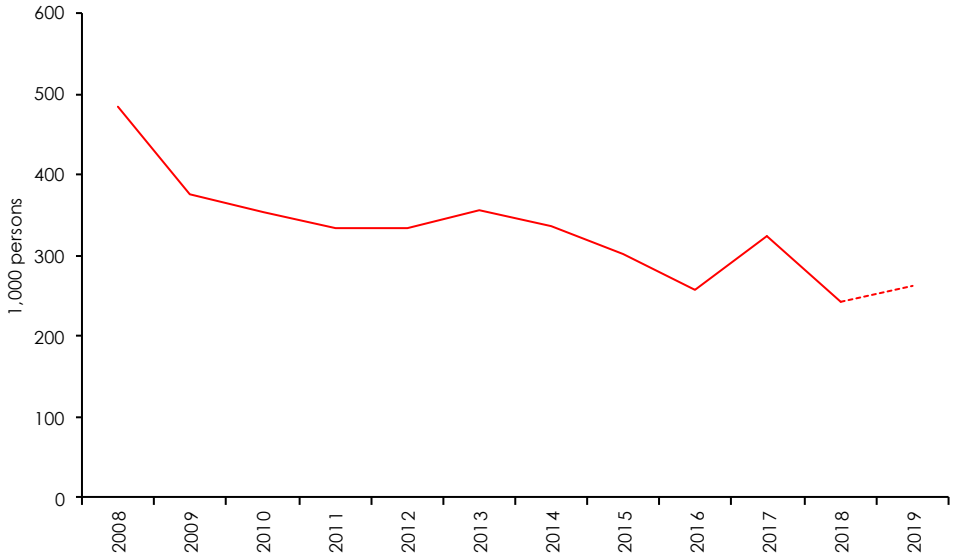
The nowcasting model for *severely materially deprived people* starts from the same set of high-frequency variables as the model for the number of *people at risk of poverty or social exclusion*. Because the root mean squared forecast error over the period 2016-2018 indicates that a model of the *Glocker – Wegmüller* (2017) type with one factor and one lag has the best predictive power, we choose the 20 high-frequency variables with the highest loading from starting set.

This model type must use a reduced number of high-frequency variables in order to achieve convergence of the maximum likelihood estimator. Usually, less than twenty variables can be handled by the estimator. The factor loadings shown in Table A.1 in the Appendix are sorted in declining order with respect to the loadings for factor 1. This gives a quick impression of the correlation of factor 1 with high-frequency variables. Factor 1 has a positive although small loading for the number of young people receiving state aide. Negative loadings appear for employment variables of the better educated as well as the number of long-term inactive persons or sick day leaves. This collection of divergent variables does not provide a meaningful interpretation, nevertheless this model delivers the best forecasts within our short forecast horizon.

Given the realizations of high-frequency variables for either the first or the second quarter of 2019 the nowcasting model predicts an increase in the number of *severe materially deprived* people of 20,600 persons towards 263,700 persons.

[9] The structural break resulted from a change in collecting income information from a pure survey-based approach towards a combination with data from tax records in 2012. To achieve comparability with previous publications Statistik Austria recomputed income data in the EU-SILC survey back until 2008.

Figure 3: Severely materially deprived people, 2008-2019



Source: Eurostat, WIFO.

People living in households with very low work intensity (01_40)

The number of *people living in households with very low work intensity* is published since 200, but the time series has a structural break in 2008 shifting the number of affected people downward by 51.000 persons.[10] Earlier records are therefore not comparable to current numbers. For this reason, we present only data from 2008 onwards. Since 2008 the people living in households with very low work intensity remained more or less constant, cf. Figure 4. Compared to 2008 an increase by 8,000 people has been registered in 2018.

The nowcasting model for *people living in households with very low work intensity* uses the same set of high-frequency variables as the model for the number of *people at risk of poverty or social exclusion*. The root mean squared forecast error over the period 2016-2018 indicates that a model of the *Glocker – Wegmüller* (2017) type with one factor, two lags of this factor and two moving average terms of the error in the signal equation of the nowcasted variable has the best predictive power.

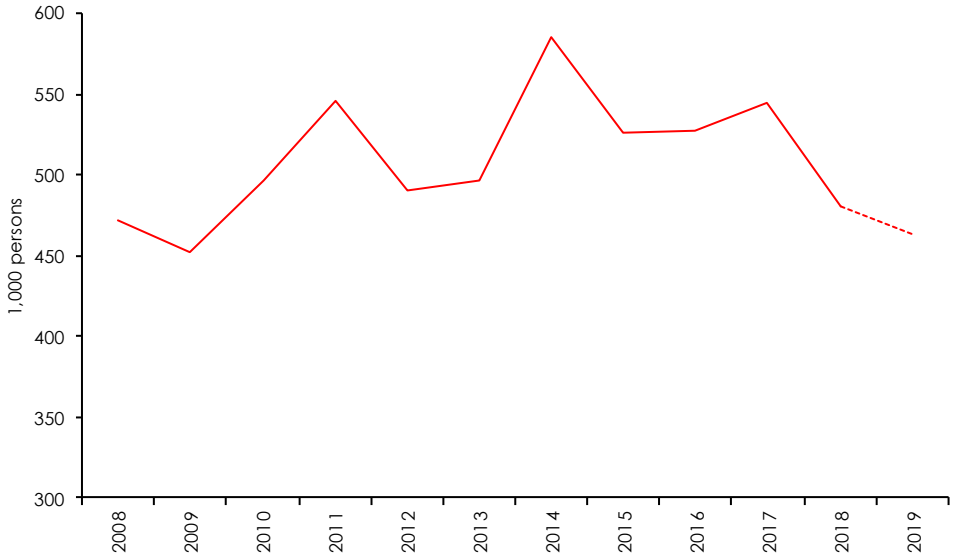
This model type can cope only with a reduced number of high-frequency variables, because, given the low number of observations, the convergence of the maximum likelihood estimator is jeopardised by a high-dimensional parameter space. In our case, less than twenty variables can be handled by this estimator. The factor loadings shown in Table A.1 in the Appendix are sorted in declining order with respect to the loadings for factor 1. This gives a quick impression of the correlation of factor 1 with high-frequency variables. Factor 1 has a positive loading on

[10] The structural break resulted from a change in collecting income information from a pure survey-based approach towards a combination with data from tax records in 2012. To achieve comparability with previous publications Statistik Austria recomputed income data in the EU-SILC survey back until 2008.

the number of state-aided young persons (younger than 25) and variables reflecting youth unemployment. The high-frequency variables with strongly negative loadings include the employment of better educated young people, sick day leaves, and long-term inactive persons. The positive coefficients of both lags of factor 1 on the nowcasted variable indicates that a deterioration of conditions in the labour market contributes to an increase in the *number of people living in households with very low work intensity*.

Given the realisations of high-frequency variables for either the first or the second quarter of 2019, the nowcasting model predicts a decrease in the number of persons living in households with low working intensity by 16,700 persons towards 463,300 persons in 2019.

Figure 4: People living in households with very low work intensity, 2008-2019



Source: Eurostat, WIFO.

People living in a dwelling with a leaking roof, damp walls, floors or foundation or rot in window frames of floor by poverty status (01_60)

The number of *people living in a dwelling with a leaking roof, damp walls, floors or foundation or rot in window frames of floor* is published since 2003, but the time series has a structural break in 2008 shifting the number of affected people upward by 3,900 persons.[11] Earlier records are therefore not comparable to current numbers. For this reason, we present only data from 2008 onwards. Since 2008 the number of people living under bad conditions declined slightly., cf. Figure 5. Compared to 2008 this variable was lower by 2,900 people in 2018.

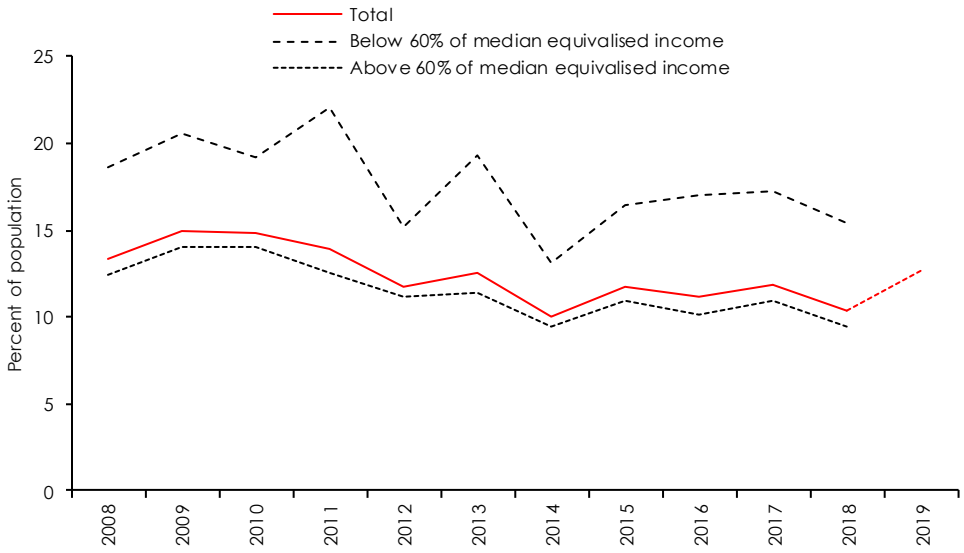
[11] The structural break resulted from a change in collecting income information from a pure survey-based approach towards a combination with data from tax records in 2012. To achieve comparability with previous publications Statistik Austria recomputed income data in the EU-SILC survey back until 2008.

The nowcasting model for *people living under bad conditions* uses the same set of high-frequency variables as the model for the number of *people at risk of poverty or social exclusion*. The root mean squared forecast error over the period 2016-2018 indicates that a model of the *Doz et al.* (2011) type with two factors and two lags has the best predictive power.

The factor loadings shown in Table A.1 in the Appendix are sorted in declining order with respect to the loadings for factor 1. This gives a quick impression of the correlation of factor 1 with high-frequency variables. Factor 1 has high loadings on unemployment variables related to young and less educated unemployed, the number of long-term unemployed, and people receiving means tested benefits. Strongly negative loadings are associated with the well-educated economically active and the economically active from outside the EU. Consequently, better labour market conditions improve the living conditions of poor households, while an increase in the number of recipients of means tested benefits tends to increase the number of people living under bad conditions.

Given the realisations of high-frequency variables for either the first or the second quarter of 2019 the nowcasting model predicts an increase in the number of *persons living under poor conditions* by 2,200 persons towards 12,600 in 2019.

Figure 5: People living in a dwelling with a leaking roof, damp walls, floors or foundation or rot in window frames of floor by poverty status, 2008-2019



Source: Eurostat, WIFO.

Monitoring Goal 1

Over the period 2013 through 2018, the development of the indicators used to assess SDG 1 provides a mixed picture on progress towards this objective. While the majority of key indicators changed for the better, income risk appears to have increased over the short-term for people in and out of work, cf. Table 3. Between 2013 and 2018 strong improvements have been recorded for the number of *severe materially deprived* people and *people living under bad conditions*. Moreover, supplementary indicators for Austria overwhelmingly hint at improving conditions for people living in poverty.

Extending the evaluation period to 2019 by using our nowcasts, confirms the picture of further progress for the *severe materially deprived people* and for *people with low work intensity*. Nevertheless, first consequences of the downturn in the Austrian industry show up in the general measure for poverty, i. e. the number of *people at risk of poverty or social exclusion*, and in the number of *people at risk of income poverty after social transfers*. Also, the *population living under poor conditions* is likely to have worsened in 2019.

Table 3: End poverty in all its forms everywhere (Goal 1)

			2013/2018 average percentage change	Progress towards objective	2013/2019 average percentage change	Progress towards objective	National 2020-Target
Key indicators							
01_10	⊙	People at risk of poverty or social exclusion	–0.8	↗	+0.1	⇩	Reduction by 235,000 persons from 2008 level
01_20		People at risk of income poverty after social transfers	+0.6	↘	+0.5	↘	
01_30		Severely materially deprived people	–7.3	⇧	–4.8	⇧	
01_40		People living in households with very low work intensity	–0.7	↗	–1.1	⇧	
01_41		In work at-risk-of-poverty rate	+0.3	↘	–		
01_60		Population living in a dwelling with a leaking roof, damp walls, floors or foundation or rot in window frames or floor	–3.6	⇧	+0.2	↘	
Multipurpose indicators: Supplementary indicators of other goals which complement the monitoring of this goal							
03_60		Self-reported unmet need for medical care	–24.2	⇧	–		
06_10		Population having neither a bath, nor a shower, nor indoor flushing toilet in their household	+8.4	⇩	–		
07_60		Population unable to keep home adequately warm	–9.9	⇧	–		
11_10		Overcrowding rate	–1.7	⇧	–		

Source: WIFO, Eurostat.

Goal 3. Ensure healthy lives and promote well-being for all at all ages

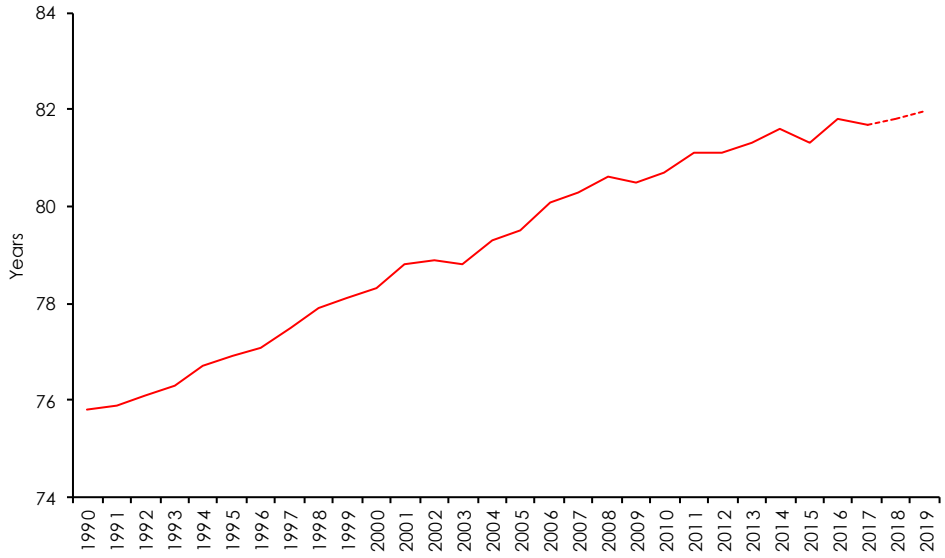
"SDG 3 aims to ensure health and promote well-being for all at all ages by improving reproductive, maternal and child health; ending epidemics of major communicable diseases; and reducing non-communicable and mental diseases. It also calls for reducing behavioural and environmental health-risk factors." (*Eurostat*, 2019)

A good health condition is a requirement for all aspects of life and is also interrelated with people's well-being. Goal 3 is represented by six key indicators:

- Life expectancy at birth, years (03_10)
- Share of people with good or very good perceived health, percent of population aged 16 or over (03_20)
- Smoking prevalence, percent of population aged 15 or over (03_30)
- Death rate due to chronic diseases, number per 100,000 persons aged less than 65 (03_40)
- Death rate due to tuberculosis, HIV and hepatitis, number per 100,000 persons (03_41)
- Self-reported unmet need for medical care, percent of population aged 16 or over (03_60)

In addition, five multipurpose indicators are assigned.

Figure 6: Life expectancy at birth, 1990-2019



Source: Eurostat, WIFO.

Life expectancy at birth

Life expectancy at birth has been steadily increasing from 75.8 years in 1990 to 81.7 years in 2017. It is still on an upward path, both in 2018 and beyond, according to the forecast of Statistic

Austria from October 2019[12]. Due to definitory reasons these data vary slightly from the Eurostat data, but their dynamics serve as perfect input for nowcasting the Eurostat series. For the nowcast, we use a DFM according to *Glocker – Wegmüller* (2017) with one factor and two lags (cf. Table A.2 in the Appendix).

Monitoring Goal 3

The assessment of the short-run development of the key indicators shows a good progress in all scopes. This refers to both, registered data (like life expectancy at birth, death due diseases) and survey data (like perceived health). Incorporating the nowcast of *life expectancy at birth* in the monitoring yields a continuation of the positive trend.

Table 4: Ensure healthy lives and promote well-being for all at all ages (Goal 3)

			2013/2018 average percentage change	*Progress towards objective*	*2013/2019 average percentage change*	*Progress towards objective*	*National 2020-Target*
Key indicators							
03_10		Life expectancy at birth	+0.1[1])	⇗	+0.1[1])	⇗	
03_20		Share of people with good or very good perceived health	+0.9	⇗	–		
03_30		Smoking prevalence	–3.2[1])	⇧	–		
03_40		Death rate due to chronic diseases	–3.2[2])	⇧	–		
03_41		Death rate due to tuberculosis, HIV and hepatitis	–9.2[2])	⇧	–		
03_60		Self-reported unmet need for medical care	–24.2	⇧	–		
Multipurpose indicators: Supplementary indicators of other goals which complement the monitoring of this goal							
02_10		Obesity rate	+1.4[3])	⇩	–		
08_60		People killed in accidents at work	–6.0[1])	⇧	–		
11_20		Population living in households considering that they suffer from noise	–1.5	⇧	–		
11_40	⊙	People killed in road accidents	–2.7	↘	–		Halving the number of road deaths starting from average 2008/2010
11_50		Exposure to air pollution by particulate matter	–3.2[1])	⇧	–		

Source: WIFO, Eurostat. – [1]) 2012/2017 and 2012/2017 average percentage change, respectively. – [2]) 2011/2016 average percentage change. – [3]) 2014/2017 average percentage change.

[12] http://www.statistik.at/web_de/statistiken/menschen_und_gesellschaft/bevoelkerung/demographische_prognosen/bevoelkerungsprognosen/index.html

Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

"SDG 4 seeks to ensure access to equitable and quality education through all stages of life, as well as to increase the number of young people and adults having relevant skills for employment, decent jobs and entrepreneurship." (*Eurostat*, 2019)

A class of endogenous growth models developed by *Lucas* (1988) is built on human capital accumulation or alternatively the proliferation of results from international and national research and development activities resulting in an increasing stock of knowledge (*Romer*, 1986) and explains missing convergence in per capita income levels across countries by deviations in their human capital accumulation. In this model class, the competitive market solution without public intervention will achieve an equilibrium output per capita level and growth rate, which is below the level possible if the state successfully intervenes in the education system or in research and development activities. This class of models provides the theoretical macroeconomic back-up for public intervention into all sorts of educational programs, by establishing patent systems, or by subsidizing research and development activities. At the microeconomic level education and training improve the employability, productivity and competitiveness of an individual. SDG 4 pursues educational targets because formal education and training on the job enhance the employability of individuals as well as aggregate productivity growth. Additionally, other closely related SDGs, will also benefit from successful further education, e. g. people are more likely to follow a healthier and sustainable live-style and their probability of behaving more tolerant and less aggressive is higher.

The EU developed and quantified several educational targets in its Education and Training 2020 (ET 2020) strategic framework[13] and distinguishes between basic, tertiary, and adult education. Basic education starts with early childhood education and ranges up to secondary education; it is supposed to endow individuals with basic skills of numeracy and literacy, and at the upper secondary level to prepare them for tertiary education. Tertiary education encompasses all kinds of higher formal education, while adult education comprises all sorts of further training. ET 2020 supports the achievement of several targets:

- at least 95 percent of children should participate in early childhood education
- fewer than 15 percent of 15-year-olds should be under-skilled in reading, mathematics and science
- the rate of early leavers from education and training aged 18-24 should be below 10 percent
- at least 40 percent of people aged 30-34 should have completed some form of higher education
- at least 15 percent of adults should participate in learning

[13] https://ec.europa.eu/education/policies/european-policy-cooperation/et2020-framework_en

- at least 20 percent of higher education graduates and 6 percent of 18-34-year-olds with an initial vocational qualification should have spent some time studying or training abroad
- the share of employed graduates (aged 20-34 with at least upper secondary education attainment and having left education 1-3 years ago) should be at least 82 percent.

Eurostat uses seven indicators in SDG 4 to analyze the access to equitable and quality education. The following six indicators

- Early leavers from education and training, percent of population aged 18 to 24 (04_10)
- Tertiary educational attainment, percent of population aged 30 to 34 (04_20)
- Participation in early childhood education, percent of children between 4-years-old and the starting age of compulsory education (04_30)
- Underachievement in reading, maths and science, percent of 15-year-old students (04_40)
- Employment rate of recent graduates, percent of population aged 20 to 34 with at least upper secondary education (04_50)
- Adult participation in learning, percent of population aged 25 to 64 (04_60)

are characterized as key indicators, while the indicator *young people neither in employment nor in education and training*, a key indicator in Goal 8, is used as supplemental information. A comparison of both lists shows that out of the seven ET 2020 targets only "skilled workers studying abroad some time during their education phase" has not been included in the list of indicators for measuring progress towards SDG 4. The indicators reflect educational activities over different life cycle stages: early childhood, regular school and student age, as well as the adult phase.

In the 2019 Eurostat report (*Eurostat*, 2019) the sample available for the computation of short- and long-term developments ranges from 1995 through 2018 but varies substantially across indicators. For example, the earliest starting date for educational indicators is the time series for *early school leavers* and *tertiary graduates among the 30-34 year-olds* starting already in 1995; also the *share of adults participating in further education* is recorded since 1995. The time series for the *share of children in pre-school education* starts in 1998, while data for *employment of tertiary graduates* start in 2000. On the other hand, data for *under-skilled teenagers* are derived from tests, which are repeated in three-year intervals only, and science related tests started as late as 2006. The indicators, available around mid of the current year, run until 2018 except data on *pre-school participation* which end in 2017, and data on *underachieving teenagers* ending in 2015.

For the nowcasting of indicators in SDG 4 we use a comprehensive set of high-frequency time series presented in Table A.3. The quarterly time series are drawn from the labour market survey (LFS), the Austria labour market service (AMS), and the Organization of Austrian Social Security (HV) and range over general unemployment and employment figures through education or age-specific numbers.

Early leavers from education and training (04_10)

The share of *early leavers from education and training* in the relevant cohort is observable since 1995. Over the short term this indicator shows a moderate improvement particularly with respect to the peak observation in 2007, cf. Figure 7. Since 2009, Austria achieves a drop-out rate below the EU 2020 target level. Nevertheless, over the last couple of years the downward trend has ebbed out.

The nowcasting model for *early leavers from education and training* is based on high-frequency variables describing the number and rate of young unemployment persons as well as the employment related figures for young people. Furthermore, we add education related variables for unemployed or employed persons, and the total population. An important short-term indicator for school should be the number of young persons not in education, or training. The number of persons taking up minor employment and the overall participation rate may indicate the overall situation of the labour market. The number of persons seeking an apprenticeship may give a hint on excess supply/demand of/for young people in the market for applied on-the-job training opportunities. While the number of pupils and students shows how many persons stay within formal education, the number of young persons receiving support from the Austrian labour market service may shed some light on the extent of problem cases. Furthermore, the education structure of the population, the gainfully employed persons and the unemployed with respect to specific young age groups should also provide some useful information for the nowcasting. Finally, the country of origin of the unemployed (domestic versus foreign) may indicate the severity of drop-outs because failing acquirement of the German language is one of the most important reasons for difficulties in entering the labour market for higher qualifications. The root mean squared forecast error over the period 2016-2018 indicates that a model of the *Doz et al.* (2011) type with two factors and only one lag for both factors has the best predictive power.

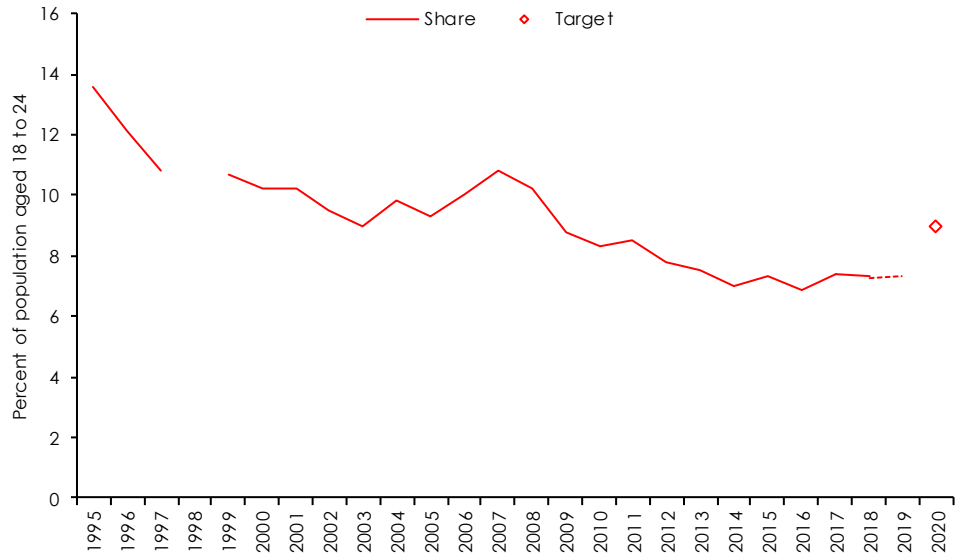
The factor loadings shown in Table A.3 in the Appendix are sorted in declining order with respect to the loadings for factor 1. This gives a quick impression of the correlation of factor 1 with high-frequency variables. The first factor has a positive and high loading on the number of unemployed persons in the age group 15-24 and the respective unemployment rate of this group. Additionally, the number of unemployed persons with low formal education (only compulsory school leaving certificate) also has a strong positive relation to first factor. A high value for factor 1 coincides usually with high values for these variables and this translates into a higher share of early drop-outs, although the coefficient of factor 1 in the signal equation for drop-outs is very small. On the other hand, a higher participation rate of persons aged 15-64 with high education level (level ISCED 3-8) and a higher share of better educated workers (attainment levels ISCED 3-8) are negatively related to the first factor. Also, the unemployment rate among persons with low educational attainment (only compulsory school leaving certificate) in percent of labour force with same characteristics and the number of employed persons from non-EU member states shows a negative relationship to the first factor. Thus,

whenever those variables show very low levels, factor 1 is likely to have a big realization and the drop-out rate will increase.

The second factor has high positive loadings on the number of marginally employed persons holding a free service contract and young economically active men in the age group 20-34. Very negative loadings can be seen for young employed men aged 20-34 and the number of unemployed persons aged 15-24. Because factor 2 has a high coefficient in the signal equation for drop-out, variations in this set of high-frequency variables will have a bigger impact on the nowcast of *early leavers from education and training*.

Given the realizations of high-frequency variables for either the first or the second quarter of 2019 the nowcasting model predicts no further improvement in the drop-out ratio. Expecting a value of 7.3 percent in 2019, Austria, however, will continue to stay below the SDG target ratio of 9.5 percent.

Figure 7: Early leavers from education and training, 1995-2019



Source: Eurostat, WIFO.

Tertiary educational attainment (04_20)

The *share of persons in the population aged 30-34 having completed a formal tertiary education* is observable since 1998. Over the long term, this indicator improves by some ten percentage points. Over the short term, it shows a moderate improvement, although Figure 8 reveals a dip in 2015, followed by a rebound over the last couple of years. Since 2013, Austria passed the EU 2020 target ratio of 38 percent but over the last two years, we can see an abating tendency.

The nowcasting model for the highly educated is based on a more selective set of high-frequency variables closely related to data on educational achievement in the labour market

survey and data collected by the Organization of Austrian Social Security (HV), cf. Table A.3 in the Appendix. The variables include the current number of pupils and students, the number of highly educated young economically active persons, and labour market participation ratios of young people, since the latter indicate possible absence from formal higher education activities. Moreover, we directly observe the share of persons with completed ISCED 5-8 education. The root mean squared forecast errors over the period 2016-2018 indicate that a model of the *Doz et al.* (2011) type with two factors and two lags has the best predictive power.

The factor loadings shown in Table A.3 in the Appendix are sorted in declining order with respect to the loadings for factor 1. This gives a quick impression of the correlation of factor 1 with high-frequency variables. The first factor has a positive and high loading on the participation ratio of women with completed ISCED 3-8 education in the age group of 20-32 and the number of economically active persons with completed ISCED 3-8 degree aged 20-34. This relation appears plausible because the age group also includes younger cohorts who will slowly move into the relevant age bracket 30-34. Furthermore, the share of persons with more than a college degree in the working age population (15-64) and the share with more than a high school degree do have high positive loadings. Both variables provide information about the spread of higher education within the population. The loading of factor 1 on tertiary educational attainment is quite high in the first period (Lag 1) but peters out in the year after because the coefficient of the second lag has similar size but the opposite sign. Consequently, the overall long-term impact of factor 1 on tertiary educational attainment is small.

Figure 8: Tertiary educational attainment, 2004-2019

Source: Statistics Austria, Eurostat, WIFO.

The second factor has high positive loadings on the participation ratio of women with a completed ISCED 3-8 degree in the age group 20-32 and the corresponding number of

economically active women. Given the high negative loading of factor 2 (Lag 1) on *tertiary educational attainment*, this implies a reduction of the share of highly educated young people if these variables realise high values during the previous period. A countermovement sets in during the second period, when the extremely high positive coefficient on the second lag will push *tertiary educational attainment* upwards. The strong negative correlations of factor 2 with the total participation ratio for persons having completed ISCED 3-8 degree in age group 20-32 and the economically active women with completed ISCED 3-8 education in the age group 25-44, respectively, imply that higher realizations for both variables will push up *tertiary education attainment* in the current year, while they will have a negative long-term impact.

Given the realizations of high-frequency variables for either the first or the second quarter of 2019, the nowcasting model predicts a small improvement from 40.7 percent in 2018 towards 40.8 percent in 2019. Austria will continue to stay above the SDG target ratio of 38 percent.

Participation in early childhood education (04_30)

The *share children participating in early childhood education* before they enter the starting age of compulsory education has been subject to many policy reforms either targeted at groups with low propensity to raise children outside the conventional family environment or at lowering the financial burden for families by providing kindergarten services free of charge. Additionally, the government increased the educational standards for pedagogues in kindergartens. Figure 9 reveals the positive outcome of all these measures over the last years. In the long term, *early childhood education* has become more widespread, increasing from 82 percent in 1998 towards 96 percent in 2017, when published data end. Austria managed to pass the EU 2020 target of 95 percent in the year 2017.

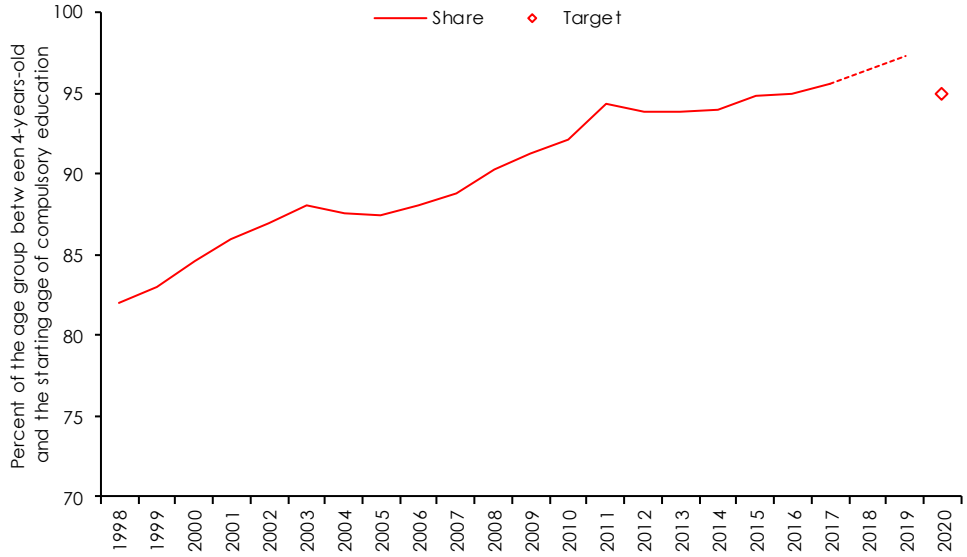
The nowcasting model for *early childhood education* is based on a broad set of high-frequency variables closely related to labour market participation and educational attainment. The reasoning for this selection is mainly that economic and family care is hardly compatible, and families are likely to use kindergarten services. Furthermore, parents with higher education will perhaps use more intensively formal institutions for child care. The quarterly variables are drawn mainly from the labour force survey, just one series is collected from the Organization of Austrian Social Security (HV), cf. Table A.3 in the Appendix. Particularly, the variables include the participation rates of age groups engaging very likely in child rearing activities, and the economic activity of persons with higher education. The root mean squared forecast errors over the period 2016-2018 indicate that a model of the *Doz et al.* (2011) type with only one factor and one lag has the best predictive power.

The factor loadings shown in Table A.3 in the Appendix are sorted in declining order with respect to the loadings for factor 1. This gives a quick impression of the correlation of factor 1 with high-frequency variables. The first factor has a positive and medium sized loading on economically active women aged 25-44 and having completed an ISCED 3-8 degree. A bunch of series with strong negative loadings is likely to move more closely in line with factor 1. These are the total participation ratio of 20-34-year olds and the corresponding number of

economically active persons. If both variables increase, factor 1 is likely to be lower, and given the negative coefficient of factor 1, this will put upward pressure on the extent of *early childhood education*.

Given the realizations of high-frequency variables for the year 2018 until the first or the second quarter of 2019, the nowcasting model predicts a continued gain from 95.6 percent in 2017 towards 97.3 percent in 2019. Austria will further surpass the SDG target ratio of 95 percent.

Figure 9: Participation in early childhood education, 1998-2019



Source: Eurostat, WIFO.

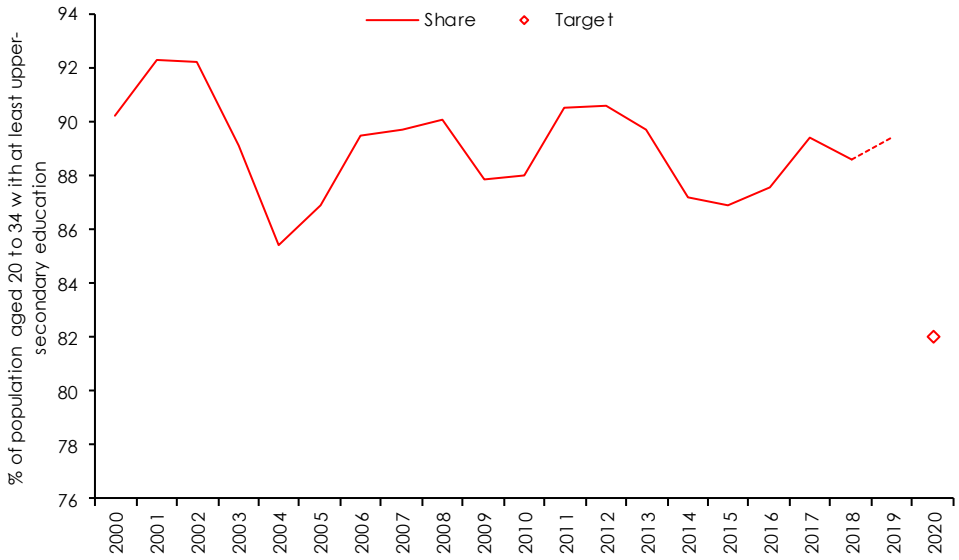
Employment rates of recent graduates (04_50)

The success of educational systems should be assessed against their capacity to endow young persons with flexible abilities being demanded by firms. Some countries in Europe fail notably on this criterium and therefore the *employment rate of recent graduates* features a prominent role among SDG 4 targets. The ET 2020 education targets propose a value of 82 percent as the target level for this indicator. Good labour market conditions provide the background for high *employment rates of recent graduates* in Austria. Figure 10 shows that Austria outmatches the EU target throughout the whole sample period from the year 2000 through 2018. There is no trend visible in this indicator, but business cycle fluctuations are clearly discernible.

The nowcasting model for the *employment rate of recent graduates* is based on a broad set of high-frequency variables closely related to labour market conditions. We use all sorts of employment data, participation rates, and unemployment data with a focus on younger age groups, persons with finished mandatory schooling, persons with foreign origin, and persons staying in unemployment for more than six months, because these groups are usually more vulnerable to economic downturns. Another group in the labour market with high exposure to

the business cycle are the marginally employed. Furthermore, we use direct information on the labour market participation of highly educated young persons published in the labour market survey. The root mean squared forecast error over the period 2016-2018 indicates that a model of the *Doz et al.* (2011) type with only one factor and one lag has the best predictive power.

Figure 10: Employment rates of recent graduates, 2000-2019



Source: Eurostat, WIFO.

The factor loadings shown in Table A.3 in the Appendix are sorted in declining order with respect to the loadings for factor 1. This gives a quick impression of the correlation of factor 1 with high-frequency variables. The first factor has positive and high loadings on unemployment variables, particularly the rate of unemployment among 15-24-year olds and the corresponding number of unemployed persons. Also, unemployment figures related to persons with low educational attainment belong to this group of variables. The variables with a high negative loading comprise the participation ratios of young workers (20-34) and marginally employed persons. In combination with the negative coefficient of the factor 1 this collection of variables shows the sensibility of young graduate employment with respect to the general labour market situation. Whenever unemployment goes up and employment goes down, factor 1 will tend to be high and the employment of graduates will be negatively impacted. The second factor has positive loadings on the number of economically active persons with higher education (ISCED 3-8) in the relevant age group (20-34) and their participation rate, while high-frequency variables like youth unemployment and unemployment among persons with low educational attainment have negative loadings. The negative coefficient of factor 2 on employment rates of young graduates appears odd, because the high-frequency variables most closely related to young graduate activity levels is positively correlated with the factor 2. The size of negative loadings, however, is considerably higher than the one for the positive

loadings, and additionally the coefficient of the factor 2 on the nowcasted variable is close to zero.

Given the realizations of high-frequency variables for either the first or the second quarter of 2019, the nowcasting model predicts an upward movement in the *employment rate of recent graduates* from 88.6 percent in 2018 towards 89.4 percent in 2019. Austria will continue to surpass the SDG target ratio of 82 percent.

Adult participation in learning (04_60)

The share of persons in the age group between 25 and 64 who participate in training activities shows the extent of educational activities among the economically active as well as the unemployed. Learning activities improve the abilities of adults to adjust to shifts in labour demand from one qualification to others. Particularly, the arrival of new technologies requires adjusting personal skills, but adult learning also improves the prospects for advancing the career. For the unemployed, it provides an opportunity to improve or adapt their skills such that they can search for jobs in different parts of the labour market. This indicator is collected and published since 1995. Due to a break in the time series in 2003, Figure 11 shows the development from 2004 onwards. After a steady improvement of the indicator, Austria surpassed the target level of 15 percent in 2016 and remained slightly above the target value since then.

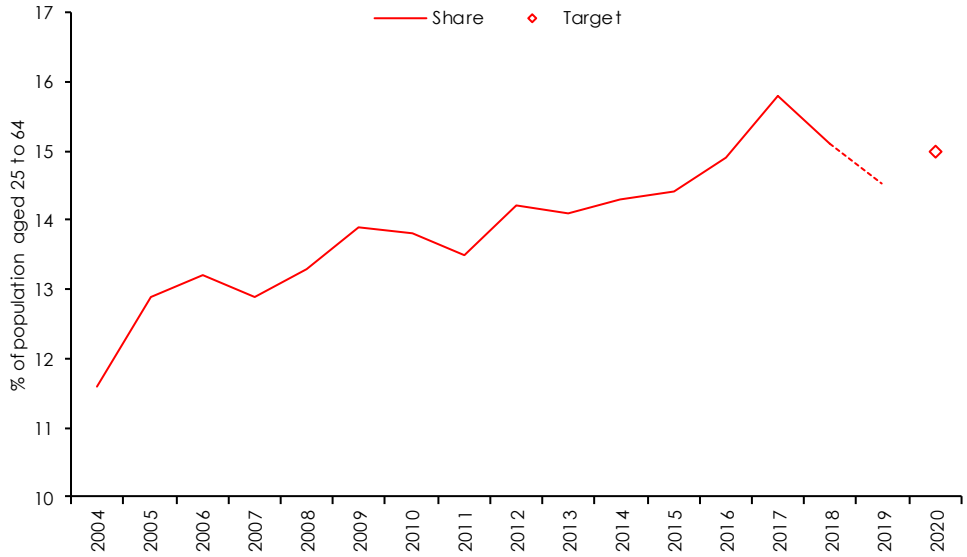
The nowcasting model for *adult learning* focusses on variables from unemployment statistics, because this group is likely to receive a treatment by the Austrian labour market service. Particularly, young unemployed, unemployed with foreign origin, unemployed with low educational attainment, long-term unemployed, young persons not in education or training, and young persons receiving state aid appear as groups with high probability of receiving treatment. On the other hand, marginally employed persons may prefer a low level of activity, because they participate in an adult education program and, if the number of middle-aged economically active persons is high, the potential for on-the-job-training increases as well. Furthermore, we consider better educated economically active people to have a higher potential for engaging in adult learning activities. The root mean squared forecast error over the period 2016-2018 indicates that a model of the *Doz et al.* (2011) type with two factors and two lags for both factors has the best predictive power.

The factor loadings shown in Table A.3 in the Appendix are sorted in declining order with respect to the loadings for factor 1. This gives a quick impression of the correlation of factor 1 with high-frequency variables. The first factor has a positive and high loading on quite divergent high-frequency variables: the number of young economically active women (according to the living concept) as well as variables describing the development of unemployment among young persons or persons with low qualification (only mandatory school finished). The strongest negative loadings of factor 1 can also be found for a bunch of divergent variables like the number of economically active highly qualified women (ISCED 3-8) in the age-group between 25-44, as well as the number of long-term inactive persons and the number of economically active persons from non-EU countries. This divergence makes it hard to give the first factor some

interesting interpretation, the short-term effect of an increase in factor 1 on adult learning activities is highly positive in the short-run although most of the positive first period effect becomes reversed after another year. Factor 2 has high negative loadings on variables describing youth unemployment and unemployment among persons with low qualifications. This fits quite well to the negative coefficient of factor 2 for adult learning activities, because increasing unemployment among problem groups on the labour market will go along with a widening of learning activities.

Given the realizations of high-frequency variables for either the first or the second quarter of 2019 the nowcasting model predicts a deterioration of adult learning activities. The share of adults actively pursuing improvements of their skills will fall from 15.1 percent towards 14.5 percent. Thus, we expect Austria to fall short of the EU-2020 target ratio of 15 percent.

Figure 11: Adult participation in learning, 2004-2019



Source: Eurostat, WIFO.

Monitoring SDG 4

Over the period 2013 through 2018, the development of the indicators provides a mixed impression. Particularly *underachievement in reading, mathematics, and science* worsened over the short-term. The *share of employed tertiary graduates* shows a small deterioration over the last five years, however, it remains firmly above the EU 2020 target, and Figure 10 shows that this indicator follows a pronounced cyclical pattern. Thus, short-term variations in this ratio reflect more a change in business cycle conditions rather than a general worsening of employment opportunities of young graduates. On the other hand, participation rates in *early childhood education*, *tertiary education attainment*, and the *drop-out ratio* improved moderately until 2018. *Adult training participation* is the only indicator with a significant progress towards the target value until 2018.

The nowcasting procedure shows that the generally positive picture with respect to SDG 4 will remain intact during 2019. Extending the sample for the short-term comparison by one more year, changes the impression only for the indicator of adult learning activities. Improvements for this indicator during the last half decade appear to come to end, with Austria even failing to achieve the EU 2020 target ratio in 2019.

Table 5: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (Goal 4)

			2013/2018 average percentage change	Progress towards objective	2013/2019 average percentage change	Progress towards objective	National 2020-Target
Key indicators							
04_10	⊙	Early leavers from education and training	–0.5	⇗	–0.4	⇗	9.5 percent
04_20	⊙	Tertiary educational attainment	+0.7	⇗	+0.6	⇗	at least 38 percent
04_30	⊙	Participation in early childhood education	+0.4[1])	⇗	+0.5[1])	⇗	at least 95 percent (EU-target)
04_40	⊙	Underachievement in reading	+4.9[2])	⇩	–		
	⊙	Underachievement in maths	+5.2[2])	⇩	–		< 15 percent (EU-target)
	⊙	Underachievement in science	+9.6[2])	⇩	–		
04_50	⊙	Employment rate of recent graduates	–0.2	⇘	–0.1	⇘	at least 82 percent (EU-target)
04_60	⊙	Adult participation in learning	+1.4	⇧	+0.5	⇗	at least 15 percent (EU-target)
Multipurpose indicators: Supplementary indicators of other goals which complement the monitoring of this goal							
08_20		Young people neither in employment nor in education and training	–0.5	⇗	–		

Source: WIFO, Eurostat. – For the indicators 4_10, 4_20, 4_30, 04_50 and 4_60, the target has been achieved. Their assessment is based on the approach for indicators without a quantitative target. – [1]) 2012/2017 and 2012/2019 average percentage change, respectively. – [2]) 2012/2015 and 2012/2019 average percentage change, respectively.

Goal 5. Achieve gender equality and empower all women and girls

"SDG 5 aims to achieve gender equality by ending all forms of discrimination, violence and any harmful practices against women and girls in the public and private spheres. It also calls for the full participation of women and equal opportunities for leadership at all levels of political and economic decision-making." (Eurostat, 2019)

Gender inequality is one of the biggest obstacles to sustainable development, economic growth and poverty reduction. The role of gender equality as driver of the development process had not been fully realized. Social, economic and political inequalities are still deep-rooted. To address these inequalities, the vital role of women and the need for their full and equal participation in all areas of sustainable development are cornerstones of Goal 5.

It consists of the following key indicators:

- Physical and sexual violence to women experienced within 12 months prior to the interview, percent of women (05_10)

- Gender pay gap in unadjusted form, percent of average gross hourly earnings of men (05_20)
- Gender employment gap, percentage points (05_30)
- Inactive population due to caring responsibilities, percent of inactive population aged 20 to 64 (05_40)
- Seats held by women in national parliaments and governments, percent of seats (05_50)
- Positions held by women in senior management, percent of positions (05_60)

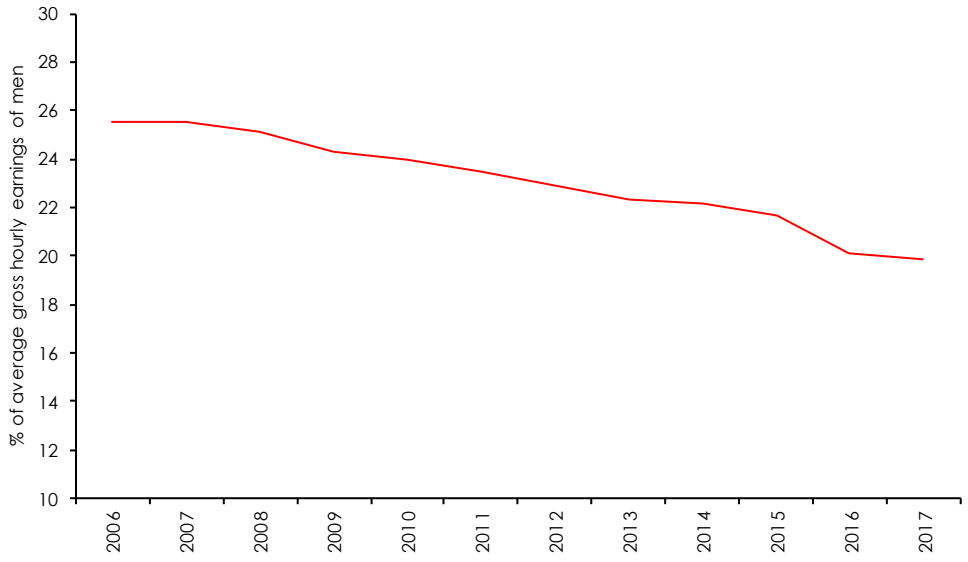
In addition, three multipurpose indicators (all three related to Goal 4) are assigned.

Gender pay gap (05_20)

The *gender pay gap* represents the difference in the average gross hourly earnings of female and male employees. It is used in unadjusted form in the EU SDG indicator set. That means, it does not consider all factors that impact on the gender pay gap, such as differences in education, labour market experience, hours worked, type of job etc.

The data for Austria between 2006 and 2017 shows a constant improvement in narrowing the gap (Figure 12). The difference was 25.5 percent in 2006 and reduced by more than 5 percentage points to 19.9 percent in the year 2017, with the year 2016 representing the highest reduction (–1.6 percentage points) in the gender pay gap measure.

Figure 12: Gender pay gap (unadjusted version), 2006-2017



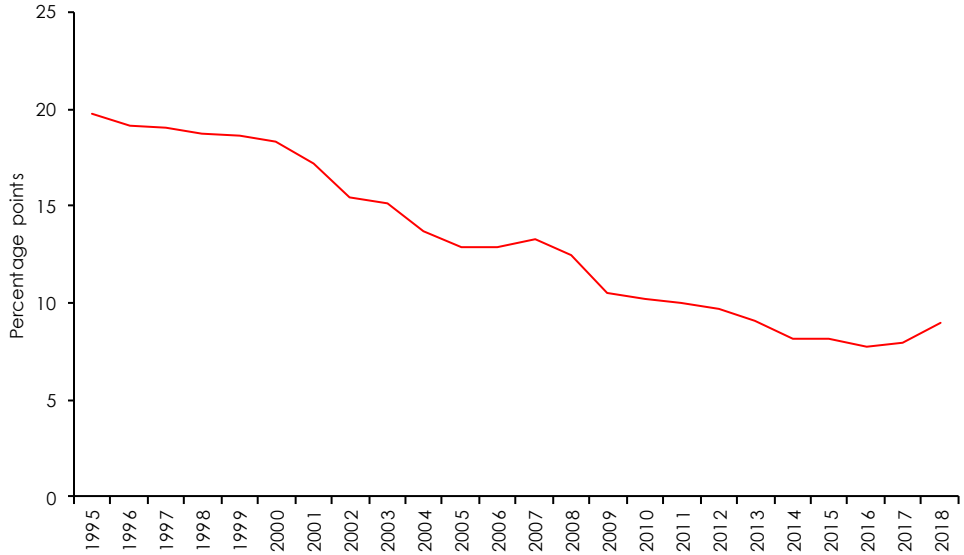
Source: Eurostat.

Gender employment gap (05_30)

The *gender employment gap* is defined as the difference between the employment rates of men and women (aged 20 to 64), where the employment rates as such are calculated by the number of people employed divided by total population in this age group, respectively.

The Austrian employment rate gap between women and men continuously decreased from 19.8 percentage points in 1995 to 9.0 percentage points in 2018 (Figure 13). But the decline is not completely smooth over the years. There exist years where the gap temporally widened up again or stagnated. Especially the increase by 1.0 percentage point in 2018 is noticeable.

Figure 13: Gender employment gap, 1995-2018



Source: Eurostat.

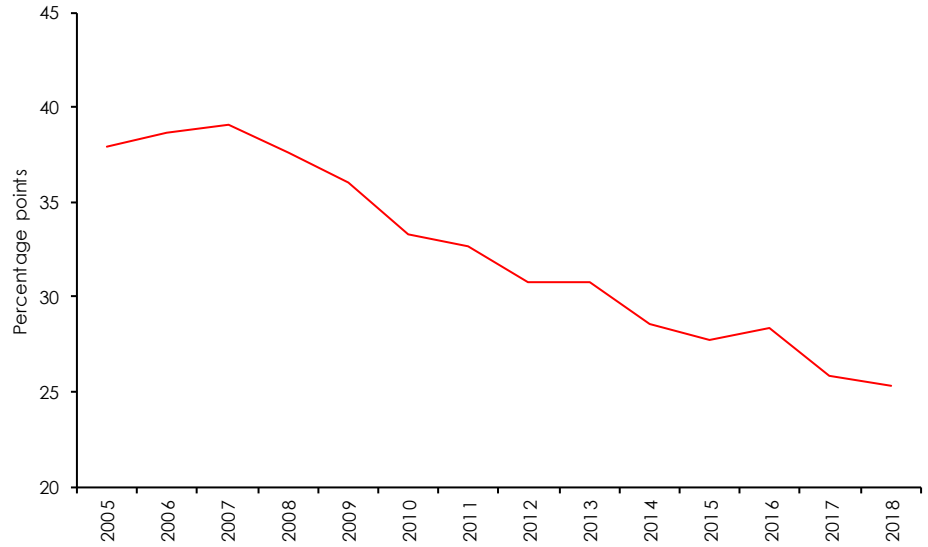
Inactive population due to caring responsibilities (05_40)

The group of economically inactive population is neither employed nor unemployed. They are outside the labour force, and the comprised individuals are not working, not actively seeking work and not available to work, even if they had found a job. While several reasons may exist why somebody is not seeking employment, the main one, especially for women, is *inactive due to caring responsibilities*. It contains inactivity due to "looking after children or incapacitated adults" or "other family or personal responsibilities". The gender gap is particularly pronounced in this respect. Other reasons are: being inactive due to illness or disability, or being in education or training, or having retired. These are main factors of inactivity reported by men.

In Austria, the gender gap in *being inactive due to caring responsibilities* has narrowed significantly over the last twenty years. Due to a break in the time series in 2004, Figure 14 shows the development from 2005 onwards. But the downward sloping trend also holds for the period 1996-2003. Not only decreased the share of women which were out of the labour force due to

caring responsibilities steadily, whereas the share of men steadily increased in the same period. Both developments amplify the improvement in the gender gap of this key indicator.

Figure 14: Inactive population due to caring responsibilities – Gender difference, 2005-2018



Source: Eurostat.

Monitoring Goal 5

The monitoring results of the key indicators of Goal 5 provide a favorable picture towards the SD objectives (Table 6). All five indicators for which sufficient enough data are available show a green arrow, four out of them even a bold one (meaning significant progress). In detail, this means:

- Between 2012 and 2017 the *gender pay gap* (in unadjusted form) decreased on average by 2,8 percent.
- The *gender employment gap* improved (i.e. the gap narrowed) in the period 2013-2018 as well, but only to a lesser extent.
- The *share of inactive people due to caring responsibilities* declined in the same 5-years period, on average, with 2,6 percent much stronger.
- With the same magnitude, but with an opposite (i.e. positive) sign, improved the indicator of *seats held by women in national parliaments*. Taking the already available value of this key indicator for 2019 into consideration results in a somewhat higher average value (+2,7 instead of +2,6).

Table 6: Achieve gender equality and empower all women and girls (Goal 5)

		2013/2018 average percentage change	Progress towards objective	2013/2019 average percentage change	Progress towards objective	National 2020-Target
Key indicators						
05_10	Physical and sexual violence to women experienced within 12 months prior to the interview	–		–		
05_20	Gender pay gap in unadjusted form	–2.8[1])	⇧	–		
05_30	Gender employment gap	–0.2	↗	–		
05_40	Inactive population due to caring responsibilities	–2.6	⇧	–		
05_50	Seats held by women in national parliaments	+2.6	⇧	+2.7	⇧	
05_60	Positions held by women in senior management	+15.7	⇧	–		
Multipurpose indicators: Supplementary indicators of other goals which complement the monitoring of this goal						
04_10	⊙ Early leavers from education and training	–0.5	↗	–0.4	↗	9.5 percent
04_20	⊙ Tertiary educational attainment	+0.7[2])	↗	+0.6[2])	↗	at least 38 percent
04_50	⊙ Employment rate of recent graduates	–0.2	↘	–0.1	↘	at least 82 percent (EU-target)

Source: WIFO, Eurostat. – [1]) 2012/2017 average percentage change. – [2]) 2014/2018 and 2014/2019 average percentage change, respectively.

Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all

"SDG 7 calls for ensuring universal access to modern energy services, improving energy efficiency and increasing the share of renewable energy. To accelerate the transition to an affordable, reliable and sustainable energy system that fulfils these demands, countries need to facilitate access to clean energy research and technology and to promote investment in resource- and energy-efficient solutions and low-carbon energy infrastructure." (*Eurostat*, 2019)

A more efficient use of energy and a shift towards renewable energy production are key elements of the EU's climate and energy package for 2020. Goal 7 consists of six key indicators:

- Primary & final energy consumption, million tonnes of oil equivalent and index 2005 = 100 (07_10)
- Final energy consumption in households per capita, kg of oil equivalent (07_20)
- Energy productivity, 2010 chain linked volumes in Euro and PPS per kg of oil equivalent (07_30)
- Share of renewable energy in gross final energy consumption, percent (07_40)
- Energy dependence, percent of imports in total energy consumption (07_50)
- Population unable to keep home adequately warm, percent of population (07_60)

and one multipurpose indicator, related to Goal 13. To assess the most recent development, we provide a nowcast of five key indicators and one multipurpose indicator. Among them are *energy consumption* and the *share of renewable energy in gross final consumption*, which are

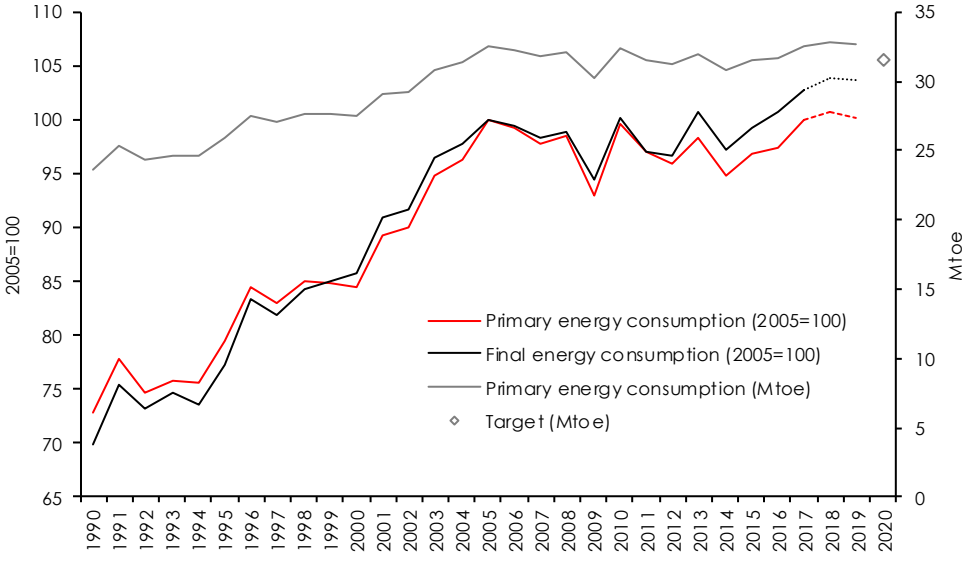
also Europe 2020 target series used to monitor progress towards the EU's objective for climate and energy policy.

Energy consumption (07_10)

With respect to the indicators for energy consumption *primary energy consumption* and *final energy consumption* are distinguished. *Primary energy consumption* comprises the total energy needs of a country excluding all non-energy use of energy carriers. In the Eurostat dataset, it is measured in million tons of oil equivalent (Mtoe) and is also represented as index. The concept of *final energy consumption* is narrower compared to that of *primary energy consumption*. It covers only the energy consumed by end-users and excludes energy used by the energy sector itself, as well as losses during transformation (for example, from oil or gas into electricity) and distribution.

Both series are used as indicators for pursuing energy efficiency improvements and belong to the Europe 2020 headline indicators. The EU aims to improve energy efficiency by 2020 by 20 percent (compared to a reference scenario). To meet the target the strategy calls for efficiency improvements in the sense of decoupling energy consumption from economic growth. Specifically, the EU aims at limiting *final energy consumption* to no more than 1,086 Mtoe and *primary energy consumption* to no more than 1,483 Mtoe by 2020. The national target for Austria for *final energy consumption* is 25.1 Mtoe, and 31.5 Mtoe for *primary energy con-sumption*.

Figure 15: Primary and final energy consumption, 1990-2019



Source: Eurostat, WIFO.

Primary energy consumption is characterized by an upward trend until 2006, followed by a decline in 2009 during the economic downturn, where the fall in production and transport

activities lead to a lower energy demand. With the recovery in 2010 and the subsequent years of slower economic growth, *primary energy consumption* was largely stable, followed by a reduction in the year 2014. During 2015, 2016 and 2017 the series increased again.

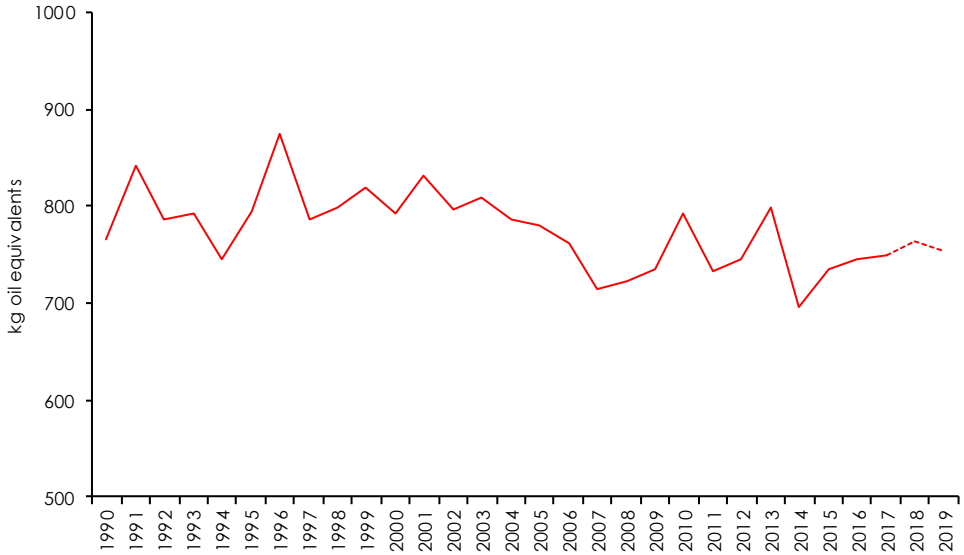
The nowcasting model for both *primary energy consumption* and *final energy consumption* is based on the following high-frequency variables: heating degree days, domestic gas consumption, GDP growth, market consumption of heating oil, domestic electricity consumption, generation of electrical energy and consumption of fuels. We use a DFM according to *Glocker – Wegmüller* (2017) with one factor and two lags. The factor loadings are shown in Table A.4 in the Appendix. The variables with the highest loading are electricity consumption and domestic gas consumption.

Given the realizations of high-frequency variables until the second quarter of 2019, it is very likely that the national 2020 target for *primary energy consumption* of 31.5 Mtoe will be missed. After amounting to 32.5 Mtoe in 2017, nowcasts suggest a moderate increase in *primary energy consumption* in 2018 followed by a slight decline in 2019.

Final energy consumption in households per capita (07_20)

Final energy consumption in households per capita is defined as the amount of energy a citizen consumes at home excluding transport. This comprises aspects like heating, lighting and the use of other electrical appliances of private households.

Figure 16: Final energy consumption per capita, 1990-2019



Source: Eurostat, WIFO.

Considering the long-run development, *final energy consumption in households* is on a stable or even a slight downward trend (Figure 16). Latest figures for 2017 imply that the indicator is 2.1 percent below the level of 1990, although it has been on a modest upward path in the last

three years. As efforts for heating play a considerable role in final energy consumption in households, the underlying development is affected by the temperature (measured by the number of heating degree days). In the nowcast approach we additionally consider quarterly data of gas and heating oil consumption, electricity consumption and generation as well as overall consumption of private households and GDP. We use a DFM according to *Glocker – Wegmüller* (2017) with one factor and two lags. The factor loadings are shown in Table A.4 in the Appendix. The variables with the highest loading are electricity consumption and domestic gas consumption.

On the base of the latest realization of these inputs, the nowcast yields a further increase of final energy consumption in households in 2018, followed by a decline in 2019.

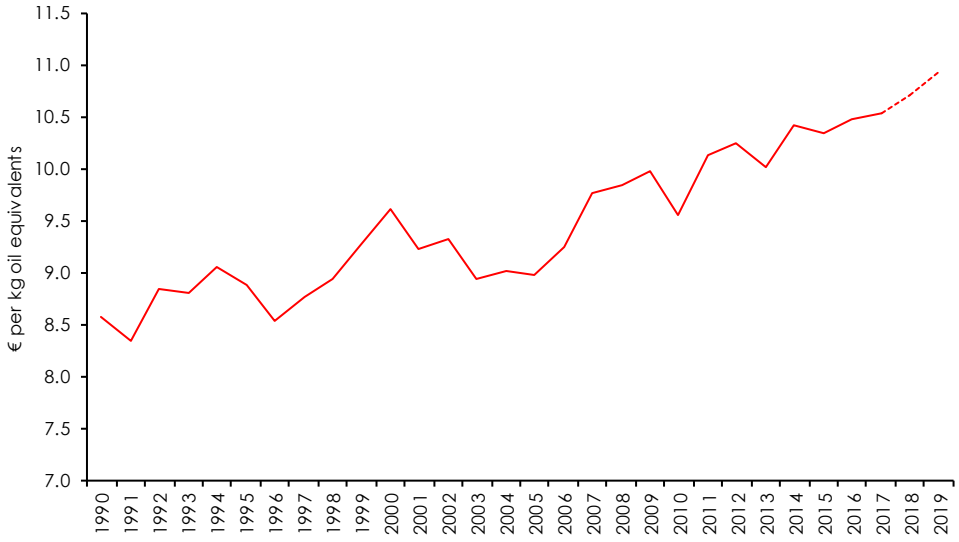
Energy productivity (07_30)

Energy productivity is defined as GDP per unit of gross inland energy consumption, measured in Euro per kg of oil equivalent. In this concept energy consumption refers to both, household consumption and input for production.

Nowcasts of energy productivity are obtained on the base of GDP figures[14] related to nowcasts of *primary energy consumption*.

Energy productivity in Austria has been on an upward trend since 1990 (Figure 17). This reflects higher economic output using fewer resources in terms of energy input. The nowcast for 2018 and 2019 suggests a continuation of this trend.

Figure 17: Energy productivity, 1990-2019



Source: Eurostat, WIFO.

[14] Values for 2019 are taken from the latest WIFO Economic Outlook (*Ederer*, 2019).

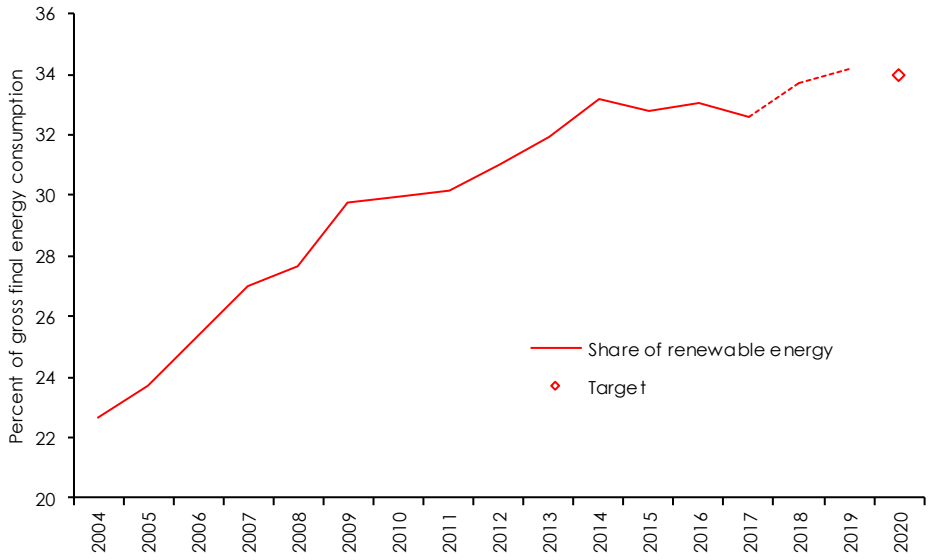
Share of renewable energy in gross final energy consumption (07_40)

The indicator considers the *share of renewable energy consumption in gross final energy consumption* according to the Renewable Energy Directive[15]. Renewable energy sources play an important role in the context of climate related action and are in focus of the EU climate policy. The objective of the Europe 2020 strategy is to increase the *share of renewable energy in gross final energy consumption* to at least 20 percent by the year 2020. The national target for Austria refers to an increase to 34 percent. Since 1990, the series has shown an increasing trend, which was slightly damped in the years between 2014 and 2017.

As their name implies, renewable energy sources are practically inexhaustible or renew within a human life time (*Eurostat*, 2019). Renewable energy comprises hydro power, solar energy, geothermal energy, wind power as well as biomass and renewable wastes. For Austria, the main renewable energy sources are hydro power, biomass and wind.

There are no high-frequency data of renewable energy consumption available for the nowcasting approach, we therefore consider data with respect to energy supply. We use the shares of alternative power generation and thermal power generation as well as domestic gas consumption as input series, the latter two having a negative impact on renewable energy consumption (Table A.4). We use a DFM according to *Glocker – Wegmüller* (2017) with one factor and two lags. Given the realizations of high-frequency variables for the year 2018 until the second quarter of 2019, the nowcasting model predicts a further increase in the share of renewable energy, allowing most likely the achievement of the national 2020 target.

Figure 18: Renewable energy, 1990-2019



Source: Eurostat, WIFO.

[15] https://ec.europa.eu/energy/en/topics/renewable-energy/renewable-energy-directive/overview

Monitoring Goal 7

The assessment of the short-run development of the indicators in Goal 7 provides a mixed impression (Table 7). While three out of seven indicators show a downward arrow, four show an improvement. In detail, this means:

- The recent increase in *primary energy consumption* opposed the theoretical growth path necessary to meet the goal of a reduction in energy consumption[16]. On average, between 2012 and 2017 *primary energy consumption* increased by an annual 0.8 percent. Extending the series with nowcasted values for 2018 and 2019, diminishes the average rate to 0.6 percent between 2012 and 2019, and thus to a lower path but still contrary to the necessary reduction.

  As regards *final energy consumption* a similar picture can be recorded. *Final energy consumption* is discussed and assessed on a regular base in "How is Austria?", where it is one of the key indicators (*Statistik Austria*, 2019). Due to the increase of the indicator in the recent past, the development has also been evaluated tendentially negative there.
- *Final energy consumption in households* shows slight increase (0.1 percent) between 2012 and 2017, which stays in the same range when extending the period under consideration until 2019. This development means a moderate movement away from the SD objectives.
- As regards *energy productivity* the assessment is more positive. Between 2012 and 2017 the series increased on average by 0.5 percent, accelerating to 0.9 percent when extending the period to 2019. Both results imply a moderate progress towards SD objectives.
- An improvement over time is observed in the *share of renewable energy*. Between 2012 and 2017, with an average increase of 1.0 percent, the series is evaluated as making moderate progress in the short-term to meet the national 2020 target. Nowcasts for 2018 and 2019 suggest a reinforcement, showing a significant progress towards the national 2020 target.

[16] The base value for the required growth rate was calculated as an average of the values 2011/2013.

Table 7: Ensure access to affordable, reliable, sustainable and modern energy for all (Goal 7)

			2012/2017 average percentage change	Progress towards objective	2012/2019 average percentage change	Progress towards objective	National 2020-Target
Key indicators							
07_10	⊙	Primary energy consumption[1])	+0.8	⇩	+0.6	⇩	reduction to 31.5 Mtoe
	⊙	Final energy consumption	+1.2	⇩	+1.0	⇩	reduction to 25.1 Mtoe
07_20		Final energy consumption in households per capita	+0.1	↘	+0.1	↘	
07_30		Energy productivity	+0.5	↗	+0.9	↗	
07_40	⊙	Share of renewable energy in gross final energy consumption	+1.0	↗	+1.4	⇧	34 percent
07_50		Energy import dependency	–0.0	↗	–		
07_60		Population unable to keep home adequately warm	–9.9[2])	⇧	–		
Multipurpose indicators: Supplementary indicators of other goals which complement the monitoring of this goal							
13_20		Greenhouse gas emissions intensity of energy consumption	–0.3	↗	–		

Source: WIFO, Eurostat. – [1]) The base value for the required growth rate was calculated as an average of the values 2011/2013.

Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

"SDG 8 recognizes the importance of sustained economic growth and high levels of economic productivity for the creation of well-paid quality jobs, as well as resource efficiency in consumption and production. It calls for providing opportunities for full employment and decent work for all while eradicating forced labour, human trafficking and child labour, and promoting labour rights and safe and secure working environments." (*Eurostat*, 2019)

Sustained and inclusive economic growth may drive progress, create decent jobs for all and improve living standards. But just creating jobs is too little. Improving the conditions for women and men, who are working, but not earning enough to lift themselves and their families out of poverty, is essential. Decent work in this respect means opportunities for everyone to get work that is productive and delivers a fair income, security in the workplace and social protection for families as well as better prospects for personal development and social integration. It is also important that all women and men are given equal opportunities in the workplace.

To cover these issues, Goal 8 consists of the following key indicators:

- Real GDP per capita, 2015 chain linked volumes in Euro and percentage change from previous year (08_10)
- Investment share of GDP, percent of GDP (08_11)
- Young people neither in employment nor in education and training, percent of population aged 15 to 29 (08_20)

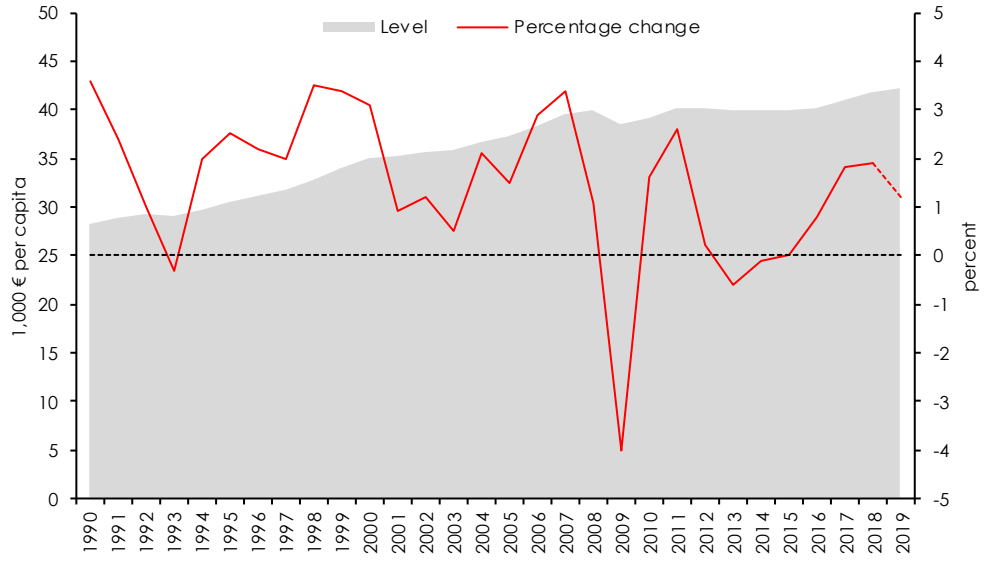
- Employment rate, percent of population aged 20 to 64 (08_30)
- Long-term unemployment rate, percent of active population (08_40)
- People killed in accidents at work, number per 100,000 employees (08_60)

The *employment rate* represents a Europe 2020 target series. There are also three multipurpose indicators aligned (related to Goal 1, 5 and 12, respectively).

Real GDP per capita (08_10)

Gross domestic product (GDP) measures the monetary value of total final output of goods and services, thus representing economic activity (either from the production, expenditure, or income perspective) in a country in a given period. GDP is the most well-known and used measure of this kind and, as such, despite its shortcomings and limitations, it is commonly used as a proxy for a country's material living standards. To break this down on the individual (i.e. average) level, per capita ratios are obtained. A positive percentage change in annual real GDP per capita can be interpreted as an increase in the average standard of living of the residents in a country. But, one of the often-cited limitations of GDP (per capita) is that it does not account for the social and environmental costs of production which effect citizens' well-being and living standards in one form or another.

Figure 19: Real GDP per capita, 1990-2019



Source: Eurostat, WIFO.

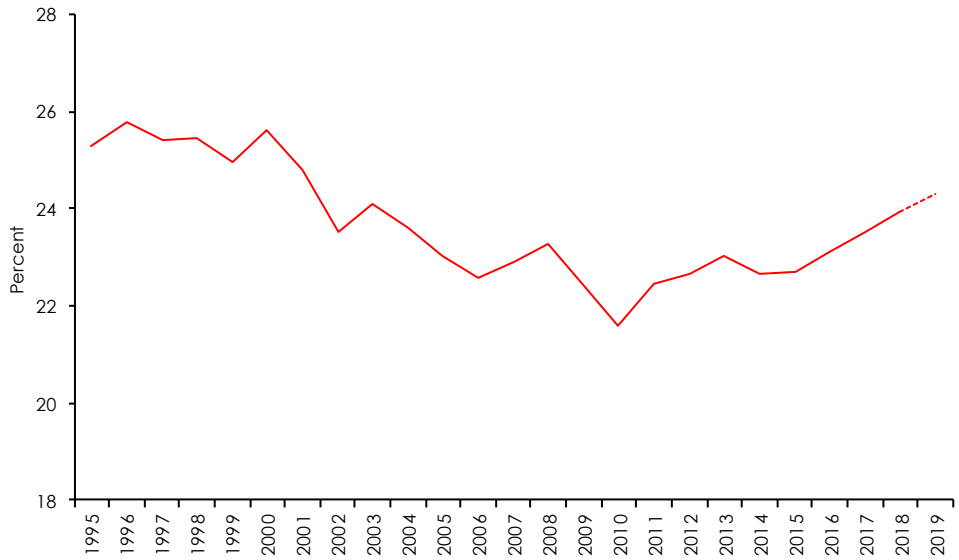
In the year 1990, real GDP per capita in Austria was 28,250€ and increased to 41,730€ in 2018, the year for which the latest official GDP release is available. Over this whole time period growth in real GDP per capita turned negative only three times, with the slump of –4 percent in the year 2009 being remarkable high (Figure 19). After the strong intermediate rebound in growth 2010-2011, real GDP per capita weakened from 2012 onwards, picked up again in 2016

and increased even stronger in the period 2017-2018. Based on the most recent WIFO Economic Outlook (*Ederer*, 2019), a growth rate of 1.2 percent in 2019 is expected, pointing to a weakening economic environment.

Investment share of GDP (08_11)

Investment influences the rate of economic growth in the short-run but also in the medium to long term. It represents capital spending that enhances future productive capacity of the economy. In the short-run, investment is part of aggregate demand. As such, if there is an increase in investment, it will (depending on the level of capacity utilization) contribute to short-run economic growth and may cause multiplier effects. On the supply-side, investing in new technology and capital or in skills and education of the labour force can increase productivity and competitiveness, foster an economy's productive capacity and in the long run support growth. In order to add to sustained economic growth, investments should exhibit economically, environmentally and socially dimensions (*Eurostat, 2019*).

Figure 20: Investment share of GDP, 1995-2019



Source: Eurostat, WIFO.

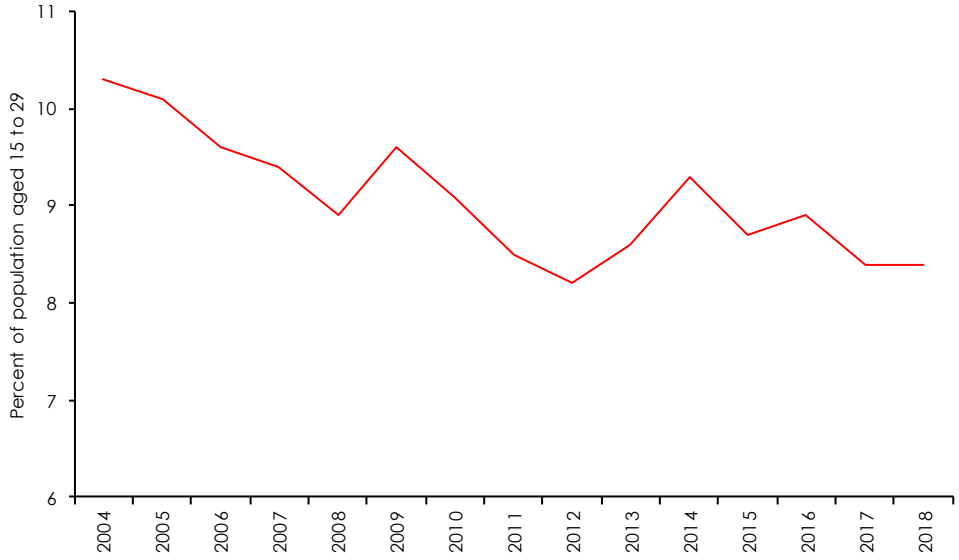
Over the last 25 years the share of investment was on average 23.7 percent of GDP, with the highest contribution to GDP in the period up to the year 2000 (on average greater than 25 percent) and the low-point reached in the aftermath of the financial crisis in the year 2010 with 21.6 percent (Figure 20). From that time onwards the investment share gradually improved (with an exemption in the period 2014-2015) and marks according to the most recent WIFO forecast a share of 24.3 percent in 2019.

Young people neither in employment nor in education and training (08_20)

The measure on *young people neither in employment nor in education or training*, the NEET rate for short, captures young people (aged 15 to 29), which are economically inactive. Various reasons exist for being inactive. For example, this relates to young people who have withdrawn from the labour market or are not entering it at all after leaving the education system. Not participating in the labour market, in training activities or in some form of education might lead in the medium to long-run not only to a permanent labour market exclusion but also to social problems and exclusions.

Between 2004 and 2018, the NEET rate for Austria exhibits a moderate downward path with distinct spikes related to weak economic conditions (Figure 21). As such, its development follows the business cycle. The spike in 2009 is related to the financial crisis 2008/2009 and the upward trend starting in 2012 to the Euro area debt crisis and the stagnation in economic activity the years after. By looking on the most recent development (up to the year 2018), it is noticeable that the strong business cycle upswing 2017/2018 has not materialized in a strong decline of the NEET rate like in former economic boom phases (e.g. the years prior the financial crisis).

Figure 21: Young people neither in employment nor in education and training, 2004-2018



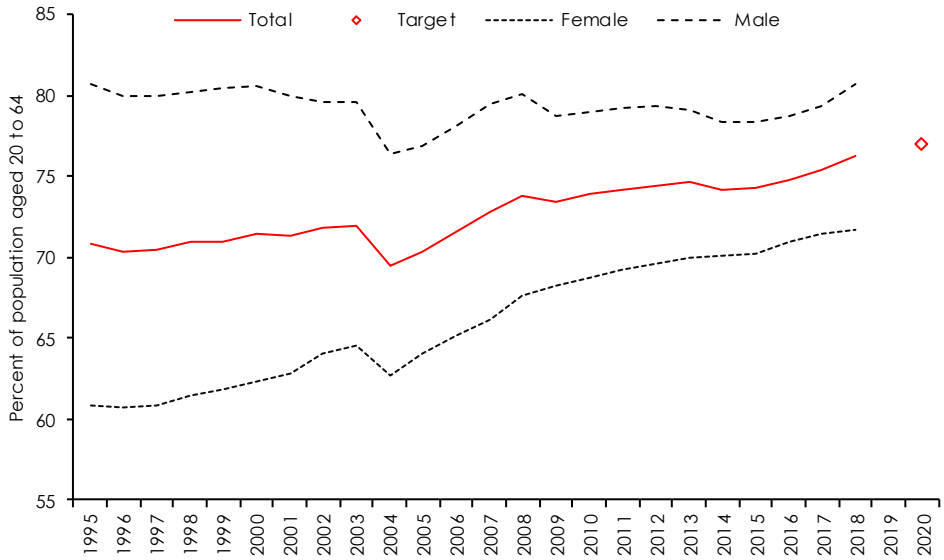
Source: Eurostat.

Employment rate (08_30)

The *employment rate* (i.e. employed persons in relation to total population; age group 20 to 64) has a national 2020 target value of 77 percent. In 1995, the rate was around 70 percent and increased up to 76.2 percent in the year 2018. The improvement comes solely by the strong increase in the female's employment rate, which was slightly above 60 percent in the mid-

nineties and enhanced in the course of the next two decades by more than 10 percentage points (2018: 71.7 percent). In contrast, the male's rate remained around 80 percent. To reach the target value for total employment in 2020, the rate must increase by 0.8 percentage points, which would mean continuing its average growth of the past 5 years.

Figure 22: Employment rate, 1995-2018



Source: Eurostat.

Long-term unemployment rate (08_40)

Long-term unemployment causes problems (e.g. mental stress or illness) for those affected and their families, and increases the *risk of poverty and social exclusion*. Beyond material living conditions, it can also lead to a deterioration of individual skills and health, hampering employability in the future, which further intensifies the strains. The long-term facet of unemployment is also of concern for policy makers. High rates indicate that labour markets are not operating efficiently and actions need to be taken.

The key indicator used by Eurostat, representing the *long-term unemployment rate,* is defined as follows: economically active people (in the age group 15 to 74) who have been unemployed for at least 12 months in relation to the active population.[17]

In Austria, in the period from 2002 to 2018, the development of the *long-term unemployment rate* exhibits two distinct humps (Figure 23). The first ranging from 2002 to 2008, providing an average rate of 1.3 percent. The latter runs from 2012-2013 to 2018 with the long-term unemployment rate on average 0.3 percentage points higher. This despite the improvement

[17] Other definitions exist. The OECD, for example, refers in the denominator to all unemployed people.

in the rate in the last two years, from a high level of 1.9 percent in 2016 down to 1.4 percent in 2018, due to strong labour market conditions in the face of the business cycle upswing.

Figure 23: Long-term unemployment rate, 2002-2018

Source: Eurostat.

Monitoring Goal 8

The monitoring results of the key indicators of Goal 8, i.e. those related to GDP as well as to the labour market, show, except the indicator for long-term unemployment, a moderate improvement towards SD objectives. In detail, this means for the key indicators analyzed:

- Between 2013 and 2018 *real GDP per capita* and *investment share of GDP* increased to a similar extent: on average by 0.9 and 0.8 percent, respectively. Adding the year 2019 to the assessment shows still moderate improvement. But the average growth rates are getting closer to the 1 percent threshold, which would be labelled as *significant progress* according to the Eurostat classification scheme and shown by a bold green upright arrow.
- With respect to the NEETs, i.e. *young people neither in employment nor in education and training*, the average percentage change in the 5-years period is –0.5, which provides moderate improvement. However, the magnitude of improvement has fallen compared to other periods in which business cycle boom phases have occurred.
- The *employment rate* improved by 0.4 percent on average between 2013-2018 and indicates, like the NEETs rate, a moderate improvement towards the SD objective.
- Irrespective of the favorable assessment of the employment and NEETs indicators, the result for the *long-term unemployment rate* is worse. On average, the rate has increased by 1.5 percent, moving significantly away from the SD objective.

Table 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all (Goal 8)

			2013/2018 average percentage change	Progress towards objective	2013/2019 average percentage change	Progress towards objective	National 2020-Target
Key indicators							
08_10		Real GDP per capita[1])	+0.9	↗	+0.9	↗	
08_11		Investment share of GDP[1])	+0.8	↗	+0.9	↗	
08_20		Young people neither in employment nor in education and training	–0.5	↗	–		
08_30	⊙	Employment rate	+0.4	↗	–		77 percent
08_40		Long-term unemployment rate	+1.5	⇩	–		
08_60		People killed in accidents at work	–6.0[2])	⇧	–		
Multipurpose indicators: Supplementary indicators of other goals which complement the monitoring of this goal							
01_41		In work at-risk-of-poverty rate	+0.3	↘	–		
05_40		Inactive population due to caring responsibilities	–2.6	⇧	–		
12_20		Resource productivity (output per DMC)	–0.7	↘	–0.4	⇧	

Source: WIFO, Eurostat. – [1]) Forecast from WIFO Economic Outlook, *Ederer* (2019). – [2]) 2012/2017 average percentage change.

Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

"SDG 9 calls for building resilient and sustainable infrastructure and promotes inclusive and sustainable industrialization. It also recognizes the importance of research and innovation for finding lasting solutions to social, economic and environmental challenges." (*Eurostat*, 2019)

Economic growth, social development and climate action are heavily dependent on investments in infrastructure, sustainable industrial development and technological progress. Research and development (R&D) and innovation are representing key ingredients, not only for economic growth, but also for job creation, enhanced labour productivity and improved resource efficiency. As an outcome, it is expected that income and, more generally, the standard-of-living improves, and companies remain competitive.

To monitor industry, innovation and infrastructure Goal 9 consists of the following key indicators:

- Gross domestic expenditure on R&D, percent of GDP (09_10)
- Employment in high- and medium-high technology manufacturing and knowledge-intensive services, percent of total employment (09_20)
- R&D personnel, percent of active population (09_30)

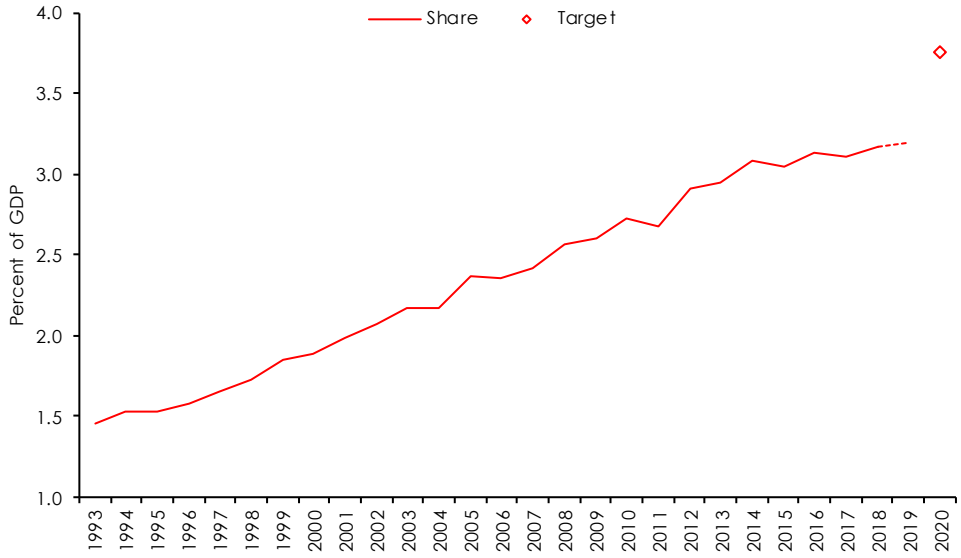
- Patent applications to the European Patent Office, total number and number per million inhabitants (09_40)
- Share of busses and trains in total passenger transport, percent of total inland passenger-kilometres (09_50)
- Share of rail and inland waterways activity in total freight transport, percent of total inland tonne-kilometres (09_60)

Out of these six indicators, the series *gross domestic expenditure on R&D* represents a Europe 2020 target series. Additionally, one multipurpose indicator (linked to Goal 12) is also aligned.

Gross domestic expenditure on R&D (09_10)

R&D expenditures play a vital role in human capital development, which in turn improves skills and knowledge of the individual and strengthens in a broader sense a countries innovation capacity and competitiveness. R&D and innovation are key policy components of the Europe 2020 strategy, with its emphasis on smart, sustainable and inclusive growth. The intensity of R&D in an economy is usually expressed by *gross domestic spending on R&D* as a percentage of GDP. Given the *domestic* scope of GDP, it contains total expenditure (current and capital) on R&D carried out by the main sectors business enterprises, government, higher education and private non-profit in a country and includes R&D funded from abroad as well. But domestic funds for R&D activities outside the country get excluded.

Figure 24: Gross domestic expenditure on R&D, 1993-2019



Source: Eurostat, Statistics Austria.

As shown in Figure 24, the proportion of R&D expenditures on GDP has constantly risen over the last decades in the Austrian economy. The ratio increased from 1.5 percent in 1993 to above 3 percent in the last years. However, the gap with respect to the national target for 2020, which

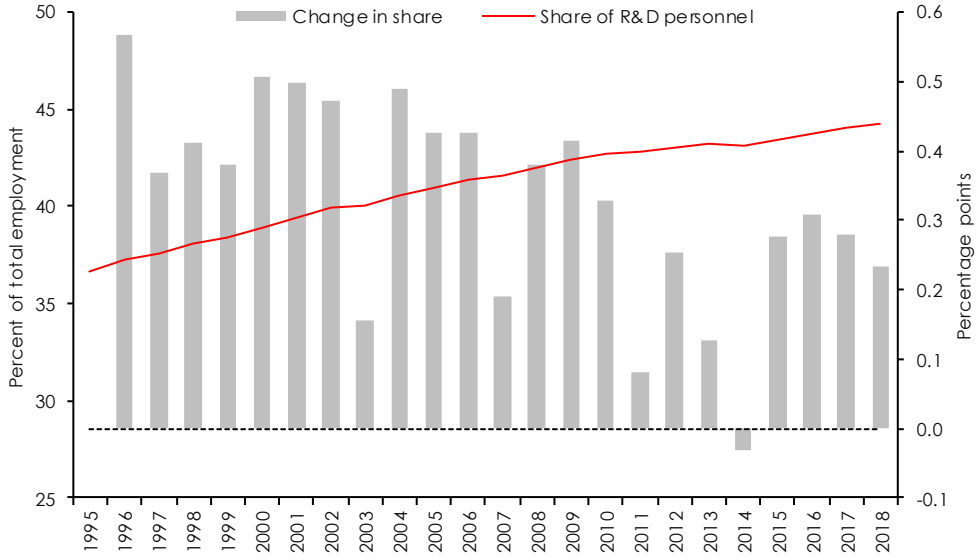
is set to 3.76 percent, is still existing. Based on the most recent forecast for 2019 (3.19 percent)[18] an increase by more than a half percentage point would be needed to reach the target.

Employment in high- and medium-high technology manufacturing and knowledge-intensive services (09_20)

Fostering R&D activities and innovation has important implications for employment. It helps to accommodate and stimulate the development of a highly skilled workforce, especially in sectors where most of the innovation and research activities are happening. On the manufacturing side, these are companies which utilize high- and medium-high technology in their production. With respect to the services sector, the so-called knowledge-intensive industries create the demand for high skilled labour.

The *employment in high- and medium-high technology manufacturing sectors and in knowledge-intensive service sectors* as a share of total employment is used as the relevant indicator. In Austria, the employment in those sectors has constantly risen (1995: 36.7 percent; 2018: 44.3 percent), but the dynamics are diminishing over time (Figure 25).

Figure 25: Employment in high- and medium-high technology manufacturing and knowledge-intensive services, 1995-2018



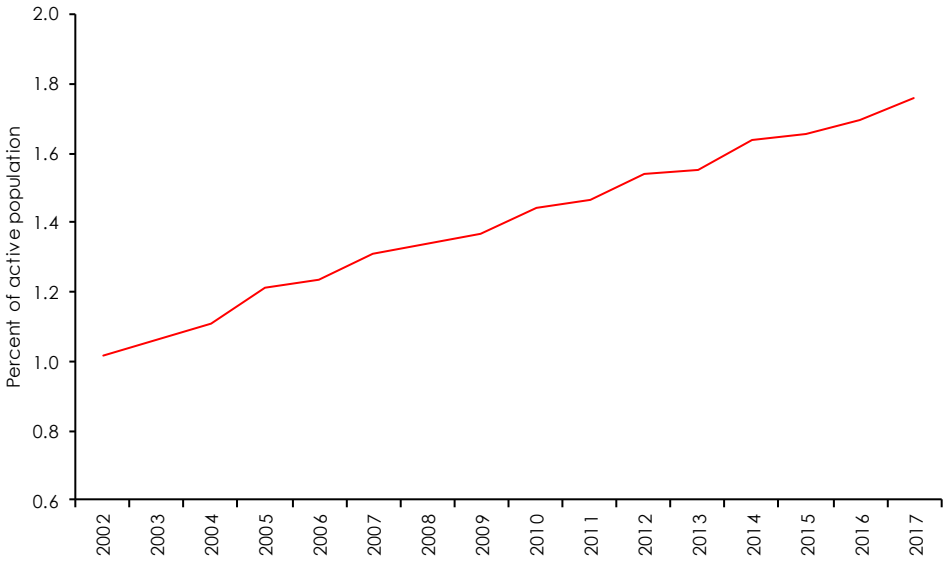
Source: Eurostat, WIFO.

[18] Statistics Austria R&D Global Estimate; see Section 2 for reference.

R&D personnel (09_30)

In line with SDG 09_20, data on *R&D personnel* help to gauge the extent of a country's R&D activity. It encompasses all persons performing R&D in a direct sense (i.e. researchers, scientists and engineers), but also includes people providing services directly linked to R&D. Data are used in full-time equivalents as a share of the active population. For Austria, this share almost doubled from 1 percent in 2002 to 1.8 percent in 2018 (Figure 26).

Figure 26: R&D personnel, 2002-2017



Source: Eurostat, WIFO.

Monitoring Goal 9

The monitoring results for Goal 9 provide a heterogeneous picture (Table 9):

- The target indicator of *gross domestic spending on R&D* signals a downward sloping red arrow. Despite its steady increase, the development over the last years was on average (+1.3 percent) too slow in order to meet the target value.
- With respect to employment in R&D intensive sectors, the assessment of the key indicator *employment in high- and medium-high technology manufacturing sectors and in knowledge-intensive service sectors* signals moderate improvement based on average employment figures for the period 2013-2018.
- A significant improvement towards the SD objective has been made with respect to employment of *R&D personnel* and *patent applications* (on average +2.6 and +1.7 between 2012/2017, respectively).

Table 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation (Goal 9)

		2012/2017 average percentage change	Progress towards objective	2012/2019 average percentage change	Progress towards objective	National 2020-Target
Key indicators						
09_10	⊙ Gross domestic expenditure on R&D[1])	+1.3	↘	+1.3	↘	3.76 percent
09_20	Employment in high- and medium-high technology manufacturing and knowledge-intensive services	+0.7[2])	↗	–		
09_30	R&D personnel	+2.6	⇧	–		
09_40	Patent applications to the European Patent Office	+1.7	⇧	–		
09_50	Share of busses and trains in total passenger transport	+0.2	↗	–		
09_60	Share of rail and inland waterways activity in total freight transport	–1.0	↘	–		
Multipurpose indicators: Supplementary indicators of other goals which complement the monitoring of this goal						
12_30	⊙ Average CO2 emissions per km from new passenger cars	–2.3	↘	–0.8	↘	95g of CO2 per km (EU regulation)

Source: WIFO, Statistics Austria, Eurostat. – [1]) Forecast from R&D Global Estimate, Statistics Austria. – [2]) 2013/2018 average percentage change.

Goal 10. Reduce inequality within and among countries

"SDG 10 addresses inequalities within and among countries. It calls for nations to reduce inequalities in income as well as those based on age, sex, disability, race, ethnicity, origin, religion or economic or other status within a country. The goal also addresses inequalities among countries, including those related to representation, and calls for the facilitation of orderly and safe migration and mobility of people." (*Eurostat*, 2019)

Like in SDG 1, where the avoidance of poverty is the target, welfare economics suggests that fairness in society will be better promoted if regional income disparities become smaller (*Rawls*, 1971). This issue applies to the inequality within a member state of the EU, as well as to inequality across member states. On the other hand, a Schumpeterian view of evolutionary growth would regard inequality and monopoly power as a necessary incentive for a market economy to allocate capital and talent effectively between competing business activities (*Schumpeter*, 1911). The empirical evidence on this issue is mixed. While *Persson – Tabellini* (1994) find a negative relation between inequality and growth, *Barro* (2000) and *Li – Zou* (1998) report a positive or instable relation. *Nicholas* (2003) shows that the innovative capacity in the 1920s USA was concentrated in large monopolistic firms, quite similar to the current situation with large digital firms dominating internet business. Within an environment of rapid technical change and financial globalisation, people with specific skills are favoured and during the transition period to a new equilibrium with normal levels of technical progress, they will be able to earn a rent on their scarce abilities. EU-regional funds, however, aim at improving the income level of NUTS-2-regions with low per-capita income and therefore a successful convergence of

regional income levels appears to be a natural choice for a social development goal in the European Union.

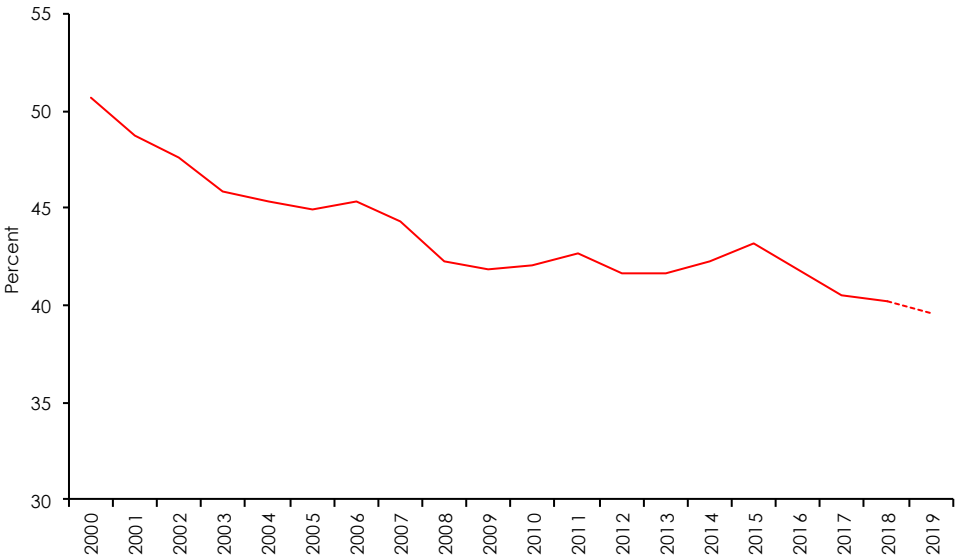
The indicators for assessing SDG 10 compare the development of purchasing power corrected measures of output and personal income across member states of the EU. Additionally, measures of the skewness of the national income distribution add to the international view on inequality a national dimension. The list of indicators evaluated by Eurostat comprises:

- Purchasing power adjusted GDP per capita, PPS, index EU28 = 100 and coefficient of variation (10_10)
- Adjusted gross disposable income of households per capita, PPS, index EU28 = 100 (10_20)
- Relative median at-risk-of-poverty gap, percent distance to poverty threshold (10_30)
- Income distribution, quintile share ratio (10_41)
- Income share of the bottom 40 percent of the population, percent of income (10_50)
- Asylum applications, number per million inhabitants (10_60)

Purchasing power adjusted GDP per capita (10_10)

The *purchasing power adjusted level of GDP per capita* in the European Union shows the average output produced per inhabitant of each EU28-member transferred into a common currency. This revaluation eliminates differences in the price levels between countries and allows a meaningful cross-country comparison of real GDP numbers. The measure of income inequality between member states refers to the *coefficient of variation of purchasing power adjusted level of GDP per capita* in the EU28. Forecasts for the *purchasing power adjusted level of GDP per capita* of the current year can be easily taken from the bi-annual forecast rounds of the European Commission. Given the effort spend by the commission to compile the forecast, we do not create a separate nowcasting model for the coefficient of variation, rather we collect individual country forecasts and compute the coefficient of variation from this cross section. With respect to this measure, we take over the values from Eurostat instead of computing a national equivalent of regional income disparities. The reason is that domestic income inequality is already monitored by using income distribution measures for Austria, and we think a meaningful translation of the SDG 10 concept to the country specific case requires a measure for the extent of income inequality outside Austria. The forecasts for *purchasing power adjusted level of GDP per capita* of member countries will also be available around mid-year. Currently, the commission forecasts of individual member countries imply a weak improvement of the coefficient of variation between EU28 member states.

Figure 27: Purchasing power adjusted GDP per capita, coefficient of variation for EU28, 2000-2019



Source: Eurostat, European Commission Economic Forecast.

Relative median at-risk-of-poverty gap (10_30)

The *relative median at-risk-of-poverty gap* shows the distance between the median income of people living below the poverty threshold relative to the threshold itself. The threshold is set at 60 percent of the Austrian median equivalised disposable income of all people. The relative median gap is measured by the ratio between the median income of people living below the poverty threshold and the threshold itself. The gap shows the skewness of the income distribution among poor people. The data source is the Austrian section of the Statistics on Income and Living Conditions (EU-SILC). The *relative median at-risk-of-poverty gap* is published since 2003, but the time series has a structural break in 2008 shifting the ratio upward by 2.9 percentage points.[19] Earlier records are therefore not comparable to current numbers. For this reason, we present only data from 2008 onwards. Since 2008, the *relative median at-risk-of-poverty gap* increased by 1.8 percentage points showing no obvious cyclical swings. This resulted in a widening of the income distribution within the poorest segment of Austrian households, cf. Figure 28.

The nowcasting model for the *median at-risk-of-poverty gap* is based on a variety of high-frequency variables describing the number of persons receiving means tested benefits, several unemployment figures (particularly long-term unemployment), the amounts payed out for social transfers, the number of economically active persons with foreign origin or only

[19] The structural break resulted from a change in collecting income information from a pure survey-based approach towards a combination with data from tax records in 2012. To achieve comparability with previous publications, Statistik Austria recomputed income data in the EU-SILC survey back until 2008.

marginally employed persons. Finally, sickness and invalidity are often associated with poverty, and therefore we also use variables from the pension and accident insurance.

On the other hand, figures on economically active persons indicate, whether business conditions facilitate or hamper the transition from the out-of-labor-force status or from unemployment status into a gainful activity with e reasonable pay-check. Furthermore, data on educational attainment point at either a decreasing probability of being subject to poverty risk – e. g. if the prevalence of higher school degrees becomes more widespread. It may also indicate increasing probabilities of poverty, e. g. if the share of persons with mandatory schooling degree increases. The root mean squared forecast error over the period 2016-2018 indicates that a model of the *Doz et al.* (2011) type with one factor and two lags has the best predictive power.

The factor loadings shown in Table A.5 in the Appendix are sorted in declining order with respect to the loadings for factor 1. This gives a quick impression of the correlation of factor 1 with high-frequency variables. The first factor has a positive and high loading on unemployment data and the number of persons receiving means tested benefits. On the other hand, employment data and the number of economically active persons from non-EU member countries show strongly negative loadings. Given the positive coefficient on the first lag of factor 1, this implies that a deterioration in the labour market tends to increase the *median at-risk-of-poverty gap*. The second lag, however, has a negative coefficient and its size is bigger compared to the lag 1 coefficient. Consequently, the positive first period effect will be corrected after one year.

Figure 28: Relative median at-risk-of-poverty gap, 2008-2019

Source: Eurostat, WIFO.

Given the realisations of high-frequency variables for either the first or the second quarter of 2019 the nowcasting model predicts an increase in the *median at-risk-of-poverty gap* by 0.9 percentage points towards 22.6 percent in 2019. This implies that the median income among poor people in Austria will further decline in 2019.

Income share of the bottom 40 percent of the population (10_50)

The income concept used to measure the *income share of the bottom 40 percent of the population* (in terms of the income distribution), is the total disposable household income, which is the household's total income after taxes, other deductions, and social transfers that is available for spending or saving. The data source is the Austrian section of the Statistics on Income and Living Conditions (EU-SILC). The income share of the bottom 40 percent of the population is published since 2003, but the time series has a structural break in 2008, shifting the ratio downward by 1.1 percentage points.[20] Earlier records are therefore not comparable to current numbers. For this reason, we present only data from 2008 onwards. Since 2008, the *income share of the bottom 40 percent of the population* declined by 0.4 percentage points. Contrary to the development within the poorest segment of Austria's households, this measure of inequality fluctuates in a narrow band between 22.6 and 23.2 percent, with the year 2018 showing the highest value throughout the last decade, cf. Figure 29.

The nowcasting model for the *income share of the bottom 40 percent of the population* uses the same set of high-frequency variables as the model for the *number of people at risk of income poverty*. The root mean squared forecast error over the period 2016-2018 indicates that a model of the *Glocker – Wegmüller* (2017) type with one factor and two lags and one moving average term for the error in the signal equation has the best predictive power.

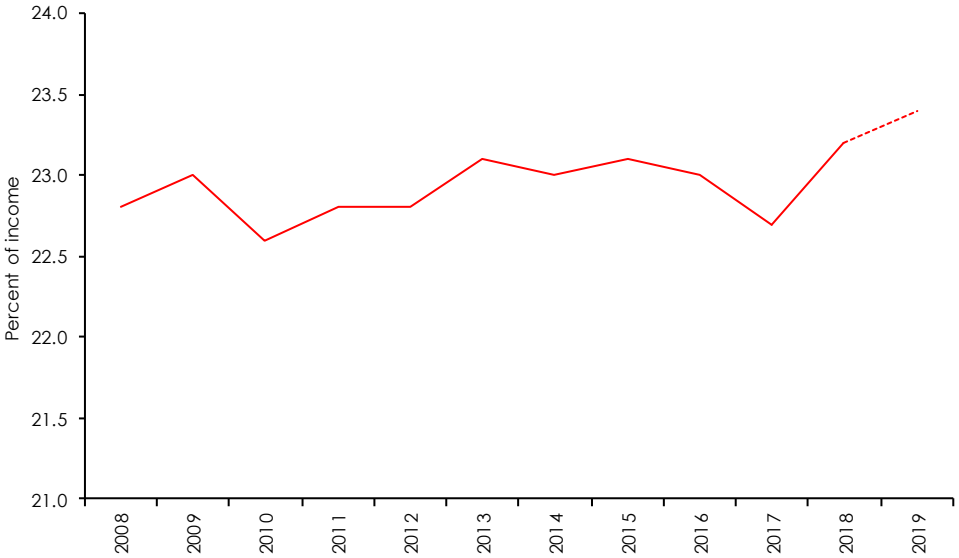
This model type must use a reduced number of high-frequency variables in order to achieve convergence of the maximum likelihood estimator. Usually, less than twenty variables can be handled by the estimator. The factor loadings shown in Table A.5 in the Appendix are sorted in declining order with respect to the loadings for factor 1. This gives a quick impression of the correlation of factor 1 with high-frequency variables. Factor 1 has a positive although small loading for the number of young people receiving state aide. Negative loadings appear for employment variables of the better educated as well as the number of long-term inactive persons or the number of sick day leaves. This collection of divergent variables does not provide a meaningful interpretation, nevertheless, this model delivers the best forecasts within our short forecast horizon.

Given the realisations of high-frequency variables for either the first or the second quarter of 2019 the now-casting model predicts an increase in the *income share of the bottom 40 percent*

[20] The structural break resulted from a change in collecting income information from a pure survey-based approach towards a combination with data from tax records in 2012. To achieve comparability with previous publications, Statistik Austria recomputed income data in the EU-SILC survey back until 2008.

of the population by 0.2 percentage points towards 23.4 percent in 2019. This implies that the overall income distribution will become slightly more equal in 2019.

Figure 29: Income share of the bottom 40 percent of the population, 2008-2019



Source: Eurostat, WIFO.

Monitoring Goal 10

Over the short term, between 2013 and 2018 most of the measures for within country and within EU-member states income inequality improved either weakly or even strongly. The *coefficient of variation of the adjusted gross disposable income of households per capita* between member states, the Austrian *income quintile share ratio*, and the Austrian *income share of the bottom 40 percent of the population* became weakly better over the last five years. Eurostat records a quite strong improvement for the *PPS-adjusted GDP-per-capita coefficient of variation* between 2013 and 2018. In the case of Austria, the income distribution within the segment of the poorest households – measured by the *relative median at-risk-of-poverty gap* – worsened weakly during the last five years.

We produce nowcasts for three of the key indicators, either by using a nowcasting model for indicators measuring inequality within Austria or by relying on the European Commission forecasts for *PPS-adjusted per-capita GDP* and computing the coefficient of variation from these forecasts. Adding one more observation to the sample does not change the general picture for development of inequality measures in Austria. We still expect a weak improvement for the *income share of the poorest 40% of households*, while the income distribution within the segment of the poorest households will weakly deteriorate. We continue to expect good news with respect to the development of inequality within the EU28. The implied value for the coefficient of variation between EU28 countries indicates a continued improvement if we add 2019 to the sample.

Table 10: Reduce inequality within and among countries (Goal 10)

		2013/2018 average percentage change	Progress towards objective	2013/2019 average percentage change	Progress towards objective
Key indicators					
10_10	Purchasing power adjusted GDP per capita, coefficient of variation, EU28[1])	–0.7	↗	–0.9	↗
10_20	Adjusted gross disposable income of households per capita	+0.8[2])	↗	–	
10_30	Relative median at-risk-of-poverty gap	+0.4	↘	+1.0	↘
10_41	Income distribution (income quintile share ratio)	–0.5	↗	–	
10_50	Income share of the bottom 40 % of the population	+0.1	↗	+0.2	↗
10_60	Asylum applications	–		–	
Multipurpose indicators: Supplementary indicators of other goals which complement the monitoring of this goal					
01_20	People at risk of income poverty after social transfers	+0.6	↘	+0.5	↘
17_20	EU financing to developing countries	–13.0[2])	⇩	–	
17_30	EU imports from developing countries	+4.9	⇧	–	

Source: WIFO, Eurostat. – [1]) Forecast calculated from Economic Outlook, European Commission. – [2]) 2012/2017 average percentage change.

Goal 12. Ensure sustainable consumption and production patterns

"SDG 12 calls for a comprehensive set of actions from businesses, policy-makers, researchers and consumers to adapt to sustainable practices. It envisions sustainable production and consumption based on advanced technological capacity, resource efficiency and reduced global waste." (*Eurostat*, 2019)

Goal 12 consists of six key indicators:

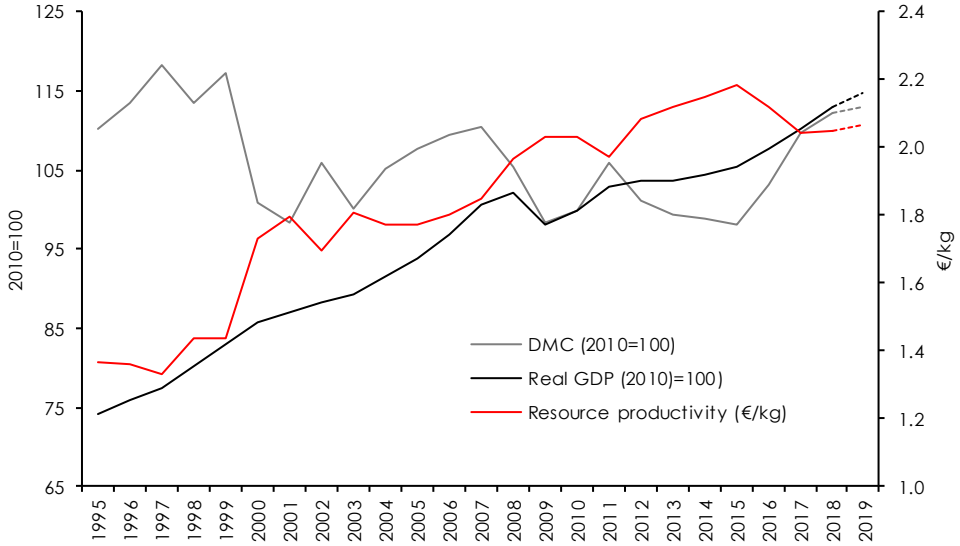
- Consumption of hazardous and non-hazardous chemicals, million tonnes (12_10)
- Resource productivity and domestic material consumption, 2010 chain linked volumes in Euro per kg DMC; index 2000 = 100; PPS per kg DMC and 1,000 tonnes DMC (12_20)
- Average CO_2 emissions per km from new passenger cars, g CO_2 per km (12_30)
- Circular material use rate, percent of total material use (12_41)
- Generation of waste excluding major mineral wastes, kg per capita (12_50)
- Recycling rate of waste excluding major mineral wastes, percent of total waste recycled (12_60)

and three multipurpose indicators. As responsible consumption and production are closely linked to the need of an efficient use of resources, the multipurpose indicators refer to the amount and the sources of energy used (Goal 7). We provide a nowcast of two key indicators (*domestic material consumption* and *CO_2 emissions from new passenger cars*) and all three multipurpose indicators. While for these five series the data coverage for Austria is good, the remaining indicators in Goal 12 are limited to a shorter sample, recorded in two-year intervals or even available on EU aggregate only.

Resource productivity and domestic material consumption (SDG 12_20)

Domestic material consumption (DMC) refers to the total amount of materials used in the economy. It is defined as the annual quantity of raw materials extracted from the domestic territory of the local economy, plus all physical imports minus all physical exports. The term "consumption" denotes apparent consumption and not final consumption only (*Eurostat*, 2019). The resources captured in the *DMC* are metal ores, non-metal minerals, biomass and fossil fuels. It is measured in thousand tons. *Resource productivity* puts *DMC* in relation to the economic situation. It is derived as GDP (in Euro, chain-linked volumes) divided by *DMC*.

Figure 30: Resource productivity and domestic material consumption, 1995-2019



Source: Eurostat, WIFO.

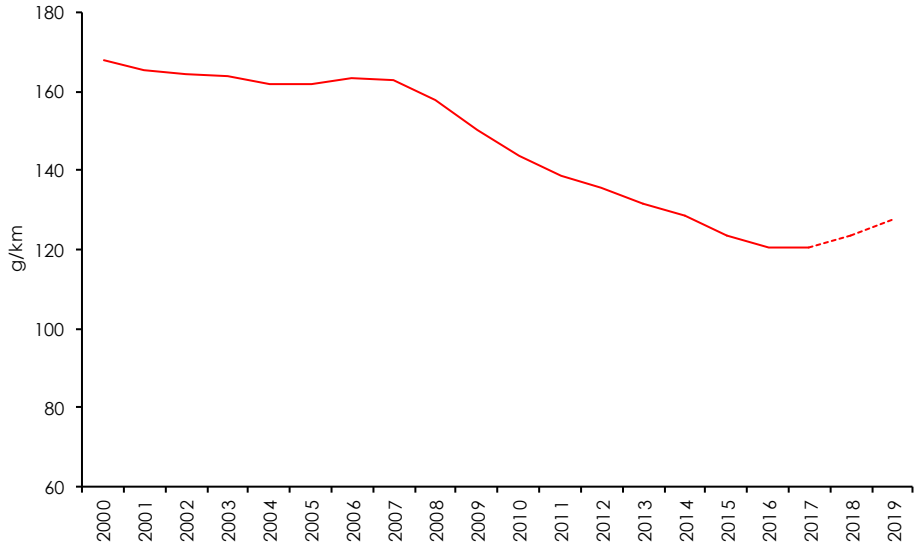
Data for *DMC* are available from 1995 until 2017. Starting at high levels, *DMC* declined in 2000, followed by a rising trend between 2001 and 2007. From 2007 until 2015 *DMC* was on a downward trend, especially during the recession in 2009, followed by a renewed acceleration in 2016 and 2017. Economic upswing phases are characterized by a higher need of material input to satisfy the increasing demand. There is empirical evidence of a positive correlation between economic growth and *DMC* (e.g. *Agnolucci et al.*, 2017). To weaken or even revert this relationship, a more efficient use of natural resources would be necessary. In this sense, sustainability calls for an absolute decoupling of *DMC* from economic growth. Literature refers to relative decoupling when *DMC* grows more slowly than the economy and absolute decoupling when *DMC* declines while economy is growing (*Statistik Austria*, 2018). The latter was observed in Austria between 2011 and 2015, where *DMC* declined by a cumulated 7.5 percent, while real GDP increased by 2.4 percent. In 2016 and 2017, *DMC* grew again faster than real GDP, leading to a falling resource productivity.

DMC is composed of the extraction of domestic raw material (metal ores, non-metal minerals, biomass and fossil fuels) plus their imports and minus their exports. To capture recent dynamics of domestic raw material extraction, we use high-frequency data covering the production of intermediate goods, energy, mining and quarrying as well as wood harvest. Additionally, we use foreign trade data of cork and wood, crude materials and fuels, hides and skins, crude materials and solid fuels. We calculate the net export for each unit and sum them up to one indicator. We use a DFM according to *Glocker – Wegmüller* (2017) with one factor and one lag. After the strong increase of domestic material consumption between 2015 and 2018 (cumulated +14 percent), nowcasting results suggest a more moderate development in 2019. Figure 30 shows *DMC*, *resource productivity* as well as GDP.

Average CO_2 emissions per km from new passenger cars (12_30)

The series is defined as the *average carbon dioxide (CO_2) emissions per km by new passenger cars* in a given year. These emissions refer to type-approval and can deviate from the actual CO_2 emissions of new passenger cars. The indicator provides quantitative information for monitoring the progress of developing new technologies in order to diminish the negative environmental impact of individual transport. For Austria, the series is available on a yearly base from 2000 to 2017.

Figure 31: Carbon dioxide emissions form new passenger cars, 2000-2019



Source: Eurostat, Statistics Austria, WIFO.

To reduce the harmful impact of passenger cars, its CO_2 emissions are subject to EU legislation. There are mandatory emission reduction targets for new cars (2015 target and 2021 target). The targets were set out as reduction of 18 percent and 40 percent, respectively, compared to the EU 2007 fleet average. This refers to an EU goal of 95 grams of CO_2 per km in 2021. In

Austria, *average CO_2 emissions per km from new passenger cars* were on a downward trend until 2017. In 2017, emissions were 25.9 percent below the value of 2007. But the downward trend came to a halt and *CO_2 emissions from new passenger cars* slightly increased in 2017.

The nowcasting model for new passenger cars is based on registrations of new passenger cars, their CO_2 emissions and the CO_2 monitoring by the Federal Ministry for Sustainability and Tourism[21]. We use a DFM according to *Glocker – Wegmüller* (2017) with one factor and two lags (cf.Table A.6). The series exhibit a downward trend until 2015 which then came to a halt and CO_2 emissions of new passenger cars increased onwards. For 2018 and 2019 figures even show an acceleration, which is translated in the nowcasting results. This recent turning point might be related to the introduction of the WLTP (Worldwide Harmonized Light Vehicle Test Procedure) in September 2017[22].

Monitoring Goal 12

Monitoring Goal 12 shows a mixed picture. While the short-run development of some indicators is well on track (*consumption of chemicals hazardous to health, circular material use, recycling rate of waste*), *resource productivity*, *average CO2 emissions for new passenger cars* and *generation of waste* are moving away from the SD objectives.

- *Resource productivity* declined by 0.7 percent between 2013 and 2018. Extending the sample for the nowcasting period, the situation improves only slightly; between 2013 and 2019 *the series* declined on average by 0.4 percent. Still, this means a movement away from the SD objectives.
- *CO_2 emissions per km from new passenger cars* declined by 2.3 percent between 2012 and 2017. However, with respect to the EU 2020 target, this denotes an insufficient progress towards the target, as a stronger decline would have been necessary to meet the target. The situation worsens when incorporating the nowcasts for 2018 and 2019. Incorporating the nowcast values, average annual change amounts to –0.8 percent between 2012 and 2019.

[21] We use registrations of new passenger cars and their CO_2-emissions, which are published by Statistik Austria on a monthly base since 2012. To obtain the quarterly figures of new passenger cars, we compute the average emissions weighted by the registrations per brand. For information before 2012, we additional construct a series using the annual average CO_2 emissions from new registrations of the top 15 brands in Austria, according to the CO_2 Monitoring by the Federal Ministry for Sustainability and Tourism. They are converted to a quarterly frequency using the BFL disaggregation method and weighted with the share of each brand of the total registrations in a quarter.

[22] The EU 2020 targets are defined according to the NEDC (New European Driving Cycle) test procedure. With the introduction of the WLTP in September 2017 new cars are certified in a more realistic test procedure. For monitoring the goal, these values are calculated back to NEDC values by the Joint Research Centre of the EU (*Tsiakmakis et al.*, 2017).

Table 11: Ensure sustainable consumption and production patterns (Goal 12)

			2012/2017 average percentage change	Progress towards objective	2012/2019 average percentage change	Progress towards objective	National 2020-Target
Key indicators							
12_10		Consumption of chemicals hazardous to health (EU28)	–0.6	↗	–		
		Consumption of chemicals hazardous to environment (EU28)	–3.1	⇧	–		
12_20		Resource productivity (output per DMC)	–0.7[1])	↘	–0.4[1])	↘	
12_30	⊙	Average CO2 emissions per km from new passenger cars	–2.3	↘	–0.8	↘	95g of CO_2 per km
12_41		Circular material use rate	+10.6[2])	⇧	–		
12_50		Generation of waste excluding major mineral wastes	+2.1[3])	⇩	–		
12_60		Recycling rate of waste excluding major mineral wastes	+0.4[3])	↗	–		
Multipurpose indicators: Supplementary indicators of other goals which complement the monitoring of this goal							
07_10	⊙	Primary energy consumption	+0.8	⇩	+0.6	⇩	reduction to 31.5 Mtoe
	⊙	Final energy consumption	+1.2	⇩	+1.0	⇩	reduction to 25.1 Mtoe
07_30		Energy productivity	+0.5	↗	+0.9	↗	
07_40	⊙	Share of renewable energy in gross final energy consumption	+1.0	↗	+1.4	⇧	34 percent

Source: WIFO, Eurostat. – [1]) 2013/2018 and 2013/2019 average percentage change, respectively. – [2]) 2011/2016 average percentage change. – [3]) 2012/2016 average percentage change.

Goal 13. Take urgent action to combat climate change and its impacts

"SDG 13 seeks to implement the commitment to the United Nations Framework Convention on Climate Change and deliver on the Green Climate Fund. It aims to strengthen countries' resilience and adaptive capacity to climate-related hazards and natural disasters with a special focus on supporting least-developed countries." (*Eurostat*, 2019)

Goal 13 is monitored with five key indicators and four multipurpose indicators. The key indicators comprise:

- Greenhouse gas emissions, index 1990 = 100 and tonnes of CO_2 equivalent per capita (13_10)
- Greenhouse gas emissions intensity of energy consumption, index 2000 = 100 (13_20)
- Mean near surface temperature deviation, degree Celsius (13_30)
- Climate-related economic losses, million Euro (13_40)
- Contribution to the international 100 billion US-dollar commitment on climate related expending, million Euro (13_50)

The multipurpose indicators relate to SDG 7 and SDG 12, focusing on environmental sustainability. We provide a nowcast of one key indicator (*greenhouse gas emissions*) and three multipurpose indicators (Table 12).

Reducing *greenhouse gas emissions* is a prerequisite for combating climate change. The series serves also as headline indicator in "How is Austria?" (*Statistik Austria*, 2019) and for the annual

monitoring report on the Europe 2020 strategy (*Eurostat*, 2018B). While there is a good data coverage for greenhouse gas emissions for Austria, for the other key indicators of SDG 13 the reporting is less well filled.

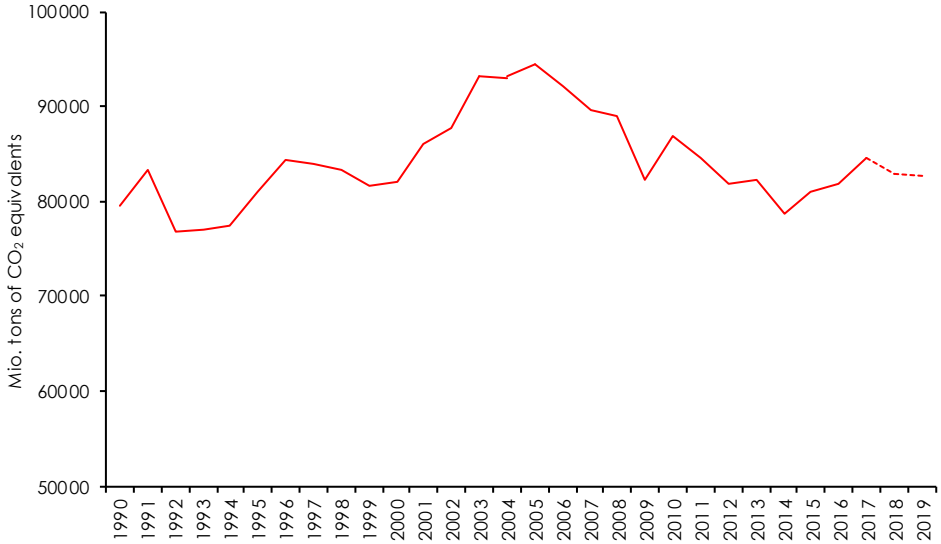
Greenhouse gas emissions (13_10)

The indicator refers to the so called "Kyoto basket" of greenhouse gases, including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and F-gases (hydrofluorocarbons, perfluorocarbons, nitrogen triflouride (NF_3) and sulphur hexafluoride (SF_6)). Using each gas' individual global warming potential (GWP), they are integrated into a single indicator expressed in units of CO_2 equivalents. The series also includes emissions from international aviation.

The EU's target is a reduction of *greenhouse gas emissions* by at least 20 percent by 2020 compared to the 1990 level. This target is split between sectors within the EU Emissions Trading Scheme (ETS) and those outside it. Concerning the non-ETS emissions, national targets have been set for each Member State in the effort sharing decision. For Austria it stipulates an emission reduction target of 16 percent compared to 2005 for the Non-ETS sectors. As the SDG indicator is based on *total greenhouse gas emissions*, this analysis does not distinguish between ETS and non-ETS emissions and therefore does not consider a quantitative target in evaluating the progress towards SD.

Data from Eurostat for *greenhouse gas emissions* are available from 1990 until 2017. The Environment Agency Austria prepares the national *greenhouse gas emissions* inventory and delivers the official figures for the reporting system for Austria within the Framework Convention on Climate Change and the European Union (*Umweltbundesamt*, 2019A). For 2018, a nowcast was published by the Environment Agency Austria (*Umweltbundesamt*, 2019B).

Figure 32: Greenhouse gas emissions, 1990-2019



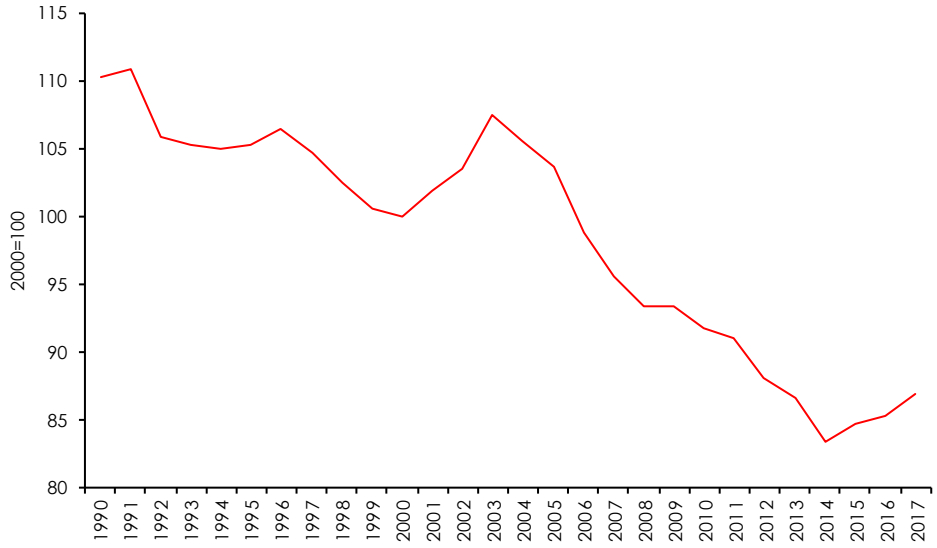
Source: UNFCCC, Eurostat, WIFO.

Greenhouse gas emissions followed an upward trend until 2005, which was interrupted by a period of decline (between 2006 and 2014). From 2015 onwards, *greenhouse gas emissions* increased again, triggered by a rise in fossil fuel sales in transport and reinforced use of fossil fuels by industrial and energy companies (*Umweltbundesamt*, 2019A).

The transport sector is a main source of *greenhouse gas emissions*. In the nowcasting model, recent traffic development is captured by figures of motor vehicle traffic counting and freight transport in kilometers driven. Besides transport, also industry plays a key role. For the estimation of the current industrial output development, we use production indices of this sector. Moreover, we consider stock of cattle, domestic electricity consumption and the generation of electrical energy from thermal power. We use a DFM according to *Glocker – Wegmüller* (2017) with one factor and two lags. The nowcasting approach yields a reduction of greenhouse gas emissions in 2018 and a stabilization in 2019. Considering the factor loadings of the nowcasting model (Table A.7), this is mainly driven by a lower gas consumption. According to the Environment Agency Austria warm weather conditions, implying lower heating efforts, had an effect in 2018, too (*Umweltbundesamt*, 2019B).[23]

Greenhouse gas emissions intensity of energy consumption (13_20)

Figure 33: Greenhouse gas emissions intensity of energy consumption, 1990-2017



Source: UNFCCC, Eurostat, WIFO.

The indicator measures the use of greenhouse gas intensive energy sources and is expressed as the ratio of energy-related greenhouse gas emissions and gross inland consumption of

[23] The nowcast of the *Umweltbundesamt* (2019B) shows a decline in 2018, too. It is more pronounced (-3.5 percent according to Eurostat definition) compared to our nowcast and reflects the renovation and maintenance downtime of a blast furnace of a big steel production company. Neither our data, nor the model approach are suited to forecast an irregular component of this kind.

energy (tones CO_2 equivalents of greenhouse gas per unit of consumed energy). *Greenhouse gas emissions intensity* shows a declining trend since 2004 (interrupted by a period of increase between 2000 and 2003), which came to a halt in 2014 and has been rising since then.

Monitoring Goal 13

Monitoring Goal 13 shows a mixed picture. While *greenhouse gas emissions* and *mean near surface temperature* deviations signal a movement away from SD objectives, indicators referring to *greenhouse gas emissions intensity of energy consumption* and *contribution to the international commitment on climate related expending* are well on track.

- *Greenhouse gas emissions* on average increased by 0.6 percent, between 2012 and 2017. This suggests a moving away from the SD objectives. Including nowcasts for 2018 and 2019 improves the situation (2012-2019 average increase of 0.1 percent), but still not sufficiently.

Table 12: Take urgent action to combat climate change and its impacts (Goal 13)

			2012/2017 average percentage change	Progress towards objective	2012/2019 average percentage change	Progress towards objective	National 2020-Target
Key indicators							
13_10		Greenhouse gas emissions	+0.6	↘	+0.1	↘	
13_20		Greenhouse gas emissions intensity of energy consumption	–0.3	↗	–		
13_30		Mean near surface temperature deviation (Europe)	+8.4[1])	⇩	–		
13_40		Climate-related economic losses	–		–		
13_50		Contribution to the international 100bn USD commitment on climate related expending	+5.1[2])	⇧	–		
Multipurpose indicators: Supplementary indicators of other goals which complement the monitoring of this goal							
07_10	⊙	Primary energy consumption	+0.8	⇩	+0.6	⇩	reduction to 31.5 Mtoe
	⊙	Final energy consumption	+1.2	⇩	+1.0	⇩	reduction to 25.1 Mtoe
07_40	⊙	Share of renewable energy in gross final energy consumption	+1.0	↗	+1.4	⇧	34 percent
12_30	⊙	Average CO2 emissions per km from new passenger cars	–2.3	↘	–0.8	↘	95g of CO_2 per km
14_50		Mean ocean acidity	–		–		

Source: WIFO, Eurostat. – [1]) 2013/2018 average percentage change. – [2]) 2014/2017 average percentage change.

5. Conclusions

Adopting quantitative rules, we follow *Eurostat* (2019) in monitoring the SDGs for the Austrian economy. In our work we focus on the short-term development over the past five years and evaluate their progress towards sustainable development objectives and targets. As latest published information for the indicators is lagged in most cases one or two years behind, we extend the assessment by incorporating nowcasts of the key indicators up to the year 2019. The nowcasts of the EU SDG indicators are based on Dynamic Factor Models which utilize information of early available quarterly data. This procedure allows us monitoring of the most recent past. As such, an unsatisfactory development of the various sustainable development objectives can be detected at an early stage.

In this case study, we build nowcasts for 25 out of the 99 EU SDG indicators. Incorporating the nowcast leads to change in the assessment of some indicators. This is the case for the *share of renewable energy in gross final energy consumption* (SDG 07_40) where the favorable values obtained in the nowcast for 2018 and 2019 lead to a better assessment.

Overall, the monitoring results for Austria for the SDGs and key indicators under consideration, including those for which nowcasts have been calculated, can be summarized as follows:

- Goal 1 "No Poverty": The six key indicators in goal 1 provide a mixed picture on this objective. While the number of severely materially deprived people and the number of people living in households with very low work intensity significantly improved, we observe a deterioration for the remaining key indicators, with the number of people at risk of poverty or social exclusion even significantly deviating from the path to the target.
- Goal 3 "Good Health and Well-being": All six key indicators in goal 3 record a progress towards SD objective, with four of them (*smoking prevalence*, *death rate due to chronic diseases*, *death rate due to tuberculosis, HIV and hepatitis*, and *self-reported unmet need for medical care*) even showing a significant progress.
- Goal 4 "Quality Education": The record for indicators in goal 4 show a mixed picture with most of them (early leavers, tertiary educational attainment, early childhood education, and adult learning) indicating progress towards the ET-2020 targets. A significant deviation from the path towards the target occurs in underachievement of basic educational abilities.
- Goal 5 "Gender Equality": All key indicators point to an improvement towards SD objective. Four out of five signal even a significant enhancement, like the measure of *gender pay gap* or the *percentage of inactive population due to caring responsibilities*.
- Goal 7 "Affordable and Clean Energy": Four out of seven key indicators show an improvement towards SD objectives. The *share of renewable energy in gross final energy consumption* even shows a significant progress when including the nowcasts until 2019. *Energy productivity*, *energy import dependency* and *population to keep home adequately warm* are on track, too. However, efforts are still necessary to meet

the target for *primary energy consumption*, *final energy consumption* and *final energy consumption in households per capita.*

- Goal 8 "Decent Work and Economic Growth": The key indicators related to GDP as well as to the labour market show a moderate improvement towards SD objective in the period 2013-2018. With an exception: the *long-term unemployment* has risen in this 5-years on average by 1.5 percent, moving away from the SD objective of lowering this rate. Incorporating values for 2019, the assessment for *real GDP per capita* and *investment share of GDP* slightly improves. For the *employment rate* to reach the national 2020 target of 77 percent, growth in the indicator for the remaining two years must pick up.
- Goal 9 "Industry, Innovation and Infrastructure": *Gross domestic expenditure on R&D*, the target indicator of this SDG, is not on track reaching the national target. The assessment provides a downward sloping red arrow. In contrary, the key indicators related to employment (i.e. *employment in technological manufacturing and knowledge-intensive services*, and *R&D personnel*) as well as *patent applications* provide moderate to significate improvement towards SD objectives based on their average growth rate in the period 2012-2017.
- Goal 10 "Reduced Inequalities": The key indicators in goal 10 overwhelmingly show an improvement in both dimensions: within Austria and between EU-member countries. Only the key indicator measuring income inequality among poor households (relative median gap) deteriorates in the short-run.
- Goal 12 "Responsible Production and Consumption": While the short-run development of *resource productivity* and *average CO2 emissions for new passenger cars* and *generation of waste* are moving away from the SD objectives, the indicators *consumption of chemicals hazardous to health, circular material use, and recycling rate of waste* are well on track. Incorporating the nowcasts of *resource productivity* and *average CO_2 emissions for new passenger cars* confirm this conclusion.
- Goal 13 "Climate Action": While the indicators *greenhouse gas emissions* and *mean near surface temperature deviations* show a significant movement away from SD objectives, the *greenhouse gas emissions intensity of energy consumption* and *contribution to the international commitment on climate related expending* show a progress towards SD objectives.

Our analysis is seen a starting point for a timely monitoring of SDG indicators. Using the methodology of DFMs nowcasts can provide valuable information on the development of the indicators at the most recent past. Further research is necessary especially with respect to the scope of the considered SDG indicators, where an expansion is planned. On the base of this research, we aim to update and report our results on a regular basis. Further room for extension lies in the construction of a composite index, which gives an overall indication of the progress of one or a set of SDGs. Like *Bolcarova – Kolosta* (2015), who constructed an aggregated SDI

index based on principal components, the DFM approach of the underlying study could be extended towards the construction of a composite index of each SDG.

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7. Appendix

A.1 Model parameter estimates

Table A.1: Model parameter estimates Goal 1

	Coefficient factor 1	p-Value	Coefficient factor 2	p-Value
People at risk of poverty or social exclusion, persons	0.19	0.443	0.43	0.020
Long-term unemployed persons	0.90	–	0.03	–
Unemployed persons with only compulsory school leaving certificate	0.88	–	0.09	–
Recipients of the needs-based minimum benefit, persons	0.88	–	–0.00	–
Unemployment rate for persons with only compulsory school leaving certificate, in percent of dependent labor force	0.87	–	0.14	–
Unemployed persons aged 15-24	0.84	–	0.21	–
Employed women aged 15-24, type of living, persons	0.82	–	0.12	–
Unemployment rate for persons aged 15-24, in percent of dependent labor force	0.81	–	0.29	–
Persons in minor employment	0.70	–	–0.08	–
Unemployed persons for a duration of more than 12 months	0.69	–	0.01	–
Young persons aged 15-24 not in employment, education or training (NEET), persons	0.65	–	–0.46	–
Unemployed persons for a duration between 6 and 12 months	0.62	–	0.21	–
Unemployed women aged 15-24, type of living, persons	0.59	–	–0.40	–
Recipients of disability pension under accident insurance, persons	0.55	–	–0.25	–
Unemployed persons for a duration of more than 12 months	0.54	–	–0.31	–
Unemployment rate for persons with an umemployment duration of more than 12 months, in percent of labor force	0.54	–	–0.31	–
Unemployed women aged 15-24, persons	0.52	–	–0.52	–
Unemployed persons aged 15-24	0.46	–	–0.75	–
Unemployed men aged 15-24, type of living, persons	0.38	–	–0.57	–
Unemployed men aged 15-24, persons	0.36	–	–0.15	–
Young persons aged <25 supported by the Austrian labour market service, persons	0.34	–	–0.54	–
Pupils and students aged 15-24, male persons	0.30	–	–0.24	–
Unemployed persons for a duration between 6 and 12 months	0.27	–	0.12	–
Unemployment rate for persons with an umemployment duration between 6 and 12 months, in percent of labor force	0.27	–	0.13	–
Unemployment rate for persons aged 15-24, in percent of labor force of the same age	0.25	–	–0.80	–
Employed women aged 20-34, persons	0.22	–	–0.14	–

	Coefficient factor 1	p-Value	Coefficient factor 2	p-Value
Unemployed persons aged 15-24 with non-Austrian citizenship	0.22	–	–0.44	–
Share of population with eductional attainment level ISCED 5-8, percent of population	0.22	–	–0.29	–
Employed persons aged 20-34	0.16	–	0.04	–
Share of population aged 30-34 with eductional attainment level ISCED 5-8, percent of population of the same age	0.16	–	–0.24	–
Daily rate for unemployment benefit in €	0.16	–	–0.37	–
Pupils and students aged 15-24, female persons	0.10	–	–0.06	–
Recipients of pensions with related derelict allowances, persons	0.03	–	–0.23	–
Employed women aged 15-64 with eductional attainment level ISCED 3-8, persons	–0.00	–	–0.09	–
Recipients of pensions for reduced ability to work with related derelict allowances, persons	–0.01	–	0.46	–
Employed men aged 20-34, persons	–0.01	–	0.20	–
Participation rate of women aged 15-64 with eductional attainment level ISCED 3-8, percent of female population of the same age	–0.07	–	–0.03	–
Share of population with degree from a secondary school/university/university of applied science, percent of population	–0.08	–	0.07	–
Employed men aged 15-24, type of living, persons	–0.11	–	0.16	–
Share of population aged 30-34 with degree from a university/university of applied science, percent of population of the same age	–0.11	–	0.13	–
Employed women aged 25-44, persons	–0.14	–	–0.22	–
Unemployed women seeking part-time work only, persons	–0.15	–	–0.32	–
Unemployment rate for persons with non-Austrian citizenship aged 15-24, in percent of labor force with same characteristics	–0.17	–	–0.66	–
Daily rate of emergency unemployment assistance in €	–0.18	–	–0.05	–
Share of population with degree from a university/university of applied science, percent of population	–0.21	–	0.10	–
Recipients of disability pension, persons	–0.25	–	–0.05	–
Recipients of pensions for reduced ability to work with related compensatory allowances, persons	–0.26	–	–0.08	–
Unemployment rate for persons with non-Austrian country of birth aged 15-24, in percent of labor force with same characteristics	–0.27	–	–0.64	–
Employed men aged 15-64 with eductional attainment level ISCED 3-8, persons	–0.28	–	0.22	–
Unemployed persons with less than ISCED-0-2 eductional attainment level	–0.29	–	–0.81	–
Recipients of pensions with related compensatory allowances, persons	–0.29	–	–0.25	–
Persons in minor employment with freelance contract	–0.31	–	0.27	–

	Coefficient factor 1	p-Value	Coefficient factor 2	p-Value
Unemployed persons with only compulsory school leaving certificate	–0.37	–	–0.80	–
Participation rate of men aged 15-64 with eductional attainment level ISCED 3-8, percent of male population of the same age	–0.41	–	0.30	–
Unemployment rate for persons with less than ISCED 0-2 eductional attainment level, in percent of labor force with ISCED 0-2	–0.50	–	–0.71	–
Unemployment rate for persons with only compulsory school leaving certificate in percent of labor force with same characteristics	–0.52	–	–0.70	–
Sick leaves, workers, persons	–0.53	–	0.29	–
Unemployed persons aged 15-24 with non-Austrian country of birth	–0.54	–	–0.60	–
Long-term unemployed persons, all status	–0.63	–	–0.40	–
Sick leaves, salaried employees, persons	–0.64	–	–0.02	–
Participation rate of persons aged 15-64 with eductional attainment level ISCED 3-8, percent of population of the same age	–0.88	–	0.15	–
Employed persons aged 15-64 with eductional attainment level ISCED 3-8	–0.89	–	0.00	–
Employed persons from non-EU member states	–0.91	–	–0.05	–
People at risk of income poverty after social transfers, persons	0.66	0.554		
People at risk of income poverty after social transfers, persons, lag 2	–0.59	0.632		
Long-term unemployed persons	0.90	–		
Unemployed persons with only compulsory school leaving certificate	0.88	–		
Recipients of the needs-based minimum benefit, persons	0.88	–		
Unemployment rate for persons with only compulsory school leaving certificate, in percent of dependent labor force	0.87	–		
Unemployed persons aged 15-24	0.84	–		
Employed women aged 15-24, type of living, persons	0.82	–		
Unemployment rate for persons aged 15-24, in percent of dependent labor force	0.81	–		
Persons in minor employment	0.70	–		
Unemployed persons for a duration of more than 12 months	0.69	–		
Young persons aged 15-24 not in employment, education or training (NEET), persons	0.65	–		
Unemployed persons for a duration between 6 and 12 months	0.62	–		
Unemployed women aged 15-24, type of living, persons	0.59	–		
Recipients of disability pension under accident insurance, persons	0.55	–		
Unemployed persons for a duration of more than 12 months	0.54	–		

	Coefficient factor 1	p-Value	Coefficient factor 2	p-Value
Unemployment rate for persons with an umemployment duration of more than 12 months, in percent of labor force	0.54	–		
Unemployed women aged 15-24, persons	0.52	–		
Unemployed persons aged 15-24	0.46	–		
Unemployed men aged 15-24, type of living, persons	0.38	–		
Unemployed men aged 15-24, persons	0.36	–		
Young persons aged <25 supported by the Austrian labour market service, persons	0.34	–		
Pupils and students aged 15-24, male persons	0.30	–		
Unemployed persons for a duration between 6 and 12 months	0.27	–		
Unemployment rate for persons with an umemployment duration between 6 and 12 months, in percent of labor force	0.27	–		
Unemployment rate for persons aged 15-24, in percent of labor force of the same age	0.25	–		
Employed women aged 20-34, persons	0.22	–		
Unemployed persons aged 15-24 with non-Austrian citizenship	0.22	–		
Share of population with eductional attainment level ISCED 5-8, percent of population	0.22	–		
Employed persons aged 20-34	0.16	–		
Share of population aged 30-34 with eductional attainment level ISCED 5-8, percent of population of the same age	0.16	–		
Daily rate for unemployment benefit in €	0.16	–		
Pupils and students aged 15-24, female persons	0.10	–		
Recipients of pensions with related derelict allowances, persons	0.03	–		
Employed women aged 15-64 with eductional attainment level ISCED 3-8, persons	–0.00	–		
Recipients of pensions for reduced ability to work with related derelict allowances, persons	–0.01	–		
Employed men aged 20-34, persons	–0.01	–		
Participation rate of women aged 15-64 with eductional attainment level ISCED 3-8, percent of female population of the same age	–0.07	–		
Share of population with degree from a secondary school/university/university of applied science, percent of population	–0.08	–		
Employed men aged 15-24, type of living, persons	–0.11	–		
Share of population aged 30-34 with degree from a university/university of applied science, percent of population of the same age	–0.11	–		
Employed women aged 25-44, persons	–0.14	–		
Unemployed women seeking part-time work only, persons	–0.15	–		
Unemployment rate for persons with non-Austrian citizenship aged 15-24, in percent of labor force with same characteristics	–0.17	–		

	Coefficient factor 1	p-Value	Coefficient factor 2	p-Value
Daily rate of emergency unemployment assistance in €	–0.18	–		
Share of population with degree from a university/university of applied science, percent of population	–0.21	–		
Recipients of disability pension, persons	–0.25	–		
Recipients of pensions for reduced ability to work with related compensatory allowances, persons	–0.26	–		
Unemployment rate for persons with non-Austrian country of birth aged 15-24, in percent of labor force with same characteristics	–0.27	–		
Employed men aged 15-64 with eductional attainment level ISCED 3-8, persons	–0.28	–		
Unemployed persons with less than ISCED-0-2 eductional attainment level	–0.29	–		
Recipients of pensions with related compensatory allowances, persons	–0.29	–		
Persons in minor employment with freelance contract	–0.31	–		
Unemployed persons with only compulsory school leaving certificate	–0.37	–		
Participation rate of men aged 15-64 with eductional attainment level ISCED 3-8, percent of male population of the same age	–0.41	–		
Unemployment rate for persons with less than ISCED 0-2 eductional attainment level, in percent of labor force with ISCED 0-2	–0.50	–		
Unemployment rate for persons with only compulsory school leaving certificate in percent of labor force with same characteristics	–0.52	–		
Sick leaves, workers, persons	–0.53	–		
Unemployed persons aged 15-24 with non-Austrian country of birth	–0.54	–		
Long-term unemployed persons, all status	–0.63	–		
Sick leaves, salaried employees, persons	–0.64	–		
Participation rate of persons aged 15-64 with eductional attainment level ISCED 3-8, percent of population of the same age	–0.88	–		
Employed persons aged 15-64 with eductional attainment level ISCED 3-8	–0.89	–		
Employed persons from non-EU member states	–0.91	–		
Severely materially deprived people, persons	0.00	0.845		
Young persons aged <25 supported by the Austrian labour market service, persons	0.03	0.521		
Unemployed persons aged 15-24	0.02	0.943		
Unemployment rate for persons aged 15-24, in percent of dependent labor force	0.02	0.945		
Unemployment rate for persons with only compulsory school leaving certificate, in percent of dependent labor force	0.00	0.919		
Employed men aged 15-24, type of living, persons	0.00	0.877		

	Coefficient factor 1	p-Value	Coefficient factor 2	p-Value
Unemployed persons with only compulsory school leaving certificate	0.00	0.973		
Participation rate of men aged 15-64 with eductional attainment level ISCED 3-8, percent of male population of the same age	–0.00	0.994		
Employed women aged 15-64 with eductional attainment level ISCED 3-8, persons	–0.00	0.991		
Employed men aged 15-64 with eductional attainment level ISCED 3-8, persons	–0.00	0.987		
Participation rate of women aged 15-64 with eductional attainment level ISCED 3-8, percent of female population of the same age	–0.01	0.989		
Employed men aged 20-34, persons	–0.01	0.787		
Employed persons aged 20-34	–0.02	0.615		
Long-term unemployed persons	–0.02	0.717		
Recipients of pensions with related derelict allowances, persons	–0.03	0.368		
Unemployed women seeking part-time work only, persons	–0.04	0.105		
Sick leaves, workers, persons	–0.08	0.133		
Long-term unemployed persons, all status	–0.10	0.002		
Employed persons aged 15-64 with eductional attainment level ISCED 3-8	–0.12	0.002		
Sick leaves, salaried employees, persons	–0.13	0.027		
Participation rate of persons aged 15-64 with eductional attainment level ISCED 3-8, percent of population of the same age	–0.13	0.002		
People living in households with very low work intensity, persons	0.01	0.487		
People living in households with very low work intensity, persons, lag 2	0.83	0.000		
People living in households with very low work intensity, persons, MA 1	–0.95	0.000		
People living in households with very low work intensity, persons, MA 2	1.15	0.116		
Young persons aged <25 supported by the Austrian labour market service, persons	0.03	0.550		
Unemployed persons aged 15-24	0.02	0.956		
Unemployment rate for persons aged 15-24, in percent of dependent labor force	0.02	0.957		
Unemployment rate for persons with only compulsory school leaving certificate, in percent of dependent labor force	0.00	0.914		
Employed men aged 15-24, type of living, persons	0.00	0.873		
Unemployed persons with only compulsory school leaving certificate	0.00	0.976		
Participation rate of men aged 15-64 with eductional attainment level ISCED 3-8, percent of male population of the same age	–0.00	0.995		
Employed women aged 15-64 with eductional attainment level ISCED 3-8, persons	–0.00	0.992		

	Coefficient factor 1	p-Value	Coefficient factor 2	p-Value
Employed men aged 15-64 with eductional attainment level ISCED 3-8, persons	–0.00	0.988		
Participation rate of women aged 15-64 with eductional attainment level ISCED 3-8, percent of female population of the same age	–0.01	0.990		
Employed men aged 20-34, persons	–0.01	0.812		
Employed persons aged 20-34	–0.02	0.688		
Long-term unemployed persons	–0.02	0.740		
Recipients of pensions with related derelict allowances, persons	–0.03	0.373		
Unemployed women seeking part-time work only, persons	–0.04	0.179		
Sick leaves, workers, persons	–0.08	0.205		
Long-term unemployed persons, all status	–0.10	0.042		
Employed persons aged 15-64 with eductional attainment level ISCED 3-8	–0.12	0.035		
Sick leaves, salaried employees, persons	–0.12	0.086		
Participation rate of persons aged 15-64 with eductional attainment level ISCED 3-8, percent of population of the same age	–0.13	0.034		
Population living in a dwelling with a leaking roof, damp walls, floors or foundation or rot in window frames or floor, percent of population	–0.85	0.319	0.13	0.775
Population living in a dwelling with a leaking roof, damp walls, floors or foundation or rot in window frames or floor, percent of population, lag 2	0.88	0.205	0.35	0.562
Long-term unemployed persons	0.90	–	0.03	–
Unemployed persons with only compulsory school leaving certificate	0.88	–	0.09	–
Recipients of the needs-based minimum benefit, persons	0.88	–	–0.00	–
Unemployment rate for persons with only compulsory school leaving certificate, in percent of dependent labor force	0.87	–	0.14	–
Unemployed persons aged 15-24	0.84	–	0.21	–
Employed women aged 15-24, type of living, persons	0.82	–	0.12	–
Unemployment rate for persons aged 15-24, in percent of dependent labor force	0.81	–	0.29	–
Persons in minor employment	0.70	–	–0.08	–
Unemployed persons for a duration of more than 12 months	0.69	–	0.01	–
Young persons aged 15-24 not in employment, education or training (NEET), persons	0.65	–	–0.46	–
Unemployed persons for a duration between 6 and 12 months	0.62	–	0.21	–
Unemployed women aged 15-24, type of living, persons	0.59	–	–0.40	–
Recipients of disability pension under accident insurance, persons	0.55	–	–0.25	–
Unemployed persons for a duration of more than 12 months	0.54	–	–0.31	–

	Coefficient factor 1	p-Value	Coefficient factor 2	p-Value
Unemployment rate for persons with an umemployment duration of more than 12 months, in percent of labor force	0.54	–	–0.31	–
Unemployed women aged 15-24, persons	0.52	–	–0.52	–
Unemployed persons aged 15-24	0.46	–	–0.75	–
Unemployed men aged 15-24, type of living, persons	0.38	–	–0.57	–
Unemployed men aged 15-24, persons	0.36	–	–0.15	–
Young persons aged <25 supported by the Austrian labour market service, persons	0.34	–	–0.54	–
Pupils and students aged 15-24, male persons	0.30	–	–0.24	–
Unemployed persons for a duration between 6 and 12 months	0.27	–	0.12	–
Unemployment rate for persons with an umemployment duration between 6 and 12 months, in percent of labor force	0.27	–	0.13	–
Unemployment rate for persons aged 15-24, in percent of labor force of the same age	0.25	–	–0.80	–
Employed women aged 20-34, persons	0.22	–	–0.14	–
Unemployed persons aged 15-24 with non-Austrian citizenship	0.22	–	–0.44	–
Share of population with eductional attainment level ISCED 5-8, percent of population	0.22	–	–0.29	–
Employed persons aged 20-34	0.16	–	0.04	–
Share of population aged 30-34 with eductional attainment level ISCED 5-8, percent of population of the same age	0.16	–	–0.24	–
Daily rate for unemployment benefit in €	0.16	–	–0.37	–
Pupils and students aged 15-24, female persons	0.10	–	–0.06	–
Recipients of pensions with related derelict allowances, persons	0.03	–	–0.23	–
Employed women aged 15-64 with eductional attainment level ISCED 3-8, persons	–0.00	–	–0.09	–
Recipients of pensions for reduced ability to work with related derelict allowances, persons	–0.01	–	0.46	–
Employed men aged 20-34, persons	–0.01	–	0.20	–
Participation rate of women aged 15-64 with eductional attainment level ISCED 3-8, percent of female population of the same age	–0.07	–	–0.03	–
Share of population with degree from a secondary school/university/university of applied science, percent of population	–0.08	–	0.07	–
Employed men aged 15-24, type of living, persons	–0.11	–	0.16	–
Share of population aged 30-34 with degree from a university/university of applied science, percent of population of the same age	–0.11	–	0.13	–
Employed women aged 25-44, persons	–0.14	–	–0.22	–
Unemployed women seeking part-time work only, persons	–0.15	–	–0.32	–
Unemployment rate for persons with non-Austrian citizenship aged 15-24, in percent of labor force with same characteristics	–0.17	–	–0.66	–

	Coefficient factor 1	p-Value	Coefficient factor 2	p-Value
Daily rate of emergency unemployment assistance in €	–0.18	–	–0.05	–
Share of population with degree from a university/university of applied science, percent of population	–0.21	–	0.10	–
Recipients of disability pension, persons	–0.25	–	–0.05	–
Recipients of pensions for reduced ability to work with related compensatory allowances, persons	–0.26	–	–0.08	–
Unemployment rate for persons with non-Austrian country of birth aged 15-24, in percent of labor force with same characteristics	–0.27	–	–0.64	–
Employed men aged 15-64 with eductional attainment level ISCED 3-8, persons	–0.28	–	0.22	–
Unemployed persons with less than ISCED-0-2 eductional attainment level	–0.29	–	–0.81	–
Recipients of pensions with related compensatory allowances, persons	–0.29	–	–0.25	–
Persons in minor employment with freelance contract	–0.31	–	0.27	–
Unemployed persons with only compulsory school leaving certificate	–0.37	–	–0.80	–
Participation rate of men aged 15-64 with eductional attainment level ISCED 3-8, percent of male population of the same age	–0.41	–	0.30	–
Unemployment rate for persons with less than ISCED 0-2 eductional attainment level, in percent of labor force with ISCED 0-2	–0.50	–	–0.71	–
Unemployment rate for persons with only compulsory school leaving certificate in percent of labor force with same characteristics	–0.52	–	–0.70	–
Sick leaves, workers, persons	–0.53	–	0.29	–
Unemployed persons aged 15-24 with non-Austrian country of birth	–0.54	–	–0.60	–
Long-term unemployed persons, all status	–0.63	–	–0.40	–
Sick leaves, salaried employees, persons	–0.64	–	–0.02	–
Participation rate of persons aged 15-64 with eductional attainment level ISCED 3-8, percent of population of the same age	–0.88	–	0.15	–
Employed persons aged 15-64 with eductional attainment level ISCED 3-8	–0.89	–	0.00	–
Employed persons from non-EU member states	–0.91	–	–0.05	–

Table A.2: Model parameter estimates Goal 3

	Coefficient	Std. Error	z-Score	p-Value
Life expectancy at birth, years	0.85	0.18	4.74	0.000
Life expectancy at birth, years, Statistics Austria	0.84	0.18	4.60	0.000
Life expectancy at birth, years, male, Statistics Austria	0.83	0.20	4.21	0.000
Life expectancy at birth, years, female, Statistics Austria	0.74	0.15	4.87	0.000

Table A.3: Model parameter estimates Goal 4

	Coefficient factor 1	p-Value	Coefficient factor 2	p-Value
Early leavers from education and training, percent of population aged 18 to 24	0.01	0.985	0.35	0.292
Unemployed persons aged 15-24	0.85	–	–0.12	–
Unemployment rate for persons aged 15-24, in percent of dependent labor force	0.83	–	–0.13	–
Unemployed persons with only compulsory school leaving certificate	0.81	–	–0.13	–
Unemployment rate for persons with only compulsory school leaving certificate, in percent of dependent labor force	0.77	–	–0.12	–
Persons in minor employment	0.73	–	–0.26	–
Young persons aged 15-24 not in employment, education or training (NEET), persons	0.65	–	–0.07	–
Unemployed women aged 15-24, type of living, persons	0.46	–	–0.62	–
Apprenticeship seekers, persons	0.25	–	–0.66	–
Unemployed men aged 15-24, persons	0.24	–	0.10	–
Pupils and students aged 15-24, male persons	0.23	–	–0.46	–
Unemployed women aged 15-24, persons	0.22	–	–0.30	–
Young persons aged <25 supported by the Austrian labour market service, persons	0.21	–	–0.69	–
Employed women aged 15-64 with eductional attainment level ISCED 3-8, persons	0.16	–	–0.49	–
Employed women aged 20-34, persons	0.14	–	0.00	–
Participation rate of women aged 15-64 with eductional attainment level ISCED 3-8, percent of female population of the same age	0.13	–	0.05	–
Pupils and students aged 15-24, female persons	0.11	–	0.02	–
Share of population aged 30-34 with degree from a university/university of applied science, percent of population of the same age	0.09	–	0.13	–
Unemployed persons aged 15-24 with non-Austrian citizenship	0.07	–	0.07	–
Share of population aged 30-34 with eductional attainment level ISCED 5-8, percent of population of the same age	0.06	–	–0.45	–
Unemployed men aged 15-24, type of living, persons	0.04	–	–0.24	–
Employed women aged 15-24, persons	0.02	–	–0.68	–
Share of population with eductional attainment level ISCED 5-8, percent of population	0.02	–	0.18	–
Unemployed persons aged 15-24	0.01	–	–0.30	–
Share of population with degree from a university/university of applied science, percent of population	0.00	–	–0.89	–
Employed persons aged 20-34	–0.06	–	–0.20	–
Employed men aged 15-24, persons	–0.07	–	0.39	–
Employed men aged 15-24, type of living, persons	–0.07	–	0.39	–
Share of population with degree from a secondary school/university/university of applied science, percent of population	–0.13	–	0.32	–

	Coefficient factor 1	p-Value	Coefficient factor 2	p-Value
Employed women aged 25-44, persons	–0.13	–	–0.16	–
Employed men aged 20-34, persons	–0.14	–	–0.02	–
Persons in minor employment with freelance contract	–0.18	–	0.45	–
Unemployment rate for persons aged 15-24, in percent of labor force of the same age	–0.18	–	0.50	–
Unemployment rate for persons with non-Austrian citizenship aged 15-24, in percent of labor force with same characteristics	–0.25	–	–0.86	–
Unemployed persons aged 15-24 with non-Austrian country of birth	–0.34	–	–0.57	–
Participation rate of men aged 15-64 with eductional attainment level ISCED 3-8, percent of male population of the same age	–0.43	–	–0.35	–
Employed men aged 15-64 with eductional attainment level ISCED 3-8, persons	–0.43	–	0.28	–
Unemployment rate for persons with non-Austrian country of birth aged 15-24, in percent of labor force with same characteristics	–0.44	–	0.23	–
Unemployed persons with less than ISCED-0-2 eductional attainment level	–0.48	–	–0.45	–
Unemployed persons with only compulsory school leaving certificate	–0.50	–	–0.73	–
Population, woman aged 25-44, persons	–0.59	–	–0.68	–
Unemployment rate for persons with less than ISCED 0-2 eductional attainment level, in percent of labor force with ISCED 0-2	–0.69	–	–0.10	–
Unemployment rate for persons with only compulsory school leaving certificate in percent of labor force with same characteristics	–0.76	–	–0.53	–
Employed persons from non-EU member states	–0.76	–	–0.51	–
Participation rate of persons aged 15-64 with eductional attainment level ISCED 3-8, percent of population of the same age	–0.79	–	0.26	–
Employed persons aged 15-64 with eductional attainment level ISCED 3-8	–0.84	–	0.16	–
Tertiary educational attainment, percent of population aged 30 to 34	0.28	0.632	–0.86	0.172
Tertiary educational attainment, percent of population aged 30 to 34, lag 2	–0.32	0.629	1.45	0.087
Participation rate of women aged 15-64 with eductional attainment level ISCED 3-8, percent of female population of the same age	0.71	–	0.35	–
Employed women aged 15-64 with eductional attainment level ISCED 3-8, persons	0.69	–	0.37	–
Share of population with degree from a university/university of applied science, percent of population	0.65	–	–0.02	–
Share of population with degree from a secondary school/university/university of applied science, percent of population	0.64	–	–0.09	–

	Coefficient factor 1	p-Value	Coefficient factor 2	p-Value
Employed men aged 15-64 with eductional attainment level ISCED 3-8, persons	0.57	–	0.50	–
Participation rate of men aged 15-64 with eductional attainment level ISCED 3-8, percent of male population of the same age	0.56	–	0.50	–
Share of population with eductional attainment level ISCED 5-8, percent of population	0.44	–	–0.41	–
Participation rate of persons aged 15-64 with eductional attainment level ISCED 3-8, percent of population of the same age	0.44	–	–0.66	–
Employed persons aged 15-64 with eductional attainment level ISCED 3-8	0.42	–	–0.66	–
Share of population aged 30-34 with eductional attainment level ISCED 5-8, percent of population of the same age	0.39	–	–0.47	–
Share of population aged 30-34 with degree from a university/university of applied science, percent of population of the same age	0.31	–	–0.23	–
Pupils and students aged 15-24, male persons	0.07	–	0.27	–
Pupils and students aged 15-24, female persons	–0.19	–	0.05	–
Participation in early childhood education	–0.16	0.639		
Pupils and students aged 15-24, male persons	0.35	–		
Share of population with degree from a secondary school/university/university of applied science, percent of population	0.08	–		
Pupils and students aged 15-24, female persons	0.08	–		
Employed women aged 15-64 with eductional attainment level ISCED 3-8, persons	–0.03	–		
Participation rate of women aged 15-64 with eductional attainment level ISCED 3-8, percent of female population of the same age	–0.03	–		
Employed women aged 20-34, persons	–0.30	–		
Participation rate of women aged 20-34, percent of female population of the same age	–0.32	–		
Employed women aged 15-24, persons	–0.39	–		
Population, woman aged 25-44, persons	–0.42	–		
Employed men aged 15-24, type of living, persons	–0.45	–		
Employed persons aged 15-64 with eductional attainment level ISCED 3-8	–0.50	–		
Employed men aged 15-24, persons	–0.51	–		
Participation rate of persons aged 15-64 with eductional attainment level ISCED 3-8, percent of population of the same age	–0.52	–		
Employed persons from non-EU member states	–0.55	–		
Participation rate of men aged 15-64 with eductional attainment level ISCED 3-8, percent of male population of the same age	–0.63	–		
Employed men aged 15-64 with eductional attainment level ISCED 3-8, persons	–0.69	–		
Participation rate of men aged 20-34, percent of male population of the same age	–0.74	–		

	Coefficient factor 1	p-Value	Coefficient factor 2	p-Value
Employed men aged 20-34, persons	–0.76	–		
Employed persons aged 20-34	–0.78	–		
Participation rate of persons aged 20-34, percent of population of the same age	–0.84	–		
Employment rate of recent graduates, percent of population aged 20 to 34 with at least secondary education	–0.32	0.513	–0.11	0.844
Unemployment rate for persons aged 15-24, in percent of labor force of the same age	0.87	–	0.06	–
Unemployed persons aged 15-24	0.81	–	–0.15	–
Unemployed persons with only compulsory school leaving certificate	0.76	–	0.42	–
Unemployed persons with less than ISCED-0-2 eductional attainment level	0.76	–	0.33	–
Unemployment rate for persons with less than ISCED 0-2 eductional attainment level, in percent of labor force with ISCED 0-2	0.75	–	0.55	–
Unemployment rate for persons with only compulsory school leaving certificate in percent of labor force with same characteristics	0.74	–	0.55	–
Unemployed men aged 15-24, type of living, persons	0.66	–	–0.16	–
Unemployment rate for persons with non-Austrian citizenship aged 15-24, in percent of labor force with same characteristics	0.59	–	0.25	–
Unemployed women seeking part-time work only, persons	0.59	–	0.36	–
Unemployed women aged 15-24, type of living, persons	0.56	–	–0.37	–
Unemployed women aged 15-24, persons	0.54	–	–0.31	–
Unemployment rate for persons with non-Austrian country of birth aged 15-24, in percent of labor force with same characteristics	0.53	–	0.39	–
Long-term unemployed persons	0.51	–	–0.35	–
Unemployed persons for a duration of more than 12 months	0.44	–	–0.24	–
Long-term unemployed persons, all status	0.40	–	0.66	–
Unemployed persons aged 15-24 with non-Austrian citizenship	0.38	–	–0.11	–
Unemployed persons for a duration of more than 12 months	0.37	–	–0.30	–
Unemployment rate for persons with an umemployment duration of more than 12 months, in percent of labor force	0.36	–	–0.31	–
Unemployed men aged 15-24, persons	0.35	–	–0.26	–
Unemployed persons aged 15-24 with non-Austrian country of birth	0.30	–	0.42	–
Share of population with eductional attainment level ISCED 5-8, percent of population	0.29	–	–0.08	–
Unemployed persons for a duration between 6 and 12 months	0.28	–	–0.52	–
Employed persons aged 15-64 with eductional attainment level ISCED 3-8	0.28	–	0.63	–

	Coefficient factor 1	p-Value	Coefficient factor 2	p-Value
Participation rate of persons aged 15-64 with eductional attainment level ISCED 3-8, percent of population of the same age	0.26	–	0.59	–
Share of population aged 30-34 with eductional attainment level ISCED 5-8, percent of population of the same age	0.22	–	–0.09	–
Share of population with degree from a university/university of applied science, percent of population	0.21	–	0.06	–
Unemployment rate for persons with only compulsory school leaving certificate, in percent of dependent labor force	0.21	–	–0.81	–
Share of population with degree from a secondary school/university/university of applied science, percent of population	0.19	–	0.09	–
Unemployed persons for a duration between 6 and 12 months	0.18	–	–0.28	–
Unemployment rate for persons with an umemployment duration between 6 and 12 months, in percent of labor force	0.16	–	–0.28	–
Unemployed persons with only compulsory school leaving certificate	0.13	–	–0.76	–
Unemployment rate for persons aged 15-24, in percent of dependent labor force	0.04	–	–0.83	–
Unemployed persons aged 15-24	0.04	–	–0.84	–
Share of population aged 30-34 with degree from a university/university of applied science, percent of population of the same age	0.01	–	–0.08	–
Employed women aged 25-44, persons	–0.06	–	0.15	–
Employed women aged 20-34, persons	–0.12	–	–0.02	–
Participation rate of women aged 15-64 with eductional attainment level ISCED 3-8, percent of female population of the same age	–0.18	–	–0.00	–
Employed women aged 15-64 with eductional attainment level ISCED 3-8, persons	–0.19	–	–0.03	–
Participation rate of women aged 20-34, percent of female population of the same age	–0.19	–	0.06	–
Employed men aged 15-64 with eductional attainment level ISCED 3-8, persons	–0.20	–	0.55	–
Participation rate of men aged 15-64 with eductional attainment level ISCED 3-8, percent of male population of the same age	–0.25	–	0.56	–
Persons in minor employment	–0.33	–	–0.22	–
Employed persons aged 20-34	–0.34	–	0.23	–
Employed men aged 20-34, persons	–0.34	–	0.31	–
Persons in minor employment with freelance contract	–0.40	–	0.24	–
Participation rate of persons aged 20-34, percent of population of the same age	–0.46	–	0.37	–
Participation rate of men aged 20-34, percent of male population of the same age	–0.53	–	0.46	–

	Coefficient factor 1	p-Value	Coefficient factor 2	p-Value
Adult participation in learning, percent of population aged 25 to 64	1.64	0.284	–0.71	0.578
Adult participation in learning, percent of population aged 25 to 64, lag 2	–1.29	0.407	–0.03	0.979
Employed women aged 15-24, type of living, persons	0.87	–	–0.02	–
Unemployed persons aged 15-24	0.82	–	–0.08	–
Unemployment rate for persons aged 15-24, in percent of dependent labor force	0.80	–	–0.09	–
Unemployed persons with only compulsory school leaving certificate	0.77	–	–0.11	–
Unemployment rate for persons with only compulsory school leaving certificate, in percent of dependent labor force	0.76	–	–0.27	–
Persons in minor employment	0.65	–	0.02	–
Young persons aged 15-24 not in employment, education or training (NEET), persons	0.51	–	–0.58	–
Unemployed persons for a duration between 6 and 12 months	0.47	–	–0.34	–
Unemployed women aged 15-24, type of living, persons	0.30	–	–0.63	–
Long-term unemployed persons	0.29	–	–0.52	–
Unemployed persons for a duration between 6 and 12 months	0.28	–	–0.28	–
Unemployment rate for persons with an umemployment duration between 6 and 12 months, in percent of labor force	0.28	–	–0.24	–
Unemployed women aged 15-24, persons	0.26	–	–0.65	–
Unemployed men aged 15-24, persons	0.25	–	–0.45	–
Pupils and students aged 15-24, male persons	0.23	–	–0.33	–
Unemployment rate for persons with an umemployment duration of more than 12 months, in percent of labor force	0.22	–	–0.48	–
Apprenticeship seekers, persons	0.22	–	0.08	–
Unemployed persons for a duration of more than 12 months	0.21	–	–0.47	–
Young persons aged <25 supported by the Austrian labour market service, persons	0.19	–	–0.46	–
Employed women aged 20-34, persons	0.15	–	0.04	–
Employed women aged 15-64 with eductional attainment level ISCED 3-8, persons	0.13	–	0.05	–
Unemployed persons for a duration of more than 12 months	0.12	–	–0.47	–
Participation rate of women aged 15-64 with eductional attainment level ISCED 3-8, percent of female population of the same age	0.10	–	0.05	–
Unemployed persons aged 15-24 with non-Austrian citizenship	0.09	–	–0.41	–
Participation rate of women aged 20-34, percent of female population of the same age	0.09	–	0.12	–
Pupils and students aged 15-24, female persons	0.08	–	0.15	–
Unemployed men aged 15-24, type of living, persons	0.08	–	–0.70	–

	Coefficient factor 1	p-Value	Coefficient factor 2	p-Value
Unemployed persons aged 15-24	0.07	–	–0.88	–
Share of population aged 30-34 with degree from a university/university of applied science, percent of population of the same age	0.06	–	0.07	–
Share of population aged 30-34 with eductional attainment level ISCED 5-8, percent of population of the same age	0.06	–	–0.24	–
Share of population with eductional attainment level ISCED 5-8, percent of population	0.05	–	–0.33	–
Employed women aged 15-24, persons	0.02	–	0.21	–
Share of population with degree from a university/university of applied science, percent of population	–0.04	–	–0.22	–
Employed persons aged 20-34	–0.06	–	0.32	–
Employed men aged 15-24, persons	–0.08	–	0.38	–
Share of population with degree from a secondary school/university/university of applied science, percent of population	–0.11	–	–0.20	–
Employed men aged 15-24, type of living, persons	–0.13	–	0.33	–
Employed women aged 25-44, persons	–0.15	–	–0.01	–
Employed men aged 20-34, persons	–0.18	–	0.37	–
Unemployment rate for persons aged 15-24, in percent of labor force of the same age	–0.19	–	–0.88	–
Persons in minor employment with freelance contract	–0.22	–	0.42	–
Unemployment rate for persons with non-Austrian citizenship aged 15-24, in percent of labor force with same characteristics	–0.31	–	–0.49	–
Employed men aged 15-64 with eductional attainment level ISCED 3-8, persons	–0.40	–	0.15	–
Unemployed persons aged 15-24 with non-Austrian country of birth	–0.42	–	–0.23	–
Unemployed persons with less than ISCED-0-2 eductional attainment level	–0.43	–	–0.75	–
Unemployment rate for persons with non-Austrian country of birth aged 15-24, in percent of labor force with same characteristics	–0.46	–	–0.40	–
Unemployed women seeking part-time work only, persons	–0.49	–	–0.49	–
Unemployed persons with only compulsory school leaving certificate	–0.53	–	–0.71	–
Population, woman aged 25-44, persons	–0.70	–	–0.20	–
Unemployment rate for persons with less than ISCED 0-2 eductional attainment level, in percent of labor force with ISCED 0-2	–0.71	–	–0.61	–
Unemployment rate for persons with only compulsory school leaving certificate in percent of labor force with same characteristics	–0.72	–	–0.59	–
Employed persons from non-EU member states	–0.81	–	0.21	–
Long-term unemployed persons, all status	–0.84	–	–0.18	–

	Coefficient factor 1	p-Value	Coefficient factor 2	p-Value
Participation rate of persons aged 15-64 with eductional attainment level ISCED 3-8, percent of population of the same age	–0.85	–	0.04	–
Employed persons aged 15-64 with eductional attainment level ISCED 3-8	–0.87	–	0.00	–

Table A.4: Model parameter estimates Goal 7

	Coefficient	Std. Error	z-Score	p-Value
Primary energy consumption, Mtoe	0.66	0.20	3.28	0.001
Domestic electricity consumption without consumption for pumped storage (total domestic supply), GWh	0.86	0.10	8.55	0.000
Domestic gas consumption, GWh	0.67	0.16	4.14	0.000
Heating degree days, number	0.46	0.09	5.14	0.000
Market consumption of heating oil, tons	0.30	0.14	2.11	0.035
Generation of electrical energy, GWh	0.23	0.10	2.17	0.030
Real GDP, trend-cycle component, €	0.12	0.13	0.91	0.365
Market consumption of fuels, tons	0.08	0.13	0.63	0.529
Final energy consumption, Mtoe	0.69	0.18	3.74	0.000
Domestic electricity consumption without consumption for pumped storage (total domestic supply), GWh	0.83	0.11	7.83	0.000
Domestic gas consumption, GWh	0.68	0.16	4.21	0.000
Heating degree days, number	0.44	0.12	3.69	0.000
Market consumption of heating oil, tons	0.31	0.14	2.28	0.023
Generation of electrical energy, GWh	0.22	0.10	2.11	0.035
Market consumption of fuels, tons	0.10	0.13	0.75	0.451
Real GDP, trend-cycle component, €	0.09	0.13	0.72	0.470
Final energy consumption in households per capita, kg oil equivalents	0.13	0.18	0.71	0.476
Domestic electricity consumption without consumption for pumped storage (total domestic supply), GWh	0.92	0.12	7.62	0.000
Domestic gas consumption, GWh	0.62	0.15	3.98	0.000
Heating degree days, number	0.46	0.09	4.91	0.000
Market consumption of heating oil, tons	0.26	0.15	1.76	0.078
Generation of electrical energy, GWh	0.24	0.10	2.31	0.021
Real GDP, trend-cycle component, €	0.20	0.11	1.79	0.074
Consumption of private housholds and NPISH, volume	0.00	0.15	0.00	1.000
Share of renewable energy in gross final energy consumption, percent	0.41	0.18	2.29	0.022
Share of alternative power generation, percent of total electricity generation	0.30	–	–	–
Share of thermal power generation, percent of total electricity generation	–0.31	0.11	–2.85	0.004
Domestic gas consumption, nsa, GWh	–0.47	0.13	–3.59	0.000

Table A.5: Model parameter estimates Goal 10

	Coefficient factor 1	p-Value
Relative median at-risk-of-poverty gap, percent distance to poverty threshold	0.24	0.648
Relative median at-risk-of-poverty gap, percent distance to poverty threshold, lag 1	–0.44	0.338
Long-term unemployed persons	0.90	–
Unemployed persons with only compulsory school leaving certificate	0.88	–
Recipients of the needs-based minimum benefit, persons	0.88	–
Unemployment rate for persons with only compulsory school leaving certificate, in percent of dependent labor force	0.87	–
Unemployed persons aged 15-24	0.84	–
Employed women aged 15-24, type of living, persons	0.82	–
Unemployment rate for persons aged 15-24, in percent of dependent labor force	0.81	–
Persons in minor employment	0.70	–
Unemployed persons for a duration of more than 12 months	0.69	–
Young persons aged 15-24 not in employment, education or training (NEET), persons	0.65	–
Unemployed persons for a duration between 6 and 12 months	0.62	–
Unemployed women aged 15-24, type of living, persons	0.59	–
Recipients of disability pension under accident insurance, persons	0.55	–
Unemployed persons for a duration of more than 12 months	0.54	–
Unemployment rate for persons with an umemployment duration of more than 12 months, in percent of labor force	0.54	–
Unemployed women aged 15-24, persons	0.52	–
Unemployed persons aged 15-24	0.46	–
Unemployed men aged 15-24, type of living, persons	0.38	–
Unemployed men aged 15-24, persons	0.36	–
Young persons aged <25 supported by the Austrian labour market service, persons	0.34	–
Pupils and students aged 15-24, male persons	0.30	–
Unemployed persons for a duration between 6 and 12 months	0.27	–
Unemployment rate for persons with an umemployment duration between 6 and 12 months, in percent of labor force	0.27	–
Unemployment rate for persons aged 15-24, in percent of labor force of the same age	0.25	–
Employed women aged 20-34, persons	0.22	–
Unemployed persons aged 15-24 with non-Austrian citizenship	0.22	–

	Coefficient factor 1	p-Value
Share of population with eductional attainment level ISCED 5-8, percent of population	0.22	–
Employed persons aged 20-34	0.16	–
Share of population aged 30-34 with eductional attainment level ISCED 5-8, percent of population of the same age	0.16	–
Daily rate for unemployment benefit in €	0.16	–
Pupils and students aged 15-24, female persons	0.10	–
Recipients of pensions with related derelict allowances, persons	0.03	–
Employed women aged 15-64 with eductional attainment level ISCED 3-8, persons	–0.00	–
Recipients of pensions for reduced ability to work with related derelict allowances, persons	–0.01	–
Employed men aged 20-34, persons	–0.01	–
Participation rate of women aged 15-64 with eductional attainment level ISCED 3-8, percent of female population of the same age	–0.07	–
Share of population with degree from a secondary school/university/university of applied science, percent of population	–0.08	–
Employed men aged 15-24, type of living, persons	–0.11	–
Share of population aged 30-34 with degree from a university/university of applied science, percent of population of the same age	–0.11	–
Employed women aged 25-44, persons	–0.14	–
Unemployed women seeking part-time work only, persons	–0.15	–
Unemployment rate for persons with non-Austrian citizenship aged 15-24, in percent of labor force with same characteristics	–0.17	–
Daily rate of emergency unemployment assistance in €	–0.18	–
Share of population with degree from a university/university of applied science, percent of population	–0.21	–
Recipients of disability pension, persons	–0.25	–
Recipients of pensions for reduced ability to work with related compensatory allowances, persons	–0.26	–
Unemployment rate for persons with non-Austrian country of birth aged 15-24, in percent of labor force with same characteristics	–0.27	–
Employed men aged 15-64 with eductional attainment level ISCED 3-8, persons	–0.28	–
Unemployed persons with less than ISCED-0-2 eductional attainment level	–0.29	–
Recipients of pensions with related compensatory allowances, persons	–0.29	–
Persons in minor employment with freelance contract	–0.31	–
Unemployed persons with only compulsory school leaving certificate	–0.37	–

	Coefficient factor 1	p-Value
Participation rate of men aged 15-64 with eductional attainment level ISCED 3-8, percent of male population of the same age	–0.41	–
Unemployment rate for persons with less than ISCED 0-2 eductional attainment level, in percent of labor force with ISCED 0-2	–0.50	–
Unemployment rate for persons with only compulsory school leaving certificate in percent of labor force with same characteristics	–0.52	–
Sick leaves, workers, persons	–0.53	–
Unemployed persons aged 15-24 with non-Austrian country of birth	–0.54	–
Long-term unemployed persons, all status	–0.63	–
Sick leaves, salaried employees, persons	–0.64	–
Participation rate of persons aged 15-64 with eductional attainment level ISCED 3-8, percent of population of the same age	–0.88	–
Employed persons aged 15-64 with eductional attainment level ISCED 3-8	–0.89	–
Employed persons from non-EU member states	–0.91	–
Income share of the bottom 40% of the population, percent of income	0.00	0.883
Income share of the bottom 40% of the population, percent of income, lag 2	0.88	0.000
Income share of the bottom 40% of the population, percent of income, MA 1	1.15	0.092
Young persons aged <25 supported by the Austrian labour market service, persons	0.03	0.521
Unemployed persons aged 15-24	0.02	0.947
Unemployment rate for persons aged 15-24, in percent of dependent labor force	0.02	0.949
Unemployment rate for persons with only compulsory school leaving certificate, in percent of dependent labor force	0.00	0.906
Employed men aged 15-24, type of living, persons	0.00	0.893
Unemployed persons with only compulsory school leaving certificate	0.00	0.974
Participation rate of men aged 15-64 with eductional attainment level ISCED 3-8, percent of male population of the same age	–0.00	0.994
Employed women aged 15-64 with eductional attainment level ISCED 3-8, persons	–0.00	0.991
Employed men aged 15-64 with eductional attainment level ISCED 3-8, persons	–0.00	0.987
Participation rate of women aged 15-64 with eductional attainment level ISCED 3-8, percent of female population of the same age	–0.01	0.989
Employed men aged 20-34, persons	–0.01	0.808
Employed persons aged 20-34	–0.02	0.666
Long-term unemployed persons	–0.02	0.752

	Coefficient factor 1	p-Value
Recipients of pensions with related derelict allowances, persons	–0.03	0.381
Unemployed women seeking part-time work only, persons	–0.04	0.183
Sick leaves, workers, persons	–0.08	0.270
Long-term unemployed persons, all status	–0.10	0.033
Employed persons aged 15-64 with eductional attainment level ISCED 3-8	–0.12	0.028
Sick leaves, salaried employees, persons	–0.12	0.056
Participation rate of persons aged 15-64 with eductional attainment level ISCED 3-8, percent of population of the same age	–0.13	0.026

Table A.6: Model parameter estimates Goal 12

	Coefficient	Std. Error	z-Score	p-Value
Domestic material consumption (DMC), tons	0.28	0.06	4.46	0.000
External contribution of crude materials and fuels other than electricity, value in €	0.63	0.23	2.70	0.007
Wood harvest	0.59	0.13	4.50	0.000
Industrial production - mining and quarrying, 2015=100	0.47	0.16	3.05	0.002
Industrial production - energy, 2015=100	0.39	0.21	1.90	0.057
Industrial production - intermediate goods excluding energy, 2015=100	0.37	0.11	3.27	0.001
Average CO2 emissions per km from new passenger cars	0.27	0.04	7.17	0.000
Average CO2 emissions per km from new passenger cars - top 15 makes	0.77	0.07	10.34	0.000
Average CO2 emissions per km from new passenger cars	0.57	0.06	9.85	0.000

Table A.7: Model parameter estimates Goal 13

	Coefficient	Std. Error	z-Score	p-Value
Greenhouse gas emissions, 1990=100	1.14	0.16	7.22	0.000
Domestic gas consumption, GWh	0.95	0.12	8.08	0.000
Generation of electrical energy from thermal power, GWh	0.69	0.08	8.42	0.000
Domestic electricity consumption without consumption for pumped storage (domestic use public grid), GWh	0.65	0.14	4.72	0.000
Heating degree days, number	0.26	0.11	2.45	0.014
Stock of cattle, number	0.15	0.28	0.53	0.594
Industrial production - industry excluding construction, 2015=100	0.10	0.13	0.75	0.455
Freight transport - truck mileage, mio. km	–0.02	0.19	–0.11	0.914

A.2 High-frequency indicators used for nowcasting

Table A.8: High-frequency indicators

Indicator	Source	Sample
Apprenticeship seekers, persons	Austrian Labour Market Service	IQ90 – IIIQ19
Average CO2 emissions per km from new passenger cars	Statistics Austria, BMNT, WIFO	1M12 – 8M19
Average CO2 emissions per km from new passenger cars - top 15 makes	Statistics Austria, BMNT, WIFO	1M00 – 8M19
Consumption of private housholds and NPISH, volume	Statistics Austria, WIFO	IQ96 – IIQ19
Daily rate for unemployment benefit in €	Austrian Labour Market Service	IQ02 – IQ19
Daily rate of emergency unemployment assistance in €	Austrian Labour Market Service	IQ02 – IQ19
Domestic electricity consumption without consumption for pumped storage (domestic use public grid), GWh	E-Control, WIFO	1M00 – 7M19
Domestic electricity consumption without consumption for pumped storage (total domestic supply), GWh	E-Control, WIFO	1M95 – 7M19
Domestic gas consumption, GWh	E-Control, WIFO	1M00 – 7M19
Employed men aged 15-24, persons	Statistics Austria (LFS)	IQ04 – IIQ19
Employed men aged 15-24, type of living, persons	Statistics Austria (LFS)	IQ04 – IIQ19
Employed men aged 15-64 with eductional attainment level ISCED 3-8, persons	Statistics Austria (LFS)	IQ04 – IIQ19
Employed men aged 20-34, persons	Statistics Austria (LFS)	IQ04 – IIQ19
Employed persons aged 15-64 with eductional attainment level ISCED 3-8	Statistics Austria (LFS)	IQ04 – IIQ19
Employed persons aged 20-34	Statistics Austria (LFS)	IQ04 – IIQ19
Employed persons from non-EU member states	Organisation of Austrian Social Security	IQ08 – IIIQ19
Employed women aged 15-24, persons	Statistics Austria (LFS)	IQ04 – IIQ19
Employed women aged 15-24, type of living, persons	Statistics Austria (LFS)	IQ04 – IIQ19
Employed women aged 15-64 with eductional attainment level ISCED 3-8, persons	Statistics Austria (LFS)	IQ04 – IIQ19
Employed women aged 20-34, persons	Statistics Austria (LFS)	IQ04 – IIQ19
Employed women aged 25-44, persons	Statistics Austria (LFS)	IQ04 – IIQ19
Exports of cork and wood, €	Statistics Austria	1M06 – 6M19
Exports of crude materials and fuels, €	Statistics Austria	1M06 – 6M19
Exports of hides and skins, €	Statistics Austria	1M06 – 6M19
Exports of mineral crude materials, €	Statistics Austria	1M06 – 6M19
Exports of other crude materials, €	Statistics Austria	1M06 – 6M19
Exports of solid fuels, €	Statistics Austria	1M06 – 6M19
Exports of textile crude materials, €	Statistics Austria	1M06 – 6M19
Freight transport - truck mileage, mio. km	Asfinag	1M04 – 9M19
Generation of electrical energy from thermal power, GWh	E-Control, WIFO	1M90 – 7M19
Generation of electrical energy, GWh	E-Control, WIFO	1M90 – 7M19
Heating degree days, number	ZAMG, Statistic Austria	1M90 – 8M19
Imports of cork and wood, €	Statistics Austria	1M06 – 6M19

Indicator	Source	Sample
Imports of crude materials and fuels, €	Statistics Austria	1M06 – 6M19
Imports of hides and skins, €	Statistics Austria	1M06 – 6M19
Imports of mineral crude materials, €	Statistics Austria	1M06 – 6M19
Imports of other crude materials, €	Statistics Austria	1M06 – 6M19
Imports of solid fuels, €	Statistics Austria	1M06 – 6M19
Imports of textile crude materials, €	Statistics Austria	1M06 – 6M19
Industrial production - energy, 2015=100	Statistics Austria	1M96 – 7M19
Industrial production - industry excluding construction, 2015=100	Statistics Austria	1M96 – 8M19
Industrial production - intermediate goods excluding energy, 2015=100	Statistics Austria	1M96 – 7M19
Industrial production - mining and quarrying, 2015=100	Statistics Austria	1M96 – 7M19
Long-term unemployed persons	Austrian Labour Market Service	IQ04 – IIIQ19
Long-term unemployed persons, all status	Austrian Labour Market Service	IQ07 – IIIQ19
Market consumption of fuels, tons	BMWFW, WIFO	1M90 – 7M19
Market consumption of heating oil, tons	BMWFW, WIFO	1M90 – 7M19
Participation rate of men aged 15-64 with eductional attainment level ISCED 3-8, percent of male population of the same age	Statistics Austria (LFS)	IQ04 – IIQ19
Participation rate of men aged 20-34, percent of male population of the same age	Statistics Austria (LFS)	IQ04 – IIQ19
Participation rate of persons aged 15-64 with eductional attainment level ISCED 3-8, percent of population of the same age	Statistics Austria (LFS)	IQ04 – IIQ19
Participation rate of persons aged 20-34, percent of population of the same age	Statistics Austria (LFS)	IQ04 – IIQ19
Participation rate of women aged 15-64 with eductional attainment level ISCED 3-8, percent of female population of the same age	Statistics Austria (LFS)	IQ04 – IIQ19
Participation rate of women aged 20-34, percent of female population of the same age	Statistics Austria (LFS)	IQ04 – IIQ19
Persons in minor employment	Organisation of Austrian Social Security	IIIQ95 – IIIQ19
Persons in minor employment with freelance contract	Organisation of Austrian Social Security	IVQ02 – IIIQ19
Population, woman aged 25-44, persons	Statistics Austria (LFS)	IQ04 – IIQ19
Pupils and students aged 15-24, female persons	Statistics Austria (LFS)	IQ04 – IIQ19
Pupils and students aged 15-24, male persons	Statistics Austria (LFS)	IQ04 – IIQ19
Real GDP, trend-cycle component, €	Statistics Austria, WIFO	IQ96 – IIQ19
Recipients of disability pension under accident insurance, persons	Organisation of Austrian Social Security	IQ04 – IIQ19
Recipients of disability pension, persons	Organisation of Austrian Social Security	IQ04 – IIQ19
Recipients of pensions for reduced ability to work with related compensatory allowances, persons	Organisation of Austrian Social Security	IQ04 – IIQ19
Recipients of pensions for reduced ability to work with related derelict allowances, persons	Organisation of Austrian Social Security	IQ04 – IIQ19
Recipients of pensions with related compensatory allowances, persons	Organisation of Austrian Social Security	IQ04 – IIQ19

Indicator	Source	Sample
Recipients of pensions with related derelict allowances, persons	Organisation of Austrian Social Security	IQ04 – IIQ19
Recipients of the needs-based minimum benefit, persons	Austrian Labour Market Service	IQ12 – IIIQ19
Share of alternative power generation, percent of total electricity generation	E-Control, WIFO	1M00 – 7M19
Share of population aged 30-34 with degree from a university/university of applied science, percent of population of the same age	Statistics Austria (LFS)	IQ04 – IIQ19
Share of population aged 30-34 with eductional attainment level ISCED 5-8, percent of population of the same age	Statistics Austria (LFS)	IQ04 – IIQ19
Share of population with degree from a secondary school/university/university of applied science, percent of population	Statistics Austria (LFS)	IQ04 – IIQ19
Share of population with degree from a university/university of applied science, percent of population	Statistics Austria (LFS)	IQ04 – IIQ19
Share of population with eductional attainment level ISCED 5-8, percent of population	Statistics Austria (LFS)	IQ04 – IIQ19
Share of thermal power generation, percent of total electricity generation	E-Control, WIFO	1M90 – 7M19
Sick leaves, salaried employees, persons	Organisation of Austrian Social Security	IQ04 – IIQ19
Sick leaves, workers, persons	Organisation of Austrian Social Security	IQ04 – IIQ19
Stock of cattle, number	Statistics Austria	IQ09 – IQ19
Unemployed men aged 15-24, persons	Statistics Austria (LFS)	IQ04 – IIQ19
Unemployed men aged 15-24, type of living, persons	Statistics Austria (LFS)	IQ04 – IIQ19
Unemployed persons aged 15-24	Austrian Labour Market Service	IQ04 – IIIQ19
Unemployed persons aged 15-24	Statistics Austria (LFS)	IQ04 – IIQ19
Unemployed persons aged 15-24 with non-Austrian citizenship	Statistics Austria (LFS)	IQ04 – IIQ19
Unemployed persons aged 15-24 with non-Austrian country of birth	Statistics Austria (LFS)	IQ04 – IIQ19
Unemployed persons for a duration between 6 and 12 months	Austrian Labour Market Service	IQ97 – IIIQ19
Unemployed persons for a duration between 6 and 12 months	Statistics Austria (LFS)	IQ04 – IIQ19
Unemployed persons for a duration of more than 12 months	Austrian Labour Market Service	IQ97 – IIIQ19
Unemployed persons for a duration of more than 12 months	Statistics Austria (LFS)	IQ04 – IIQ19
Unemployed persons with less than ISCED-0-2 eductional attainment level	Statistics Austria (LFS)	IQ04 – IIQ19
Unemployed persons with only compulsory school leaving certificate	Austrian Labour Market Service	IQ04 – IIIQ19
Unemployed persons with only compulsory school leaving certificate	Statistics Austria (LFS)	IQ04 – IIQ19
Unemployed women aged 15-24, persons	Statistics Austria (LFS)	IQ04 – IIQ19
Unemployed women aged 15-24, type of living, persons	Statistics Austria (LFS)	IQ04 – IIQ19
Unemployed women seeking part-time work only, persons	Statistics Austria (LFS)	IQ04 – IIQ19
Unemployment rate for persons aged 15-24, in percent of dependent Labour force	Austrian Labour Market Service	IQ04 – IIIQ19

Indicator	Source	Sample
Unemployment rate for persons aged 15-24, in percent of Labour force of the same age	Statistics Austria (LFS)	IQ04 – IIQ19
Unemployment rate for persons with an umemployment duration between 6 and 12 months, in percent of Labour force	Statistics Austria (LFS)	IQ04 – IIQ19
Unemployment rate for persons with an umemployment duration of more than 12 months, in percent of Labour force	Statistics Austria (LFS)	IQ04 – IIQ19
Unemployment rate for persons with less than ISCED 0-2 eductional attainment level, in percent of Labour force with ISCED 0-2	Statistics Austria (LFS)	IQ04 – IIQ19
Unemployment rate for persons with non-Austrian citizenship aged 15-24, in percent of Labour force with same characteristics	Statistics Austria (LFS)	IQ04 – IIQ19
Unemployment rate for persons with non-Austrian country of birth aged 15-24, in percent of Labour force with same characteristics	Statistics Austria (LFS)	IQ04 – IIQ19
Unemployment rate for persons with only compulsory school leaving certificate in percent of Labour force with same characteristics	Statistics Austria (LFS)	IQ04 – IIQ19
Unemployment rate for persons with only compulsory school leaving certificate, in percent of dependent Labour force	Austrian Labour Market Service	IQ04 – IIIQ19
Wood harvest	WIFO, BMLFUW	IQ95 – IIQ19
Young persons aged <25 supported by the Austrian labour market service, persons	Austrian Labour Market Service	IQ07 – IIIQ19
Young persons aged 15-24 not in employment, education or training (NEET), persons	Statistics Austria (LFS)	IQ06 – IIQ19