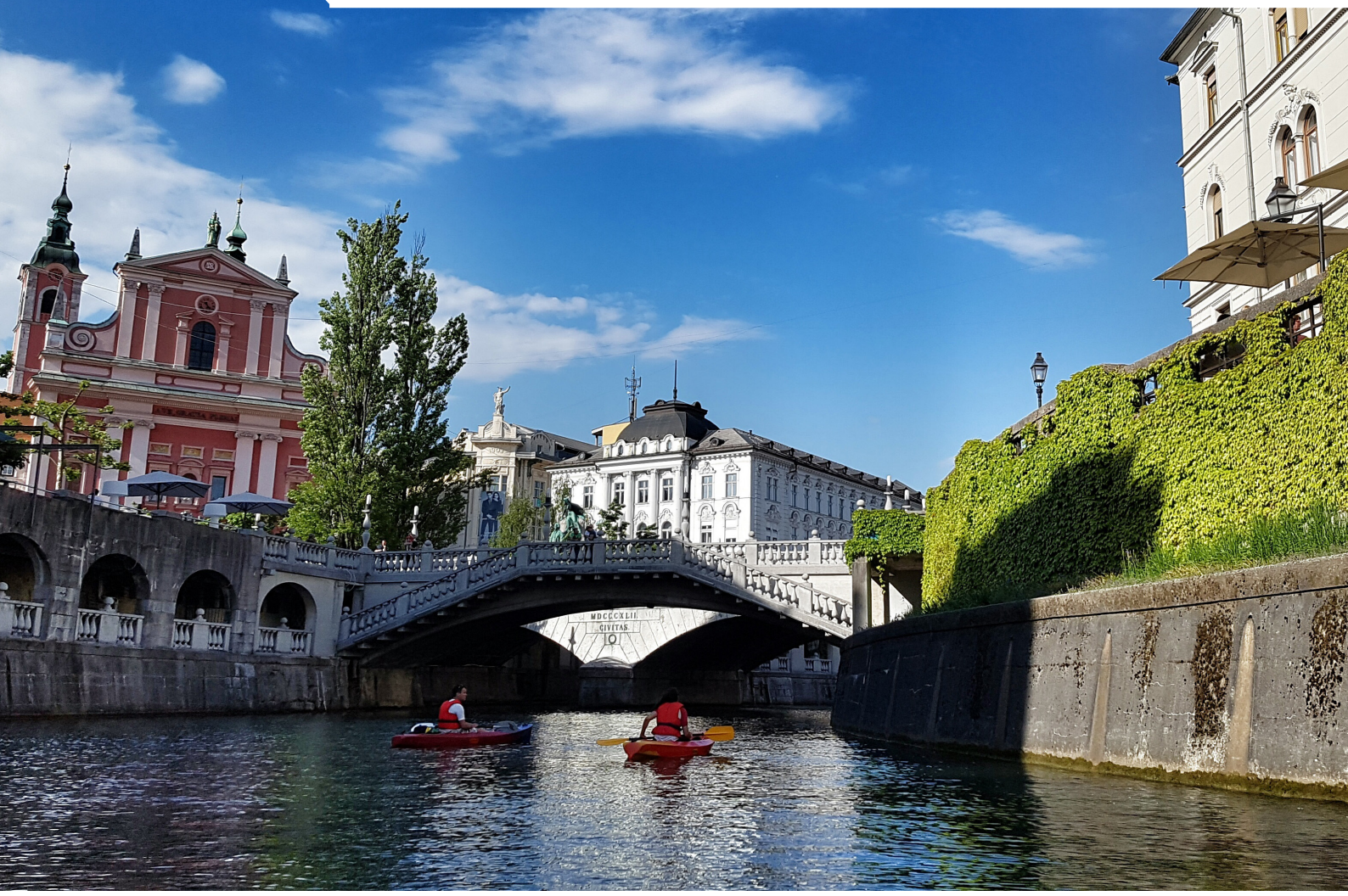
Development Strategy 2030

SLOVENIA

Prospects, challenges and policy options to achieve the main objectives

April 2019



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Slovenia Development Strategy 2030: Prospects, challenges and policy options to achieve the main objectives

The principal authors of the report are Jean Chateau, Alain de Serres, Yvan Guillemette and Fabrice Murtin, with significant contributions provided by Peter Gal and Anna Vindics. All are staff members of the OECD. The report has greatly benefitted from multiple exchanges with Slovenian authorities through workshops and seminars, as well as from useful comments and suggestions from officials, in particular Katja Lautar and Franci Kluzer from the Ministry of Finance, and Timotej Soos from the Ministry of Foreign Affairs. The authors are grateful to Alenka Smerkolj, former Minister at Government Office for Development and European Cohesion for her support to the project. They are also grateful to their OECD colleague Amelia Godber for editorial assistance.

Slovenia Development Strategy 2030: Prospects, challenges and policy options to achieve the main objectives

The Slovenian Government has developed a strategic vision for the country supported by a long-term national development strategy to achieve a number of goals towards that vision by 2030 and meet its commitments to the UN Sustainable Development Goals (SDGs). This report uses a multi-country and multi-sector modelling framework to develop a baseline scenario of the Slovenian economy until 2050, taking into account developments in neighbouring countries and, more broadly, the major regions of the world.

The baseline scenario, which is developed under the assumption of unchanged policy settings, underscores a number of areas where achieving the targets set by the government will be challenging as well as other areas where targets appear more easily within reach. The latter include the goals related to productivity and environmental objectives, even though some specific areas such as transport-related pollution emissions will pose major challenges. Among the targets that will be more difficult to achieve, the main ones are the employment rate increases, rises in average income (GDP per capita), public finance consolidation and income inequality reductions.

The report proposes a menu of policy options that could support the strategy elaborated by the government to achieve the main goals. The scope for improving the economic performance through structural reforms across a broad range of policy areas is illustrated through multiple scenarios developed with the modelling framework as alternatives to the baseline projection. Each scenario shows how productivity, employment (overall and for specific groups), life expectancy, greenhouse gas emissions and energy efficiency are impacted by changes in labour and product market policies, as well as by reform in the health sectors and environmental policies.

The first Chapter of the report provides a non-technical review of the modelling framework used to conduct the long-term projection and scenario analysis. The next Chapter presents a baseline scenario for the evolution of the Slovenian economy over the next three decades and discusses the key assumptions underpinning the projection. The main areas covered in the baseline scenario are the prime determinants of income growth (productivity, employment, investment), of environmental and public finance sustainability (energy, climate, budgetary pressures) and of well-being (health outcomes and efficiency). The final Chapter presents the main results from the scenario analysis undertaken with the modelling framework.

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Chapter 1. An analytical framework to map the national development strategy into a reform agenda

Jean Chateau, Alain de Serres, Yvan Guillemette and Fabrice Murtin

Introduction

The Slovenian Government has developed a strategic vision for the country supported by a long-term national development strategy to achieve a number of goals towards that vision by 2030 and meet its commitments to the UN Sustainable Development Goals (SDGs).[1] As part of its support to Slovenia for the elaboration of a policy strategy, the OECD is using a projection framework tailored to study the course of the Slovenian economy over the next 10, 20 and 30 years under different assumptions.

On the basis of this framework, a first "reference" scenario is constructed under the assumption of "unchanged policies", also referred to as "business-as-usual". This provides a baseline for the examination of alternative scenarios exploring the impact of different assumptions with respect to developments in the rest of Europe and the world, with a view to identifying future tensions most likely to emerge under current policy settings. It also serves as a starting point for the examination of different policy scenarios showing how changes in policy settings in different areas could influence the course of the economy.

The development of a baseline long-term scenario builds on the set of quantitative indicators that have been assembled in the measurement framework to quantify and monitor progress on the key objectives and goals set by the Slovenian authorities for the pursuit of the vision. The indicators are crucial to assess where the Slovenian economy stands relative to other countries in areas of strategic importance to the population, providing a benchmark against which long-term objectives can be set.

The long-term scenario goes one step further by providing a more dynamic picture of the economy, showing where it may stand relative to other countries in 20 to 30 years, taking into account broad development trends in Slovenia as well as the rest of the world. The same framework is used to assess the impact of different policy menus to achieve a number of goals set under the national development strategy.

Doing so across a number of well-being domains such as income, innovation, inclusiveness and the environment requires the elaboration of a framework that not only connects together the various objectives, but also links each of them to policy instruments through well-established channels. Hence, the set of variables and goals that can be covered and projected in such a framework is inevitably more limited than the set of quantitative indicators provided through the measurement framework.

This Chapter provides a non-technical review of the modelling framework used to conduct the long-term scenario analysis. The next section lays-out the broad structure of the framework, summarising the main modules, how they are related to each other, as well as the set of variables and goals they can cover, respectively. The following sections provide more details on the structure of each module.

[1] See Slovenian Development Strategy 2030.

1.1. An overview of the modelling framework

One purpose of the modelling framework is to project plausible, albeit conditional, global economic developments over the next 10, 20 and 30 years, in a way that allows for drawing implications for individual countries, including small open economies such as Slovenia. For this information to help with the pursuit of the goals set in the national development strategy (henceforth NDS), economic development needs to be defined sufficiently broadly to encompass dimensions of well-being beyond average income, such as health, job opportunities and earnings dispersion. It must also be defined in a way that is consistent with the preservation or expansion of different types of "capital", in particular human, physical, social and environmental capital. This is to ensure that the economic development path is sustainable.

At the same time, the modelling framework needs to provide explicit links between the main dimensions of economic development and policy levers. In doing so, it should capture the policy influence on key dimensions through both direct and indirect channels, so as to allow for richer policy interactions, but also to make explicit areas of policy synergies and trade-offs. The approach taken for generating long-term scenarios that meet these objectives and constraints is to bring together different models – each focusing on different aspects of economic developments – in a framework that is sufficiently flexible to be adapted to country-specific challenges and circumstances.

The link to policies acknowledges that different dimensions of economic development are driven by a combination of both policy and non-policy factors. GDP per capita tends to be higher in countries that pursue pro-growth policies (i.e policies to boost employment and productivity through investment in physical and knowledge-based capital), but it is also affected by other drivers, which can be (largely) exogenous, such as the demography and geography, or endogenous, such as good health or education. In a similar manner, health outcomes are influenced by health policies, such as government spending on health care, but also indirect factors, such as income, education and pollution, suggesting that there may be feedback linkages between different outcomes. The way resources are distributed (i.e. social protection and tax and transfer policies) can also affect equality of opportunities to participate in the production process and potentially average outcomes.

The overall framework consists of four modules, as illustrated in Figure 1. A macro module focuses on key determinants of income generation such as productivity, investment in both physical and knowledge-based capital, employment and skills development. Together, they determine the medium- and long-term growth rate of the economy as measured by GDP. The focus is on the long-term drivers of growth, and thus on the aggregate supply-side determinants, but the module also includes government and external accounts. This means that in the medium to long term, the evolution of GDP is determined by trend employment and the amount of value-added in goods and services produced on average by each employee (which is labour productivity). In turn, as will be explained below, labour productivity is influenced by investment in physical capital, both private and public, but also knowledge-based capital (R&D, software and databases, design, reorganisation of production and staff training, etc.).[2]

[2] In this framework, long-term average income is determined by supply-side determinants, i.e. the resources invested in generating value added. Average income is in turn distributed from firms to workers, investors and ultimately to households, both directly and via the taxes and transfers

From the macro module determining economy-wide outcomes, the framework goes to a more sectoral and disaggregated analysis, with a focus on issues such as environmental sustainability and inclusiveness. The environmental module is based on a detailed sectoral structure of the economy, in particular in the areas of energy demand and supply (production), as well as sectors of particular relevance to the emission of greenhouse gases (e.g. agriculture, forestry, and energy-intensive sectors). The detailed sectoral composition of the environmental module also allows for issues of trade and competitiveness to be explored, using as an input the outcome of the firm-level analysis showing the position of Slovenian firms in terms of productivity performance relative to the best – or "frontier" firms – at the world level within each industry.

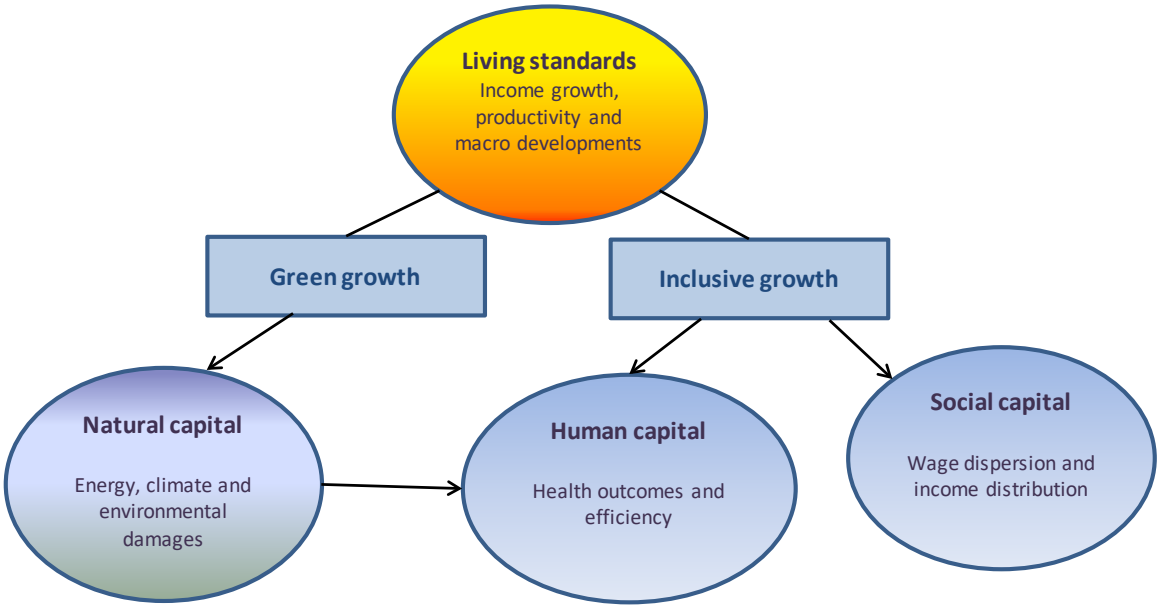
The emphasis of the other two modules is on dimensions of well-being, namely health outcomes and income distribution. The structure of the latter two modules is rather simple, consisting of one main relationship linking measures of health outcomes and income distribution, respectively, to a number of policy and non-policy determinants. As indicated in Figure 1.1, several of the projected variables from the core module are used as input into the other three modules. More specifically:

- GDP per capita, the average number of years of schooling in the population, and public spending on healthcare all feed into the module on health outcomes.
- The level of productivity, the amount of investment in R&D as a percentage of GDP and the skill composition of the population are used as inputs in the income inequality module.
- GDP per capita, the level employment, and the level of productivity are used in the environment module along with the overall external balance. In turn, pollution emissions generated by the environmental module feed into the module on health outcomes.

Aside from the environmental module, most of the main relationships linking outcomes to policy (and non-policy) drivers are obtained from cross-country / time-series regression analysis on the basis of aggregate data. One implication is that the estimated impact of a given driver represents a cross-country average that applies in a linear fashion independently from country-specific circumstances that could influence the magnitude of the effect. To some extent, country-specific effects can be obtained by conditioning the impact of a policy change in one area on initial policy settings in this or another area. There is a possibility to use country-specific (conditional) impact in the cases where such conditioning is supported by evidence. For example, the impact of labour market reforms on employment could be stronger if regulatory barriers to the entry of firms are relatively low (Égert and Gal, 2018).

operated by governments. In this simple framework, overall aggregate demand has little effect on long-term supply, but the composition of demand, in particular between investment and consumption, does influence supply through the capital stock and labour productivity.

Figure 1.1. The structure of the modelling framework in a nutshell



1.2. The model for long-term projections of income per capita and its main drivers

The long-term growth module characterises the supply-side of the economy, with average income being proxied by GDP per capita. The projection is anchored in a standard production function (modelled as a Cobb-Douglas) which provides a natural and coherent framework for assessing the influence of policies through the two main proximate determinants of GDP per capita, namely labour productivity and employment. The quantitative impact of policies is typically obtained from reduced-form empirical estimations across a large set of countries (both OECD and non-OECD in the case productivity, mostly OECD in the case of employment).

1.2.1. The influence of policy and non-policy drivers through labour productivity

For the purpose of the long-term projection, labour productivity is measured as GDP per person employed and is decomposed into its two principal components, capital deepening and multi-factor productivity (MFP). Hence, the influence of policy and non-policy determinants on labour productivity is captured through two main empirical relationships (Figure 1.2). Even though such a distinction raises a number of issues related to the measurement of MFP, it allows for a broader set of empirical determinants and policy channels to be identified. Furthermore, a separate focus on MFP is particularly important in the context of a projection horizon over which most of the gains in material living standards arise from factors such as investment in knowledge-based capital and innovation.

The relationship for *capital deepening* -- measured as the ratio of the stock of physical capital (building, machine and equipment)[3]to output (GDP) -- aims to capture the contribution to labour productivity of technologies that are embodied in equipment. In the long run, the capital-output ratio is determined by components of the user cost of capital (relative price of investment, real interest rate and the corporate tax rate) as well as by indicators of product and labour market regulations. In the former case, the indicator measures the extent of regulatory barriers to competition in network industries (ETCR), while in the case of the labour market the indicator measures the strictness of employment protection legislation (EPL) on open-ended contracts. Long-term investment is thus directly related to three structural policy variables: *corporate taxation, product market regulation and job protection legislation* (Table 1.1).

Policy variables such as the regulatory barriers to competition and employment protection legislation are constructed in the form of numerical or quantitative indicators which capture the stance of legislation the respective areas. For instance, the indicator of product market regulation (ETCR) measures the incidence of regulatory barriers to competition via ***state control of business operations*** and ***the protection of incumbents***, as well as through various ***legal and administrative barriers to start-ups*** or ***to foreign trade and investment***. The indicator is constructed based on detailed information on regulatory practices across a large number of sectors, with a strong emphasis on network industries, but also professional services and retail distribution.[4]

The relationship for *multi-factor productivity* (MFP) plays a central role in the long-term model insofar as it largely determines the process of income convergence across countries (in addition to capturing a broad range of policy channels).[5] The main empirical determinants include a mix of intermediate growth drivers such as education (human capital), openness to international trade, investment in innovation and a measure of income dispersion, as well as a number of policy variables that conditions the market environment in which businesses operate. Convergence in average income across countries is conditional on differences in the level of these determinants gradually narrowing over time.

The direct policy determinants of MFP, i.e. those that condition the market environment (often referred to as framework conditions) include the *quality of institutions* (as measured by a World Bank governance indicator called the rule of law) and the same measure of *regulatory barriers to competition* in network industries (ETCR) as used in the relationship for capital deepening. This is in addition to policy variables affecting MFP through trade openness, R&D investment, human capital and a measure of income inequality. A preliminary estimation of the relative impact of the main drivers is shown on Figure 1.3.

[3] See Guillemette, de Mauro and Turner (2018) for more details on the projection of the capital stock and investment.

[4] The acronym ETCR stands for Energy, Transport, Communication and Retail industries.

[5] See Guillemette et al (2017) for more details on the multi-factor productivity convergence framework.

Figure 1.2. The determinants of labour productivity

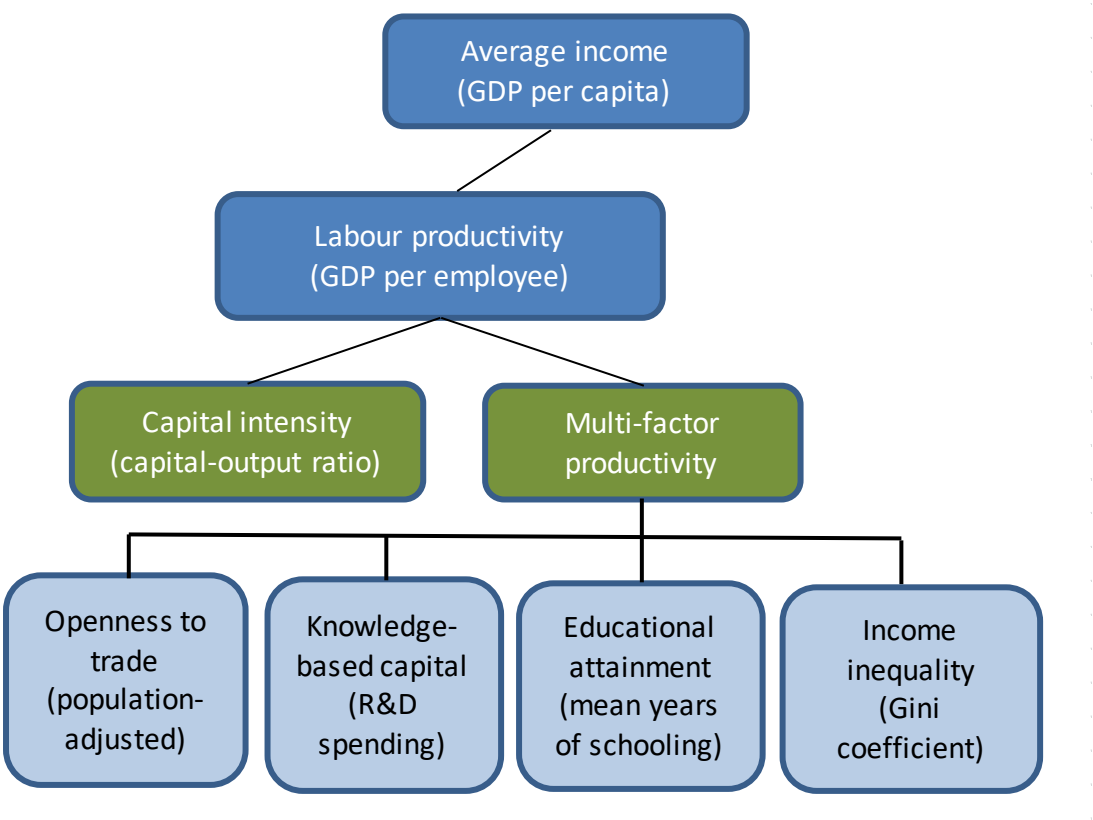
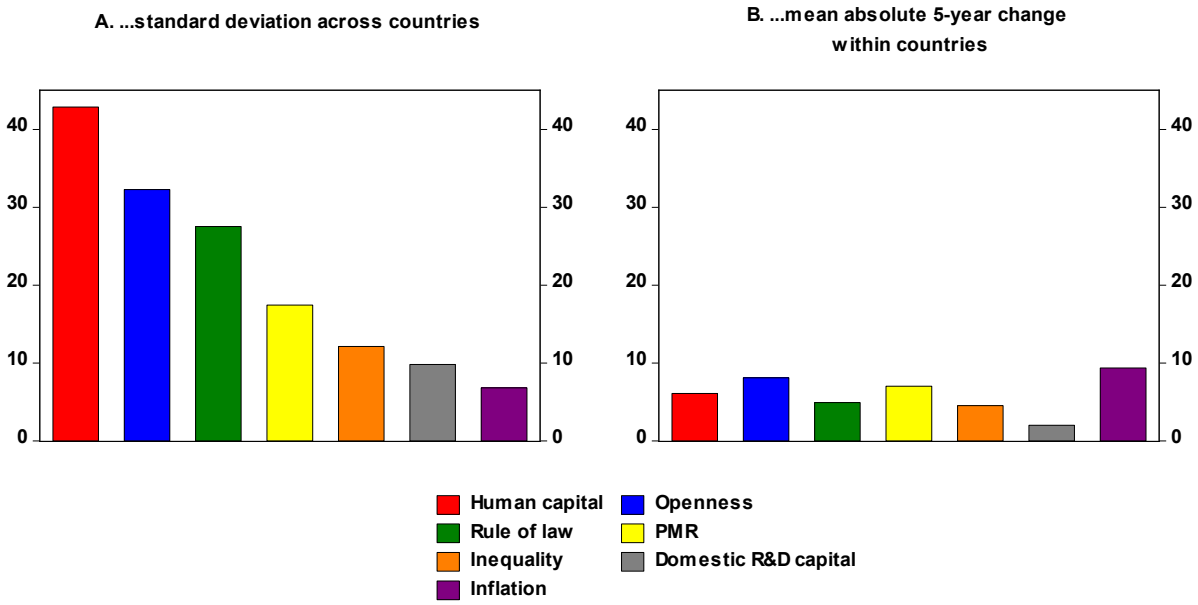


Table 1.1. Policy and institutional variables having an influence on employment rates

Multi-factor productivity	Capital output ratio
Policies and institutions • Regulatory barriers to competition (OECD ETCR indicator) • Rule of law (World Bank Governance Indicators)	**Policies** • Corporate tax rate • OECD indicator of employment protection legislation • Regulatory barriers to competition (OECD ETCR indicator)
Intermediate drivers • Trade openness (sum of exports and imports as a ratio of GDP, adjusted for population size) • R&D intensity (business spending on R&D as a percent of GDP) • Human capital (mean years of schooling) • Income inequality (Gini coefficient)	**Other drivers** • Relative price of investment good (ratio of deflator of investment to GDP deflator) • Inflation-adjusted long-term interest rate

Figure 1.3. Long-term effects of structural policy changes on MFP

Per cent increase in equilibrium labour efficiency following an improvement in the determinants calibrated on…



Source: Guillemette and Turner (2018)

1.2.2. The influence of policy and non-policy drivers through employment

The long-term profile of total employment to overall population is derived from a combination of i) demographic projections that set the evolution of working-age population (age 15-74), ii) a cohort analysis of likely trends in aggregate employment rates, and iii) empirical relationships that link the employment rates of different age/sex groups to a number of policy determinants (Figure 1.4) (Guillemette and Cavalleri, 2017). The main set of policy variables having an influence on aggregate employment rates can be regrouped into four broad categories: tax-benefit systems and activation policies, wage-setting institutions, labour and product market regulations, and control variables. The impact of these variables can be measured directly on aggregate employment rates or indirectly through their (distinct) effects across age or skill groups (Gal and Theising, 2015). A number of additional variables that operate only through specific groups are also included, as indicated in Tables 2 and 3.

- *Government spending on childcare benefits* (in particular in-kind benefits) and the length of maternity leave (in weeks) have both a positive impact on the employment rate of prime-age women.
- *The legal age of retirement* has an impact on the employment rates of elderly workers (55-64), with a small aggregate effect.
- A few policy variables may have a relatively limited impact on aggregate employment but entail more significant effect on the composition across skill level or age groups. For instance, strict employment protection legislation raises the employment rate of high-skilled workers at the expense of low- and medium-skilled ones. High regulatory barriers to product market competition tend to lower the employment rate of medium-skilled workers most.

Figure 1.4. The proximate determinants of total employment to population

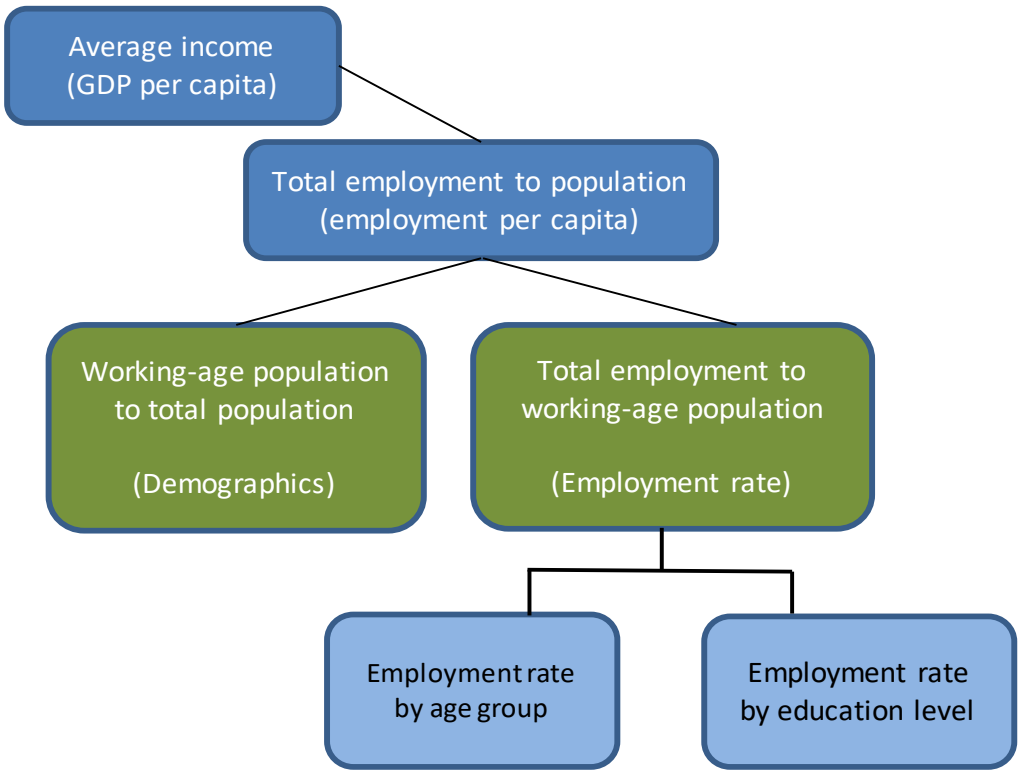


Table 1.2. Policy and institutional variables having an influence on employment rates

Tax-benefit system and activation policies • Unemployment benefit replacement rates (gross, average across durations, family statuses and income levels) • Spending on active labour market policies (per unemployed, as % of GDP) • Labour tax wedge (couple with a single earner and 2 children)	**Wage-setting institutions** • Minimum wages (as % of median) • Excess coverage of wage bargaining agreements (difference between bargaining coverage and union coverage)
Product market regulations • Regulatory barriers to competition in network industries (ETCR)	
Policies affecting specific groups • Legal retirement age • Government spending on family benefits (in-kind, per GDP, %) • Length of maternity leave (weeks)	**Average skills level** • Educational attainment (adjusted years of schooling)

Table 1.3. Effects of structural policy changes on the employment rate

Percentage point change in age/sex-specific employment rate for a one-unit change in indicator

	Standard deviation[1]	Youth (15-24)	Prime-age women	Prime-age men	Elderly (55+)
UE benefit replacement rate (in pp)	9.5	-0.183	-0.204	-0.147	-0.343
ALMP spending (pp of GDP per capita)	20.8	0.147	0.092	0.047	0.063
Tax wedge single (pp of labour costs)	9.4	-0.866			
Tax wedge couple (pp of labour costs)	11.9			-0.274	-0.26
Excess coverage (pp of workforce)	23.6		-0.171		
Minimum wage (pp of median wage)	12.3	-0.311	-0.421		
Family benefits in kind (pp of GDP)	0.6		4.698		
Number of weeks of maternity leave	9		0.265		
Legal age for pensions	3.8				0.851
ETCR (index, higher is more restrictive)[2]	1.5		-0.762	-0.762	
Educational attainment (years of schooling)[3]	2.3	-2.83	1.706	0.582	

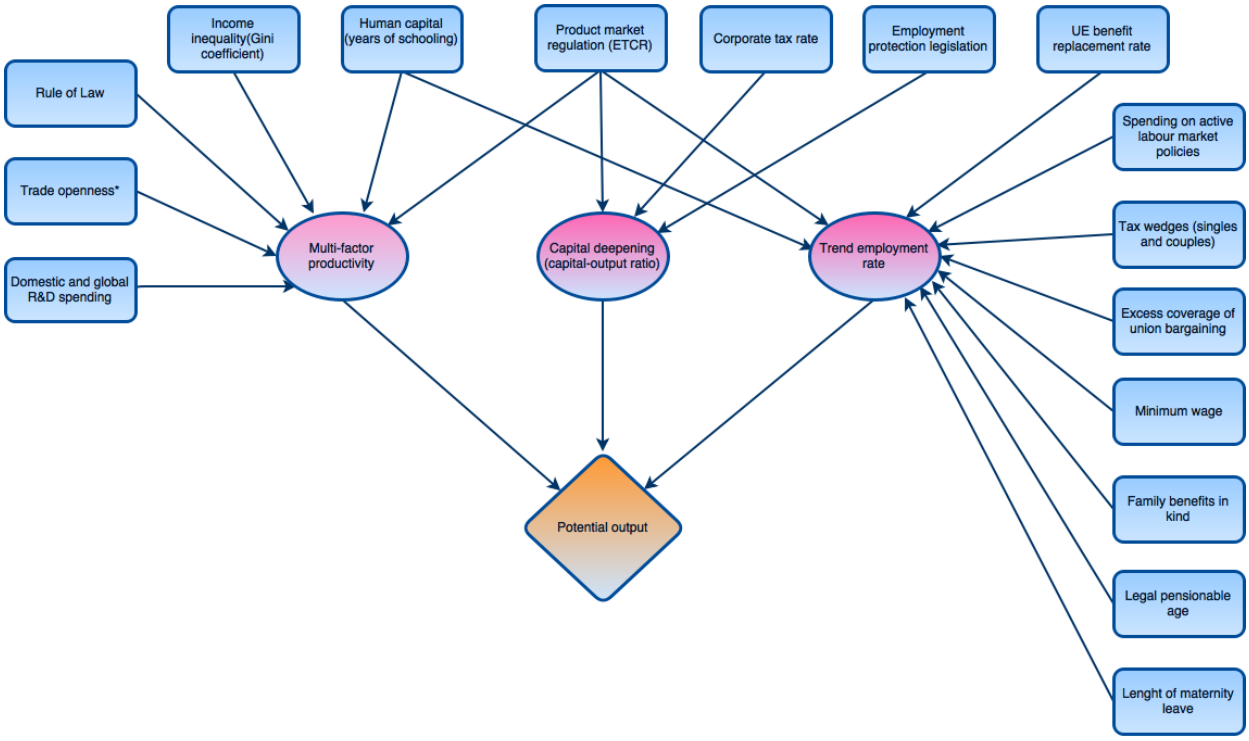
1. Except for educational attainment, standard deviations are from Table 5 in Gal and Theising (2015). All figures include both within- and between-country variation and generally cover OECD countries.
2. In Égert and Gal (2016), the ETCR effect is only statistically significant for prime-age women. Here it is assumed to apply equally to men and women but is calibrated to match the overall effect reported by these authors.
3. The educational effects for prime-age men and women are from the empirical work underlying Égert and Gal (2016), even though these effects are not reported in the paper. The youth effect is from new estimation work described in the next sub-section.
Source: Égert and Gal (2016), Gal and Theising (2015) and authors' calculations.

1.2.3. Other key relationships of the long-term growth module

Despite its focus on the supply side and the generation of income, the long-term growth module also includes a number of relationships to project the evolution of the current account, the public sector budget balance and the general government debt. The current account is essentially modelled as the difference between aggregate saving and investment. The private component of aggregate investment is determined as the flow needed to achieve the desired capital-output ratio, while the public sector component (public investment) is set exogenously as a policy variable. The profile of private saving is a function of the dependency ratio, life expectancy, labour productivity, private credit, the oil trade balance and the fiscal balance (through partial Ricardian effects). The public sector component of saving is set by the budget balance, and is hence based on both spending and tax decisions.

An overview of the linkages between policies and average income (or potential output) through the three main drivers on the supply side appears in Figure 1.5. It provides an indication of the broad set of policy variables that can be used to capture and assess the impact of reforms. To give some examples, a reform of public procurement procedures that would reduce the vulnerability to corruption would be captured as a strengthening of the rule of law indicator. In the same vein, an improvement in the issuance of licenses for starting a business, while facilitating the entry in regulated professions would translate into a reduction in the indicator of regulatory barriers to competition (ETCR). In both cases, this would also boost productivity, as well as employment in the case of more competition-friendly product market regulation. Regarding the labour market, increasing resources for job-search assistance and training, in particular for the long-term unemployed and low-skilled, would raise the employment rate in the medium to long term.

Figure 1.5. Overall structure of the macro module with policy channels on main drivers of income



Source: Turner and Guillemette (2018)

1.3. The environmental module

The environmental module is based on the OECD ENV-Linkages modelling framework (Chateau, Dellink and Lanzi, 2014)). It describes economic activities in different sectors and regions and how they interact. Like the long-term growth model, it is also a global economic model featuring all the main regions/countries of the world. The model is built on a consistent set of data describing the behaviour of production sectors and consumers in the different regions, with a focus on energy and international trade. One of the main strengths of the model is to link economic activity to environmental pressures -- more specifically greenhouse gas (GHG) emissions – and shed light on the medium and long-term impact of environmental policies.

1.3.1. The broad structure of the environmental model

In contrast to the other modules that are based on estimated semi reduced-form relationships, ENV-Linkages is a calibrated dynamic computable general equilibrium model, which allows for better exploiting the sectoral details in assessing the environmental impact of production and trade. Production is assumed to operate under cost minimisation with perfect markets and constant return to scale technology. The sector-level production technology is specified as nested Constant Elasticity of Substitution (CES) production functions in a hierarchy as exposed in Figure 1.6.

The model adopts a putty/semi-putty technology specification, where substitution possibilities among factors are assumed to be higher with new vintage capital than with old vintage capital. In the short run, this ensures inertia in the economic system, with limited

possibilities to substitute away from more expensive inputs, but in the longer run this implies relatively smooth adjustment of quantities to price changes. Capital accumulation is modelled as in the traditional Solow/Swan neo classical growth model. The macroeconomic dynamic of the model matches perfectly the projections of growth model described in section 3.

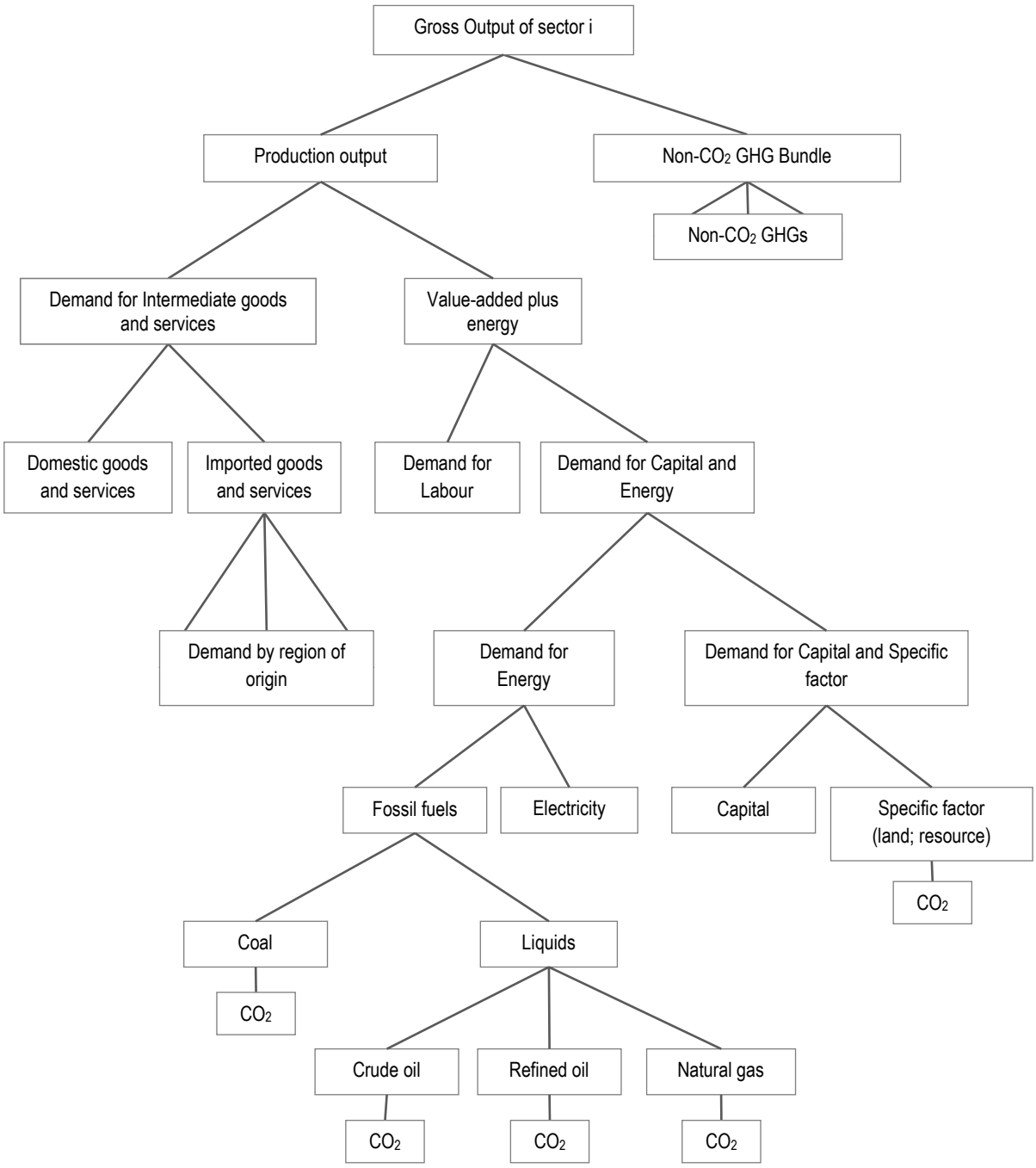
The energy bundle is of particular interest for analysis of climate change issues. Energy is a composite of fossil fuels and electricity. In turn, fossil fuel is a composite of coal and a bundle of the "other fossil fuels". At the lowest nest, the composite "other fossil fuels" commodity consists of crude oil, refined oil products and natural gas. The value of the substitution elasticities are chosen as to imply a higher degree of substitution among the other fuels than with electricity and coal.

International trade is based on a set of regional bilateral flows. The model adopts the Armington specification, assuming that domestic and imported products are not perfectly substitutable. Moreover, total imports are also imperfectly substitutable between regions of origin. Allocation of trade between partners then responds to relative prices at the equilibrium. Market goods equilibria imply that, on the one side, the total production of any good or service is equal to the demand addressed to domestic producers plus exports; and, on the other side, the total demand is allocated between the demands (both final and intermediary) addressed to domestic producers and the import demand.

Emissions can be abated through three channels: (i) reductions in emission intensity of economic activity; (ii) changes in structure of the associated sectors away from the 'dirty' input to cleaner inputs, and (iii) changes in economic structure away from relatively emission-intensive sectors to cleaner sectors. The first channel, which is not available for emissions from combustion of fossil fuels, entails end-of-pipe measures that reduce emissions per unit of the relevant input. The second channel includes for instance substitution from fossil fuels to renewable in electricity production, or investing in more energy-efficient machinery (which is represented through higher capital inputs but lower energy inputs in production). An example of the third channel is a substitution from consumption of energy-intensive industrial goods to services. In the model, the choice between these three channels is endogenous and driven by the price on emissions.

The long-term profile of aggregate productivity and value-added for all major regions / countries is determined by the long-term growth model, but the environmental module determines the change over time in production structure and trends in trade specialisation across the sectors included in the model (Table 1.4). More specifically, some sectors in some countries take advantage of comparative advantage associated with the change in endowments of production factor inputs or in their efficiency of use relative to other factors. This explains that changes in production patterns do not necessarily correspond to changes in demand and partly reflect changes in trade specialisation patterns. One factor that shape comparative advantage is the performance of Slovenian firms in each sector relative to both the national frontier and, more importantly, the global frontier, which is measured as the average level of productivity of the top 5 per cent firms at the world level in a given sector. This is based on firm-level data analysis conducted for Slovenia which serves as a complementary input on the environmental module, and in particular for the elaboration of the baseline.

Figure 1.6. Production structure of a generic sector in ENV-Linkages



Source: Chateau, Dellink and Lanzi (2014).

1.3.2. The link to policies

The environmental module is designed to explore the impact of policy mixes on a range of environmental issues, including the phasing-out of fossil-fuel subsidies, the pricing of GHG emissions and other climate change mitigation policies. Measures with budgetary implications can be fully taken into account and offset through changes in the tax or spending structure of public accounts. The module can also be used to study the impact of regulatory or technology-enhancing measures to promote greener modes of production and growth. As a by-product of its structure and scope, the module can also be used to explore more sector-based or trade-related measures, although in this case the link from policy to outcome may be less direct. Finally, given its interaction with the long-term growth module, the environmental module can be used to assess the environmental consequences of pro-growth policies.

Table 1.4. Sectoral aggregation of ENV-Linkages

Agriculture, Fishing and Forestry	Manufacturing
Paddy rice	Food Products
Wheat and meslin	Textiles
Other grains	Chemicals
Vegetables and fruits	Iron and steel
Oil seeds	Pulp, paper and publishing products
Sugar cane and sugar beet	Non-metallic minerals
Fibres plant	Motor vehicles
Other crops	Non-ferrous metals
Livestock	Electronic equipment
Forestry	Fabricated metal products
Fisheries	Wood products
Non-manufacturing Industries	Other transport equipment
Coal extraction	Other machinery and equipment
Crude oil extraction	Other manufacturing
Natural Gas extraction and distribution	**Services**
Other mining	Land transport
Petroleum and coal products	Air transport
Electricity transmission and distribution	Water transport
Electricity generation (7 technologies [#])	Business services
Water collection and distribution services	Non-business Services (government,…)
Construction	

[#] *Note:* Electricity generations: Nuclear Electricity; Hydro (and Geothermal); Solar &Wind; Coal-powered electricity; Gas-powered electricity; Oil-powered electricity; Other (combustible renewable, waste,...).

Source: Chateau, Dellink and Lanzi (2014).

1.4. The health and life expectancy module

In the case of health outcomes, a production function approach is also being used to describe the links with input (intermediate drivers) and policies. As illustrated in Figure 1.7, aside from the provisions of health care services, the main inputs in the health production function include pollution and education. Education plays a role through increased awareness and more effective use of health services. Besides, time and country-specific factors are included to account for various effects such as long-term medical progress, geography, life style and culture.

The main inputs to the health function (and hence underlying policies) are consistent with those of other modules: health spending and education outcomes are the same used by the long-term growth model, while pollution emissions are determined by the environmental module. A few policy variables are directly related to the health module: in addition to the amount of public spending on health, measures of spending efficiency based on a survey of institutional characteristics of the health sector provide a direct policy lever to influence health outcomes (de la Maisonneuve et al., 2016).

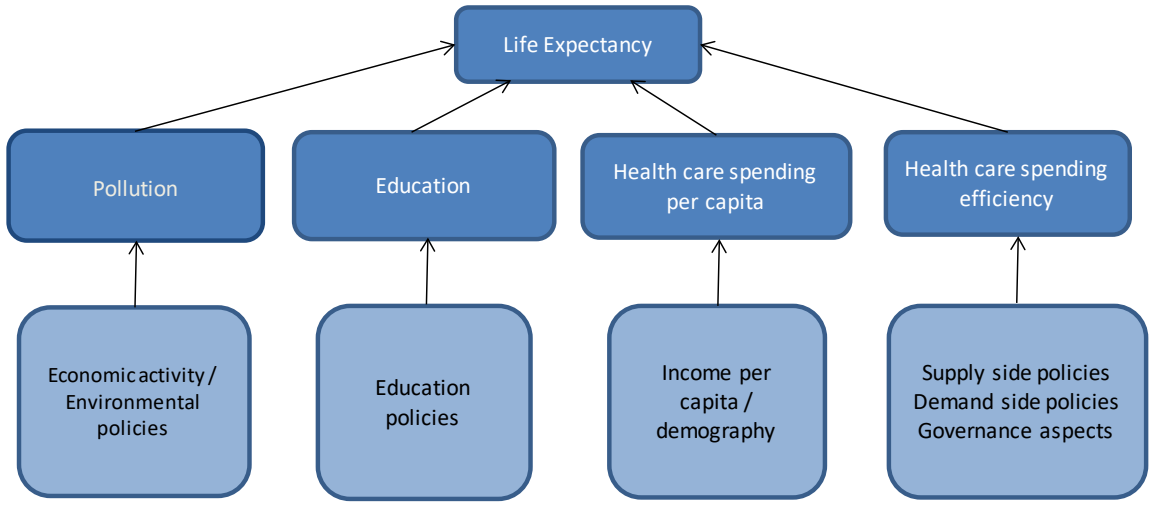
More specifically, the institutional set-up of health systems is characterised by a series of indicators that can be regrouped in three broad categories according to whether they influence primarily i) the supply side (e.g. incentives to generate service volume, incentives for quality, choice among providers, regulation on hospital supply and prices); ii) the demand side (e.g. gatekeeping, depth of basic insurance); or iii) the public management, coordination and financing aspects of the health system (e.g. use of health technology assessment, degree of decentralisation of health system functions).

In the framework shown on Figure 1.7, this set of institutions and policies of the healthcare sector can influence health outcomes and longevity through spending efficiency. Put differently, the joint impact of a given policy or institution on health spending and longevity can be used to assess the potential efficiency gains from a specific reform. For example, an increase in competition among providers of complementary health insurance would generally help to reduce costs in the long term while improving outcomes as fewer people renounce prevention or early-symptom treatments, especially among low-income, high-risk groups. Also, a better rationalisation of spending on new health technologies towards those that bring highest cost-effective innovations would deliver stronger gains in outcomes for a given amount of additional spending (Lorenzoni et al., 2018).

Figure 1.8 reviews all health system indicators used in the analysis.[6] Slovenia ranks higher than the OECD average on a number of institutions and policies that have been effective at reducing cost pressures, such as the *scope and depth of coverage* of minimal insurance, the use of *over-the-basic market forces* for complementary health insurance as well as the degree of *regulation of workforce and equipment*. Priorities for reforms concern the domains that imply no trade-off between outcomes and spending, namely those institutions that reduce cost pressures without hampering healthcare quality, or conversely, those institutions that foster healthcare quality without increasing cost pressures.

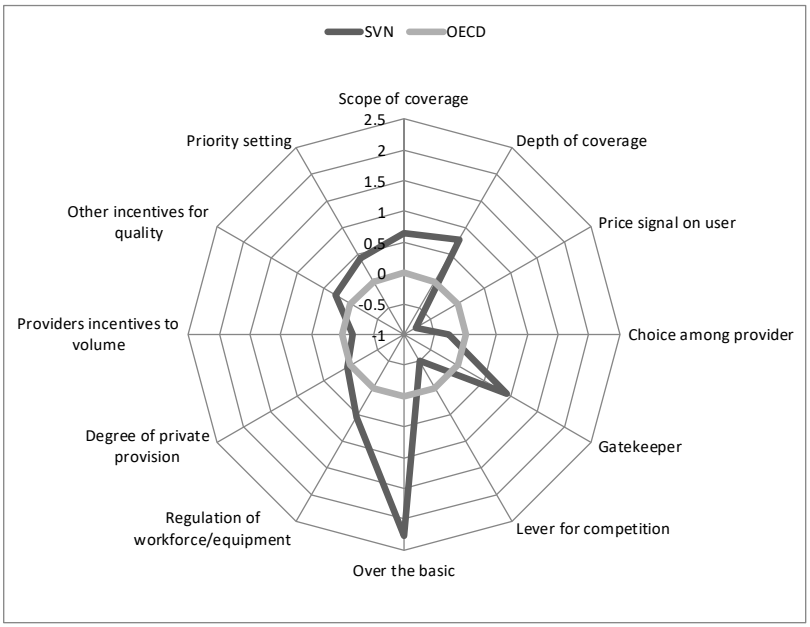
[6] Each indicator is standardised so that 0 corresponds to the OECD average and 1 to one standard deviation.

Figure 1.7. The links between policies and core determinants of life expectancy



Source: Lorenzoni et al., 2018

Figure 1.8. Health system characteristics in Slovenia

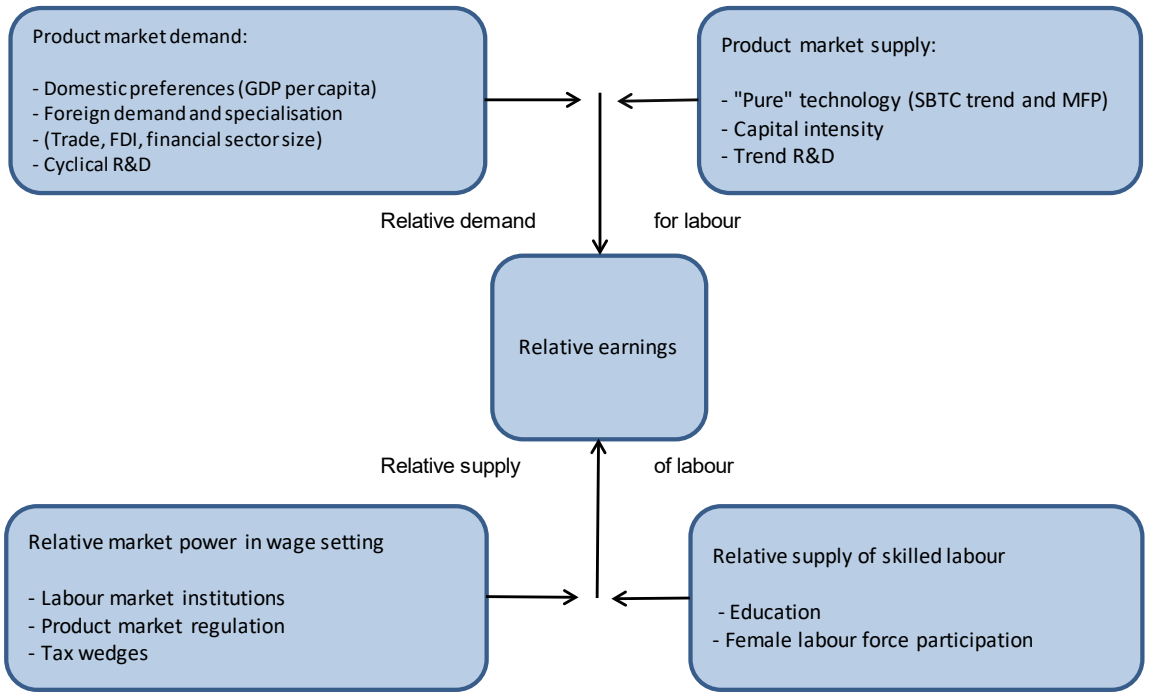


Note: standardised indicators of health system characteristics. A value of 1 represents one standard deviation from OECD average, which is set to zero for all variables.

1.5. The earnings dispersion module

The earnings dispersion module focuses on the determinants of wage dispersion and is based on an extended version of the Tinbergen model whereby wage dispersion largely results from a race between skill-biased technical change and rising educational attainments (Braconier and Ruiz Valenzuela, 2014). The outcome variable (the ratio of top to bottom wage deciles) is related to a number of policy and non-policy determinants in the area of globalisation, innovation and productivity, education, product and labour market regulations, social protection and wage bargaining institutions, as well as taxation (see Figure 1.9 for an illustration). For the long-term baseline projection, the non-policy drivers such as productivity, trade, education and the labour force participation of women are provided for the most part by the long-term growth module.

Figure 1.9. Determinants of earnings dispersion in the extended Tinbergen framework



1.6. The mapping of NDS priorities and goals into the framework: An overview

The National Development Strategy is articulated around five strategic orientations with a view to delivering a high quality of life for all: i) resilient, inclusive, safe and responsible society, ii) highly productive economy that creates value for all, iii) learning for and through life, iv) well-preserved natural environment and v) high level of cooperation, competence and governance efficiency. These orientations are supported by more specific goals, many of which can be covered directly or indirectly by the framework.

The more specific goals covered are listed in the set of tables below (see Table 3.1 in Chapter 3). Both the main goals and underlying objectives are mentioned in Table 1.5, along with the module of the framework to which each of the goals best corresponds. An important distinction is made also between goals that can be derived as output or outcomes

for the model – indicated in the table with an "O" in brackets – versus other goal areas which can be used as inputs in one or more of the modules – indicated with an "I" in brackets. In the latter case, the contribution of the model consists in assessing the implications for other outcomes of developments in specific goal areas.

One example is various measures to improve educational outcomes, which are assumed to improve human capital (a major driver of growth and health outcomes) or targeted R&D in clean technology, which can lead to a faster transition to renewables or increase energy efficiency. The model does not inform about the best way to achieve better outcomes in these areas but can give an indication of the potential gains in terms of productivity, environmental quality and income distribution. Put differently, the translation of policy measures into changes in human capital or energy efficiency gains is done outside the modelling framework. As another example, the benefits from *enhancing the flexicurity system* can be simulated with a combination of a loosening of job protection legislation and a strengthening of active labour market policies.

Table 1.5. Linking the NDS objectives with the framework modules and variables

Main goal	*Underlying objectives*	*Module and variables*
Healthy and active life **(1)**	- Adjusting social subsystems to change population, in areas such a labour market, social protection systems, migrations. (I) - Ensuring access to high-quality healthcare services and L-T care. (I) and (O).	*Long-term growth module and health module:* Years of healthy life, life expectancy, age dependency ratio
Knowledge and skills for high-quality life and work **(2)**	- Developing knowledge and skills for life, improving functional literacy. (I) - Ensuring effective education at all levels to improve employability of individuals (I) - Encourage low-educated and other disadvantaged groups to participate in education and training, increasing mobility and reducing social exclusion (I)	*Long-term growth module and health module*: - Efficiency of education spending, employment rate of medium and high-skilled workers
Decent life for all **(3)**	- Ensuring a suitable level of income with a view to reducing the risk of poverty and social exclusion. (O) - Designing sustainable social protection systems. (I)	*Income inequality module* Policies to prevent widening of wage dispersion.
Culture and language as main factors of national identity **(4)**		
Economic stability **(5)**	- Promoting sustainable economic development to reduce the gap vis-à-vis more advanced economies. (O) - Devising solutions to pursuing general government structural balance and reducing of public debt. (O)	*Long-term growth module*: GDP per capita, Public debt/GDP

Competitive and socially responsible corporate sector (6)	- Encouraging the development of science and research and the digital transformation of companies. (I) - Promoting the internationalisation of companies through FDIs and participation in GVCs. (I) - Providing a stimulating and predictable support environment. (I) - Effectively managing SOEs and withdraw from state-ownership in non-strategic sectors. (I)	*Long-term growth module and environmental module:* Productivity, measures of trade intensity Product market regulation (governance of SOEs)
Inclusive labour market and high-quality jobs (7)	- Creating quality jobs that bring higher added value and ensure appropriate wage (O) - Adjusting jobs and work organisation to an ageing labour force (I) - Improving the flexicurity system and reducing the unemployment and inactivity traps (I)	*Long-term growth module:* Labour force participation by age groups, working poor (as proxied by low-skilled)

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Chapter 2. A long-term baseline projection for the Slovenian economy

Jean Chateau, Alain de Serres, Peter Gal, Yvan Guillemette, Fabrice Murtin and Anna Vindics

Introduction

This Chapter presents a baseline scenario for the evolution of the Slovenian economy over the next three decades and discusses the key assumptions underpinning the projection[7]. The main areas covered in the baseline scenario are the key determinants of income growth (productivity, employment, investment), of environmental and public finance sustainability (energy, climate, budgetary pressures) and of well-being (health outcomes and efficiency). The broad forces driving the future path of the Slovenian economy include i) technological progress and productivity catch-up vis-à-vis more advanced economies, ii) the demographic transition, and iii) developments in the rest of the world and their impact on trade patterns. In the case of the environment, the falling contribution of energy production to greenhouse gas emissions will be one of the driving forces, while the energy intensity of economic activity is projected to remain roughly constant, based on current policies.

The next section looks at long-term trends in income per capita, assessing the contribution of the proximate determinants (employment and productivity) as well as the main underlying drivers (trade, innovation, human capital) and how they influence the pace of catching-up. The subsequent section examines the performance of Slovenian firms in an international context and the projected changes in the structure of the economy. Section 2.4 looks at future environmental pressures from economic activity and the impact of pollution. Finally, section 2.5 provides some indication of the impact of future trends on productivity, employment and human capital on earnings inequality.

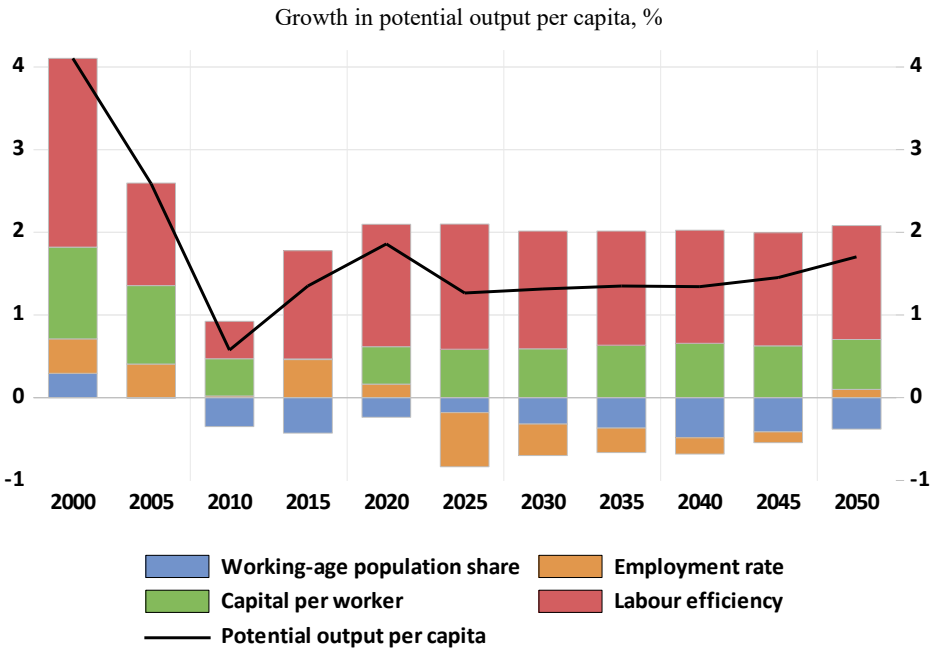
2.1. Long-term trends in income per capita and its underlying drivers

Following a decade of deceleration to 2010, potential output per capita growth has rebounded and is projected to peak just below 2% per annum around 2020, before decelerating again to around 1½ per cent per annum as the demographic transition occurs (Figure 2.1). The acceleration since 2010 has mainly been driven by gains in labour efficiency, while the projected slowdown is due to a decline in the aggregate employment rate and eventually also to a decline in the active share of the population. Late in the projection period, as the drag from population ageing fades out, potential output per capita growth could climb back toward 2% per cent per annum.

More recently, growth has been above estimated potential growth rates and so a continued moderation is to be expected at the beginning of the next decade as actual growth rates gradually converge toward potential.

[7] The baseline scenario described here is the same as in Guillemette and Turner (2018), so see therein as well for a description of global trends as well as details on the assumptions and methodology.

Figure 2.1. The acceleration in labour productivity will more than compensate for negative employment growth



2.1.1. Productivity developments over the next decades

In the projection framework, the profile of economy-wide labour productivity is essentially driven by five components:

- The projected changes in investment in tangible (or physical) capital such as buildings and machines & equipment.
- An assumed trend growth rate of technological progress of 1½ per cent per year that is common to all countries.
- The projected changes in the underlying structural determinants of labour efficiency.
    - These include rising educational attainment among the adult population, investment in innovation (intangible capital), deepening cross-border trade, as well as improvement in the quality of basic institutions and the degree of product market competition.
- Together, these factors determine the equilibrium path of labour efficiency that the economy can be expected to reach (also commonly referred to as the "steady-state" path of labour efficiency).
- A convergence term, according to which the gap between the actual level of labour efficiency and the "steady-state" path is set to be closing at a pace of around 2 per cent per year. Hence, inasmuch as the measured level of labour efficiency at the start of a period is below the steady-state one, the growth rate of labour efficiency over this period is slightly higher than the steady-state rate, so that the actual level catches up to the equilibrium one.

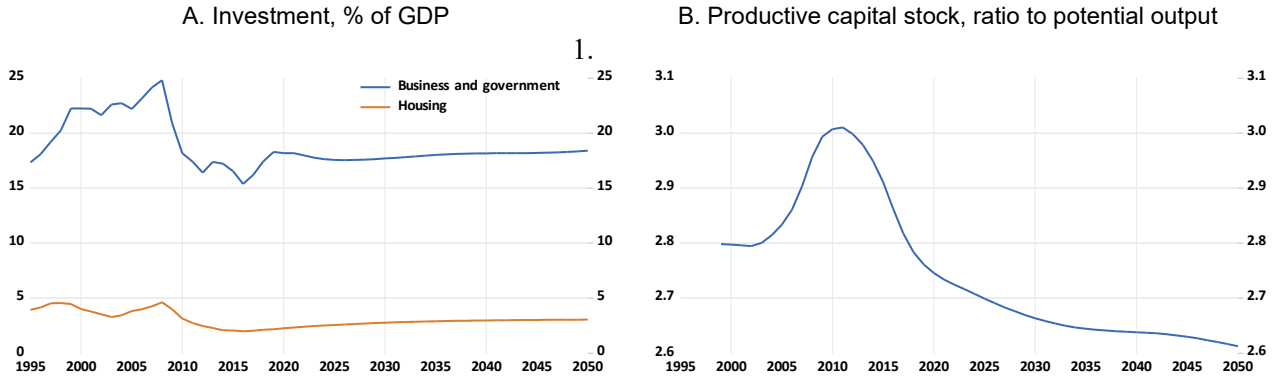
- The gradual phasing-out of a residual term, which is the difference between the growth rate predicted by the long-run labour efficiency equation and the trend labour efficiency growth rate underlying the short-run potential output estimates (which serves as starting point for the long-run projection). This residual term can be positive or negative depending on how the economy is performing relative to what the long-run equation's prediction.

Investment in physical capital

Over the projection period, the productive capital stock is projected by allowing for cyclical effects while following the convention that the capital-to-output ratio should gradually stabilise[8]. This last feature helps to keep the contribution of capital accumulation to growth relatively modest in the baseline scenario, respecting a stylised fact of historical growth decomposition exercises. The evolution of the capital stock responds to changes in the user cost of capital (based on an interest rate, a scrapping rate and a corporate tax rate) and, in scenarios other than the baseline, to reforms in product market regulation and employment protection legislation. In the baseline scenario, changes to the productive capital stock occur only through changes in business investment, while the ratio of government investment to GDP is assumed fixed. Housing investment and inventory investment – needed to obtain total investment – are assumed to gradually return to average historical ratios.

Investment fell precipitously in Slovenia with the global economic and financial crisis that started in 2008 and, since then, the productive capital-to-output ratio has been declining (Figure 2.2). The projection framework just described implies that in the baseline scenario, business and government sector investment remains broadly stable while housing investment rises slightly. The capital-to-output ratio continues to decline over the projection period but at a slowing rate and in the very long-term would eventually stabilise around 2½, which is a typical value among OECD countries. Also, while the capital-to-output ratio declines over the projection period, it does not fall as quickly as potential employment. Therefore, capital per worker contributes positively to growth in coming decades (Figure 2.1).

Figure 2.2. Rising investment is projected to gradually stabilise the capital-to-output ratio



[8] The methodology for projecting investment and capital stock is described in details in Guillemette, de Mauro and Turner (2018).

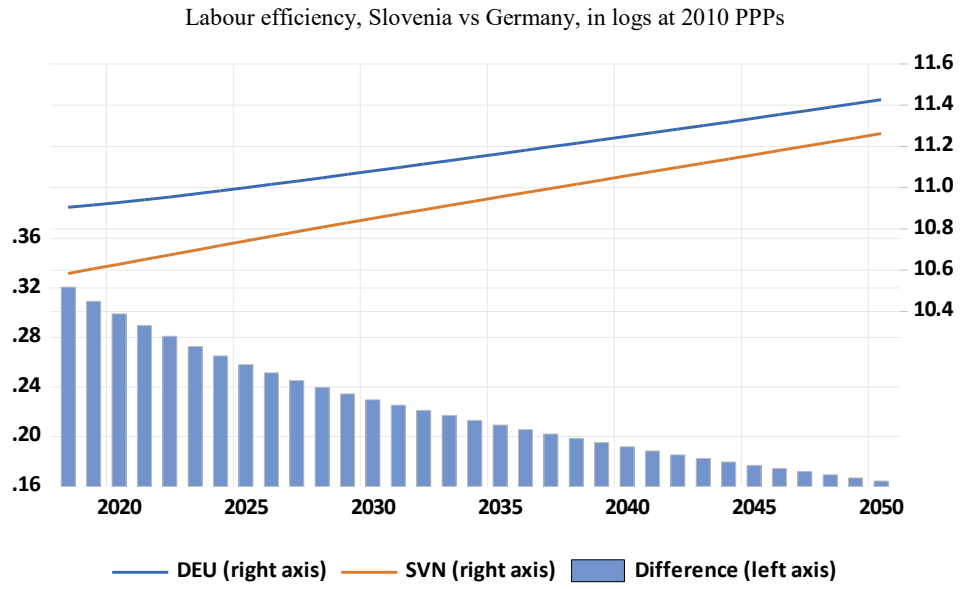
The evolution of labour efficiency

The profile of labour efficiency over the projection period is driven in part by developments in a number of structural determinants that can be split between policy and non-policy drivers. The latter include intermediate growth drivers such as educational attainment (proxying for human capital), R&D spending and trade openness. The former includes a proxy for the overall quality of institution, in particular of the legal and judicial infrastructure (rule of law), as well as a measure of regulatory barriers to competition.

Among these, only educational attainment (as measured by mean years of schooling in the adult population) is assumed to vary over time in the baseline scenario. The projected rise in overall educational attainment is driven both by rising educational attainment among younger cohorts and by the gradual replacement of less educated cohorts by more educated ones in the labour force. As a result, human capital remains supportive to growth moving forward, albeit at a diminishing rate in the more distant horizon. In contrast, investment in innovation (as measured by R&D intensity), the degree of openness to international trade (as measured by the sum of exports and imports as a ratio to GDP and adjusted for population size), the quality of legal institutions (as measured by the rule of law) and the degree of product market competition (as measured by the OECD indicator of product market regulation) are assumed to remain unchanged under the "no-policy change" baseline scenario.

Hence, aside from the contribution of human capital, growth in labour efficiency is driven by i) the assumed one-and-a-half-percent trend growth rate in global technological progress; ii) the gradual closing of the initial gap between actual labour efficiency and its steady-state path; and iii) the gradual phasing-out of the residual term from the labour efficiency equation. The latter accounts for a large portion of the increase in the growth rate of labour efficiency over time. One interpretation is that the Slovenian economy has been underperforming in recent years relative to what could be expected given its fundamentals, such as institutional quality, trade openness and level of education. The assumption made is that the under-performance is essentially due to temporary factors whose influence will slowly diminish over time, implying faster growth going forward. The upshot is gradual catch-up of the level of labour efficiency in Slovenia to that of Germany, with the current labour efficiency gap roughly halving by 2050 (Figure 2.3).

Figure 2.3. Labour efficiency is projected to converge gradually albeit not fully to the German level



2.1.2. The main drivers of aggregate employment

Population in Slovenia is currently growing at a very low rate. It is projected to start declining in the mid-2020s and the rate of decline should accelerate slowly and reach -0.16% annually by 2050. Meanwhile, life expectancy at birth is projected to increase from 83.1 years to 87.1 years for females, and from 77.5 to 82.4 for males, by 2050. The fertility rate, already low at 1.6 births per woman, is projected to rise slightly to 1.7 births per woman by 2050, but this is still well below replacement rate. As a result of these trends, the population is expected to age rapidly, as in many other OECD countries. The old-age dependency ratio, defined as the population aged 75 and over as a percentage of the working-age population (15-74), has already increased from a low of 5.4% in 1994 to 11.9% today. It is projected to keep increasing at a rapid pace and reach 25.1% in 2050. Although no OECD country has such a high dependency rate now, by then several will, including Germany, Italy, Spain and Greece.

The negative contribution of employment to output per capita growth is largely, but not entirely, attributable to population ageing. Both male and female aggregate employment rates have been declining for a while and are expected to continue to do until around 2045 (Figure 2.4). This is in contrast to many other countries where a rising female employment rate offsets somewhat the effects of ageing (i.e. the tendency for the overall employment rate to decline because employment rates for older age groups are lower). The lack of an uptrend in the aggregate female participation rate is partly due to female employment in Slovenia being high already historically, with little progression across successive birth cohorts, thus limiting the upside potential relative to many other countries (Figure 2.5). The comparison of panel B of Figure 2.5 with panel A of Figure 2.6 shows a striking difference in the employment profile of women between Slovenia and Germany.

Figure 2.4. The employment rates of men and women follow similar profiles

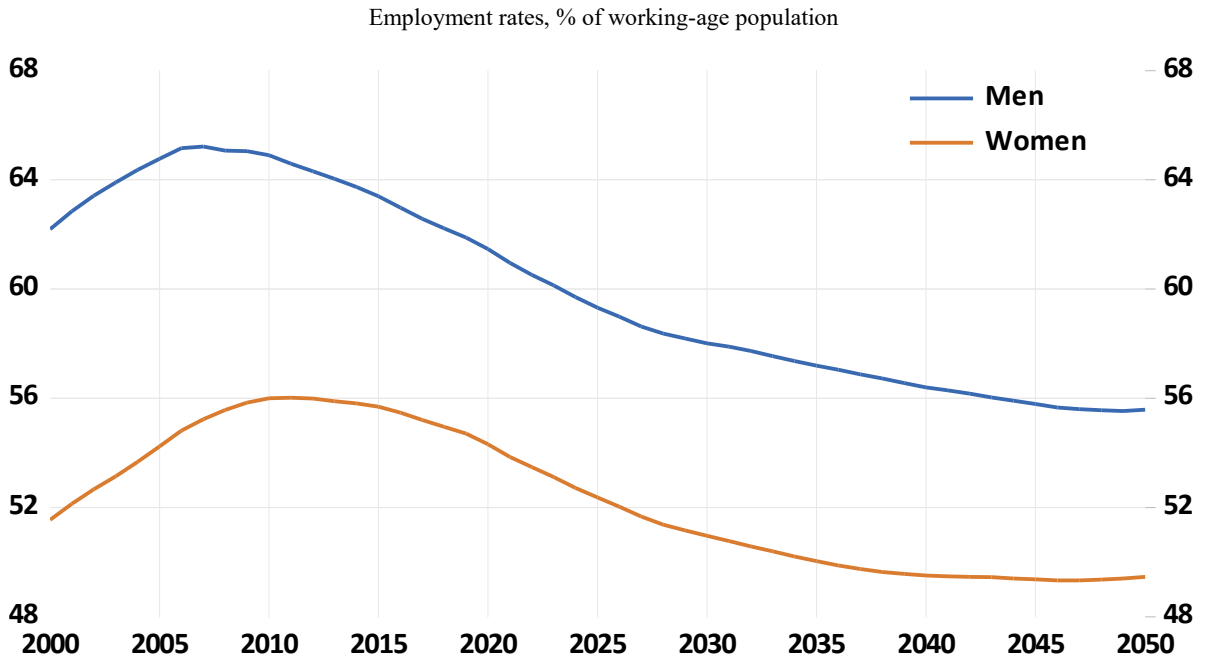


Figure 2.5. Participation rates across the life cycle by birth cohort, % of working-age population

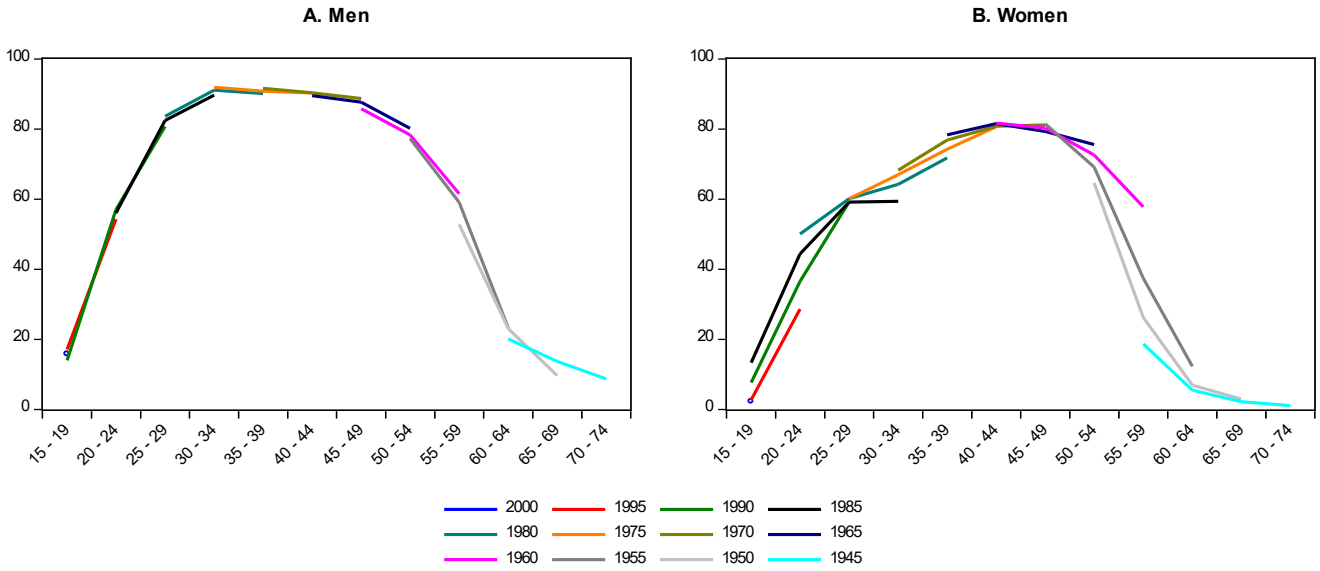


Figure 2.6. Particip ation rates of women across the life cycle by birth cohort, Germany

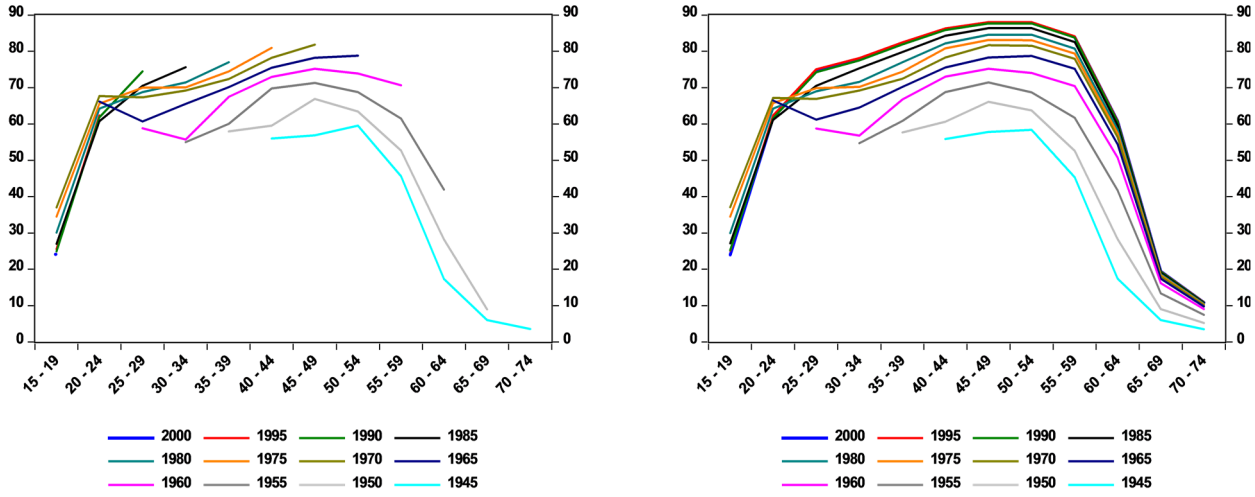
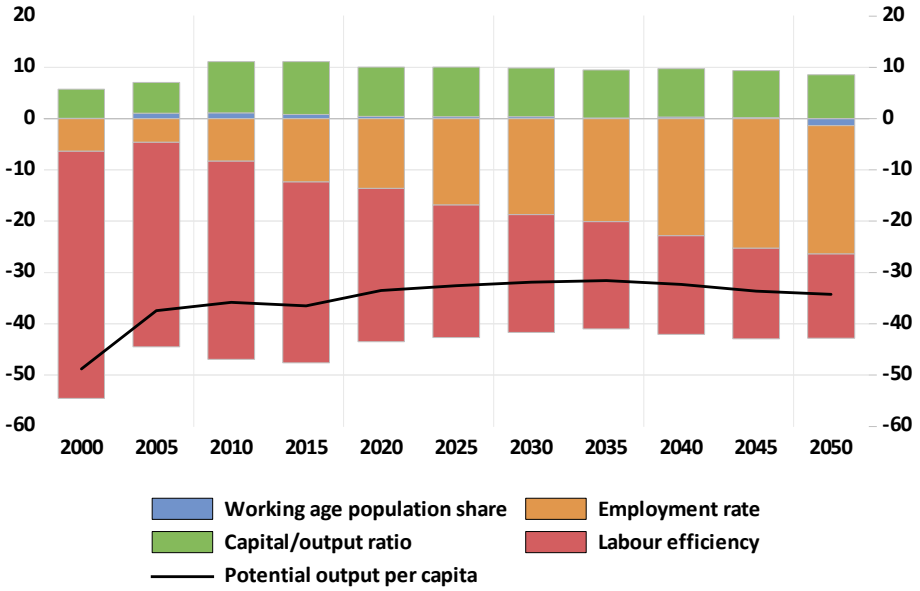


Figure 2.7. The income gap vis-à-vis Germany is projected to remain broadly stable

Per cent difference in potential output per capita between Slovenia and Germany, at 2010 PPPs



2.2. The future profile of earnings distribution and potential risks of growing inequality

In terms of earnings inequality, Slovenia stands near the mid-range of a large set of European countries, with the wage of workers in the top decile being more than three times the wage of those in the bottom decile (Figure 2.22). Based on past trends, earnings inequality is projected to rise significantly over the next decades, driven primarily by skills-biased technological progress. The latter contributes to higher demand for skilled labour, which is only partially offset by increases in the supply of high-skilled workers, resulting

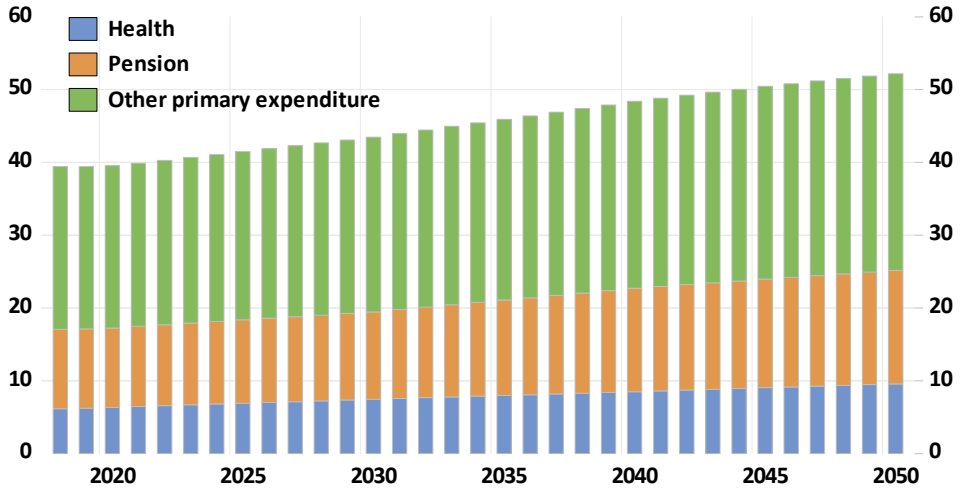
the debt target does not in itself dominate fiscal policy. Fiscal pressures from demographic and other sources are then visible in what happens to the overall tax rate.

Public spending on health and pensions

Public health expenditure projections (including long-term care) are obtained from a relationship in the spirit of Lorenzoni et al. (2018). The health spending projections take into account both demographic and non-demographic drivers. Demographic drivers relate broadly to the age structure of the population and the evolution of its health status. Non-demographic drivers include income (and the responsiveness of health spending to it) and prices of health technologies and services. Nevertheless, the combination of demographic and income effects fails to explain a large part of historical growth in public health-care expenditure. The residual is most likely related to the quality of health products and services as well as to underlying health policies and institutions (de la Maisonneuve et al., 2016).[9] In the projections, a residual expenditure growth assumption of 1.3% per year is assumed in the cost-pressure scenario used for the baseline projection. In the case of Slovenia, public health spending is projected to increase from about 6% of GDP currently to 7.5% in 2030 and 9.5% in 2050 (Figure 2.8).

Figure 2.8. Public expenditure is set to increase

Public expenditure, $ of GDP



Pension spending projections are taken from European Commission (2018) and include not only the projected increases in the number of beneficiaries, but also the future impacts of already-legislated measures such as retirement age increases, in-built pension system stabilisers, phasing out of early retirement provisions, changes to benefit formulas, etc. In the case of Slovenia, no change to the legal retirement age is currently legislated. Public pension expenditure is projected to increase from about 11% of GDP now to 12% in 2030 and 15.6% in 2050 (Figure 2.6). Altogether, these demographically-sensitive spending categories, which take up less than 20% of GDP now, are expected to absorb 2½ per cent of GDP more in 2030 and about 8 percentage points of GDP more in 2050 in the baseline scenario.

[9] De la Maisonneuve, C., Moreno-Serra, R., Murtin, F., Oliveira-Martins, J. (2016), "The Role of Policy and Institutions on Health Spending", Health Economics 26 (7), 834-843.

For other primary expenditure (i.e. primary expenditure excluding health and pensions), the baseline assumption is that such expenditure is maintained in real terms on a per capita basis, rather than remaining stable as a share of GDP. This difference is important for long-term fiscal projections, because maintaining expenditure on a per capita basis means that public finances are sensitive to the employment rate, as tax revenue follows employment whereas expenditure is linked to the total population. This in turn means that public finances are more sensitive to demographic developments, and that structural reforms that boost employment have an additional benefit on the fiscal position. This feature of the model also puts upward pressure on public spending given the projected evolution of the employment-to-population ratio. While accounting for about 22.5% of GDP now, other primary expenditure are projected to take up 24% of GDP in 2030 and 27% of GDP in 2050.

Public revenues and the net lending balance

Prior to the global financial and economic crisis that started in 2008, Slovenia was enjoying a cyclical boom and had an enviable fiscal position, with a low and rapidly shrinking deficit and low public debt (Figure 2.9). The structural fiscal position was somewhat less rosy, however. The underlying fiscal balance (i.e. adjusted for the cycle and one-offs) had started deteriorating in 2006, mainly due to a rise in structural primary expenditure. The crisis and its aftermath added a huge cyclical deterioration to the fiscal position, leading to a very substantial increase in public debt. The cyclical recovery that started in 2014, combined with restraint on the expenditure side, has brought the fiscal situation back to a more sustainable position, with the public debt ratio declining slightly since 2016.

Figure 2.9. Government revenue will need to increase to ensure fiscal sustainability

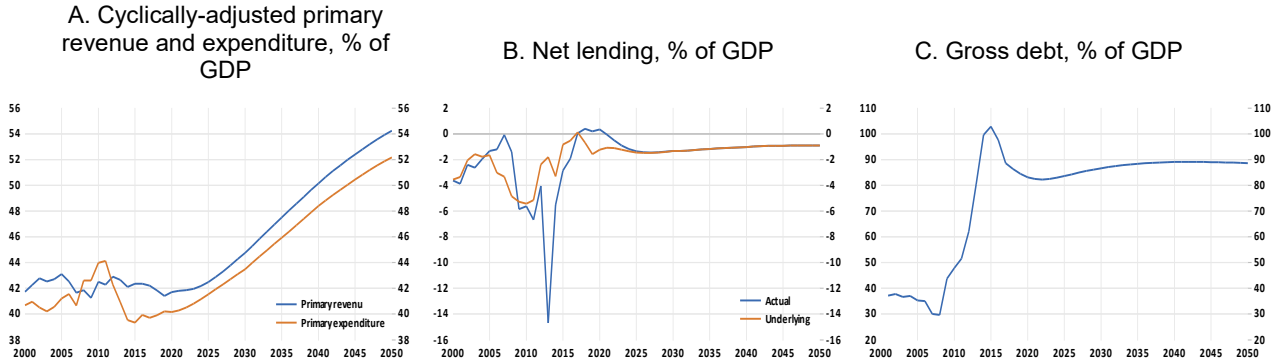
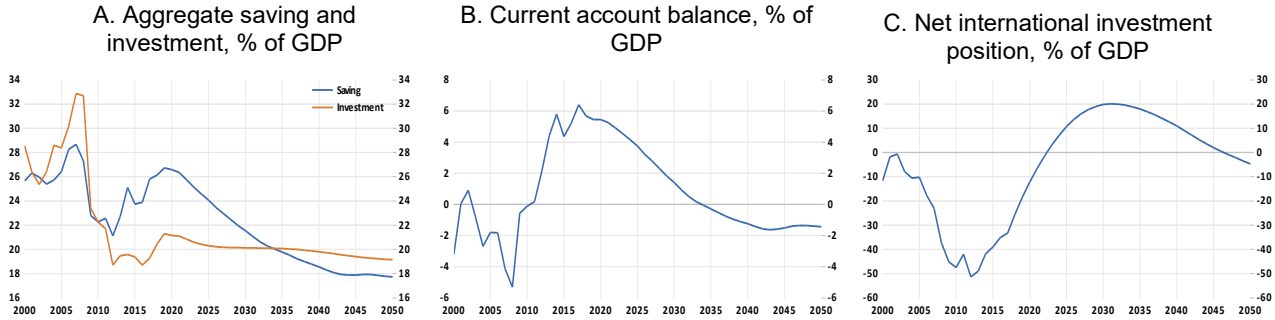


Figure 2.10. The current account surplus is projected to shrink gradually



2.2. Production sectors, firm level performance and trade patterns

The process of catching-up described in the previous section, combined with demographic trends and development in the rest of the world will likely bring further significant changes in the economic structure of the Slovenian economy. Attempting to project the nature of these changes with any degree of confidence is naturally fraught with difficulties and uncertainties, but a number of drivers and trends can be singled out as potentially having a determining influence on the future industrial structure.

The baseline scenario presented in this section has been developed using the OECD ENV-Linkages Model (Chateau et al., 2014),[10] and includes projections of macro-economic variables (GDP, investment, employment, productivity, etc.) that are fully consistent with the baseline scenario for these variables discussed in the previous section. The focus of this section is thus on the sector composition of the economy. This turn will help to better understand the main sources of environmental pressures, in particular greenhouse gas emissions, which are discussed in the next section. The section starts with a brief comparison of the productivity performance of Slovenian firms against that of leading international firms across a large number manufacturing and service industries.

2.2.1. The productivity performance of Slovenian firms and sectors in an international context

Using firm-level data from the Orbis database, the productivity performance of Slovenian firms can be examined from three angles.[11] A first angle is a snapshot on the global-national frontier and non-frontier gaps at the detailed industry level. This provides a static picture of where the best Slovenian firms stand relative to the top world performers within the respective industries. The other two angles show the change over time (more or less the last decade): i) the extent to which the best domestic firms (national frontier) have caught up or lost ground vis-à-vis the world frontier and ii) how lagging domestic firms have performed relative to the national frontier over the same period (2003-2013).

Slovenian firms and the global productivity frontier: How do the gaps vary across industries?

Looking first at the productivity gap within industries between firms at the global frontier vis-à-vis best-performing domestic firms (national frontier) and lagging domestic firms, a number of stylised facts can be highlighted (Figure 2.11):

- The most productive firms of Slovenia – the national frontier – that are part of the global frontier are in some of the traditional services sectors (hotels and logistics) in ICT services (computer programming and telecom) and construction, architecture or real estate related activities. Among manufacturing, a mix of low-

[10] This model is a computable general equilibrium model that characterizes the dynamic of 46 sectors and the trade of 38 goods among countries.

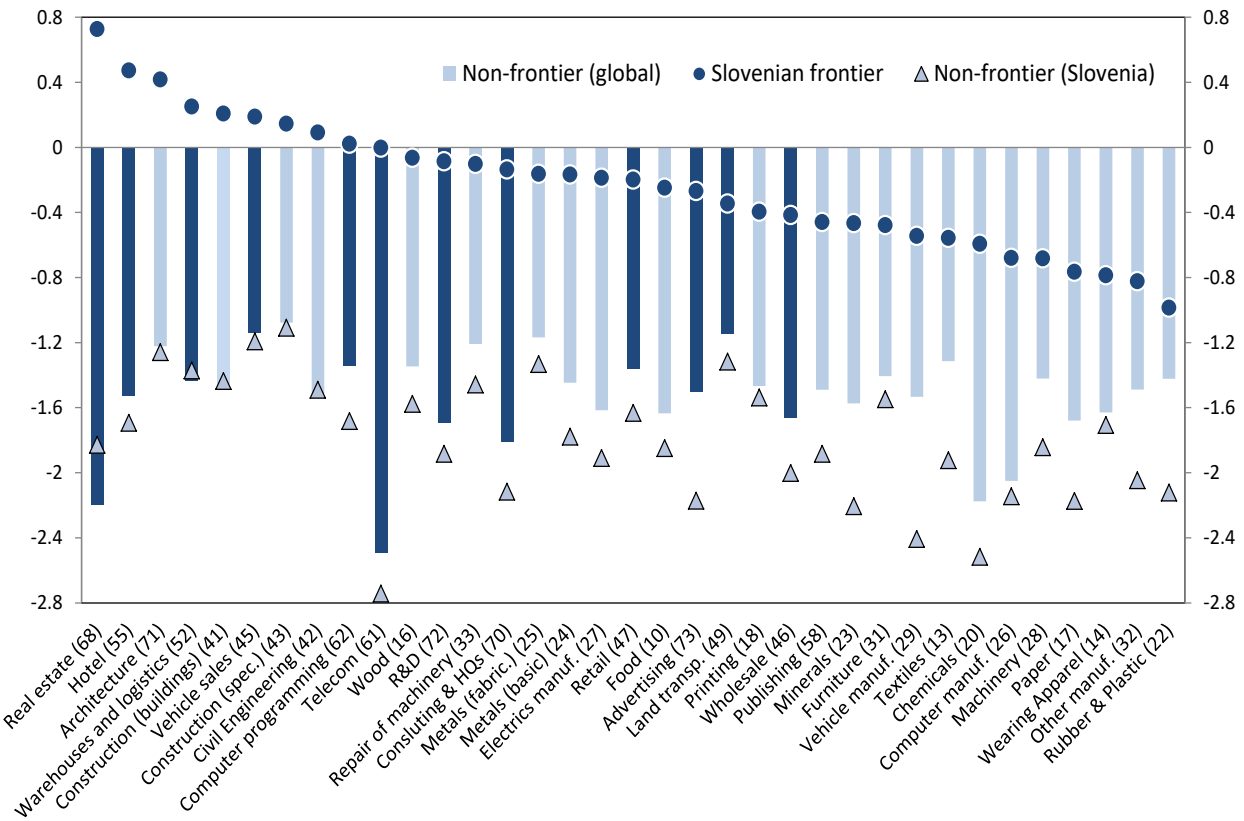
[11] The extent of the coverage in Orbis varies across countries. In the case of Slovenia, the coverage of firms in terms of value added and employment is comparatively high, capturing 80-85% of the total in manufacturing, 70-75% for retail and wholesale distribution, around 60% for other market services (ex. Finance), and 50-60% for construction. These numbers are higher than the average OECD country in Orbis. Still, the incomplete coverage of firms in the dataset can potentially affect the results, in particular for those sectors that are less well captured in the data (construction and some segments of market services).

tech (wood and metals) and high-tech (electrics) industries also come close to global best practice when their most productive businesses are considered.

- Interestingly, some manufacturing industries have relatively low national frontier levels compared to the global frontier (machinery, mineral manuf. and plastic, along with computer manufacturing). The size of their gap vis-à-vis the global frontier implies that they are about less than half as productive. Put differently, Slovenia in these sectors does not appear to have firms that operate close to the global frontier.
- The gaps between non-frontier firms and the global (or even national) frontier firms are large, although for the most lagging Slovenian sectors, the main driver appears to be low frontier productivity and not primarily low productivity of non-frontier Slovenian firms (see right hand part of the chart, sectors such as machinery, minerals, rubber and plastic and computer manuf.).

Figure 2.11. Comparing the productivity frontier with other firms in Slovenia and globally

Long MFP gaps from the global productivity frontier (top 10% of firms within 2-digit sectors, 2012-2013)



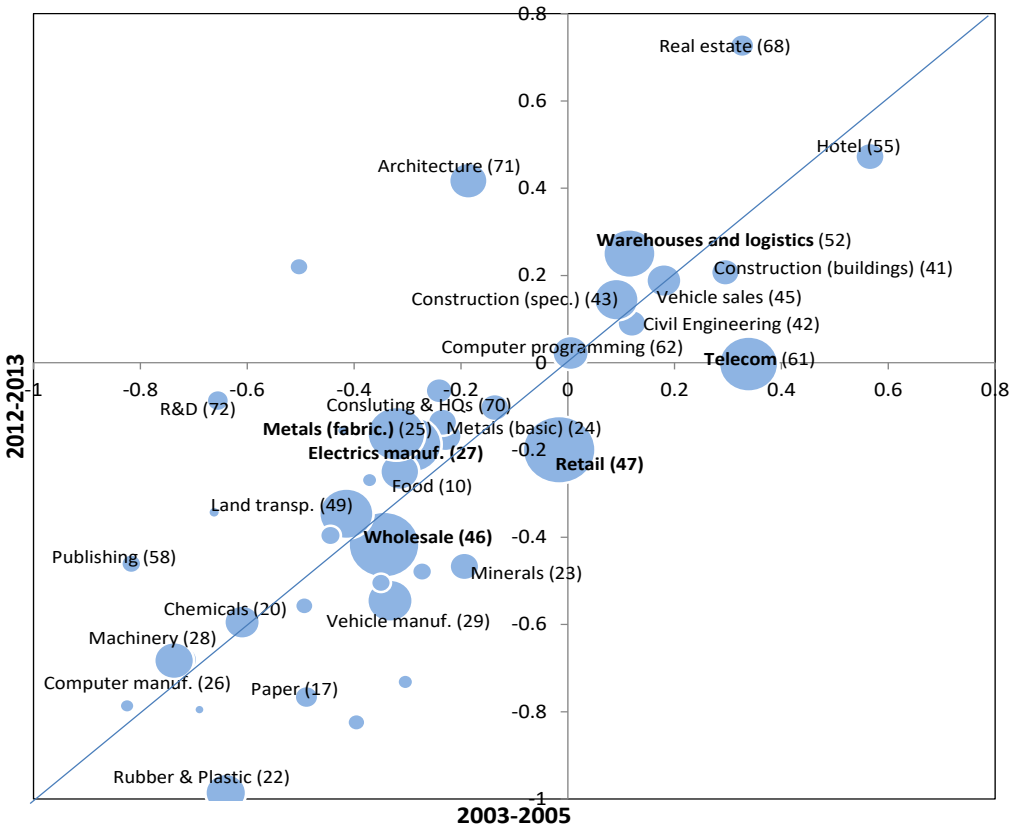
Note: All values are measured as difference in median log MFP levels between the top 10% of global firms (global frontier), within each 2-digit sector that has at least 3 frontier firms in Slovenia. NACE Rev. 2 industry codes (2-digit) are in parentheses. Industries are ranked in increasing distance of the Slovenian frontier from the global frontier. Dark columns indicate market services sectors.

The evolution of global and national frontier firms: weak catching-up over the past decade

Looking at the change over time in the relative performance of firms that are at the national frontier vis-à-vis the global frontier indicates that catching-up has been weak overall, with some exceptions (Figure 2.12):

- Some of the sectors with the best frontier-performance seem to have improved further throughout the 10 years between 2003 and 2013 (warehouses and logistics; real estate and architecture). Other good performing sectors have fallen behind somewhat (telecom, retail and hotels) but still remain close to or at the global frontier.
- The national frontier of some sectors caught up somewhat with the global best practice (metal and electrics manufacturing). The rapid catching-up of the R&D sector is perhaps most notable due to potentially strong spillovers to other sectors that use R&D.
- The positions of traditional manufacturing sectors have fallen further behind from an already poor starting point (paper, rubber, minerals and vehicle manufacturing).

Figure 2.12. The gap between the Slovenian and global frontier firms



Note: circles show the difference in median levels of log MFP between the top 10% of global firms in terms of log MFP (global frontier) and Slovenian top 10% of firms (national). The size of the circles is proportional to the value added share of the sectors in 2012-2013. The names of the smallest sectors are not shown for easier readability. Circles above the 45 degree line indicate that the national frontier in those sectors improved their relative performance vis-à-vis the global frontier.

The evolution of domestic leading and lagging firms: some degree of catching-up

The domestic landscape is characterised by a large degree of heterogeneity between leading and lagging firms within industries.

- In the majority of industries, the gap between the national frontier and laggard firms grew over the 10-year period. The biggest were retail and logistics – sectors where the gaps were already big initially. The most extreme cases occurred in the hospitality business (hotels; food services). Other large sectors – wholesale and manufacturing of electrical equipment – maintained the same, relatively large gap.
- A few small sectors experienced a catching up to the national frontier, such as vehicle manufacturing and sales and computer programming. The most extreme case is the telecom sector – although the gap was initially very big there, and the closure occurs primarily due to the national frontier falling further behind from the global frontier (Figure 2.13).

Figure 2.13. The gap between non-frontier and national frontier firms in Slovenia

Note: circles show the difference in median levels of log MFP between the top 10% of Slovenian firms in terms of log MFP and other Slovenian. The size of the circles is proportional to the value added share of the sectors in 2012-2013. The names of the smallest sectors are not shown for easier readability. Circles below the 45 degree line indicate that the gap between the national frontier and the typical firm grew.

Summing-up, the performance of Slovenian firms in international comparison is generally better in services than manufacturing sectors. In a number of specific service sectors, the best performing Slovenian firms within specific sectors are found to be as productive (or even more productive) than the top 5 per cent firms operating in the same sectors at the global level. This is particularly the case in real estate, hospitality, architecture and engineering, warehouse and logistics as well as telecoms and R&D. At the same time, the productivity dispersion between the best national firms and lagging ones within each of these sectors is similar to what is observed globally, and has increased significantly since the early 2000s. While Slovenian firms are reasonably well placed to benefit from the expected growing demand for certain types services over the next decades (notably business services such as engineering, architecture and computer programming), a failure to narrow the productivity gap between the best performing firms and the laggards could limit the overall growth in such sectors.

2.2.2. Projected changes in the structure of the Slovenian economy over the next decades

The economy is projected to change significantly over the next decades. The change in economic structure has been linked to technological innovations, changes in consumption patterns, population increases, competition and foreign direct investments. The Slovenian economy was particularly hard hit by the European economic crisis of early 2000s but the situation has since changed, with economy growing favourably across all sectors since the past few years.

Asymmetrical changes in production structure and demand patterns

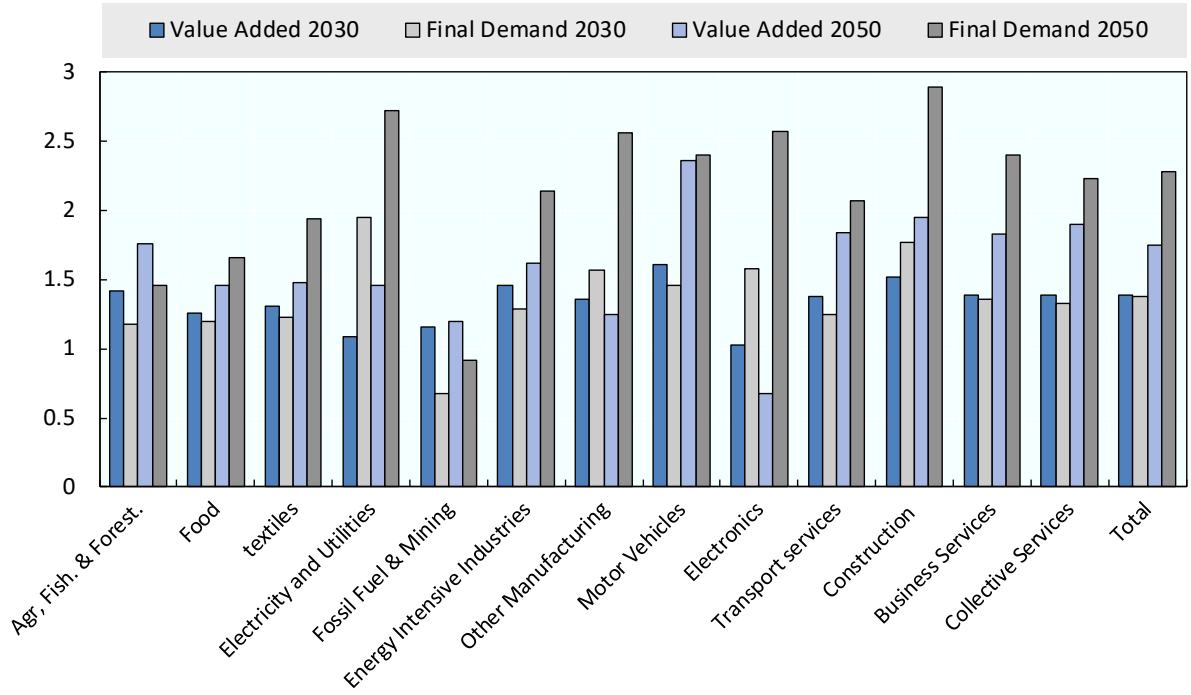
A clear difference between changes in production structures and final demands across aggregate economic sectors is projected between 2011 and 2050 (Figure 2.14). As wealth increases, the production from the food and textile industry and the demand for such products are both projected to grow the least, while at the opposite end, construction, business and collective services[12] will enjoy fastest growth over the next decades.

Shifts in the industry structure reflect changes in three main drivers: production modes, preferences and international trade patterns. Changes in production modes can affect the economic structure in several ways. For instance, new technologies have paved way for simpler production methods that are both more rapid and cost effective. At the same time, the service industry has become one of the leading economic sectors in Slovenia due to changes in demand patterns for more service and leisure industries, but not only: it also reflects an intensification of services inputs in all industries (resulting from the ITC revolution and intensification of R&D expenses).

In absolute (final demand) terms, the shift in the production structure also reflects the increase in the overall size of population and level of activity. For example, the demand for transport services is projected to be significantly higher in 2030 and 2050 relative to the immediate post-crisis level, underscoring the need for more and better developed transport services.

[12] Collective services include administration, defence, education and health expenditures.

Figure 2.14. Changes in value added structure and final demand expenditures in 2030 and 2050 (relative to 2011), by group of commodities



Note: Energy Intensive industries are Pulp and paper products, Chemicals, Non-metallic minerals and Iron and Steel.
Source: OECD ENV-Linkages model

The asymmetry between changes in production and demand structures is reflected in trade patterns and specialization

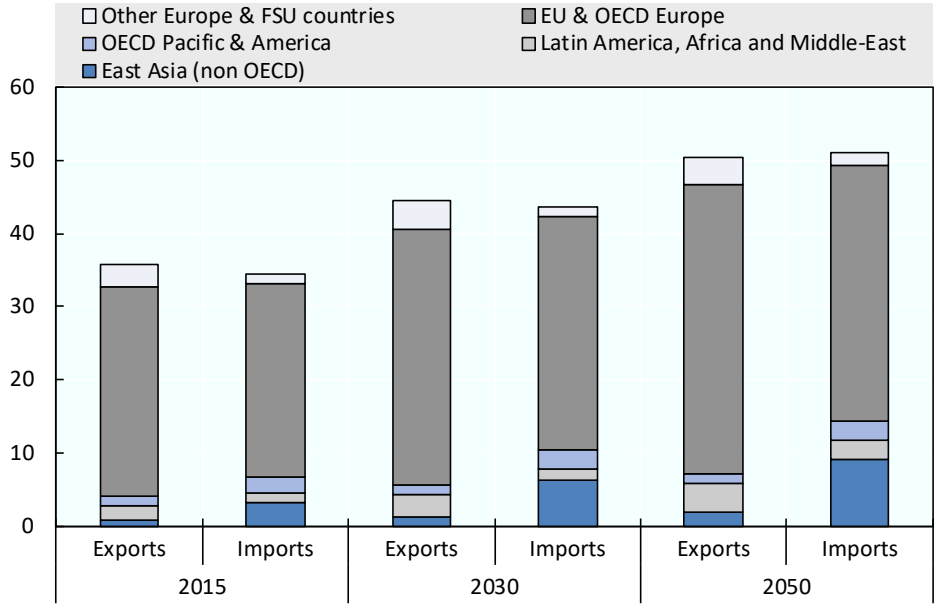
In the case of a small open economy such as Slovenia, changes in the patterns of trade are a fundamental driver of shifts in the production structure. Pursuing the trends of the past decades, the baseline projection shows that trade patterns will continue to shift over the next 15-20 years, and then will progressively stabilize other the subsequent 20 years (2030-2050). In particular, Slovenia is likely to diversify its trading partners, specialising increasingly in services sectors of the economy. This trend is reinforced by the fact that the Slovenian economy is expected to be even more open to foreign trade, in part reflecting a deepening integration into the European Union.

As mentioned in Section 2 (and shown on Figure 2.10), current account balance as percent of GDP is projected to remain positive and substantial until 2030, and then turn negative thereafter. The net exports as a per cent of GDP will follow a very similar trend. European countries will continue to be the main partners of Slovenian both for its exports and imports (Figure 2.15). However, the share of Asian products in Slovenian imports is expected to increase substantially (mainly for energy intensive industries products and electronics), while the share of imports from Russia and FSU countries is projected to decrease (mostly due to reduction in energy imports).

The export structure across the trading partners is projected to be relatively stable. As a result, the deficit relative to Asian countries (including, but to a lower extent, OECD Asian

countries) is going to increase but will be more than offset by growing surplus relative to Europe and Russia.

Figure 2.15. Changes in Trade Partners from 2015 to 2030 and 2050: Exports and imports of Slovenia (in billions of 2011 constant USD)

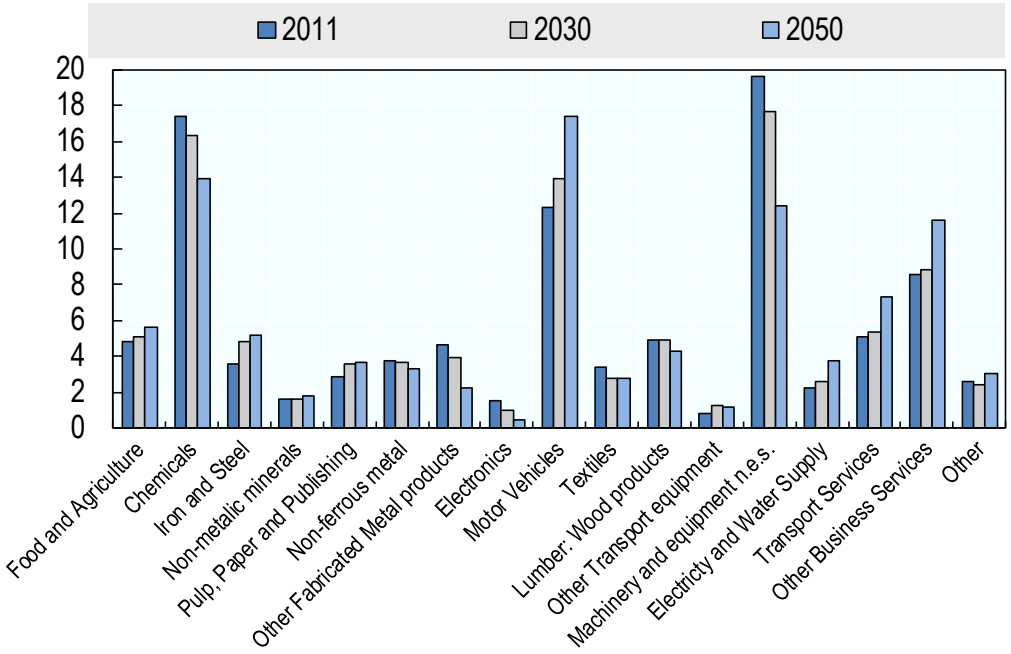


Source: OECD ENV-Linkages model

In contrast to the relative stability of export partners, the structure of export by product or service is going to change more deeply during the next decades (Figure 2.16). Slovenia's export structure will appear to be even more centred on motor vehicles and other transport equipment in 2050 than in 2015. The specialization in these industries will suggest that the current strong position, in terms of competiveness, of these industries on international markets will be reinforced in the future. Nevertheless, it may also present some weakness since these industries are also among the more vulnerable to offshoring and therefore are very sensitive to any change in domestic competiveness relative to trading partners. One could also note that the share of "business services" exports is projected to increase strongly after 2030, reflecting mostly future increase in tourism in the years to come.

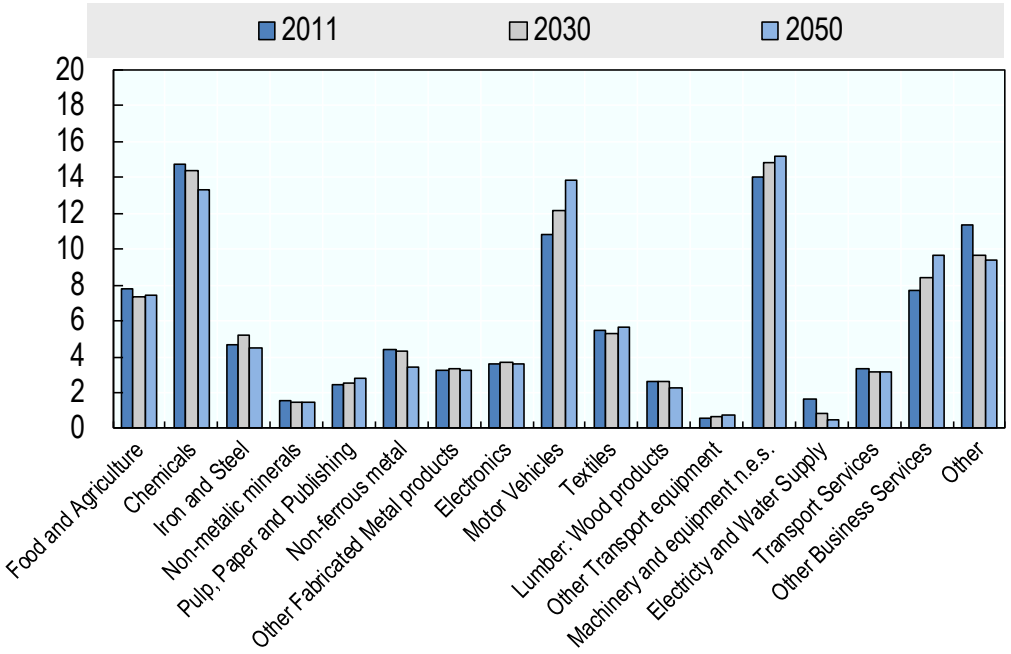
In contrast, the structure of import appears more balanced across goods and is projected to change more modestly in the future (Figure 2.15). Nevertheless, two points deserve some attention: first, the share of food and agriculture import to total import is projected to decrease and, second, the increase of imports of services (including personal services and health services) is consistent with projection for wealth and population increases, as well as population ageing. This together with the strong specialisation toward motor vehicles production and "machinery and equipment" production suggest that policies do not prevent a slight rebalancing of resources towards domestic service production at the expense of some pro-export industries.

Figure 2.16. Trade structure of exports (share of export of each product in total exports, percentage)



Note: Other includes: Other Manufacturing, Construction, Fossil Fuel and Mining, "Government" services
Source: OECD ENV-Linkages model

Figure 2.17. Trade structure of imports (share of import of each product in total imports, percentage)



Source: OECD ENV-Linkages model

2.3. Environmental pressures from economic activity and impact from pollution

Growing population and economic activity have historically led to various environmental pressures that have been recorded, for example in the OECD Environmental Performance Reviews: Slovenia 2012. This section presents a baseline projection that features some decoupling of economic growth and environmental damages, but not necessarily for all environmental indicators. Economic growth is often accompanied by growing pressures on environment, but in services-based economies, actually only relatively small sectors of activity are responsible for most of the total greenhouse gas (GHG) emissions. In this section a special attention is put on industries that have an incidence on energy production and consumption as well as greenhouse gas emissions. The section also looks at the potential impacts of outdoor air pollution and climate change.

2.3.1. Economic activity and the environment

The industries having a particularly large impact on the environment include agriculture, energy system and use, and transportation (as well as generally "energy-intensive industries"). Each is briefly reviewed in this sub-section.

Agriculture

Agriculture in Slovenia accounts for about 2.5% of the GDP and it only employs 6% of the population. The stance of agriculture in Slovenia is most similar to that in Austria and Switzerland.[13] More than half of agricultural production (54.5%) is accounted for by animal products. The most important crop product groups are cereals and "fruits and vegetables". Among animal products, cattle, cow milk, and pigs predominate.

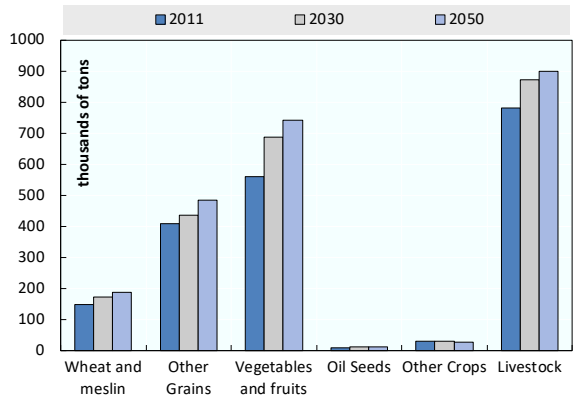
Slovenia has strongly cooperated in the implementation of the EU rules for banning or restricting the growing of genetically modified organisms (GMOs). Organic production is based on ecological systems using natural resources: they are using living organisms and mechanical production methods, growing plants in soil and others, while the cultivation of GMOs is prohibited, although imports are allowed. The use of ionizing radiation to destroy harmful organisms in food is also forbidden. In the case of processed organic food, the main requirement is that it contains at least 95% of agricultural ingredients from organic agriculture products and food ingredients.

While the relative share of agriculture in total value added is going to decrease, the agricultural production is still projected to grow by some margin by 2050. The current food production is projected to increase for the majority of the crops and help the country to achieve self-sufficiency in overall food needs. The quantity (number of tons) of all the food and livestock products listed is expected to rise, implying an overall increase in food production over the next 30 years despite the decline as a share of GDP.

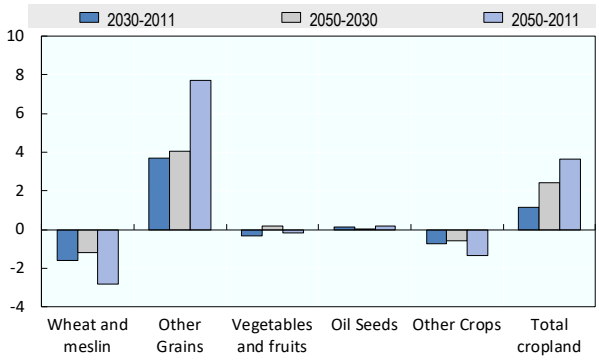
[13] One of the most and specific problem faced by Slovenian agriculture is the age structure of farmers at family-owned farms, because most farmers are above 55 years old. Slovenia is fully aware of this problem, which also explains the slower transfer of knowledge and technology to farming. Therefore a number of measures have been taken in the last few years to encourage ageing farmers to retire and transfer their farms to their descendants.

Figure 2.18. Agriculture features: Production and crop land

Panel A: Production in tons in 2011 2030 and 2050 (livestock in value added)



Panel B: Harvest Land Changes (1000 ha): 2011 - 2030 Total arable land: 184190ha



Source: OECD ENV-Linkages model

The increase in agriculture and food production is ultimately linked to the rising demand from a growing population as well as changes in diets, but not only. In the context of widely open agricultural markets, and especially in the integrated EU agricultural landscape, changes in production levels also reflect developments in Slovenian partners.

The increase in production could come from multiple channels. First, improved farming technologies (including fertilizer use by units of production that will increase by 3% from 2015 to 2050) will lead to higher efficiency in farming activities and hence increased food production. As years go by, new innovations transform traditional farming methods into much faster ones and with high yield capacity. Second, increases in crops production are also facilitated by the expansion of total agricultural crop land and its re-allocation across the different crops (right-hand side of Figure 2.16). These land-use changes are the main drivers of GHG emissions related to land-use, as well as of rising water stress and biodiversity pressures.

Transportation

The main services associated with the transport companies and industries are the handling of goods, maritime and inland logistics terminal operations, additional services, freight forwarding and freight shipping, goods warehousing and storage. In the case of Slovenia, well-developed infrastructure has facilitated economic growth of the country by promoting mobility and logistics of goods and services. The transport network is well developed with an international airport next to the capital city; the rest of the country is well connected by road and rail networks. The motorway density in Slovenia is above the recommended average of EU-28, the country is easily connected to the rest Europe by car or lorry. There are over 700 km of well-maintained motorways and 1000 km of trunk roads. By 2020, the extended motorway across Europe will be completed.

According to ITF projections (ITF, 2016) the number of people expected to travel by land are projected to increase by 46% between 2015 and 2030 (with a higher increase for passenger by train than by road) and then an increase of 38% from 2030 to 2050. The road freight capacity is also set to increase by 41% and 36%, respectively over the two same

period, while air transport will record the highest increase, at 71% and 40%. The sudden increase in the number of people using the road and air transport can be attributed to two factors: the rise in population means that more people are likely to travel, while more goods will be moved and more cars will be sold. The other factor contributing to the significance increase in passengers is improved infrastructure, making transport cheaper and more easily and frequently available to more people.

Energy system and use

Oil made up the largest share of the Slovenian total primary energy supply (TPES) for the period 2008 to 2015, although it is important to underscore the moderate but persistent decline from 38% in 2008 to 34% in 2015, and the expected fall to around 30% in 2030. Natural gas will grow in importance, compensating the significant decrease of the remaining fossil fuels supply.[14] Specifically, the predicted share for 2030 is 18%, which is quite different from the steady 12% observed during the last several years. Nuclear energy accounted for about one fifth of TPES and this share is likely to remain constant in the coming years. The most prominent change relates to the continuous increase in the share of renewable energy, which accounted for 11% in 2008, 17% in 2015 and is projected to reach 20% in 2030.[15]

In 2015, the domestic energy sources in Slovenia – domestic coal, electricity produced from nuclear power and hydropower, and other renewable energy sources (solar, biomass, biogas, and waste) – covered about 51% of the energy needs. Slovenia produces negligible amounts of refined oil and natural gas, and thus is completely reliant on imports of these two fuels. Moreover, Slovenia had in 2015 a significant export of electricity about 7% of the total electricity generated, which is expected to reach a 10% of the total electricity generated in 2030[16] and then fall down to only 5% in 2050.

Transport is the largest energy consumer, followed by manufacturing and construction, and households. An analysis for the energy savings data in 2015 shows that the policy measures adopted had greatest impact on industry and transports: in the recent years the energy savings in transport was resulting from changing the fuel mix by the adding of fuel additives

[14] Slovenia does not have its own sources of natural gas, storages of natural gas or LNG terminals. Therefore, the wholesale natural gas market is limited by imports of gas through transmission systems of neighbouring countries with their own gas sources. The wholesale market is mainly supplied by gas from Austria and Italy. The traditionally largest source of natural gas until 2013 was the Russian Federation with more than 50%, but due to market liberalization, this source was replaced by Austria. Market shares show that the competitiveness of the Slovenian retail market is steadily increasing. In 2015, the increased competitiveness was achieved by means of the increasingly market shares of the companies GEN-I (10.72%) and Plinarna Maribor (6.38%), which were the largest natural gas suppliers with respect to 2014. However, Geoplin (50.48%) suffered the largest decrease in the market share in 2015, which was already in 2014 among the companies that lost the largest market share.

[15] However, Slovenia has a target of achieving 25% of energy contribution from renewable sources by year 2020. The share of renewable sources increased the most in heating and cooling; by 14 percentage points from 2005 to 34% in 2014. Although Slovenia currently still depends on fossil fuels as the main sources of energy, the government continues to advocate of renewable sources of energy, so that by year 2030 the dependency on fossil fuels will be greatly reduced.

[16] This number is lower than the 14% official projection of energy minister of Slovenia done in 2014, mostly because of differences in electricity demands changes in partner countries.

while energy savings in industry were achieved with different measures, but the largest impact is registered from heat production.

In 2020, the baseline projection estimates show a 5% increase in final energy consumption, compared with 2015 (4.65 Mtoe), but after energy demand is projected to be roughly constant up to 2050 around 5 Mtoe per year. The increase in final energy consumption is mainly influenced by higher consumption of electricity: that increase from 1.1 to 1.4 in 2030 and 1.55 in 2050. Then renewable energy also increase from 0.65 to 0.8 in 2050 while final energy demand of natural gas stay constant after 2020 around 0.65 (starting from 0.55 in 2015). The final demand of other energy carriers (including liquid fossils fuel) are expected to decrease along the horizon: going from 2.1 Mtoe per year in 2015-2020 to 1.9 Mtoe/year in 2030, staying constant at this level from 2030 to 2050.

As a result, the share of electricity consumption in total final energy consumption will increase gradually from 40 to 50% in 2040 and will stay constant after during 2030-2050. Manufacturing and construction are the sectors with highest electricity consumption, and are expected to keep increasing until 2030. Households are the second largest electricity consumers. The total number of households' consumers has been growing on average by 0.4% throughout the period 2011-2015, but the estimations show a significant decline for the period between 2020 and 2030.

Domestic sources of electricity generation cover around 80% of the total consumption (in 2015). As shown in Figure 2.19, nuclear power accounted for the largest share of domestically-generated electricity (38% in 2015),[17] followed fossil fuels (32.5%) and Hydro-Power (around 26%). Other renewable electricity sources account for only 2%. There is evidence of improvements comparing the electricity generation structure in 2015 with the data observed for 2010, when nuclear power accounted for 35% of the total electricity mix, followed by coal (34%) and all renewable electricity only accounted for 28.5%. This represents an improving trend that is expected to continue at least until 2030. The projection for 2030 (Figure 2.19) shows a drop of the nuclear power share to 31% in 2030 and 29.5% in 2050 while coal power share will decrease to 21% in 2030 and even more after, down to 10% in 2050.

Plants using fossil fuels accounted for 8 percentage points more of the total production in 2015 than the previous year. It is worth stressing the actual importance of lignite as one of the main domestic sources of energy[18] and the fact that it is projected to decrease by 30% in 2030, while in the same times gas powered electricity will nearly double. As a result,

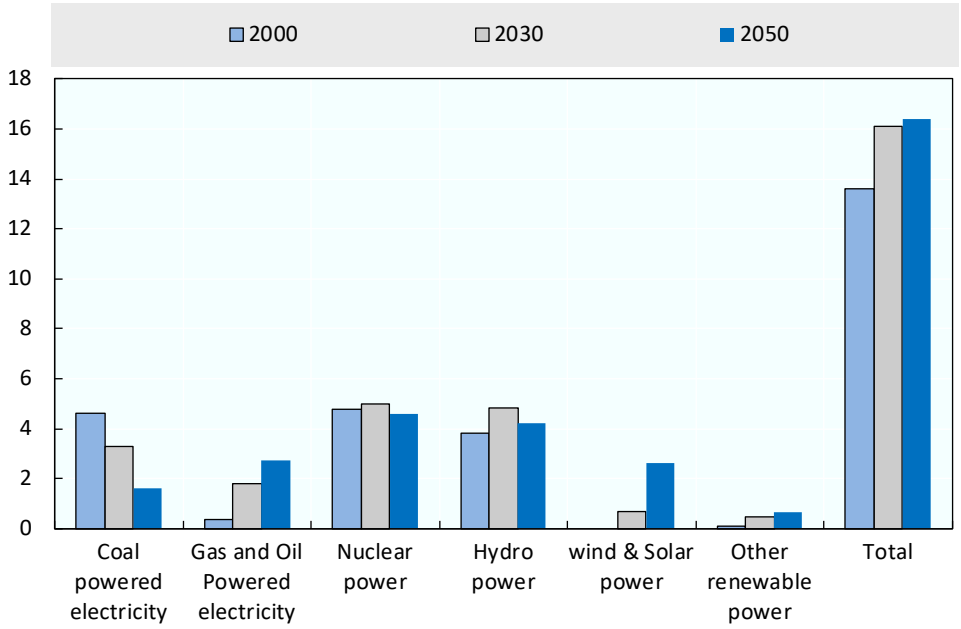
[17] Slovenia has a nuclear reactor in operation, the NPP Krško, which is jointly owned by Croatia. Its operational life was initially planned to be 40 years, but a 20-year extension was confirmed in 2015, subject to inspections in 2023 and 2033. It is operated by Nuklearna Elektrarna Krško (NEK), which is held by the company Gen Energija.

[18] Lignite is exploited in the unique coal mine in Slovenia, Velenje mine, and the main part of this resource is destined to the Šoštanj power plant. The company´s long-term strategy is to operate in the mine until 2054, as it is likely to remain Slovenia's only exploitable energy resource. The majority share of the Velenje coal mine belongs to the state-owned Holding Slovenske Elekrarne (HSE), which also owns the Šoštanj and Trbovlje thermal power plants and the hydroelectric plants based on the Drava, Sava and Soča rivers. However, lignite is very low calorific value and Slovenia depends on imports of higher calorific coal. The imported coal is mainly used by the former Termoelektrarna Toplarna Ljubljana (TE-TOL) heat and power plant, which covers 90% of the capital´s heat demand and 3% of its power demand. TE-TOL and Energetika Ljubljana merged in 2014.

both this change in fuel mix across fossil fuel sources, plus the total reduction of 20% of electricity generated by all RES, will explain a large fall in CO2 emissions from fuel combustion (see next section).

The above discussion makes clear that energy demand in Slovenia is expected to remain roughly constant through the years, but with a significant difference between the various energy sources. Oil-based energy consumption will remain the most used energy resource, but its usage will decline over the years to 2030. This in part reflects the programme put in place to promote the use of renewable sources of energy to reduce the dependency of non-renewable sources of energy, which are mostly classified as environmental pollutants. The result is a notable increase in the use of renewable sources of energy, in particular hydropower. At the same time, Slovenia is fostering natural gas supply. The energy consumption will continue to increase over time due to growing economic activities and population. Slovenia is striving in become energy sufficient, which explains the country's commitment to invest in the energy sector.

Figure 2.19. Evolution of Electricity Power mix, 2000, 2030 and 2050 (TWh)



Source: OECD ENV-Linkages model

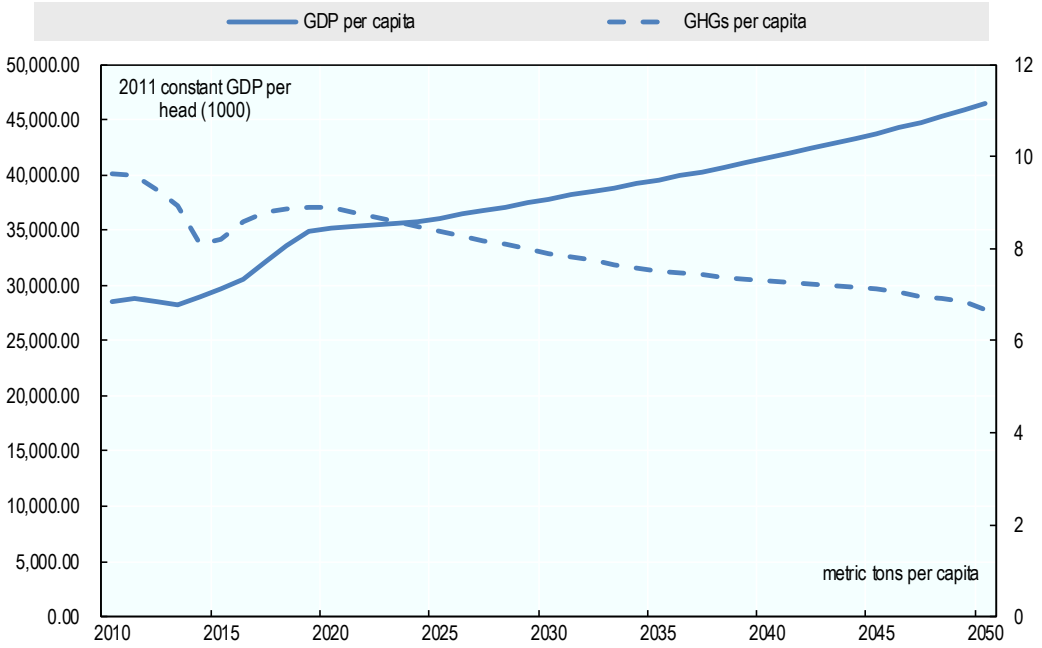
2.3.2. Environmental impacts and economic consequences of environmental damages

From the decoupling of emissions and GDP to a total emission reduction

Greenhouse gas emissions have been a concern for Slovenia over the last few years. The country is still engaged and committed to control its emissions. The Slovenian government has committed to combating climate change locally and is engaging international partners for the control of emissions. The EU has been on the lead in promoting ambitious near-, mid- and long-term greenhouse gas emission reduction objectives that will see the rise of global mean temperatures kept below 2°C relative to preindustrial levels. Slovenia had set an objective of reducing domestic greenhouse gas emissions by 8% from 1986 to 2005.

The Slovenian 2020 target is a limit to growth in emissions to a maximum of 4% relative to the 2005 level. The economic crisis has moved Slovenia closer to meeting its national and international commitments, so that emissions decreased by 1% between 2005 and 2011, which is a positive outcome for the country based on the target set. Between 2011 and 2015, total GHG emissions (excluding CO2 Lulucf) decreased strongly, by almost 15% (resulting from changes in transport blending and electricity mix). In sum, in 2015 the total level of GHGs emission was 10% lower than in 1990 (and even 22% lower when all emissions including CO2 Lulucf are taken into account).

Figure 2.20. Decoupling trends: real GDP per capita vs total greenhouse gas emissions per capita



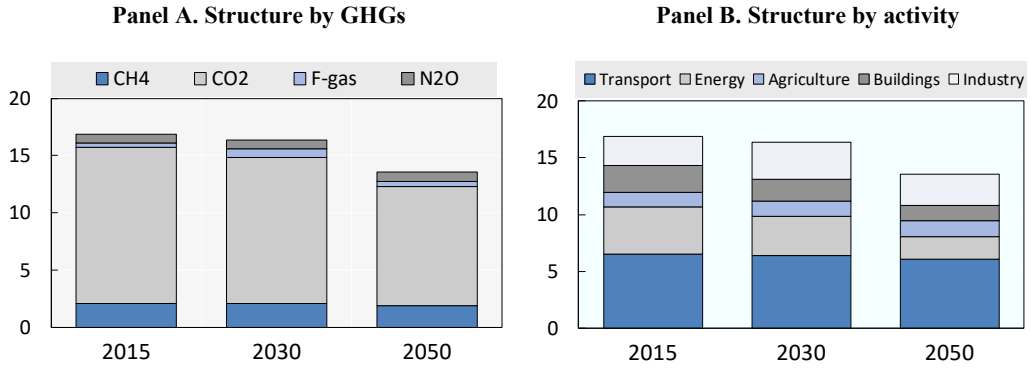
Note: Total GHGs emissions (excluding CO2 LULUCF), metric tons per capita; GDP Per head, constant PPPs, reference year 2011, thousands of USD
Source: OECD ENV-Linkages Model

GHG emissions and GDP are going to be more and more decoupled in the future: total GHG emissions per habitant will continue to decrease over the years to 2050, but to at a slower pace than in the recent years, while GDP per capita will increase (Figure 2.20). The decrease in the CO2 from fuel combustion both in absolute level and per capita is resulting from the active campaigns by the government and other stakeholders in promoting the use of green energy or renewable energy sources instead of fossil-fuel in power generation, but also from the shift from coal toward gas in fossil-fuel powered electricity itself. Slovenia will spend EUR 1bn over the next seven years to reduce carbon dioxide emissions, according to an operational plan being drafted by the government. The greatest effort will be required in transport, where emissions continue to rise. The plan by the government is part of the EU plans for controlling GHG emissions in sectors such as transport, households, agriculture and industries.

According to the latest national projections submitted to the European Commission, and when existing measures are taken into account, the emission reduction target will almost be met, with a gap of only 0.1 percentage point: +4% by 2020 compared to 2005 (Rajković, 2014). In 2011, the energy sector (e.g. mostly electricity generation) was ranked second in greenhouse gas emissions (Figure 2.21, panel B) accounting for 26%, after transportation (33%). In 2030 and 2050 the energy share of emission is projected to be reduced (e.g. mostly electricity generation), while the shares of all sectors will mostly increase proportionally. By consequence, the share of CO2 emissions in total GHG emissions will also decrease from 2015 to 2050 (Figure 2.21, panel A), while the share of CH4 emissions (linked to agriculture and waste management is projected to increase.

As the Slovenian economy expands, emissions of CO2 will roughly stay constant from 2015 to 2030, and then -- in absence of additional policy action -- slightly decrease with the projected shift away of coal power in electricity mix (Figure 2.19). The 2012 OECD Environmental Performance Review suggested that while emissions from manufacturing, commercial and residential sectors have decreased, the reduction has been insufficient to offset an increase in CO2 emissions in the transportation sector. Whether or not Slovenia meets its international commitments in terms of reduction of GHG emissions will critically depend on transport emissions. It had only come close to meeting its target of reducing the country's average greenhouse gas emissions by 8% in 2012.

Figure 2.21. Evolution of the structure of GHG emissions (excluding LULUCF), by gases (left panel) and by economic source: 2011, 2030 and 2050 (Mt CO2eq)



Source: OECD ENV-Linkages model

If Slovenia is to lower its CO2 emissions by more than projected in this baseline by 2050, the current reliance on carbon-intensive means of transportation will have to be reduced. To this effect, transport policy is now focusing on more appropriate land use planning, public transport infrastructure and a reduction in the use of international road traffic. If new means of transporting goods are not developed as the Slovenian economy grows, CO2 emissions will rise to hazardous levels by the end of the coming decade.

Outdoor air pollution and its socio-economic consequences

In addition to emissions of greenhouse gases, outdoor air pollution and its health and socio-economic consequences are also a concern in Slovenia. In particular, poor air quality leads to an increasing number of cases of bronchitis, asthma, and chronic obstructive pulmonary

diseases among other lung and breathing-related illnesses. Most importantly, air pollution is the cause of a large number of premature deaths.

As illustrated in Table 2.1, premature deaths caused by air pollution in Slovenia were estimated to be 853, according to the most recent Global Burden of Disease (GBD) study (Forouzanfar et al., 2015; Brauer et al., 2016). This number is projected to slightly decrease by 2030, but it will likely increase after 2030 in absence of additional policy action.

The health consequences of air pollution also include an increasing number of cases of illness. The economic consequences of these health issues are numerous and include lost working days, which have an impact on labour productivity, and healthcare costs. It is projected that the number of lost working days will slightly increase by 2030 from 0.39 to 0.43 per worker per year and that the total additional healthcare costs will increase from USD bn 13.7 to 20. The social and economic impact of this sharp increase will be felt not only in the health care sector, but throughout the social fabric of the country.

Table 2.1. Selected impact of outdoor air pollution and their effects

		2010	2030	2050	
Air pollutant concentrations	O3 (µg/m³)	54.3	53.8	54.3	
	PM (µg/m³)	10.2	7.9	7.7	
Social Damages	Premature deaths	853	839	971.5	
	Lost working days / workers	0.39	0.43	0.5	
Healthcare cost	USD 2010 MER	13.7	20.0	31.2	

Source: OECD (2016) with a slightly different baseline

Economic consequence of climate change

The Slovenian economy will be adversely affected by a range of climate change impacts. Climate change has been linked to a wide array of impacts, including sea level rise, extreme weather events, agricultural productivity, changes in energy and tourism, health (not least due to heat stress), loss of ecosystem services and triggering of high-impact large-scale singular events; see OECD (2015) for more details. Climate change impacts will lead to changes in production and consumption patterns, which have negative effects on the economy.

Specific projections of climate change damages for Slovenia is beyond the scope of the OECD modelling work, given the inherent uncertainties in projecting differences in impacts of climate change on local temperatures and especially local precipitation patterns. However, given the geographical location of the country, it is clear that the consequences of temperature rises will gradually become significant and negative. OECD (2015) identifies only relatively minor, but strictly negative consequences of climate change for the European Union, with GDP losses less than 1% annually by 2060, but the report stresses that this only covers some of the major climate impacts and that the Mediterranean countries will be more strongly adversely affected than the average EU country. Of course, more ambitious global mitigation action will partially reduce these potential damages.

2.4. The future profile of earnings distribution and potential risks of growing inequality

In terms of earnings inequality, Slovenia stands near the mid-range of a large set of European countries, with the wage of workers in the top decile being more than three times

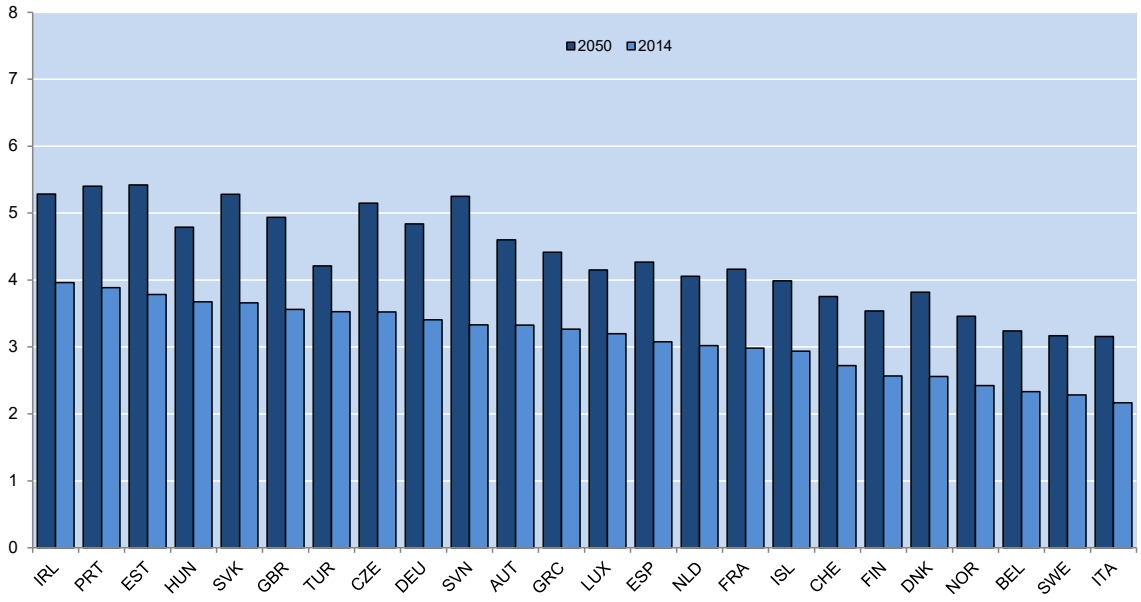
the wage of those in the bottom decile (Figure 2.22). Based on past trends, earnings inequality is projected to rise significantly over the next decades, driven primarily by skills-biased technological progress. The latter contributes to higher demand for skilled labour, which is only partially offset by increases in the supply of high-skilled workers, resulting in strong pressures on wages in the upper-part of the distribution. Given that skill-biased technological change is a global phenomenon, a significant rise in wage dispersion is projected for all countries. This is shown on Figure 2.23, with a large contribution to widening wage dispersion that is identical across all countries, and which reflects the projected common trend growth of 1 per cent per year in technological progress (light blue portion of the bar, labelled SBTC). As can be seen from Figure 2.23, the increase in the skills level of the working-age population through improvements in education attainments only plays a minor role in mitigating the rise in wage dispersion (black portion of the bar, labelled HSLS). To a large extent, this is a reflection of the limited scope for further improvements in educational attainments, which are already high in many countries.

Many of these trends are common to all countries, but two factors contribute to the relatively larger magnitude of the widening dispersion in the case of Slovenia. First, given the large scope for catching-up vis-à-vis advanced countries, productivity is projected to rise more rapidly than in many other countries, as indicated in section 2, putting further pressures overall on the demand for high-skilled workers. This is the contribution of the country-specific component of productivity growth (labelled MFP in the chart, which appears just above the SBTC portion). Second, for reasons mentioned in section 2, the employment rate of women is projected to decline by more in Slovenia than in other countries, as a result of population ageing (top portion of the bar, labelled "Female emp"). In the past, an increase in the employment rate of women has been one factor contributing to lower wage dispersion, thus partly offsetting the pressures from skills-biased technological change.

As a result of these factors, Slovenia is the country facing the highest increase in wage dispersion, at least among European countries. The average wage of the top decile is projected to go from 3 times to over 5 times the average wage of the bottom (first) decile. However, the increase has to be seen against a starting point that is relatively enviable. Income inequality, as measured on the basis of household disposable income is relatively low in Slovenia, thanks in good part to a tax and transfer system that is fairly highly redistributive relative to other countries. Furthermore, the projected widening of wage dispersion is based on the assumption of continuing trends, in particular in terms of skills-biased technological changes. In this regard, it is very difficult at this stage to assess what will be the impact of digitalisation and how it could affect the relative demand for high-skill workers. But the risk that it continues to put upward pressures on wage dispersion cannot be dismissed. Hence, these projections indicate that future changes in the wage distribution could put additional pressures on the redistribution capacity of the tax and transfer systems to maintain low income inequality in disposable income and underscore the importance of policies to raise the skills level across the working age population, beyond what can be achieved through an increase in the number of years of schooling.

Figure 2.22. The projected increase in the dispersion of wages across the distribution

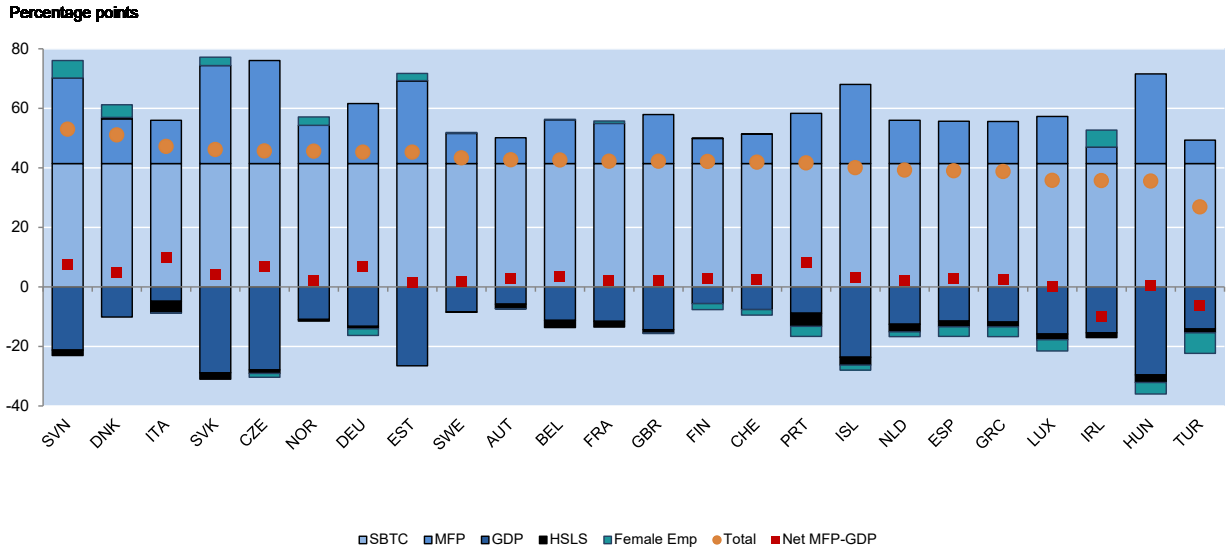
The ratio of wages in the top to bottom deciles (D9/D1), 2014, 2050



Source: OECD Earnings database

Figure 2.23. The contributions of the main factors to the projected increase in wage dispersion

Percentage change in wage dispersion (D9/D1) between 2017 and 2050



Note: SBTC refers to skills-biased technological change, MFP to multi-factor productivity, HSLS to the ratio of high-skilled to low-skilled workers. The total change in wage dispersion is represented by the orange circle. The red square shows the net of the positive effect from MFP and the negative effect of GDP per capita on wage dispersion.
Source: OECD Earnings database.

2.5. Summing up

Overall, the long-term baseline scenario shows only modest catching-up of income per capita in Slovenia relative to more advanced economy such as Germany. Labour productivity is projected to gradually converge towards German levels, although a gap remains at the end of the projection period, reflecting differences in policy settings at the start of the period. However, the catching-up in productivity is largely offset by a growing gap in employment rates. The latter reflects essentially the smaller scope for progress in the employment rate of women in Slovenia. Given population ageing, employment is projected to contribute negatively to growth over a period going from 2025 to 2045, assuming no change in policies. The weak employment profile is in turn putting additional pressures on public finances, over and above those associated with growing pension and healthcare costs.

Despite the growing size of the economy over the next three decades, emissions of CO2 will roughly stay constant from 2015 to 2030, and then slightly decrease until 2050. Total GHG emissions per habitant will continue to decrease over the years to 2050, but at a slower pace than in the recent years, suggesting that low-hanging fruits have, for the most part, been picked. Further gains in energy efficiency will contribute to the reduction in GHG emissions per capita, as overall energy demand is projected to be roughly constant up to 2050, despite growing output per capita. Another contributing factor is the shift away from coal power in the electricity mix in favour of fuel and renewable sources. While oil-based energy consumption will remain the most used energy resource, its usage will decline over the years to 2030. However, little progress in terms of CO2 emission reductions is expected in the transport sector, which is the largest emitter with over 30% of total GHG emissions, ahead of the energy sector (over 25%).

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Chapter 3. The potential gains from policy reforms: Results from scenario analyses

Jean Chateau, Alain de Serres, Yvan Guillemette, Fabrice Murtin and Anna Vindics

Introduction

This Chapter presents the main results from the scenario analyses undertaken with the modelling framework. Along with the set of results, it provides a brief overview of the scenarios that have been proposed and discuss how the policy changes are calibrated. The Chapter is meant to give guidance on how best to use the results presented to support the choice of targets. As a general principle, the relationship between policy variables and outcome variables coming out from the modelling framework can be taken as largely linear (i.e. doubling the magnitude of the policy change will also double the impact on the outcome variable).

3.1. The policy scenarios

The list of 18 scenarios is presented in Tables 3.1 and 3.2. Both tables show the link between the scenarios and the goal areas of the National Development Strategy, going either by scenario (Table 3.1), or by goal area (Table 3.2). The first four scenarios focus on labour market policies and social protection. Three of those scenarios, (1, 3 and 4), aim at improving incentives to work as well as employability. Another one (scenario 2) focuses on the cost of labour and hence job creation. The second set of scenarios regroups policy reforms aimed primarily at boosting productivity. They reflect the potential impact of improving the legal and judicial infrastructure (scenario 6) as well as the framework conditions for ensuring competitive product markets (scenario 7). The two additional productivity-oriented scenarios focus on more specific drivers, namely innovation and education (scenarios 8 and 9).

The third set of scenarios is concentrating on the potential benefits of improving the institutions and policies in the health sector. The results from three distinct reforms are presented (scenarios 11 to 13), each focusing on three policies that can both improve health outcomes while reducing costs, hence that avoid trade-offs between the two objectives. The three policy areas considered are the scope of basic coverage, regulation of workforce and equipment, as well as priority setting. The fourth set of scenarios looks at the impact of reforms to achieve environmental objectives, including increases in energy efficiency (scenario 15), raising carbon prices (scenario 16) and increasing the share of renewable in total electricity production (scenario 17). For each block of scenarios, one simulation provides the cumulated impact of the various policy changes implemented. The scenario 18 considers all policies of the three previous scenarios together. Since the future energy-mix of Slovenia is not entirely consensual, an additional scenario 18b is proposed, considering the same set of decarbonisation policies of scenario 18 relative to an alternative baseline projection of the energy system.

The first 10 scenarios are implemented mainly via the long-term macro module, although some of the policy variables involved are also determinants in the main relationships of other modules. In addition, the outcome variables of the long-term macro module also appear as determinants in other modules, in particular the inequality module and, to a lesser

extent, the health module. This is described in Table 3.1 in the form of parallel scenarios and indirect scenarios.

- For instance, the tax wedge and excess coverage of collective agreements are two variables that have an impact on wage dispersion and thus the reforms proposed under scenario 2 directly affect employment and GDP per capita (macro module) but also wage dispersion (inequality module). The same is true for the reduction in regulatory barriers to competition proposed under scenario 7. Finally, the change in education levels examined under scenario 9 feed directly into the long-term macro, inequality and health modules.
- Each time a policy change implemented in the long-term macro module has an impact on GDP per capita, productivity (MFP), R&D spending or the employment rate of women, the change in the latter variables are in turn introduced in the inequality module since they are among determinants of wage dispersion. Likewise, higher GDP per capita feed into the health module while changes in productivity (MFP) and employment can have an impact on energy and pollution emissions and thus feed into the environmental module.

In addition to listing each of the scenarios and indicating which goal areas they are most closely linked to, Table 3.1 also presents the benchmark used to calibrate the change or shock in the policy variables. For the scenarios involving labour market and productivity policies (scenarios 1 to 10), the benchmark is the average across countries of the size of the changes observed within countries over 5-year periods. For the health scenarios, the magnitude of the shock is calibrated with a view to closing half of the gap to best performer in the area of the policy variable chosen for simulation. Finally, in the case of environmental goals, the shocks are calibrating such as to achieve long-term targets set in the context of international commitments.

In order to get a better sense of what these benchmarks represent in terms of actual magnitude of changes in policy variables, Table 3.3 indicates, for each scenario, their unit of measurement as well as the corresponding size of the change implemented when the simulation is performed. This is to provide an indication of the size of elasticity or coefficient linking policy variables with outcome variables. To put the change in policy variables in some perspective, the final column of Table 3.3 reports the difference in the respective variables between the value for Slovenia and the OECD average. For example, the increase in spending on active labour market policies corresponding to the 5-year variation benchmark would not quite bring Slovenia to the OECD average, but would go a long way. Likewise, the suggested reduction in unemployment benefit replacement rate would still leave Slovenia above OECD average in terms of size of support for the unemployed.

The benchmarks used for calibrating the various scenarios and the corresponding magnitude of the change in the policy variables should not be interpreted as suggested targets. They have been chosen with a view to provide a mapping between policies and the main outcome variables of interest, based on simulated policy change of a reasonable magnitude, i.e. which has been observed in the past. Also, it should be kept in mind that for the purpose of the scenarios, it has been assumed that the policy changes reported in Table 3.3 are not phased in, but rather implemented in a single year (first year of simulation). Still, their impact on outcome variables builds-up gradually over time, according to the dynamic properties of the respective equations. As mentioned above, the relationship between policy and outcome variables can be taken as essentially proportional (or linear), at least as a first approximation.

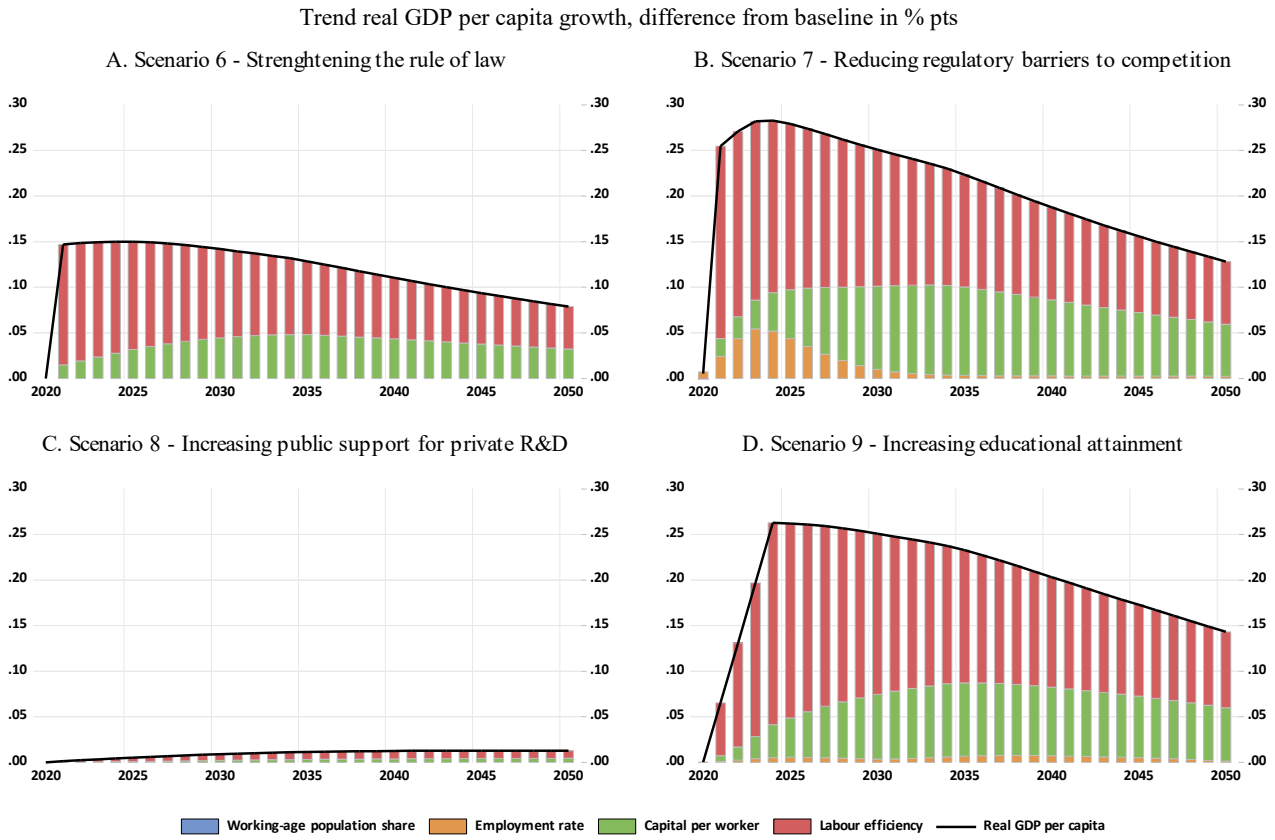
3.2. The scenario results

The results from each scenario are reported in a series of panels (Table 3.4). For each scenario, the results are reported in the same format, covering the same (whole) set of outcome variables that have been viewed as of main interest for the establishment of targets and monitoring of progress. For each variable and scenario, the table shows the baseline value in (or around) 2017, as well as the baseline values in 2030 and 2050. For the latter two years, in addition to the baseline values, the table shows the difference between scenario and baseline (shock minus control) in the form that can most naturally be interpreted. Depending on the outcome variable of interest, this can be in percentage difference of baseline (e.g. level of GDP per capita), in percentage point difference (most variables measured in ratios) or simply in absolute difference (e.g. life expectancy measured in years). The first column of Table 3.4 indicates, for each variable, the units in which the difference between scenario and baseline are reported.

3.2.1. Productivity and employment

Among the scenarios featured in Table 3.4, the ones focusing primarily on boosting productivity are those having the largest impact on GDP per capita, with the exception of the increase in R&D spending whose effect is relatively marginal. Although most of the gains in living standards occur via higher multifactor productivity (labour efficiency in the figure), the productivity gains also spur additional investment and capital intensity contributes positively to growth (Figure 3.1). Reducing regulatory barriers to competition also raises the employment rate slightly. The differences across scenarios are due to both the estimated impacts of policy reforms on the different components of potential output built into the model, but also on the relative magnitude of shocks (despite using a comparable benchmark for the calibration of the change in the policy variable). Reforms that raise economic performance mainly by boosting multifactor productivity exhibit slow dynamics: even by 2050 their full impact on the level of GDP per capita is not fully phased in.

Figure 3.1. impact on living standards for productivity-enhancing scenarios



The scenarios focusing primarily on **raising employment** have more limited long-term impacts on GDP per capita but they occur more quickly (Figure 3.2). They also contribute more to improving public finances, as indicated by the reduction in the primary revenues (as a percent of GDP) needed to stabilise the debt-to-GDP ratio at its baseline level. The latter, which can be interpreted as an overall "tax take", falls relative to baseline in every scenario where the main outcome is a rise in employment, with the extent of the decline being larger in cases where the policy change involves no net up-front increase in public spending.

In scenario 5, which combines scenarios 1 to 4, required primary revenue is slightly higher than baseline in the early part of the projection period because of the direct fiscal costs of assumed policy measures, but eventually it is more than 1 percentage point of GDP lower than baseline (Figure 3.3). In contrast, productivity-boosting scenarios have relatively little effects on the primary revenues needed to stabilise public debt. One reason for the difference is that while an increase in productivity and employment can both yield higher tax revenues, this tends to be offset by higher spending in the case of productivity, but not in the case of employment (or to a much lesser extent)[19].

[19] This is as long as the increase in employment takes place in the private sector.

Figure 3.2. Impact on living standards from employment-enhancing scenarios

Trend real GDP per capita growth, difference from baseline in % pts

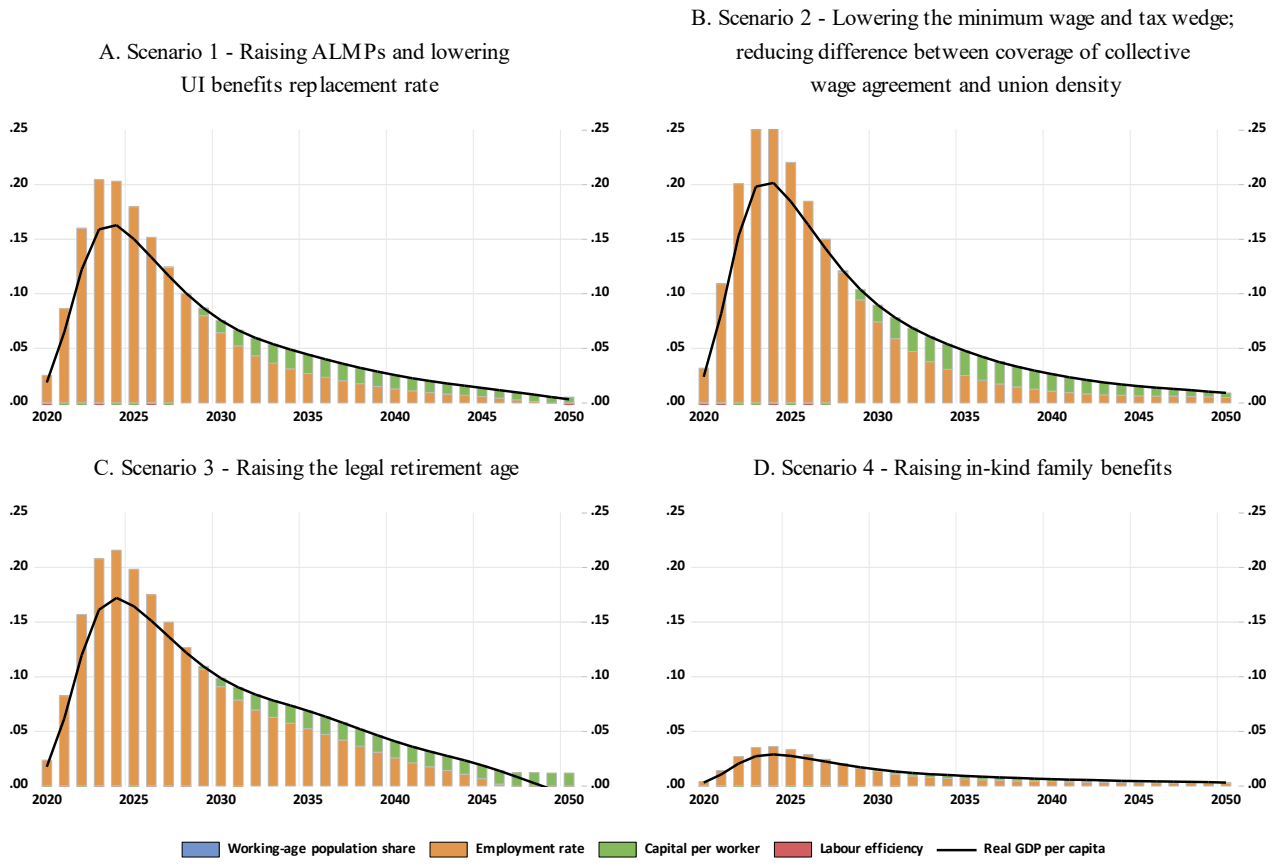
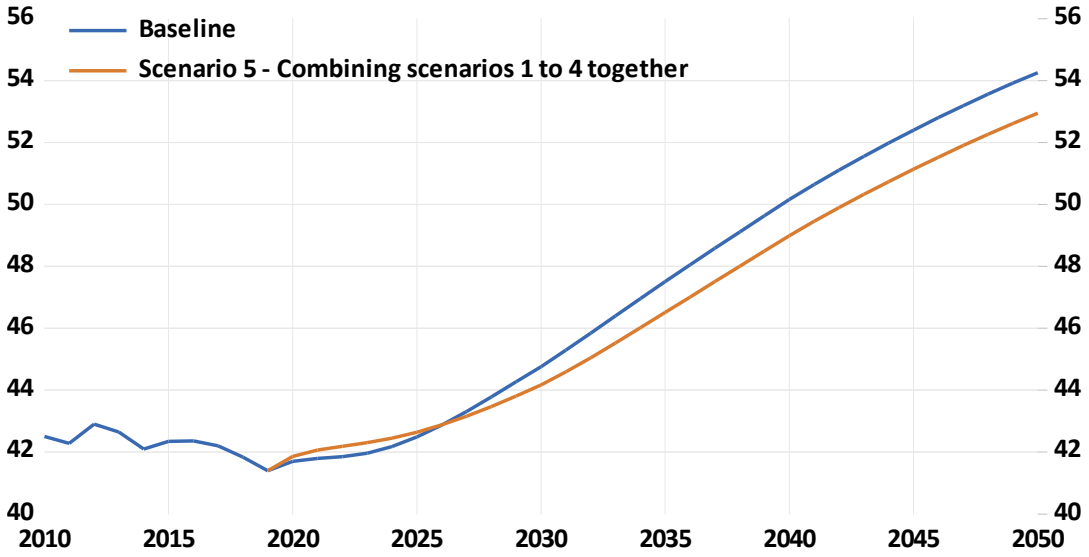


Figure 3.3. Scenarios that boost employment lower fiscal pressures

Government primary revenue required to stabilise public debt and meet future spending pressures, % of GDP



3.2.2. Inequality and health

Increases in employment also tend to lower wage inequality, in particular when the employment rate of women is boosted. In contrast, policy changes that raise productivity tend to exacerbate wage dispersion, except in the case of higher education. Overall, the impact of scenarios on wage dispersion is relatively modest compared to the trend increase observed in the baseline, under the pressure of gains in multi-factor productivity (thus reflecting skills-biased technological changes that are not matched by a proportional increase in the availability of high-skilled workers).

In the case of scenarios to improve health system efficiency, three institutions involve 'win-win' policy reforms as they are found to be negatively associated with cost pressures, and positively with health outcomes; these are i) the scope of basic coverage, ii) regulation of workforce and equipment and iii) priority setting. While Slovenia performs better than the OECD average along these three dimensions, some further gains in efficiency could be realised within each of them.

Among those three scenarios, improving priority setting is the one yielding the largest gains, both in terms of progress in life expectancy and cost reductions. Improving regulation of workforce and equipment also generates non-negligible cost reductions – helping to offset the trend increase in the baseline – but with fewer benefits in terms of life expectancy. Finally, expanding the scope of basic coverage has smaller but nonetheless also joint benefits. The combined effect of these three scenarios is shown as scenario 14 in Table 3.1. The overall impact on life expectancy – an increase of close to one-third of a year – seems modest relative to the 5 years gain expected between now and 2050. Nevertheless, considering that this is achieved through reforms that simultaneously help reducing health spending pressures by over 2 percentage points of GDP (by 2050), the overall benefits are not negligible.

3.2.3. Energy and the environment

Finally, among the three scenarios focusing on saving fossil energy to reduce greenhouses gases (GHG) emissions and outdoor air pollution, the one achieving improvements in energy efficiency generates substantial long-run gains in the level of GDP per capita and, to a much lesser extent, employment. The other two scenarios, consisting of an increase in carbon taxes or implementing subsidies for renewable energy have only marginal effects on output and employment. As expected ambitious reduction of GHGs emissions through a carbon tax show a small reduction of GDP per capita around -1.5% by 2050 but this is a modest costs in comparison to the corresponding total GHGs (including lulucf emission) reduction achieved that should be around -70% relative to 1990 level.

The two other policies, which consist in improving energy efficiency and promoting renewable subsidies are shown to be much less ambitious in reaching this environmental target, respectively -53% and -54% relative to 1990 levels. In any case, they would need to be accompanied by some additional measures in order to reach the EU ambitious targets from Paris 2015 agreement on reducing GHGs emissions by 70 to 80% in 2050 relative to 1990). Three elements explained why the very ambitious carbon tax policy considered here (around 280 constant 2017 euros per tonne of Co2 equivalent by 2050) is not very costly relative to what could be expected from general literature/projections. The first is that all the three environmental policies considered here are implemented at the EU level and not at the level of Slovenia alone. Economic structure and energy system of Slovenia (relying heavily on Hydro and Nuclear Power) will tend to make the mitigation effort relatively cheaper relative to its neighbours and then some activity will be reallocated in Slovenia or

at least Slovenian economy will suffer from less competiveness losses relative to its European partners.

The second explanation is that the extra revenues generated by the carbon taxes will be used to reduce some other distortive taxation, which would stimulate employment. Finally, the functioning of EU ETS system will imply that Slovenia will be a net-exporters of carbon credit into the European carbon market, since for reaching a same level of emission per capita/or per unit of GDP than its partners Slovenia has less effort to do and hence could sell additional permits. At least, the simulation of the scenario 18 considering all the 3 policies together shows that even a more ambitious target of 80% reduction in GHGs emissions in 2030 could be achieved with a net positive gain of around 2% of GDP per capita. This reflects that part of the extra revenues of the carbon tax would also be devoted to finance both energy efficiency measures and renewable subsidies, which in the absence of these extra taxes were partly financed through higher income taxation (in scenario 15 and 16).

3.2.4. Implications for the Slovenian Development Strategy and measures required to achieve the goals

The Slovenian Development Strategy is organised around 5 strategic orientations, underpinned by 12 twelve goals (see Chapter 1, Table 1.1). For each of these goals, progress is assessed through a small set of indicators, for which a number of numerical targets have been set. The modelling framework, including both the baseline projection and policy scenarios can be used to inform about the magnitude of the challenges in pursuing the objectives and hence the extent of policy reforms required to achieve some of the targets. It can do so in particular for 7 of the 12 goal areas, using outcome variables from the modelling framework.

Targets that appear to be within reach

Among the targets that appear to be more easily achievable, the main ones are productivity and some of the environmental objectives.

In the case of **labour productivity**, the objective is to bring the level in Slovenia to 95 per cent of the EU average by 2030, up from 82 per cent currently. The baseline scenario, developed under the assumption of unchanged policies, suggests that two-thirds of the objective could be achieved simply through the technological catching-up vis-à-vis the most advanced economies. The policy scenarios suggest that reforms to improve the efficiency of the legal and judicial infrastructure (rule of law) and to lower regulatory barriers to competition (scenarios 6 and 7) would be sufficient to close the remaining one-third of the gap and thus to achieve the target.

In the case of environmental objectives the **GHG commitments** by EU at the 2015 Paris Agreement (-70 to -80% relative to 1990 level) would be probably fulfilled at a lesser cost by Slovenia (relative to EU partners, see previous section) due partly to characteristic of its energy system, where electricity rely mostly on Hydro Power and Nuclear Power. The EU targets on **renewable energy share** in total energy demand could also been reached at lower costs thank to still some possibility in Hydro Power potential and to the very abundant biomass (e.g. forestry) resource. The only remaining challenge concerns transportation emissions, both with respect to GHG emissions and outdoor pollutants. This is a main source of concern insofar as these transport emissions are linked to international (EU) transport services. Regarding the latter, a lot will depend on the speed of the future electrification of vehicle fleet and the extension of

railroad transportation, but this is a general issue for all EU countries, not a problem specific to Slovenia.

Targets that are likely to prove more challenging to achieve

Among the targets that will be more difficult to achieve, the main ones are the employment rate, average income (GDP per capita), public finance consolidation and income inequality reductions.

- In the case of the **employment rate**, an increase of five percentage points by 2030 relative to the 2016 level (from 70.1 to 75 per cent) has been set as a goal in the Development Strategy. According to the baseline projection exposed in the previous Chapter, the profile for the employment rate suggests instead a decline of three percentage points over the same period, reflecting mainly the demographic pressures and the limited scope for increases in the labour force participation of women to offset the decline in the working-age population. This means that in order to achieve the target, what is required is an increase in the employment rate equivalent to 8 percentage points to compensate for the underlying decline.
    - The results from scenario 5, which combines four measures directly aimed at raising the employment rate, shows that these actions together could raise the employment rate by 3 percentage points by 2030. This would be just sufficient to offset the underlying decline stemming from the demographics, but not to get close to achieving the objective set in the Strategy.
    - However, scenario 5 is based on reform measures that can be seen as relatively modest, in particular in light of where Slovenia stands relative to the OECD average on some of these policy areas. In particular, further increases in the employment rate could be obtained from a more significant rise in **active labour market policies** as well as from a more ambitious reform of pensions so as to further extend the **effective retirement age**.
    - In scenario 3 (and scenario 5), **retirement age** is assumed to be pushed back by slightly over one year. Bringing retirement age closer to the OECD average would imply a change 3 to 4 times more ambitious. That alone could raise the overall employment rate by an extra **2 or 3 percentage points**, with the employment rate of older workers rising by 7 to 10 percentage points, as compared to less than 3 percentage points in scenario 3.
    - In the case of **active labour market policies**, doubling the size of the reforms (an increase of around 11 percentage points in amount spent per person employed) would bring an additional rise of **one percentage point** in the overall employment rate (see scenario 1). Since the increase in spending is on a per unemployed basis, this needs not involve a massive medium-term budgetary effort insofar as the number of unemployed workers could fall over the period.
    - Another area where Slovenia could get closer to OECD average is **the labour tax wedge**, in particular on low-wage earners. There again the size of the adjustment in scenario 2 is relatively modest and would still leave the tax wedge in Slovenia well above the OECD average, albeit close to the EU average. A more significant reduction in the tax wedge could help bring about another **one percentage point** increase in the overall employment rate,

benefitting this time lower-skilled (and youth) workers especially if the reduction were to be concentrated on this group so as to mitigate the budgetary cost.

- In the case of **GDP per capita**, the objective of closing the level gap vis-à-vis the EU average by 2030 comes out as somewhat ambitious, reflecting to a large extent the challenge faced in achieving the target in the employment rate. As shown in the previous Chapter, the income gap vis-à-vis Germany is only expected to close a little between now and 2030 in the baseline scenario, due to the narrowing productivity gap being largely offset by a growing employment gap.
- Another objective which will likely require significant action to be achieved is the reduction in the **general government debt-to-GDP ratio** from around 80 percent to 60 percent in 2030. As the baseline scenario indicates, a significant and steady increase in overall tax revenues will already be necessary simply to offset the projected trend rise in expenditure, leaving thereby the overall debt-to-GDP ratio around the current level. This illustrates the magnitude of the challenge in bringing that level to the Maastricht threshold of 60 percent, as this will necessitate a strong control on public spending, which in absence of significant reforms, will be hard to achieve.
    - This is where reforms to pensions to increase the **effective retirement age** could be very helpful. Extending the working life would not only reduce pressures on pension spending but also raise the overall employment rate. As discussed in the previous Chapter, achieving higher growth through employment gains is more effective at supporting public finance consolidation than boosting growth through productivity gains.
    - Therefore, all reforms that would contribute to achieving the ambitious target of raising the employment rate by five percentage points by 2030 would at the same time help with the public finance objective. For instance, scenario 5 shows that a combination of labour market reforms that would boost the employment rate by 3 percentage points would not fully offset the 2½ percentage points of GDP rise in tax revenues necessary to stabilise the debt at the current level, but it would mitigate that rise by 0.6 percentage points.
- The final objective that may not be easy to achieve is the one on **earnings dispersion**. While the target is to maintain the ratio of high to low wages at a comparatively low level of around 3.5, the baseline scenario indicates that further progress in educational attainment are unlikely to be sufficient to offset the pressures from skill-biased technical change on the wage distribution, leading to growing earnings inequality. In this case, reforms to further raise the employment rate among less-skilled workers and women, as well as measures to facilitate skills up-grading are likely to be necessary to mitigate the trends towards wage inequality. Mitigating the rise in wage inequality is all the more important that Slovenia is one of the countries already achieving a large amount of redistribution through taxes and transfers.

Table 3.1. List of scenarios by main module of the framework

Table 3.1A: Long-term macro module: Employment

Module	Scenario	Benchmark for shock	Goal area and variable of interest
	Labour market policies and social protection		
Long-term macro module	1- Flexicurity: Raising ALMPs and tightening long-term UI benefits	Average of 5-year variation	*Goal 7 – inclusive labour market* Employment rate (aggregate and age-groups)
Long-term macro module	2- Cost of labour: Lowering the minimum wage and tax wedge on labour income; reducing excess coverage of wage agreements	Average of 5-year variation.	*Goal 7 – inclusive labour market* Employment rate (aggregate and age-groups)
Long-term macro module	3 – Demographics and pensions: Raising legal retirement age	Average of 5-year variation	*Goal 5 – Economic stability* *Goal 7 – inclusive labour market* Primary revenues as a percentage of GDP Employment rate (aggregate and older workers)
Long-term macro module	4- Employment gap between men and women: Raising in-kind family benefits	Average of 5-year variation	*Goal 3 – A decent life for all* *Goal 7 – Inclusive labour market* Employment rate (aggregate and women)
Long-term macro module	5- Reforms of labour market policies and social protection: Scenarios 1 to 4 implemented jointly	Average of 5-year variation	*Goal 3 – A decent life for all* *Goal 7 – Inclusive labour market* Employment rate (aggregate and age-groups) Primary revenues as a percentage of GDP

Table 3.1B: Long-term macro module: Productivity

Module	Scenario	Benchmark for shock	Goal area and variable of interest
	Product market regulation and innovation policies		
Long-term macro module	6- Legal infrastructure: Improving the rule of law	Average of 5-year variation	*Goal 10 – Trustworthy legal system* GDP per capita (growth and level) MFP gap vis-à-vis 3 sets of countries
Long-term macro module	7- Framework conditions (product market regulation): Reducing regulatory barriers to competition, especially through easing of state control and improvement of governance of SOEs	Average of 5-year variation	*Goal 6 – Competitive corporate sector* GDP per capita (growth and level) MFP gap vis-à-vis 3 sets of countries
Long-term macro module	8 – Innovation: Increasing public support for private R&D	Average of 5-year variation	*Goal 6 – Competitive corporate sector* GDP per capita (growth and level) MFP gap vis-à-vis 3 sets of countries
Long-term macro module	9- Education: Increasing average level of schooling (mean years of schooling)	Average of 5-year variation	*Goal 2 – Knowledge and skills* GDP per capita (growth and level) MFP gap vis-à-vis 3 sets of countries
Long-term macro module	10- Reforms of product market policies and education: Scenarios 6 to 9 implemented jointly	Average of 5-year variation	*Goal 2 – Knowledge and skills* *Goal 6 – Competitive corporate sector* *Goal 10 – Trustworthy legal system* GDP per capita (growth and level) MFP gap vis-à-vis 3 sets of countries

Table 3.1C: Health module: Life expectancy and health care costs

Module	Scenario	Benchmark for shock	Goal area and variable of interest
	Health policies and outcomes		
Health module	11- Extending the scope of basic coverage	Closing half of the gap to best performer	*Goal 1 Healthy and active lifestyle* Life expectancy Health care costs
	12- Improving regulation of the workforce and equipment		
	13- Improving priority setting		
	14- Improving cost-efficiency in health sector: Scenarios 11 to 13 implemented jointly		*Goal 5 Economic stability* Public debt/GDP ratio Primary structural balance
	Parallel scenario: same policy variable as long-term macro module		
Health module	Higher level of education (mean years of schooling)	Average of 5-year variation	Scenario 9
	Indirect scenarios: Input from other modules		
Health module	Higher GDP per capita	Input from long-term macro module	Scenario 10

Table 3.1D: Environmental module: Energy use and pollution emission

Module	Scenario	Benchmark for shock	Goal area and variable of interest
		Environmental policies and outcomes	
ENV-Linkages	15- Raising energy efficiency	-2% up to (2016-2030) and -1.5% (2030-2050) rate of change in energy use per output	*Goal 8 – Low carbon economy* GHG emissions per unit of GDP Energy use per unit of GDP
ENV-Linkages	16- Raising carbon tax	Carbon Tax is on averaged around 280 2017 euros in 2050 vs 21 (2017 euros) in the baseline	Share of renewable in total energy
ENV-Linkages	17- Increasing share of renewable in electricity production		*Goal 6 -- Competitive corporate sector*
ENV-Linkages	18- Combined set of policies to achieve environmental goals Scenarios 15 to 17 implemented jointly[20]	+15 points of renewable energy in 2030 relative to baseline, +18 in 2050 Calibrated to achieve targets for 2030 and beyond	GDP per capita (growth and level) MFP gap vis-à-vis 3 sets of countries
		Indirect scenarios: Input from other modules	
ENV-Linkages	Higher aggregate employment	Input from long-term macro module	Scenario 5
ENV-Linkages	Higher productivity (MFP)	Input from long-term macro module	Scenario 10

[20] In addition, two alternative scenarios have been considered. A scenario 18b has been conducted corresponding to the same set of assumption of scenario 18 but implemented around an alternative baseline projection characterised by different projections for the future energy system. And, a scenario 18c that combines environmental policies framework studied in scenario 18 plus the policy package of scenario10, which includes changes in product market regulation, innovation support and education policies.

Table 3.1E: Inequality module: Wage dispersion

Module	Scenario	Size of shock	Key outcome variable and goal
	Parallel scenarios: Wage dispersion		
Inequality module	Lowering the tax wedge and reducing excess coverage of collective agreement (part of scenario 2)	Average of 5-year variation	*Goal 3 – A decent life for all* Decile ratio of gross earnings (D9/D1)
Inequality module	Reducing regulatory barriers to competition (scenario 7)	Average of 5-year variation	
Inequality module	Increase in ratio of high-skilled to low-skilled workers (corresponding to increase in mean years of schooling) (scenario 9)	Average of 5-year variation	
	Indirect scenarios: Input from other modules		
Inequality module	Higher GDP per capita Higher MFP Higher R&D spending from macro module Higher employment rate of women	Input from long-term macro module	Scenarios 1 to 10

Table 3.2. List of key outcome variables and link to scenarios by main goal areas

Main goal	*Outcome indicators*	*Related scenario*
Healthy and active lifestyle (1)	- Life expectancy - *Health care costs*	Scenarios 9 to 14
Knowledge and skills for high-quality life and work (2)	- Mean years of schooling (input)	Scenarios 9 and 10
A decent life for all (3)	- Wage dispersion (D9-D1)	Scenarios 1 to 10
Economic stability (5)	- GDP per capita (growth) - Primary revenues as a percentage of GDP	Scenarios 1 to 10 for both, 15 to 18 for GDP per capita
Competitive and socially responsible entrepreneurial and research sector (6)	- Multi-factor productivity or GDP per employee: i) Gap vis-à-vis most advanced – (USA, DEU, FRA, GBR, CAN) ii) Gap vis-à-vis Visegrad 4 iii) Gap vis-à-vis Germany - Increase in R&D as a % of GDP (input)	Scenarios 6 to 10
Inclusive labour market and high-quality jobs (7)	- Employment rates (total employees) - Employment rates (youth) - Employment rates (older workers) - Employment rates (prime-age women)	Scenarios 1 to 5, 7, 9, 10 and 15 to 18
Low-carbon circular economy (8)	- GHG emissions per unit of output - Energy per unit of output - Share of renewable in total electricity	Scenarios 5, 10 and 15 to 18
Trustworthy legal system (10)	- Rule of law index (input)	Scenarios 6 and 10

Table 3.3. List of scenarios and magnitude of policy change

Scenarios	Change in the following variables	Units of measurement of variables	Size of shock	Diff. with OECD avg[1]
		Labour market and social protection policies		
1	Raising ALMPs and lowering UI benefits replacement rate	- ALMP per unemployed as a % of GDP per capita - Unemployment benefits (% of earnings)	+ 5.85 p.p. - 2.70 p.p.	- 7.60 p.p. + 10.0 p.p.
2	Lowering the minimum wage and tax wedge; reducing difference between coverage of collective wage agreement and union density	- Minimum wage (% of median) - Labour tax wedge, couple (% of total labour costs) - Labour tax wedge, single (% of total labour costs) - Coverage minus union density (p.p. diff.)	- 3.45 p.p. - 2.96 p.p. - 1.79 p.p. -3.03 p.p.	+ 8.5 p.p. + 1.70 p.p. + 7.30 p.p. +17.0 p.p.
3	Raising the legal retirement age	- Statutory age of retirement	+ 1.15 yrs	- 5.05 yrs
4	Raising in-kind family benefits	- Spending on benefits as a % of GDP	+ 0.19 p.p.	- 0.35 p.p.
5	Scenarios 1 to 4 implemented jointly			
		Product market regulation, innovation and education		
6	Improving the rule of law	- Index from -2 to 2	+ 0.178	- 0.36
7	Reducing regulatory barriers to competition	- OECD PMR indicator (index 0 to 6)	- 0.315	+ 0.30
8	Increasing public support for private R&D	- R&D spending as a % of GDP	+0.15 pp	+ 0.03 p.p.
9	Increasing educational attainment	- Mean years of schooling	+0.5 over 5 years	+ 1.97 years
10	Scenarios 6 to 9 implemented jointly			
		Health policy scenarios		
11	Extending the scope of basic coverage	- OECD health indicator (index 0 to 6)	+0.09	+0.60
12	Improving regulation of workforce and equipment	- OECD health indicator (index 0 to 6)	+0.62	+0.51
13	Improving priority setting	- OECD health indicator (index 0 to 6)	+0.98	+0.40
14	Scenarios 11 to 13 implemented jointly			

		Environmental policy scenarios	
15	Raising energy efficiency	Energy per unit of GDP (Mtoe / USD MER)	- 30% in energy use by unit of output in 2030 relative to 2015 - 1.5% each year after 2030
16	Raising carbon tax	From 16 (in the baseline) to 278 euros (2017 base) / tCo2 eq (average over GHG and source), in 2050	- 35% in GHG emission (including co2 lulucf) in 2030 (relative to 2010) - 70% in GHG emission (including co2 lulucf) in 2050
17	Increasing share of renewable in energy demand		30% in 2030 and 40% in 2050 () relative to 11.5% in 2015
18	Scenarios 15 to 17 implemented jointly		

1. This is based on the latest year available, most commonly 2015. A negative entry means that Slovenia is below OECD average in the policy area.

Table 3.4. Results for key outcome variables: all scenarios

		Scenario 1 – Raising ALMPs and lowering UI benefits				
	Scenario shown as[1]	Baseline 2017	Baseline 2030	Scenario 2030	Baseline 2050	Scenario 2050
- Real GDP per capita (growth)	p.p. diff	4.95	1.32	0.08	1.72	0.00
- Real GDP per capita, 2010 prices (level)	% diff	19,386	23,481	1.20	31,179	1.77
Multi-factor productivity						
- % of advanced countries	p.p. diff	67.02	74.08		77.65	
- % of CEC 4	p.p. diff	94.27	91.14		91.88	
- % of Germany	p.p. diff	71.76	79.48		84.88	
Employment						
- Employment rate (aggregate)	p.p. diff	62.09	59.62	0.83	57.50	0.99
- Employment rate (youth)	p.p. diff	31.41	28.90	1.32	27.37	1.35
- Employment rate (older)	p.p. diff	25.13	25.55	1.07	22.60	1.29
- Employment rate (women)	p.p. diff	55.20	50.96	1.00	49.45	1.19
Public finance						
- Cyclically-adjusted primary revenue, % of GDP	p.p. diff	42.20	44.76	-0.03	54.25	-0.26
Health outcomes						
- Life expectancy	Years	81.50	83.64		86.17	
- Public health care expenditure, % of GDP	p.p. diff	6.10	7.46	-0.02	9.56	-0.04
Wage dispersion						
- Decile ratio of gross earnings (D9/D1)	Diff in ratio	3.45	4.40	-0.04	6.17	-0.07
Environmental outcomes						
- GHG emissions per unit of GDP	% diff	0.29	0.21		0.14	
- Energy per unit of GDP	% diff	0.11	0.08		0.05	
- Share of renewable in total energy	% diff	0.16	0.20		0.25	

1. Depending on the variable, the scenario results are presented in deviation from baseline in percentage difference (% diff), percentage points difference (p.p. diff) or in absolute difference (indicated).

Scenario 2 – Lowering the minimum wage and tax wedge; reducing difference between coverage of collective wage agreement and union density

	Scenario shown as[1]	Baseline 2017	Baseline 2030	Scenario 2030	Baseline 2050	Scenario 2050
- Real GDP per capita (growth)	p.p. diff	4.95	1.32	0.09	1.72	0.01
- Real GDP per capita, 2010 prices (level)	% diff	19,386	23,481	1.47	31,179	2.11
Multi-factor productivity						
- % of advanced countries	p.p. diff	67.02	74.08	0.00	77.65	0.00
- % of CEC 4	p.p. diff	94.27	91.14	0.00	91.88	0.00
- % of Germany	p.p. diff	71.76	79.48	0.00	84.88	0.00
Employment						
- Employment rate (aggregate)	p.p. diff	62.09	59.62	1.02	57.50	1.18
- Employment rate (youth)	p.p. diff	31.41	28.90	2.55	27.37	2.62
- Employment rate (older)	p.p. diff	25.13	25.55	0.63	22.60	0.77
- Employment rate (women)	p.p. diff	55.20	50.96	1.36	49.45	1.61
Public finance						
- Cyclically-adjusted primary revenue, % of GDP	p.p. diff	42.20	44.76	-0.40	54.25	-0.60
Health outcomes						
- Life expectancy	Years	81.50	83.64		86.17	
- Public health care expenditure, % of GDP	p.p. diff	6.10	7.46	-0.03	9.56	-0.05
Wage dispersion						
- Decile ratio of gross earnings (D9/D1)	Diff in ratio	3.45	4.40	-0.02	6.17	-0.05
Environmental outcomes						
- GHG emissions per unit of GDP	% diff	0.29	0.21		0.14	
- Energy per unit of GDP	% diff	0.11	0.08		0.05	
- Share of renewable in total energy	% diff	0.16	0.20		0.25	

1 Depending on the variable, the scenario results are presented in deviation from baseline in percentage difference (% diff), percentage points difference (p.p. diff) or in absolute difference (indicated).

	Scenario 3 – Raising legal retirement age					
	Scenario shown as[1]	Baseline 2017	Baseline 2030	Scenario 2030	Baseline 2050	Scenario 2050
- Real GDP per capita (growth)	p.p. diff	4.95	1.32	0.10	1.72	0.00
- Real GDP per capita, 2010 prices (level)	% diff	19,386	23,481	1.32	31,179	2.14
Multi-factor productivity						
- % of advanced countries	p.p. diff	67.02	74.08	0.00	77.65	0.00
- % of CEC 4	p.p. diff	94.27	91.14	0.00	91.88	0.00
- % of Germany	p.p. diff	71.76	79.48	0.00	84.88	0.00
Employment						
- Employment rate (aggregate)	p.p. diff	62.09	59.62	0.92	57.50	1.20
- Employment rate (youth)	p.p. diff	31.41	28.90	0.00	27.37	0.00
- Employment rate (older)	p.p. diff	25.13	25.55	2.85	22.60	3.43
- Employment rate (women)	p.p. diff	55.20	50.96	1.05	49.45	1.27
Public finance						
- Cyclically-adjusted primary revenue, % of GDP	p.p. diff	42.20	44.76	-0.35	54.25	-0.62
Health outcomes						
- Life expectancy	Years	81.50	83.64		86.17	
- Public health care expenditure, % of GDP	p.p. diff	6.10	7.46	-0.02	9.56	-0.05
Wage dispersion						
- Decile ratio of gross earnings (D9/D1)	Diff in ratio	3.45	4.40	-0.01	6.17	-0.02
Environmental outcomes						
- GHG emissions per unit of GDP	% diff	0.29	0.21		0.14	
- Energy per unit of GDP	% diff	0.11	0.08		0.05	
- Share of renewable in total energy	% diff	0.16	0.20		0.25	

1 Depending on the variable, the scenario results are presented in deviation from baseline in percentage difference (% diff), percentage points difference (p.p. diff) or in absolute difference (indicated).

	Scenario 4 – Raising in-kind family benefits					
	Scenario shown as[1]	Baseline 2017	Baseline 2030	Scenario 2030	Baseline 2050	Scenario 2050
- Real GDP per capita (growth)	p.p. diff	4.95	1.32	0.02	1.72	0.00
- Real GDP per capita, 2010 prices (level)	% diff	19,386	23,481	0.22	31,179	0.35
Multi-factor productivity						
- % of advanced countries	p.p. diff	67.02	74.08		77.65	
- % of CEC 4	p.p. diff	94.27	91.14		91.88	
- % of Germany	p.p. diff	71.76	79.48		84.88	
Employment						
- Employment rate (aggregate)	p.p. diff	62.09	59.62	0.15	57.50	0.20
- Employment rate (youth)	p.p. diff	31.41	28.90		27.37	
- Employment rate (older)	p.p. diff	25.13	25.55		22.60	
- Employment rate (women)	p.p. diff	55.20	50.96	0.34	49.45	0.43
Public finance						
- Cyclically-adjusted primary revenue, % of GDP	p.p. diff	42.20	44.76	0.15	54.25	0.09
Health outcomes						
- Life expectancy	Years	81.50	83.64		86.17	
- Public health care expenditure, % of GDP	p.p. diff	6.10	7.46	0.00	9.56	-0.01
Wage dispersion						
- Decile ratio of gross earnings (D9/D1)	Diff in ratio	3.45	4.40	-0.01	6.17	-0.03
Environmental outcomes						
- GHG emissions per unit of GDP	% diff	0.29	0.21		0.14	
- Energy per unit of GDP	% diff	0.11	0.08		0.05	
- Share of renewable in total energy	% diff	0.16	0.20		0.25	

1 Depending on the variable, the scenario results are presented in deviation from baseline in percentage difference (% diff), percentage points difference (p.p. diff) or in absolute difference (indicated).

	Scenario 5 – Scenarios 1 to 4 implemented jointly					
	Scenario shown as[1]	Baseline 2017	Baseline 2030	Scenario 2030	Baseline 2050	Scenario 2050
- Real GDP per capita (growth)	p.p. diff	4.95	1.32	0.27	1.72	0.01
- Real GDP per capita, 2010 prices (level)	% diff	19,386	23,481	4.18	31,179	6.33
Multi-factor productivity						
- % of advanced countries	p.p. diff	67.02	74.08		77.65	
- % of CEC 4	p.p. diff	94.27	91.14		91.88	
- % of Germany	p.p. diff	71.76	79.48		84.88	
Employment						
- Employment rate (aggregate)	p.p. diff	62.09	59.62	2.90	57.50	3.54
- Employment rate (youth)	p.p. diff	31.41	28.90	3.87	27.37	3.98
- Employment rate (older)	p.p. diff	25.13	25.55	4.55	22.60	5.48
- Employment rate (women)	p.p. diff	55.20	50.96	3.76	49.45	4.50
Public finance						
- Cyclically-adjusted primary revenue, % of GDP	p.p. diff	42.20	44.76	-0.59	54.25	-1.31
Health outcomes						
- Life expectancy	Years	81.50	83.64		86.17	
- Public health care expenditure, % of GDP	p.p. diff	6.10	7.46	-0.07	9.56	-0.14
Wage dispersion						
- Decile ratio of gross earnings (D9/D1)	Diff in ratio	3.45	4.40	-0.08	6.17	-0.16
Environmental outcomes						
- GHG emissions per unit of GDP	% diff	0.29	0.21	-0.8	0.14	-0.7
- Energy per unit of GDP	% diff	0.11	0.08	-1.0	0.05	-1.2
- Share of renewable in total energy	% diff	0.16	0.20	-0.3	0.25	-0.1

[1] Depending on the variable, the scenario results are presented in deviation from baseline in percentage difference (% diff), percentage points difference (p.p. diff) or in absolute difference (indicated).

	Scenario 6 – Improving the rule of law					
	Scenario shown as[1]	Baseline 2017	Baseline 2030	Scenario 2030	Baseline 2050	Scenario 2050
- Real GDP per capita (growth)	p.p. diff	4.95	1.32	0.14	1.72	0.08
- Real GDP per capita, 2010 prices (level)	% diff	19,386	23,481	1.48	31,179	3.72
Multi-factor productivity						
- % of advanced countries	p.p. diff	67.02	74.08	1.29	77.65	2.95
- % of CEC 4	p.p. diff	94.27	91.14	1.59	91.88	3.50
- % of Germany	p.p. diff	71.76	79.48	1.38	84.88	3.23
Employment						
- Employment rate (aggregate)	p.p. diff	62.09	59.62		57.50	
- Employment rate (youth)	p.p. diff	31.41	28.90		27.37	
- Employment rate (older)	p.p. diff	25.13	25.55		22.60	
- Employment rate (women)	p.p. diff	55.20	50.96		49.45	
Public finance						
- Cyclically-adjusted primary revenue, % of GDP	p.p. diff	42.20	44.76	0.02	54.25	-0.08
Health outcomes						
- Life expectancy	Years	81.50	83.64		86.17	
- Public health care expenditure, % of GDP	p.p. diff	6.10	7.46	-0.03	9.56	-0.08
Wage dispersion						
- Decile ratio of gross earnings (D9/D1)	Diff in ratio	3.45	4.40	0.04	6.17	0.09
Environmental outcomes						
- GHG emissions per unit of GDP	% diff	0.29	0.21		0.14	
- Energy per unit of GDP	% diff	0.11	0.08		0.05	
- Share of renewable in total energy	% diff	0.16	0.20		0.25	

1 Depending on the variable, the scenario results are presented in deviation from baseline in percentage difference (% diff), percentage points difference (p.p. diff) or in absolute difference (indicated).

	Scenario 7 – Reducing regulatory barriers to competition					
	Scenario shown as[1]	Baseline 2017	Baseline 2030	Scenario 2030	Baseline 2050	Scenario 2050
- Real GDP per capita (growth)	p.p. diff	4.95	1.32	0.25	1.72	0.13
- Real GDP per capita, 2010 prices (level)	% diff	19,386	23,481	2.72	31,179	6.61
Multi-factor productivity						
- % of advanced countries	p.p. diff	67.02	74.08	2.01	77.65	4.57
- % of CEC 4	p.p. diff	94.27	91.14	2.47	91.88	5.40
- % of Germany	p.p. diff	71.76	79.48	2.15	84.88	4.99
Employment						
- Employment rate (aggregate)	p.p. diff	62.09	59.62	0.20	57.50	0.23
- Employment rate (youth)	p.p. diff	31.41	28.90		27.37	
- Employment rate (older)	p.p. diff	25.13	25.55		22.60	
- Employment rate (women)	p.p. diff	55.20	50.96	0.21	49.45	0.26
Public finance						
- Cyclically-adjusted primary revenue, % of GDP	p.p. diff	42.20	44.76	-0.05	54.25	-0.24
Health outcomes						
- Life expectancy	Years	81.50	83.64		86.17	
- Public health care expenditure, % of GDP	p.p. diff	6.10	7.46	-0.05	9.56	-0.15
Wage dispersion						
- Decile ratio of gross earnings (D9/D1)	Diff in ratio	3.45	4.40	0.05	6.17	0.11
Environmental outcomes						
- GHG emissions per unit of GDP	% diff	0.29	0.21		0.14	
- Energy per unit of GDP	% diff	0.11	0.08		0.05	
- Share of renewable in total energy	% diff	0.16	0.20		0.25	

1 Depending on the variable, the scenario results are presented in deviation from baseline in percentage difference (% diff), percentage points difference (p.p. diff) or in absolute difference (indicated).

	Scenario 8 – Increasing public support for private R&D					
	Scenario shown as[1]	Baseline 2017	Baseline 2030	Scenario 2030	Baseline 2050	Scenario 2050
- Real GDP per capita (growth)	p.p. diff	4.95	1.32	0.01	1.72	0.01
- Real GDP per capita, 2010 prices (level)	% diff	19,386	23,481	0.05	31,179	0.29
Multi-factor productivity						
- % of advanced countries	p.p. diff	67.02	74.08	0.05	77.65	0.24
- % of CEC 4	p.p. diff	94.27	91.14	0.06	91.88	0.29
- % of Germany	p.p. diff	71.76	79.48	0.05	84.88	0.27
Employment						
- Employment rate (aggregate)	p.p. diff	62.09	59.62		57.50	
- Employment rate (youth)	p.p. diff	31.41	28.90		27.37	
- Employment rate (older)	p.p. diff	25.13	25.55		22.60	
- Employment rate (women)	p.p. diff	55.20	50.96		49.45	
Public finance						
- Cyclically-adjusted primary revenue, % of GDP	p.p. diff	42.20	44.76	0.00	54.25	0.00
Health outcomes						
- Life expectancy	Years	81.50	83.64		86.17	
- Public health care expenditure, % of GDP	p.p. diff	6.10	7.46	0.00	9.56	-0.01
Wage dispersion						
- Decile ratio of gross earnings (D9/D1)	Diff in ratio	3.45	4.40	-0.00	6.17	0.00
Environmental outcomes						
- GHG emissions per unit of GDP	% diff	0.29	0.21		0.14	
- Energy per unit of GDP	% diff	0.11	0.08		0.05	
- Share of renewable in total energy	% diff	0.16	0.20		0.25	

1 Depending on the variable, the scenario results are presented in deviation from baseline in percentage difference (% diff), percentage points difference (p.p. diff) or in absolute difference (indicated).

	Scenario 9 – Increasing educational attainment					
	Scenario shown as[1]	Baseline 2017	Baseline 2030	Scenario 2030	Baseline 2050	Scenario 2050
- Real GDP per capita (growth)	p.p. diff	4.95	1.32	0.25	1.72	0.15
- Real GDP per capita, 2010 prices (level)	% diff	19,386	23,481	2.22	31,179	6.37
Multi-factor productivity						
- % of advanced countries	p.p. diff	67.02	74.08	1.94	77.65	4.97
- % of CEC 4	p.p. diff	94.27	91.14	2.38	91.88	5.88
- % of Germany	p.p. diff	71.76	79.48	2.08	84.88	5.43
Employment						
- Employment rate (aggregate)	p.p. diff	62.09	59.62	0.02	57.50	0.08
- Employment rate (youth)	p.p. diff	31.41	28.90	-1.34	27.37	-1.41
- Employment rate (older)	p.p. diff	25.13	25.55		22.60	
- Employment rate (women)	p.p. diff	55.20	50.96	0.11	49.45	0.22
Public finance						
- Cyclically-adjusted primary revenue, % of GDP	p.p. diff	42.20	44.76	0.04	54.25	-0.17
Health outcomes						
- Life expectancy	Years	81.50	83.64	0.17	86.17	0.25
- Public health care expenditure, % of GDP	p.p. diff	6.10	7.46	-0.21	9.56	-0.64
Wage dispersion						
- Decile ratio of gross earnings (D9/D1)	Diff in ratio	3.45	4.40	-0.07	6.17	-0.04
Environmental outcomes						
- GHG emissions per unit of GDP	% diff	0.29	0.21		0.14	
- Energy per unit of GDP	% diff	0.11	0.08		0.05	
- Share of renewable in total energy	% diff	0.16	0.20		0.25	

1 Depending on the variable, the scenario results are presented in deviation from baseline in percentage difference (% diff), percentage points difference (p.p. diff) or in absolute difference (indicated).

	Scenario 10 – Scenarios 6 to 9 implemented jointly					
	Scenario shown as[1]	Baseline 2017	Baseline 2030	Scenario 2030	Baseline 2050	Scenario 2050
- Real GDP per capita (growth)	p.p. diff	4.95	1.32	0.68	1.72	0.37
- Real GDP per capita, 2010 prices (level)	% diff	19,386	23,481	6.79	31,179	18.28
Multi-factor productivity						
- % of advanced countries	p.p. diff	67.02	74.08	5.55	77.65	13.68
- % of CEC 4	p.p. diff	94.27	91.14	6.83	91.88	16.20
- % of Germany	p.p. diff	71.76	79.48	5.96	84.88	14.97
Employment						
- Employment rate (aggregate)	p.p. diff	62.09	59.62	0.22	57.50	0.31
- Employment rate (youth)	p.p. diff	31.41	28.90	-1.34	27.37	-1.41
- Employment rate (older)	p.p. diff	25.13	25.55		22.60	
- Employment rate (women)	p.p. diff	55.20	50.96	0.32	49.45	0.48
Public finance						
- Cyclically-adjusted primary revenue, % of GDP	p.p. diff	42.20	44.76	0.01	54.25	-0.49
Health outcomes						
- Life expectancy	Years	81.50	83.64	0.27	86.17	0.47
- Public health care expenditure, % of GDP	p.p. diff	6.10	7.46	-0.37	9.56	-1.10
Wage dispersion						
- Decile ratio of gross earnings (D9/D1)	Diff in ratio	3.45	4.40	0.06	6.17	0.21
Environmental outcomes						
- GHG emissions per unit of GDP	% diff	0.29	0.21	-1.8	0.14	-2.6
- Energy per unit of GDP	% diff	0.11	0.08	-1.6	0.05	-3.7
- Share of renewable in total energy	% diff	0.16	0.20	-1.0	0.25	-1.4

1 Depending on the variable, the scenario results are presented in deviation from baseline in percentage difference (% diff), percentage points difference (p.p. diff) or in absolute difference (indicated).

	Scenario 11 – Extend Scope of Basic coverage					
	Scenario shown as[1]	Baseline 2017	Baseline 2030	Scenario 2030	Baseline 2050	Scenario 2050
- Real GDP per capita (growth)	p.p. diff	4.95	1.32		1.72	
- Real GDP per capita, 2010 prices (level)	% diff	19,386	23,481		31,179	
Multi-factor productivity						
- % of advanced countries	p.p. diff	67.02	74.08		77.65	
- % of CEC 4	p.p. diff	94.27	91.14		91.88	
- % of Germany	p.p. diff	71.76	79.48		84.88	
Employment						
- Employment rate (aggregate)	p.p. diff	62.09	59.62		57.50	
- Employment rate (youth)	p.p. diff	31.41	28.90		27.37	
- Employment rate (older)	p.p. diff	25.13	25.55		22.60	
- Employment rate (women)	p.p. diff	55.20	50.96		49.45	
Public finance						
- Cyclically-adjusted primary revenue, % of GDP	p.p. diff	42.20	44.76		54.25	
Health outcomes						
- Life expectancy	Years	81.50	83.64	0.11	86.17	0.11
- Public health care expenditure, % of GDP	p.p. diff	6.10	7.46	-0.18	9.56	-0.51
Wage dispersion						
- Decile ratio of gross earnings (D9/D1)	Diff in ratio	3.45	4.40		6.17	
Environmental outcomes						
- GHG emissions per unit of GDP	% diff	0.29	0.21		0.14	
- Energy per unit of GDP	% diff	0.11	0.08		0.05	
- Share of renewable in total energy	% diff	0.16	0.20		0.25	

1 Depending on the variable, the scenario results are presented in deviation from baseline in percentage difference (% diff), percentage points difference (p.p. diff) or in absolute difference (indicated).

	Scenario 12 – Improving regulation of workforce and equipment					
	Scenario shown as[1]	Baseline 2017	Baseline 2030	Scenario 2030	Baseline 2050	Scenario 2050
- Real GDP per capita (growth)	p.p. diff	4.95	1.32		1.72	
- Real GDP per capita, 2010 prices (level)	% diff	19,386	23,481		31,179	
Multi-factor productivity						
- % of advanced countries	p.p. diff	67.02	74.08		77.65	
- % of CEC 4	p.p. diff	94.27	91.14		91.88	
- % of Germany	p.p. diff	71.76	79.48		84.88	
Employment						
- Employment rate (aggregate)	p.p. diff	62.09	59.62		57.50	
- Employment rate (youth)	p.p. diff	31.41	28.90		27.37	
- Employment rate (older)	p.p. diff	25.13	25.55		22.60	
- Employment rate (women)	p.p. diff	55.20	50.96		49.45	
Public finance						
- Cyclically-adjusted primary revenue, % of GDP	p.p. diff	42.20	44.76		54.25	
Health outcomes						
- Life expectancy	Years	81.50	83.64	0.10	86.17	0.06
- Public health care expenditure, % of GDP	p.p. diff	6.10	7.46	-0.37	9.56	-1.16
Wage dispersion						
- Decile ratio of gross earnings (D9/D1)	Diff in ratio	3.45	4.40		6.17	
Environmental outcomes						
- GHG emissions per unit of GDP	% diff	0.29	0.21		0.14	
- Energy per unit of GDP	% diff	0.11	0.08		0.05	
- Share of renewable in total energy	% diff	0.16	0.20		0.25	

1 Depending on the variable, the scenario results are presented in deviation from baseline in percentage difference (% diff), percentage points difference (p.p. diff) or in absolute difference (indicated).

	Scenario 13 – Improving priority setting					
	Scenario shown as[1]	Baseline 2017	Baseline 2030	Scenario 2030	Baseline 2050	Scenario 2050
- Real GDP per capita (growth)	p.p. diff	4.95	1.32		1.72	
- Real GDP per capita, 2010 prices (level)	% diff	19,386	23,481		31,179	
Multi-factor productivity						
- % of advanced countries	p.p. diff	67.02	74.08		77.65	
- % of CEC 4	p.p. diff	94.27	91.14		91.88	
- % of Germany	p.p. diff	71.76	79.48		84.88	
Employment						
- Employment rate (aggregate)	p.p. diff	62.09	59.62		57.50	
- Employment rate (youth)	p.p. diff	31.41	28.90		27.37	
- Employment rate (older)	p.p. diff	25.13	25.55		22.60	
- Employment rate (women)	p.p. diff	55.20	50.96		49.45	
Public finance						
- Cyclically-adjusted primary revenue, % of GDP	p.p. diff	42.20	44.76		54.25	
Health outcomes						
- Life expectancy	Years	81.50	83.64	0.31	86.17	0.38
- Public health care expenditure, % of GDP	p.p. diff	6.10	7.46	-0.57	9.56	-1.77
Wage dispersion						
- Decile ratio of gross earnings (D9/D1)	Diff in ratio	3.45	4.40		6.17	
Environmental outcomes						
- GHG emissions per unit of GDP	% diff	0.29	0.21		0.14	
- Energy per unit of GDP	% diff	0.11	0.08		0.05	
- Share of renewable in total energy	% diff	0.16	0.20		0.25	

1 Depending on the variable, the scenario results are presented in deviation from baseline in percentage difference (% diff), percentage points difference (p.p. diff) or in absolute difference (indicated).

	Scenario 14 – Scenarios 11 to 13 implemented jointly					
	Scenario shown as[1]	Baseline 2017	Baseline 2030	Scenario 2030	Baseline 2050	Scenario 2050
- Real GDP per capita (growth)	p.p. diff	4.95	1.32		1.72	
- Real GDP per capita, 2010 prices (level)	% diff	19,386	23,481		31,179	
Multi-factor productivity						
- % of advanced countries	p.p. diff	67.02	74.08		77.65	
- % of CEC 4	p.p. diff	94.27	91.14		91.88	
- % of Germany	p.p. diff	71.76	79.48		84.88	
Employment						
- Employment rate (aggregate)	p.p. diff	62.09	59.62		57.50	
- Employment rate (youth)	p.p. diff	31.41	28.90		27.37	
- Employment rate (older)	p.p. diff	25.13	25.55		22.60	
- Employment rate (women)	p.p. diff	55.20	50.96		49.45	
Public finance						
- Cyclically-adjusted primary revenue, % of GDP	p.p. diff	42.20	44.76		54.25	
Health outcomes						
- Life expectancy	Years	81.50	83.64	0.30	86.17	0.30
- Public health care expenditure, % of GDP	p.p. diff	6.10	7.46	-0.78	9.56	-2.43
Wage dispersion						
- Decile ratio of gross earnings (D9/D1)	Diff in ratio	3.45	4.40		6.17	
Environmental outcomes						
- GHG emissions per unit of GDP	% diff	0.29	0.21		0.14	
- Energy per unit of GDP	% diff	0.11	0.08		0.05	
- Share of renewable in total energy	% diff	0.16	0.20		0.25	

1 Depending on the variable, the scenario results are presented in deviation from baseline in percentage difference (% diff), percentage points difference (p.p. diff) or in absolute difference (indicated).

	Scenario 15 – Increasing Energy efficiency					
	Scenario shown as[1]	Baseline 2017	Baseline 2030	Scenario 2030	Baseline 2050	Scenario 2050
- Real GDP per capita (growth)	p.p. diff	4.95	1.32	0.08	1.72	0.12
- Real GDP per capita, 2010 prices (level)	% diff	19,386	23,481	1.19	31,179	3.61
Multi-factor productivity						
- % of advanced countries	p.p. diff	67.02	74.08		77.65	
- % of CEC 4	p.p. diff	94.27	91.14		91.88	
- % of Germany	p.p. diff	71.76	79.48		84.88	
Employment						
- Employment rate (aggregate)	p.p. diff	62.09	59.62	0.60	57.50	1.40
- Employment rate (youth)	p.p. diff	31.41	28.90		27.37	
- Employment rate (older)	p.p. diff	25.13	25.55		22.60	
- Employment rate (women)	p.p. diff	55.20	50.96		49.45	
Public finance						
- Cyclically-adjusted primary revenue, % of GDP	p.p. diff	42.20	44.76		54.25	
Health outcomes						
- Life expectancy	Years	81.50	83.64		86.17	
- Public health care expenditure, % of GDP	p.p. diff	6.10	7.46		9.56	
Wage dispersion						
- Decile ratio of gross earnings (D9/D1)	Diff in ratio	3.45	4.40		6.17	
Environmental outcomes						
- GHG emissions per unit of GDP	% diff	0.29	0.21	-7.5	0.14	-9.6
- Energy per unit of GDP	% diff	0.11	0.08	-13.1	0.05	-26.6
- Share of renewable in total energy	% diff	0.16	0.20	0.0	0.25	0.2

1 Depending on the variable, the scenario results are presented in deviation from baseline in percentage difference (% diff), percentage points difference (p.p. diff) or in absolute difference (indicated).

	Scenario 16 – Raising Carbon tax					
	Scenario shown as[1]	Baseline 2017	Baseline 2030	Scenario 2030	Baseline 2050	Scenario 2050
- Real GDP per capita (growth)	p.p. diff	4.95	1.32	-0.04	1.72	-0.05
- Real GDP per capita, 2010 prices (level)	% diff	19,386	23,481	-0.56	31,179	-1.53
Multi-factor productivity						
- % of advanced countries	p.p. diff	67.02	74.08		77.65	
- % of CEC 4	p.p. diff	94.27	91.14		91.88	
- % of Germany	p.p. diff	71.76	79.48		84.88	
Employment						
- Employment rate (aggregate)	p.p. diff	62.09	59.62	-0.10	57.50	0.00
- Employment rate (youth)	p.p. diff	31.41	28.90		27.37	
- Employment rate (older)	p.p. diff	25.13	25.55		22.60	
- Employment rate (women)	p.p. diff	55.20	50.96		49.45	
Public finance						
- Cyclically-adjusted primary revenue, % of GDP	p.p. diff	42.20	44.76		54.25	
Health outcomes						
- Life expectancy	Years	81.50	83.64		86.17	
- Public health care expenditure, % of GDP	p.p. diff	6.10	7.46		9.56	
Wage dispersion						
- Decile ratio of gross earnings (D9/D1)	Diff in ratio	3.45	4.40		6.17	
Environmental outcomes						
- GHG emissions per unit of GDP	% diff	0.29	0.21	-12.1	0.14	-22.2
- Energy per unit of GDP	% diff	0.11	0.08	-5.8	0.05	-2.6
- Share of renewable in total energy	% diff	0.16	0.20	2.3	0.25	2.9

1 Depending on the variable, the scenario results are presented in deviation from baseline in percentage difference (% diff), percentage points difference (p.p. diff) or in absolute difference (indicated).

	Scenario 17 – Increasing renewable subsidy					
	Scenario shown as[1]	Baseline 2017	Baseline 2030	Scenario 2030	Baseline 2050	Scenario 2050
- Real GDP per capita (growth)	p.p. diff	4.95	1.32	-0.01	1.72	0.02
- Real GDP per capita, 2010 prices (level)	% diff	19,386	23,481	-0.12	31,179	0.26
Multi-factor productivity						
- % of advanced countries	p.p. diff	67.02	74.08		77.65	
- % of CEC 4	p.p. diff	94.27	91.14		91.88	
- % of Germany	p.p. diff	71.76	79.48		84.88	
Employment						
- Employment rate (aggregate)	p.p. diff	62.09	59.62	-0.10	57.50	0.00
- Employment rate (youth)	p.p. diff	31.41	28.90		27.37	
- Employment rate (older)	p.p. diff	25.13	25.55		22.60	
- Employment rate (women)	p.p. diff	55.20	50.96		49.45	
Public finance						
- Cyclically-adjusted primary revenue, % of GDP	p.p. diff	42.20	44.76		54.25	
Health outcomes						
- Life expectancy	Years	81.50	83.64		86.17	
- Public health care expenditure, % of GDP	p.p. diff	6.10	7.46		9.56	
Wage dispersion						
- Decile ratio of gross earnings (D9/D1)	Diff in ratio	3.45	4.40		6.17	
Environmental outcomes						
- GHG emissions per unit of GDP	% diff	0.29	0.21	-7.8	0.14	-6.5
- Energy per unit of GDP	% diff	0.11	0.08	-7.5	0.05	-4.2
- Share of renewable in total energy	% diff	0.16	0.20	9.7	0.25	9.4

1 Depending on the variable, the scenario results are presented in deviation from baseline in percentage difference (% diff), percentage points difference (p.p. diff) or in absolute difference (indicated).

	Scenario 18 – Scenarios 15 to 17 implemented jointly					
	Scenario shown as[1]	Baseline 2017	Baseline 2030	Scenario 2030	Baseline 2050	Scenario 2050
- Real GDP per capita (growth)	p.p. diff	4.95	1.32	0.04	1.72	0.09
- Real GDP per capita, 2010 prices (level)	% diff	19,386	23,481	0.56	31,179	2.35
Multi-factor productivity						
- % of advanced countries	p.p. diff	67.02	74.08		77.65	
- % of CEC 4	p.p. diff	94.27	91.14		91.88	
- % of Germany	p.p. diff	71.76	79.48		84.88	
Employment						
- Employment rate (aggregate)	p.p. diff	62.09	59.62	0.60	57.50	1.40
- Employment rate (youth)	p.p. diff	31.41	28.90		27.37	
- Employment rate (older)	p.p. diff	25.13	25.55		22.60	
- Employment rate (women)	p.p. diff	55.20	50.96		49.45	
Public finance						
- Cyclically-adjusted primary revenue, % of GDP	p.p. diff	42.20	44.76		54.25	
Health outcomes						
- Life expectancy	Years	81.50	83.64		86.17	
- Public health care expenditure, % of GDP	p.p. diff	6.10	7.46		9.56	
Wage dispersion						
- Decile ratio of gross earnings (D9/D1)	Diff in ratio	3.45	4.40		6.17	
Environmental outcomes						
- GHG emissions per unit of GDP	% diff	0.29	0.21	-23.1	0.14	-31.1
- Energy per unit of GDP	% diff	0.11	0.08	-23.6	0.05	-30.0
- Share of renewable in total energy	% diff	0.16	0.20	11.7	0.25	11.8

1 Depending on the variable, the scenario results are presented in deviation from baseline in percentage difference (% diff), percentage points difference (p.p. diff) or in absolute difference (indicated).

Scenario 18b – Scenarios 18 with alternative Energy System

	Scenario shown as[1]	Baseline 2017	Baseline 2030	Scenario 2030	Baseline 2050	Scenario 2050
- Real GDP per capita (growth)	p.p. diff	4.95	1.32	0.04	1.72	0.09
- Real GDP per capita, 2010 prices (level)	% diff	19,386	23,481	0.61	31,179	2.41
Environmental outcomes						
- GHG emissions per unit of GDP	% diff	0.29	0.21	-19.4	0.14	-20.1
- Energy per unit of GDP	% diff	0.11	0.08	-21.5	0.05	-46.7
- Share of renewable in total energy	% diff	0.16	0.20	8.4	0.25	15.6

Scenario 18c – Scenarios 18 with scenario 10 policies (*i.e.* product market regulation, innovation and education)

	Scenario shown as[1]	Baseline 2017	Baseline 2030	Scenario 2030	Baseline 2050	Scenario 2050
- Real GDP per capita (growth)	p.p. diff	4.95	1.32	0.59	1.72	0.59
- Real GDP per capita, 2010 prices (level)	% diff	19,386	23,481	9.06	31,179	22.60
Environmental outcomes						
- GHG emissions per unit of GDP	% diff	0.29	0.21	-24.6	0.14	-32.7
- Energy per unit of GDP	% diff	0.11	0.08	-25.4	0.05	-37.1
- Share of renewable in total energy	% diff	0.16	0.20	10.7	0.25	10.2

1 Depending on the variable, the scenario results are presented in deviation from baseline in percentage difference (% diff), percentage points difference (p.p. diff) or in absolute difference (indicated).