OECD Food and Agricultural Reviews

Innovation, Agricultural Productivity and Sustainability in Latvia

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Foreword

At the time of Latvia's accession to the OECD in 2016, agricultural innovation was one of the areas identified where an OECD review was likely to benefit the sector's future. *Innovation, agricultural productivity and sustainability in Latvia* was prepared for this purpose. It is part of the OECD Food and Agricultural Reviews series and builds on analyses of policies that facilitate productivity growth and sustainability in food and agriculture carried out at the OECD. It uses the framework developed to assess the wide range of policies that influence the performance of the sector. The framework identifies policy incentives and disincentives to innovation, structural change, natural resource use, and climate change. This framework, which has been applied in 12 country reviews to date, is undergoing revisions in light of analyses and experience gained.

The overall assessment of the review is synthesised in Chapter 1 together with the report recommendations. Chapter 2 gives an overview of the characteristics and performance of the food and agriculture sector and identifies future challenges. Policy drivers for innovation are discussed in the subsequent chapters, with a focus on agricultural policy in Chapter 6 and the agricultural innovation system in Chapter 7.

The review was prepared at the OECD Trade and Agriculture Directorate by Morvarid Bagherzadeh (project leader) with contributions from Gwendolen DeBoe and in close collaboration with the Ministry of Agriculture of the Republic of Latvia under the leadership of Rigonda Krieviņa. Urszula Ziebinska provided research and statistical assistance and Martina Abderrahmane provided editorial assistance and publication support.

The review draws on a comprehensive background report prepared by a team of experts at the Latvia University of Life Sciences and Technologies (LLU) led by Aleksejs Nipers. It also draws on recent OECD economic and innovation reviews and datasets.

The review has benefited from detailed comments from experts at the Ministry of Agriculture of the Republic of Latvia, particularly from the active engagement of Zigmārs Ķikāns, Indra Ruļuka, and Baiba Kļaviņa (overall coordinator). There were significant contributions from the Ministry of Education and Science, the Ministry of Economy, the Ministry of Environmental Protection and Regional Development, the Ministry of Finance, the Ministry of Transport and the Ministry of Welfare of the Republic of Latvia, the State Chancellery and the Central Statistical Bureau as well as consultations with a wide diversity of other sectorial experts and stakeholders in Latvia. Valuable comments were received from colleagues at the OECD Trade and Agricultural Directorate, in particular Carmel Cahill, Frank van Tongeren, Franck Jésus, Catherine Moreddu, who leads the work on innovation, productivity and sustainability in food and agriculture, and Santiago Guerrero, as well as from Delegates to the Working Party on Agricultural Policies and Markets where Nils Øyvind Bergset (Norway) and David Reid (New Zealand) were lead reviewers.

The Working Party on Agricultural Policies and Markets declassified the review at its meeting of November 2018.

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Acronyms and useful links

Acronym or title	English title	**Original title and website**
ADC	Agricultural Data Centre	http://www.ldc.gov.lv/en
Altum	State Joint Stock Company Development Finance Institution Altum	AS "Attīstības finanšu institūcija Altum" https://www.altum.lv/en/
AIC	Quality Agency for Higher Education,	Akadēmiskās Informācijas Centrs http://www.aic.lv/portal/en
AREI (LLU)	Institute of Agricultural Resources and Economics	Agroresursu un ekonomikas institūts. http://www.arei.lv/en/
AWU	Annual work unit	
BIF	Baltic Innovation Fund	http://www.eif.org/what_we_do/resources/BIF/
BIOR	Institute of Food Safety, Animal Health and Environment	Pārtikas drošības, dzīvnieku veselības un vides zinātniskais institūts "BIOR", https://www.bior.lv/en
BPSA	Strategic Alliance of Bioeconomy Research	
CAP	European Union's Common Agricultural Policy	https://ec.europa.eu/agriculture/cap-overview_en
CSB	Central Statistical Bureau of Latvia	Centrālā statistikas pārvalde http://www.csb.gov.lv/en
CFCA	Central Finance and Contracting Agency	Centrālā finanšu un līgumu aģentūra (CFLA), https://www.cfla.gov.lv/en/
DI (LLU)	Institute of Horticulture	Dārzkopības institūts, http://www.lvai.lv/
EEN	Enterprise Europe Network	https://een.ec.europa.eu/
EEA	European Environment Agency	https://www.eea.europa.eu/
EIF	European Investment Fund	http://www.eif.org/index.htm
EPO	European Patent Office	https://www.epo.org/index.html
ETS	Emission Trading System	
ERDF	European Regional Development Fund (EU Structural Funds)	Eiropas Reģionālās attīstības fonds http://ec.europa.eu/regional_policy/en/funding/erdf/
ESF	European Social Fund (EU Structural Funds)	Eiropas Sociālais fonds http://ec.europa.eu/esf/home.jsp
FADN	Farm Accountancy Data Network	http://ec.europa.eu/agriculture/rica/
Farmers Parliament		Zemnieku saeima, http://zemniekusaeima.lv/en/
GHG	greenhouse gas	
HEI	Higher education institutions	
IIR (CEIP)	Informative Inventory Report, Centre on Emission Inventories and Projections	www.ceip.at
IKVD	State Education Quality Service	Izglītības kvalitātes valsts dienests https://ikvd.gov.lv
JSC	Joint stock company	
LAAPC	Latvian Plant Protection Research Centre	Latvijas Augu aizsardzības pētniecības centrs. http://www.laapc.lv/en/
Latvia Credit Union of Farmers		Latvijas Lauksaimnieku krājaizdevu sabiedrība (website address to be added)
Latvia Guarantee Agency		Latvijas Garantiju agentura

LCS	Latvia Council of Science	Latvijas zinātnes padome, https://www.lzp.gov.lv/index.php?mylang=english
LIAA	Investment and Development Agency of Latvia	Latvijas investīciju un attīstības aģentūra, http://www.liaa.gov.lv/en
Latvian Agricultural Organization Cooperation Council		Biedrība "Lauksaimniecības organizāciju sadarbības padome", http://www.losp.lv/
LEGMC	Latvian Environment, Geology and Meteorology Centre	Latvijas Vides, ģeoloģijas un meteoroloģijas centrs (LVGMC) https://www.meteo.lv/en/
LLKC	Latvian Rural Advisory and Training Centre	Latvijas lauku konsultāciju un izglītības centrs, http://new.llkc.lv/lv/latvian-rural-advisory-and-training-centre
LLU	Latvia University of Life Sciences and Technologies	Latvijas lauksaimniecības universitāte, www.llu.lv
LPTP	Latvia Food Technology Platform	
LPUF	Latvian Federation of Food Companies	Latvijas Partikas uznemumu federacija, http://www.lpuf.lv/en
MK	Cabinet of Ministers of the Republic of Latvia	Latvijas Republikas Ministru kabinets, https://www.mk.gov.lv/en
MoA	Ministry of Agriculture of the Republic of Latvia	Latvijas Republikas Zemkopības ministrija (ZM), http://www.zm.gov.lv/en/
MoA-RE	Ministry of Agriculture Real State Ltd	Zemkopības ministrijas nekustamie īpašumi, www.zmni.lv
MoD	Ministry of Defence of the Republic of Latvia	Latvijas Republikas Aizsardzības ministrija, www.mod.gov.lv
MoE	Ministry of Economy of the Republic of Latvia	Latvijas Republikas Ekonomikas ministrija (EM), www.em.gov.lv
MoEPRD	Ministry of Environmental Protection and Regional Development of the Republic of Latvia	Latvijas Republikas Vides aizsardzības un reģionālās attīstības ministrija (VARAM), http://varam.gov.lv/
MoES	Ministry of Education and Science of the Republic of Latvia	Latvijas Republikas Izglītības un zinātnes ministrija (IZM), www.izm.gov.lv
MoF	Ministry of Finance of the Republic of Latvia	Latvijas Republikas Finanšu ministrija (FM), www.fm.gov.lv
MoFA	Ministry of Foreign Affairs of the Republic of Latvia	Latvijas Republikas Ārlietu ministrija, www.mfa.gov.lv
MoI	Ministry of Interior of the Republic of Latvia	Latvijas Republikas Iekšlietu ministrija, www.iem.gov.lv
MoJ	Ministry of Justice of the Republic of Latvia	Latvijas Republikas Tieslietu ministrija, www.tm.gov.lv
MoH	Ministry of Health of the Republic of Latvia	Latvijas Republikas Veselības ministrija, www.vm.gov.lv
MoT	Ministry of Transport of the Republic of Latvia	Latvijas Republikas Satiksmes ministrija, www.sam.gov.lv
MoW	Ministry of Welfare of the Republic of Latvia	Latvijas Republikas Labklājības ministrija, www.lm.gov.lv
NIR (UNFCCC)	National Inventory Report under the UNFCCC and the Kyoto Protocol	
NDP 2020	National Development Plan 2014-20	http://www.pkc.gov.lv/sites/default/files/images-legacy/NAP2020%20dokumenti/NDP2020_English_Final.pdf
NRT	Natural Resource Tax	
NVA	Public Employment Service of Latvia	Nodarbinātības valsts aģentūra http://www.nva.gov.lv/
PDO	Protected Designation of Origin	https://ec.europa.eu/info/food-farming-fisheries/food-safety-and-quality/certification/quality-labels_en
PGI	Protected Geographical Indication	https://ec.europa.eu/info/food-farming-fisheries/food-safety-and-quality/certification/quality-labels_en
RIS3	Research and Innovation Smart Specialisation Strategy	http://s3platform.jrc.ec.europa.eu/regions/LV/tags/LV

RSS	Rural Support Service	Lauku atbalsta dienests (LAD) http://www.lad.gov.lv/en/news/
SAPS	Single Area Payment Scheme	
SEA	State Employment Agency	Nodarbinātības valsts aģentūras http://www.nva.gov.lv/
SLS	State Land Service	Valsts zemes dienests (VZD) http://www.vzd.gov.lv/lv/
SME	Small and medium enterprise	
TFP	Total Factor Productivity	
TSG	Traditional Speciality Guaranteed	https://ec.europa.eu/info/food-farming-fisheries/food-safety-and-quality/certification/quality-labels/quality-schemes-explained_en#tsg
UAA	Utilised Agricultural Area	
VAAD	State Plant Protection Service	Valsts augu aizsardzības dienests http://www.vaad.gov.lv/english.aspx
VET	Vocational Education and Training	
VLT (LLKC)	Latvian National Rural Network	Lauku tīkls, http://www.laukutikls.lv/
ZTAI	Guidelines for the Development of Science, Technology and Innovation for 2014-2020	Zinātnes, tehnoloģijas attīstības un inovācijas pamatnostādnes 2014-2020 http://www.izm.gov.lv/images/zinatne/ZTAIP_2014-2020.pdf

Executive summary

In the past 25 years, Latvia has transitioned from central planning to a market economy. It joined the European Union in 2004 and the euro area in 2014. Latvia has been a member of the OECD since 2016. Today, as a small, dynamic and open economy, Latvia deploys a broad range of reform initiatives that have driven progress, although generally from low levels, in many of the areas that would nurture future innovation-based economic-growth. However, progress has been slower in agriculture and more needs to be done to equip this sector with a well-functioning innovation system, and a policy environment facilitating productivity and sustainability improvements.

Agricultural innovation must be harnessed to improve the sector's productivity and the efficiency of the food system. Innovation can also be channelled to increase the sector's resilience to future challenges, including climate change adaptation and mitigation and the accelerated propagation of pests and diseases.

While Latvia's agriculture faces challenging climatic conditions with a short vegetation period, it enjoys high levels of land and water availability and quality. Its environmental performance is high and, although there may be local environmental stress, no area of national concern has been identified so far despite intensification of mineral fertiliser use over the past decade. The sustainable drainage of excess water in soils is the main issue with regards to water management. Continued and improved monitoring of the impact of agriculture on the environment is needed.

Today, cereals and dairy farming make up most of Latvia's agricultural output. The structure of commercial farms is dual; livestock farms are typically smaller than the average EU farm, whereas cereal farms are mostly large and export-oriented. Cereals are Latvia's top agro-food export commodity group. At the same time, half of the farms do not market any agricultural goods at all.[1] They weigh on the sector's performance, divert resources and support from the productive segments of the sector and may contribute to informality.

While Latvia is mostly a service economy, its agriculture holds a relatively large share in the economy (3%), in exports (17%) and in employment (8%) compared to EU and OECD averages. Accession to the European Union and implementation of the Common Agricultural Policy stopped the sector's decline and contributed to its relatively large share in the economy. The decline of agricultural land use stopped and agriculture increased its land area, although not to historical highs. Agricultural incomes have risen, both as a result of direct payments, and indirectly through structural adjustment and support to investments that have contributed to labour productivity growth, to higher yields and ultimately to higher agricultural Total Factor Productivity (TFP).

Agricultural TFP growth has been strong and sustained, although from very low levels and the sector has not yet reached its full efficiency and productivity potential. While labour productivity has improved significantly, it remains low. Low labour productivity,

lower wages and higher unemployment in rural areas partly explain rural poverty and urban migration.

Infrastructures and services have improved, but they serve the urban population better than the sparsely populated rural areas. These must be strengthened to improve the attractiveness of rural areas and connect them to markets. This is all the more critical considering the growth opportunities for the food and agriculture sector arising from better connectedness to markets.

The share of the food industry in GDP and employment has declined and its structure has evolved since 2005. Today, food processing counts fewer large businesses and more numerous small ones. Farming suffers from value chain inefficiencies and it exports raw or low value-added products. This is the case for milk, for example. Markets also lack for the subsidy-stimulated organic farming sector, which sells more than half of its milk and eggs, approximately one-third of its meat, and cereals and one-tenth of its vegetables as conventional products.

This review takes stock of progress and success and identifies policy areas where more needs to be done to ensure that the agricultural sector continues its transition to higher productivity and sustainability.

The main findings and recommendations are summarised below.

Main findings	Recommendations
Agriculture	
Non-commercial farms account for about half of farms. They divert productive resources and agricultural support from the sector and may contribute to informality.	Address social issues with **social policies**. Use advisory services and retraining to support the transition of non-commercial farmers to **market oriented activities**, within or outside the agricultural sector.
Support accounts for more than 60% of average farm income.	Target support currently based on area or production to the sector's **longer-term productivity**: education, farm management, investment, co-operation.
Latvia's CAP payments have supported farm incomes and productivity.	Increase incentives to produce **higher value** products. Address **bottlenecks** along the value chain.
Farming suffers from value chain inefficiencies and exports raw or low value-added products.	Use CAP RDP funds to • **strengthen the value chain** through producer groups and the processing industry; • facilitate co-operation in the **creation and diffusion of innovation**.
Regulations on land ownership and lease may hinder a more efficient allocation of land resources.	Ease regulations on land ownership and lease to support a well-functioning **land market**. Consider other instruments to guarantee farmers' access to land and prevent speculation.
Access to credit has improved, from low levels. National policies support farm access to credit.	Evaluate the recent restructuring of **Altum** and the adequacy of the institutional framework for the sector's **credit** needs.
Latvia's CAP RDP choices support investments to improve the overall performance and competitiveness of agricultural holdings. Production-distorting support remain in specific commodity sectors. Voluntary coupled support absorbs half as much budget as the annual expenditure under the CAP RDP competitiveness priority.	Align policy signals, reduce commodity-specific support and use budgets to encourage the **longer-term productivity** and **competitiveness** of the sector.
More than two-thirds of farm labour is unpaid.	Accompany the transition of unpaid family labour into the formal labour force. Provide a **legal status** to unpaid agricultural labour and adjust tax, social security and pension systems accordingly. Improve **job opportunities** in and outside the sector for unpaid farm labour through education and better connection to job markets.
Unemployment is higher in rural areas. Labour costs have increased	While taking into account job quality aspects, increase recourse to contracting for farm labour and farm services and consider relaxing

while they remain below EU28 levels.	wage obligations for non-EU labour to encourage employment, increase farm productivity and the viability of rural areas.
Subsidies per head of livestock tend to intensify livestock production and increase the environmental load. Diesel fuel and natural gas used in agriculture benefit from reduced excise tax rates and add to the sector's environmental load.	Eliminate support based on animal numbers and production volumes that adversely affect the environment. Payments per ha of grass rather than per animal head could be a first step towards less environmentally harmful practices. Gradually reduce the excise tax rebates for diesel fuel and natural gas used in agriculture and encourage the use of renewable energy.
Innovation dissemination and take-up	
Little is known on the factors that drive the adoption of innovation at farm level.	Use CAP RDP funds to support • farmer access to **advisory services** • farmer participation in **innovation networks** Identify and monitor factors that drive the **adoption** of innovative technologies, practices, at the farm level and along the food chain.
Advisory and education services in agriculture and food production have become more widely available. At the same time, there is a skills shortage in the farm workforce.	Bridge the skill gap and improve the educational attainment of farm holders and train **qualified specialists**. Further strengthen **knowledge transfer activities** to facilitate better access of the farming workforce. Harness the **farm advisory** system to facilitate the participation of farmers in training and expand innovation take up. The system can also be used to support small farms' assessment of their **profitability** and transition to more profitable activities in and outside the sector.
Latvia has directed very little CAP RDP funds to risk management instruments. While innovation can improve farm resilience; associated investments may increase farmers' financial vulnerability.	Promote **risk management** and strengthen risk management tools.
Education	
Adult participation in training has increased significantly, although from low levels and mostly in non-formal education.	Strengthen the availability, accessibility and affordability of **lifelong development** opportunities both in qualifying and informal agricultural education.
The education system needs to adapt to the changing demography. The Employment Council, established in 2016, addresses labour market issues, including those related to education and the impact of demographic trends.	Attract **foreign students** and encourage **lifelong learning** to enlarge the pool of students.
The share of Latvia's tertiary educated students in the science, technology, engineering and mathematics (STEM) fields is below the OECD and the EU average rates. More students have chosen STEM fields since 2015.	Encourage student participation in **STEM** fields to offer a supportive environment for the creation, adoption and acceptance of innovative technologies
Research and innovation	
The ZTAI sets general innovation policy objectives for innovation in the bioeconomy in general. Numerous policy instruments in place and available public funds are significant for agricultural innovation.	Define a specific **agricultural innovation strategy** using a **bottom-up** approach to identify the sector's specific needs and gaps in the agricultural innovation system. Improve the co-ordination among the policy instruments and public funds. Monitoring their implementation, evaluate their direct outcomes and socio-economic and environmental impacts.
There is insufficient participation of research institutions in EU and other international initiatives.	Ensure stable funding for the **research infrastructure** in food and agriculture to strengthen capacity to participate in collaborative efforts. Maintain public funding to enable co-operation with private companies and with foreign research organisations
Latvia's research and innovation capacity lacks a critical mass to contribute to the needs of the agricultural sector.	Foster **regional collaboration** in research and innovation to overcome the market-size limitations.
Little private expenditure is invested in agro-food R&D	Use **public procurement** to stimulate innovation. Strengthen public-private co-operation, in particular on projects directed towards the market **introduction of research results**.
Better information and better data are needed to support better	For **farm** managers: use farm level data and improve access to

decision making from field to policy making.	information on markets, regulations and policy instruments to enhance farm and risk management choices. For **policy** makers: better data allows better targeting of policy instruments to objectives and needs, a more accurate monitoring of outcomes and, altogether, improve policy relevance. Improve capacity by participating in internationally comparable data collection and reporting exercises.

Note

[1] Farms that do not market any agricultural goods, hereafter "non-commercial farms", include households with agricultural land, kitchen gardens, and subsistence and hobby farms.

Chapter 1. Overall assessment and recommendations

This chapter introduces the framework used to analyse the extent to which Latvian policies foster productivity and sustainability in the food and agriculture sector and presents an overview of findings for a wide range of policies. It also includes specific policy recommendations for each policy area reviewed.

1.1. A framework to analyse policies for innovation, productivity and sustainability in the food and agriculture sector

Improving agricultural productivity and sustainability to meet the growing global demand for food, feed, fuel and fibre will be achieved through more efficient use of natural and human resources. A wide range of policies affect the performance of the food and agriculture sector, and these need to be considered alongside agriculture-specific policies.

At the time of Latvia's accession to the OECD, agricultural innovation was one of the issues identified where an OECD review was likely to benefit the country. This highlights the Latvian authorities' goals and vision for the sector's future at the time, and the relevance of this review.

The framework applied in this review considers the full range of policy incentives and disincentives to innovation, structural change, natural resource use, and climate change as drivers of productivity growth and the sustainable use of resources (Figure 1.1).

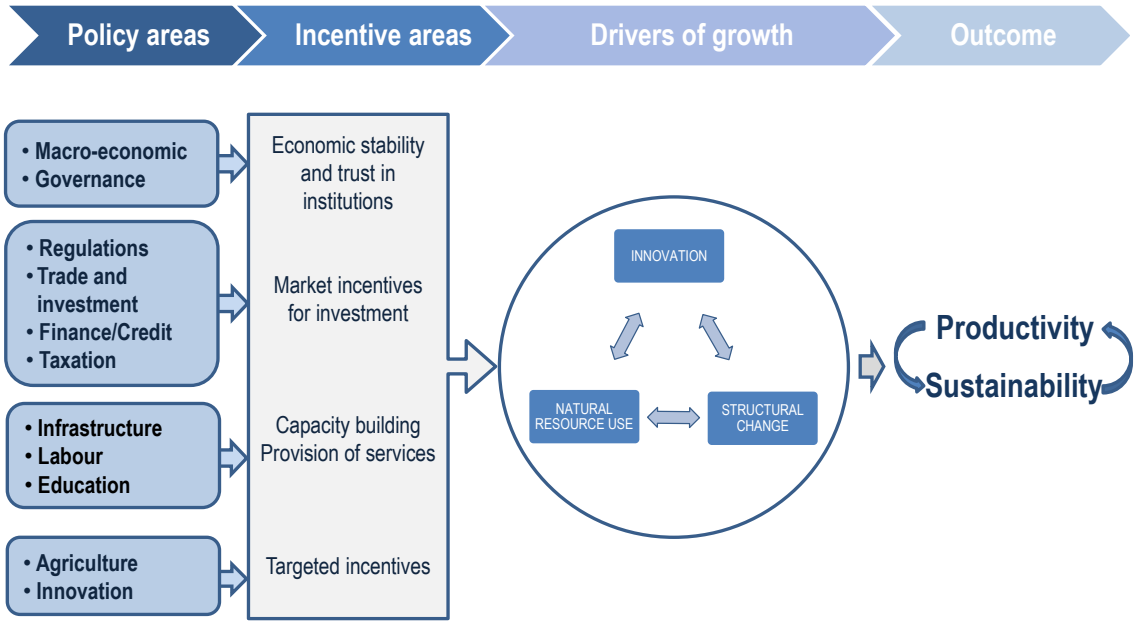
This review begins with an overview of the characteristics and performance of the food and agriculture sector and the future challenges faced by this sector (Chapter 2). A wide range of policies is considered according to the main channels or incentive areas through which they affect drivers of productivity growth and environmental sustainability:

- Economic stability and trust in institutions (justice, security, property rights), which are essential to attract long-term investment in the economy (Chapter 3).
- Private investment, which in turn requires a transparent and predictable environment that balances the interests of investors and society (Chapter 4).
- Capacity building, including the provision of essential public services (Chapter 5).
- Agricultural policy, domestic and trade-related (Chapter 6).
- The agricultural innovation system (Chapter 7).

A policy area can affect productivity and sustainability drivers through more than one channel, and policies can have a positive or negative effect depending on the type and intensity of implementation measures.

This review draws on a background report provided by the Latvia University of Life Sciences and Technologies, recent OECD economic and innovation reviews and internationally comparable data.

Figure 1.1. Policy drivers of innovation, productivity and sustainability in the food and agriculture sector



Source: OECD (2015), "Analysing Policies to improve agricultural productivity growth, sustainably: Revised framework", www.oecd.org/agriculture/policies/innovation.

1.2. Main challenges and opportunities for the Latvian food and agriculture sector

Latvia's growth in food and agricultural production since the early 2000s took place in a context of dynamic economic growth and improvements in innovation relevant policy areas, from generally low levels.

Latvia is a dynamic, small and open economy, but with a declining population and skills shortage

A dynamic economy: In the past 25 years, Latvia successfully transitioned from central planning to a market economy. It joined the European Union and subsequently the euro area. It recovered from the financial crisis, adapted to the export ban imposed by the Russian Federation and has stabilised its macroeconomic performance. Its five-year average real growth exceeds EU28 and OECD averages. Government finances are solid, public debt is one of the lowest in the European Union and the economy enjoys the confidence of the financial markets. Private indebtedness is low. Employment is above the OECD and EU average rates and there is a high demand for skills.

A small economy: When compared to other OECD member countries, the territory of Latvia is among the (eight) smallest and its economy is one of the (three) smallest; it is one of the (six) least populated and its GDP per capita one of the (seven) lowest. Its population is mostly urban and suburban (68%), ageing and declining (-20% in the past 20 years).

An open economy: Considering that Latvia is dynamic and small, trade accounts for a substantial part of its economy, a part that is larger than the OECD average. Membership of the European single-market widens market opportunities for Latvian businesses that

are also well connected to Eastern neighbours. Latvia's current account balance is positive; exports of goods and services make up 58% of its GDP and imports 57%. Latvia ranked first most open OECD economy for trade in services in 2017.

A challenging demography combined with skills shortage and informality: Low innovation capacity and low business sophistication are intertwined with low birth rates, continuous emigration, mostly of the youth, skills mismatch and a large informal sector. These factors influence the medium-term productivity and competitiveness of Latvia. Efforts are ongoing and should be strengthened to address the skills mismatch and widespread informality. Businesses also face increasing domestic production costs, in particular labour costs, although they remain well below the EU28 average.

This general context has a strong impact on food and agriculture

The characteristics of the general economy also apply to, and may be exacerbated in, the food and agriculture sector and rural areas. In particular, with a mostly urban population (68%), infrastructures and services are generally less developed and unemployment higher in rural areas. About 76% of the total labour input in Latvian agriculture is unpaid family labour. Low labour productivity in the economy also occurs in agriculture and food processing, and lower wages in rural areas partly explain rural poverty and urban migration. As in the rest of the economy, food and agriculture deliver mainly unprocessed products with low value-added to global value chains (GVCs).

Agriculture uses the abundant land and water resources sustainably

A maritime climate with low temperatures and high precipitations prevails almost uniformly across the Latvian territory. The temperature averages at 5.9ºC, precipitations at 667 mm and there are 1 790 hours of sunshine per year. Latvia's vegetation period is short and the highest temperatures together with the highest precipitations typically occur in July and August. Cold temperatures reduce the need to use pest and disease protection chemicals.

Latvia enjoys high levels of land and water availability and quality. Its environmental performance is high and, although there may be local environmental stress, no area of national concern has been identified so far. Land abandoned in the 1990s has been partly recovered for agricultural use. The sustainable drainage of excess water in soils is the main issue regarding water management.

Productivity improvements have led to strong agricultural production growth

Agriculture is growing, although at a slower pace than the economy as a whole. The share of agriculture in the economy (3%), in trade (16%)[1] and in employment (8%) is higher than EU and OECD averages.

Agricultural Total Factor Productivity (TFP) growth has been strong and sustained, although from very low levels and the sector has not yet reached its full efficiency and productivity potential. Improvements in labour productivity have been particularly high, although labour productivity is still low. Cereals and dairy make up most of Latvia's agricultural output and crop output has grown the most rapidly. Agricultural output growth in recent years has also been facilitated by the considerable increase, from very low levels, in the use of mineral fertilisers. While usage levels are the lowest among EU Member States, their increase has resulted in higher environmental load and greenhouse

gas (GHG) and ammonia emissions, compared previous levels. This suggests a need for continued monitoring of the impact of agriculture on the environment.

Further structural adjustment would increase economic performance

Some adjustment in farm size distribution has taken place, but a large number of small, non-commercial farms remain and weigh on the sector's economic performance as they benefit from sectoral support and may contribute to informality. They typically occupy less than 4.9 ha and, altogether, use 2.2% of the utilised agricultural area (UAA). Less than half of registered farms market more than 10% of their production (46% of farms market no production at all).

The commercial farms structure is dual; livestock farms are typically smaller than the average EU livestock farms, whereas cereal farms are mostly large and export oriented. Cereals are Latvia's top agro-food export commodity group.

More attention should be paid to the food chain

Since 2005, the share in GDP and employment of the food industry has declined and the structure of the sector has changed. There have been business entries, exits, splits and consolidations and, today, there are fewer large businesses and more numerous small processing enterprises. Also observed in other sectors most agro-food exports are raw or low value-added products, pointing to value chain inefficiencies including a possible lack of processing capacity and a weak organisation of the supply chain. This is the case for milk for example.

Organic farming is growing both in number of farms and area. Area under organic production has nearly doubled in the past ten years. However more than half the organic milk and eggs produced, approximately one-third of meat and cereals and one-tenth of organic vegetables are sold to conventional processors, pointing to excess supply, lack of markets and supply chain deficiencies. These deficiencies must be addressed as more public funds encourage conversion to and maintenance of organic production.

…..and to prepare the sector for future challenges

Agricultural innovation can also be harnessed to prepare the sector for future challenges including climate change adaptation and mitigation and the trade-accelerated propagation of pests and diseases. In recent years, Latvia's agriculture has been exposed to magnified weather variability and trade disruptions. Agricultural innovation can contribute to the sector's resilience.

This report aims to take stock of progress and successes and identify policy areas where more needs to be done to ensure that Latvia can harness agricultural innovation, continue transition and prepare for future challenges and opportunities to increase the sector's productivity and sustainability.

1.3. Framework conditions for investment

Governance has improved with reforms in the public administration

Since 2011, Latvia's government is striving to address identified issues with the quality of public institutions. Efforts are ongoing and progress is observed. The 2017 "Going for Growth" reform indicator has ranked Latvia as a top reformer, which confirms the positive trend in the overall performance of the country. However the quality of public

institutions does not yet equal that of the EU28 and OECD averages, mainly explained by a less efficient legal framework in settling disputes and in challenging regulations.

Further improvements in the regulatory environment would facilitate investments in food and agriculture

Despite progress, Latvia's regulatory environment for enterprises performs less well than the OECD average and opportunities for improvement exist. Barriers to entrepreneurship remain in the licence and permits system and the administrative burden both for corporation and for sole proprietor firms may hinder investment decisions.

Regulations apply to private ownership of agricultural land that seek to guarantee Latvian farmers' access to land and to prevent speculation on agricultural land as CAP support is attributed to agricultural land. These regulations may hinder a more efficient allocation of land resources (Section 1.3 on the Framework conditions for investment). Other instruments could be considered that may better address concerns and support a well-functioning land market.

Latvia applies EU regulations on farm inputs, on food safety, traceability and quality. It has developed national legislation and institutions that fall under the authority and governance of the Ministry of Agriculture (MoA) for their implementation.

The Latvian economy is open to trade and investment

Latvia is well integrated in international markets but exports are mainly low value-added goods. While participation in GVCs has improved, the share of companies that participate in knowledge-intensive sectors remains low. Latvia could trade up its participation in GVCs through policies that encourage capital and labour flow to firms with high growth potential. Latvia could lower its regulatory barriers to trade which are higher than the OECD and the European Union. In addition, physical trade infrastructures, including transport and storage need to be strengthened to match trading needs and ambitions.

Latvia is open to Foreign Direct Investment (FDI), generally more so than the EU average. However, while it is also open to FDI, the agricultural sector stands out as more restrictive, less open, compared to other sectors and to the European Union as, for example, restrictions apply to agricultural land purchase.

Access to credit has improved

While indicators of financial market development point to significantly lower performance than the OECD average and are slightly lower than the EU28 average, the legal rights index that encapsulates the strength of the credit system is above the OECD average. Farmers' access to credit has also improved and credit for agricultural business development can be sourced through EU and national programmes, and the State Joint Stock Company Altum. Efforts should be continued to support the development of the financial market.

The tax system is being reformed

The overall tax load in Latvia is considered as moderate. A tax reform introduced in 2018 is expected to reduce inequality, to reduce the size of the informal economy and to increase the efficiency of tax administration. Tax revenues would increase to 30% of GDP as a result of the reform. The basic personal income tax rate is reduced with some progressivity, including a non-taxable minimum and the corporate tax rate increased. The

lowest wages pay no or little income tax. This is why progressivity in taxation may be less effective to fight informality in agriculture where the lowest salaries are widespread.

The corporate income tax system has been used to support research and development (R&D) up to 2018, with an allowance for R&D expenses that proved to be too low to be effective. With the 2018 reform, reinvested profits are exempted from corporate income tax and tax allowances are provided to investment projects, including in R&D activities. This new measure should be monitored and adjusted as necessary to achieve desired outcomes.

A broad range of environmental taxes applies in Latvia. In 2016, they accounted for 3.7% of GDP, higher than the EU average of 2.4%. Three-quarters of environmental taxes are levied on energy, to which transport adds another 20%, a structure similar to that of the EU average. In 2015, agriculture contributed 4% of the overall environmental tax receipts, compared to a 2% EU average.

Agriculture complies with the overall requirements of the tax codes. However, reliefs and exemptions from several taxes are provided to agricultural activities. These include the allowance for agricultural producers to file for personal income tax rather than corporate tax, VAT compensation for unprocessed agricultural products, real estate and vehicle tax reliefs and, under specific conditions and volume limitations, a reduced excise tax rate for limited amounts of fuel and exemption from the excise tax on gas for specific uses.

1.4. Improving capacities and services

Infrastructure networks have improved, but more needs to be done in rural areas to connect people and markets

Overall, the quality of Latvia's transport infrastructure is below the OECD average. While port facilities are relatively well developed and Riga hosts the biggest airport in the Baltic region, the gap with both OECD and EU averages is wider for railroad infrastructure and widens even more for road infrastructure.

The rail system operates on a gauge that is identical in Baltic neighbours and countries of the Commonwealth of Independent States, thus facilitating eastbound communications. Investments are planned to better connect to the EU rail network. This would help better connect agro-food production with wider markets.

The road transport infrastructure which serves urban areas is improving but is less developed in rural areas. This is an identified obstacle to the functioning of the labour market. Urban areas, with two-thirds of the population, also benefit from better electricity and telecoms infrastructures. Mobile phone coverage and internet services are high by OECD and EU standards equally in rural and urban territories.

Despite improvements supported by EU and domestic funding, access to infrastructure and services in rural areas with low population density is an identified challenge for policy makers. Past investment may have lacked a consistent territorial development plan that the recent development of a central public service system under the State Regional Development Agency should help tackle.

Shortages in labour and skills are a serious impediment to innovation take up and rural development

Latvia's labour market efficiency is close to the average OECD and EU levels. Temporary employment contracts are less used than in other EU countries. While permitted, the participation of non-EU labour is discouraged by higher than average industry-wage obligations. Of particular relevance to agriculture, labour agreements concerning specific tasks are also less frequent. While taking into account job quality aspects, increasing the recourse to contracting for farm labour and farm services and considering relaxing the wage obligations on non-EU labour could encourage employment, increase farm productivity and improve the viability of rural areas.

The labour regulation facilitates seasonal work with a separate income tax on short-term seasonal agricultural workers within specific boundaries on the duration, the income and the tasks. Taxes on labour are found to have a high and negative effect on work incentives, mostly affecting low wages that are dominant in food and agriculture. While it has been reduced, the burden on low wages should be further eased.

There is a high demand for skills in the whole economy, including food and agriculture. Latvia's education system has improved in the past 25 years but more efforts are now needed to ensure that all students have access to a quality education. The education system in Latvia is highly decentralised and influenced by multiple demographic factors that have contributed to declining student enrolment numbers in recent years from previous very high levels. These factors include low birth rates, rural-to-urban migration and emigration. Since 2016, the Employment Council addresses labour market issues, including those related to education and demographic trends.

Educational attainment is above the OECD and EU averages and a higher share of the population has upper secondary or post-secondary non-tertiary education. At tertiary level, Latvia's attainment rate is slightly below the OECD average level. In particular, the share of Latvia's tertiary educated students in the science, technology, engineering and mathematics fields (STEM), critical for the acceptance, dissemination and take up of innovation, has been below the OECD and the EU average rates. However, more students have chosen STEM fields since 2015.

Adult participation in training has increased significantly, although from low levels and mostly in non-formal education. Measures that ensure the availability, accessibility and affordability of lifelong development opportunities should be strengthened in both the qualification-certified education and the non-formal acquisition of skills.

The agricultural education system is integrated into the general system and available at vocational and higher education levels. Non-formal agricultural education opportunities also exist. After a long period of relative decrease, agriculture attracts a larger share of students today than it did in 2009/10.

The overall education system needs to adapt to the changing demographic reality; and the pool of potential students could be enlarged to attract foreign students and encourage lifelong learning.

Improving data and analysis for decision making

Better information and better data are needed to support better decision making from the farm to policy making. Better use of farm data and better access to market, regulatory and policy information would enhance farm and risk management choices. From a policy

maker's point of view, better data availability would allow better targeting of policy instruments to objectives and needs, a more accurate monitoring of outcomes, and altogether improve policy relevance. Participation in internationally comparable data collection and reporting exercises should prove useful in this regard. More specifically, this review points to the following areas for data and information improvement: farm income, environmental performance (particularly data on pesticide use and GHG emissions), adult education and learning, farmer participation in knowledge exchange networks and agricultural research investment.

1.5. Agricultural policies

Latvia implements the EU's Common Agricultural Policy (CAP) and, while some measures are fixed, an increasing share of its CAP budget can be spent on choice measures. Currently agricultural support accounts for more than 60% of the farm income[2] on average. While support offers a stable and predictable income, mostly to those who hold eligible land, it influences production choices and the allocation of resources, diverting resources from more efficient agricultural holdings.

In Latvia, the bulk of agricultural support to individual farmers and to the sector at large is provided within the CAP, mostly through a uniform (flat rate) and broad based per-hectare payment under the Single Area Payment (SAP) scheme. Under this scheme, the attribution of support is dependent on eligible hectares. While it does not influence production decisions, it may keep unproductive farmers in the sector, as only half of Latvian farms are commercial farms. In addition, specific commodities receive about one-fifth of Pillar I direct support in 2016.[3] While temporary payments supporting adjustment in specific commodity sectors in the early days of EU accession were phased out, other commodity-specific payments remain based on Latvia's choices in the implementation of Pillar I support. These distort the allocation of resources across sectors. Agriculture is also supported by several national policy instruments, including support to credit and tax exemptions.

Among EU Member States, Latvia has the lowest level of EU financed agricultural expenditure per hectare and the national budget finances a supplement to the SAPS to close part of the gap with the average EU per hectare payment. The supplement was not paid in 2017 and 2018 due to lack of public finance.

Under Pillar 2 of the CAP (Rural Development Programme, RDP), Latvia supports investments to improve the overall performance of agricultural holdings and their competitiveness, to facilitate business start-ups, to support small farms' growth and to diversify activities in rural territories. Part of the RDP funds have been redirected to programmes with higher environmental constraints.

Latvia has chosen to redirect part of the funding for the uniform per hectare direct payments in Pillar 1, on the one hand to Pillar 2 resources for farmer elected medium-term contractual schemes, and on the other hand to attribute the maximum allowed budget to production-distorting direct support to specific commodity sectors in Pillar 1. Policy signals received by farmers may be contradictory and detrimental to the longer-term productivity and competitiveness of the sector.

Recommendations

- Focus sectoral policies on improving long-term productivity. Address social needs with social policies. Provide a legal status to agricultural family labour and adjust tax, social security and pension systems accordingly.
- Use advisory services and retraining to support non-commercial farms to develop and transition to market oriented activities, within or outside the agricultural sector. Improve job opportunities for unpaid farm labour through education and better connection to job markets.
- With few exceptions, Latvia's agricultural policy choices generally go in the right direction, they minimise production distorting support, and target issues. Their outcome should be monitored to adjust where necessary for the sector to reap their full benefits.
- Reduce commodity-specific support and de-link livestock support from production volumes (per hectare of grass rather than per animal head).
- Target innovation directly: implement Pillar 2 measures that strengthen the value chain and facilitate the creation and diffusion of innovation in agriculture and food processing, including advisory services, participation in innovation networks, co-operation.
- Current support levels reduce incentives for farmers to engage in on-farm risk management actions. Very little budget is allocated to RDP-funded risk management instruments. While innovation can improve farm resilience, it may also increase the financial vulnerability of the farm. Thus risk management should be promoted and risk management tools strengthened to encourage farmers' take up.

1.6. Agricultural innovation systems

Innovation enabled economic growth is at the centre of Latvia's medium and long-term plans.

EU policies and funding shape Latvia's agricultural innovation system. These include the overarching Europe 2020 framework strategy, its research and innovation programme Horizon 2020, structural funds, the CAP and the European Investment Fund and the Research and Innovation programme.

The Science Technology development guidelines (ZTAI) set general innovation policy objectives and the investment trajectory for innovation in the bioeconomy, including agriculture. It defines the action lines necessary to upgrade Latvian science, technology and innovation to a competitive level. The ZTAI is supported by the Research and Innovation Smart Specialisation Strategy (RIS3) and its implementation is monitored.

In a context where little private expenditure is invested in agro-food R&D, public monies fund numerous agricultural innovation programmes. Their outcomes may be strengthened with improved co-ordination, monitoring of their implementation and evaluation of their direct outcomes and socio-economic and environmental impacts.

A life sciences university, the LLU, and its affiliated scientific institutions carry out most agricultural-related research in Latvia. Their research infrastructure was assessed recently and subsequently modernised. Time should be allowed for the new structure to deliver

expected results. Latvia is well connected to international research networks. However, the lack of funding hampers the participation of research institutions in EU and other international initiatives and their access to innovations generated elsewhere.

So far, Latvia has been adapting existing innovations created abroad to its own needs more than investing in agricultural R&D to develop national solutions. This is illustrated by the low rate of patents and other R&D outcomes. To efficiently adopt existing innovations requires a well-functioning knowledge-transmission chain from the sources of innovations up to the farm. It also requires educated farm holders and qualified specialist.

Adopting existing innovations should be supported by Latvia's capacity to connect to R&D networks. Public funding must be maintained to enable co-operation with private companies and with foreign research organisations. Latvia's participation in thematic networks on global challenges funded by the European Innovation Programme for agriculture (EIP-AGRI) has helped strengthen links between research, innovations and implementation. Their success is an encouraging development and funding should be increased to meet the stakeholders' interest. Public-private co-operation should also be strengthened in particular on joint projects directed towards the introduction of research results in the market.

With support from EU funding, advisory and education services in agriculture and food production have become more widely available. They should be further strengthened to facilitate better access by the farming workforce. In turn, this should facilitate innovation take up. Advisory services could also be used to support the analysis of farm profitability and accompany farmers in their development choices. Implementation of new technologies and techniques and foreign experience are an important part of innovations. However little information is available on farmer participation in such activities, they are neither monitored nor measured.

Recommendations

- Monitor factors that drive the adoption of innovative technologies, practices, at the farm level and along the food chain.
- Ensure funding to strengthen Latvia's capacity to connect to R&D networks. Enable the research infrastructure in food and agriculture to engage in co-operation with private companies and to participate in collaborative efforts.
- Foster regional collaboration in research and innovation.
- Bridge the skill gap; improve the educational attainment of farm holders and train qualified specialists.
- Harness the farm advisory system to improve access and participation of farmers, in particular smaller farms. The system can also be used to support small farms' evaluation of their profitability and possibly transition to more profitable market activities.

Notes

[1] Calculated average of the shares of agro-food imports and exports in total trade.

[2] Farm income net of wages paid.

[3] Direct support to specific commodity sectors under Pillar 1 includes the voluntary coupled support (VCS) that was introduced as a choice measure of the CAP 2014-20 and the transitional national aid (TNA) (Sections 6.2 and 6.3).

Chapter 2. Overview of the food and agriculture situation in Latvia

This chapter describes the general geographic, economic, social and environmental context in which the food and agriculture sector in Latvia operates. It also gives an overview of the natural resource base upon which it relies. The chapter outlines the share of food and agriculture in the economy and portrays the sector's main structural characteristics, its main outputs and markets, and analyses the main trends in agricultural productivity and sustainability.

2.1. General geographic and economic context

The territory of Latvia stretches 450 km from the Baltic Sea in the West to the Russian Federation and Belorussia in the East (longitudes 20 to 28) and 210 km South to North, from Lithuania to Estonia (latitudes 55 to 58). It has a coastline of 531 km (CSB, 2017). Its area is among the smallest OECD members.

There are close to 2 million inhabitants in Latvia (Table 2.1). The share of its population under age 15 is below the OECD average, while the share of its population over age 65 is above (OECD, 2017a). The average population density of 32 inhabitants per km^2 masks regional disparities. About 68% of the population lives in urban localities and the capital city of Riga is home to 32% of the Latvia's population. In the past 20 years, the total population of Latvia has decreased by 20%, with an observed acceleration in a context of economic slowdown during 2009-10, to which both urban and rural areas contributed (CSB, 2017).

A maritime climate with low temperatures and high precipitations prevails almost uniformly across the Latvian territory.[1] The temperature averages at 5.9ºC, precipitations at 667 mm and there are 1 790 hours of sunshine per year (LEGMC, 2018). Latvia's vegetation period is short and the highest temperatures together with the highest precipitations typically occur in July and August.

Table 2.1. Contextual indicators

	GDP	Population	GDP per capita	Total land area	Agricultural land	Arable land per capita
	PPP (USD billion)	(million)	PPP (USD)	(thousand km^2)	(thousand ha)	(hectares)
	(2017)	(2017)	(2017)	(2015)	(2015)	(2015)
Latvia	54	2	27 632	62*	1 885**	0.62
Estonia	42	1	31 739	42	994	0.51
Lithuania	91	3	32 154	63	3 006	0.75
Canada	1 714	37	46 705	9 094	62 656	1.22
Czech Republic	385	11	36 350	77	4 213	0.30
Denmark	297	6	51 496	42	2 611	0.41
Finland	248	6	44 956	304	2 273	0.41
Netherlands	904	17	52 799	34	1 837	0.06
Poland	1 102	38	28 686	306	14 371	0.29
EU28	21 086	512	41 119	4 238	184 534	0.21
OECD	56 473	1 295	43 624	34 466	1 181 729	0.30

Note: PPP: Purchasing Power Parity. * The total country area including inland water is 64 thousand km2. ** According to national statistics, in 2017 Latvia's Area of Agricultural land is 2.34 million ha and its Utilised Agricultural Area (UAA) is 1.93 million ha (CSB, 2018).
Sources: OECD (2018a), System of National Accounts (database), http://stats.oecd.org/; FAO (2017a), FAOSTAT (database), www.fao.org/faostat; World Bank (2018), World Development Indicators (database), http://data.worldbank.org/indicator; Eurostat (2017a), Population on 1 January by age and sex (database) [demo_pjan], http://ec.europa.eu/eurostat/data/database.

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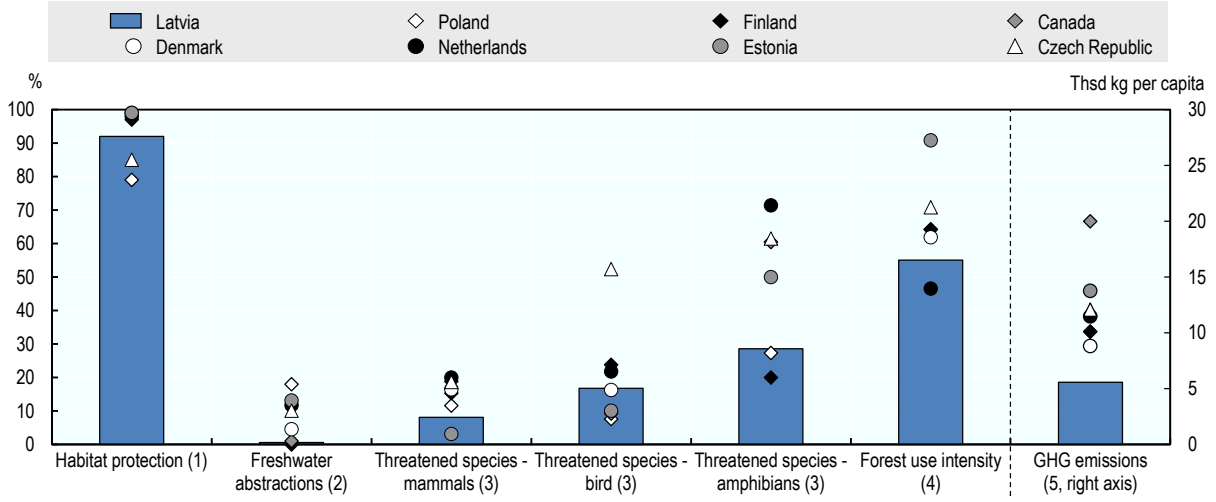
Since 1995, Latvia's GDP has been growing at a faster rate than the OECD average and its GDP per capita was slightly below that of other Baltic countries at 63% of the OECD average in 2017 (Table 2.1). Latvia is mostly a services economy (80% of GDP); it ranked first among OECD countries for openness in trade in services in 2017 (OECD,

2018b). Manufacturing accounts for 13% of GDP to which the food industry contributes about 15% of manufacturing value added in 2016 (CSB, 2017).

Latvia's environmental performance is high (Figure 2.1) and no area of national concern has been identified. However, current trajectories of increasing environmental pressures from agriculture, such as increasing fertiliser use and positive balances of both Nitrogen and Phosphorus (i.e. excess application compared to needs), could, if continued, cause problems in the future. Local environmental issues do occur, such as greenhouse gas emissions released from drained organic soils or peatlands (Lupikis et al., 2017). They require careful management.

As a member of the European Union, Latvia implements EU environmental directives and regulations. Latvia ratified the UNFCCC Paris Agreement on 16 March 2017. Per capita greenhouse gas (GHG) emissions are well below EU average as renewable energy, mostly wood, supply around 40% of total primary energy use. Relatively low household incomes and the absence of heavy industry contribute to this favourable situation. Environmental tax revenue, mostly energy and transport-related taxes, make up about 3.7% of GDP and nearly 10% of total government revenue (Eurostat, 2017b; OECD, 2018a).

Figure 2.1. National environmental performance



Notes: 1. Habitat protection: percentage sufficiency of terrestrial sites designated under the EU Habitats Directive for 2013. For Canada, data are not available.
2. Freshwater abstraction: share of gross freshwater abstractions in total renewable freshwater resources for 2015 for Latvia, Poland, Estonia and the Czech Republic, 2014 for Denmark, 2013 for Canada and 2012 for Netherlands. For Finland, data are not available.
3. Threatened species: share of threatened species in total known species (by category) for latest year available, generally late 2000s. For Denmark, data on threatened amphibians are not available.
4. Forest use intensity: ratio of actual fellings to annual productive capacity, expressed as a percentage, for 2014 for Latvia, Denmark, Estonia and the Czech Republic, 2013 for the Netherlands and 2010 for Finland and Poland. For Canada, data are not available.
5. Greenhouse gas emissions: thousand kilograms of greenhouse gas emissions per capita for 2015.
Source: OECD (2018a), Environment (database), http://stats.oecd.org/.

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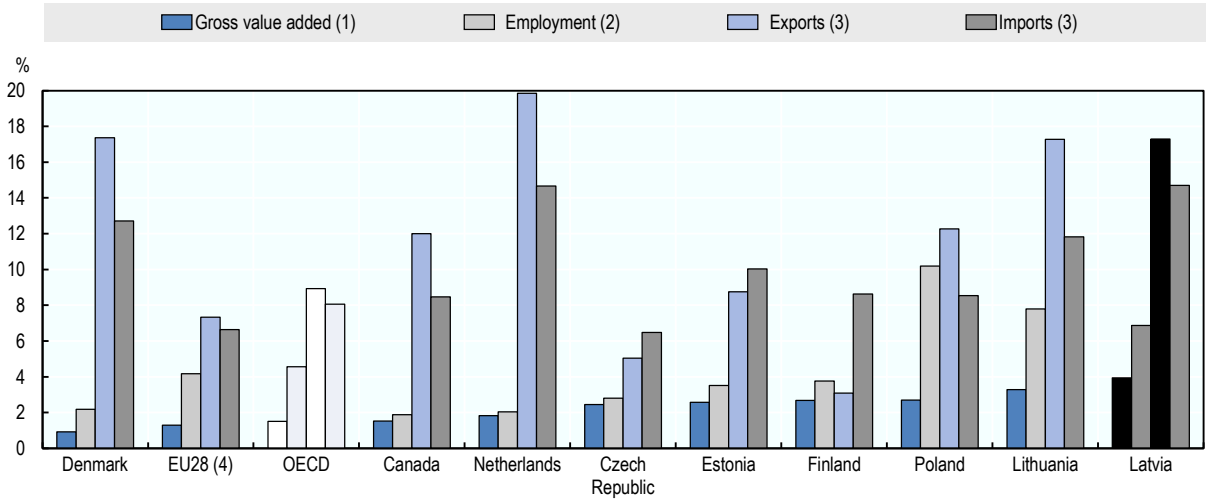
2.2. The role of agriculture in the Latvian economy

Agriculture, hunting, forestry and fishing contribute to about 4% of Latvia's economy, 16% of trade[2] and 7% of employment; a higher share on all accounts than the average of EU and OECD countries (Figure 2.2). The significance of agriculture is even higher in rural areas where it contributes to around 20% of employment (CSB, 2018a).

Figure 2.2. Share of agriculture in the economy, 2016



Notes: Countries are ranked according to gross value added levels.
1. Value added in agriculture, hunting, forestry and fishing as a share of total value added. For Canada, data refer to 2014.
2. Share of employed persons, aged 15 years and over, in agriculture, hunting, forestry and fishing in total NACE activities. In most OECD countries, the labour force survey covers the population aged 15 years and over, however both lower and upper limits may vary. In Latvia, the surveyed population is 15-74 years old. Data refer to 2017.
3. The definition of agro-food trade does not include fish and fish products. Agro-food codes in H0: 01, 02, 04 to 24 (excluding 1504, 1603, 1604 and 1605), 3301, 3501 to 3505, 4101 to 4103, 4301, 5001 to 5003, 5101 to 5103, 5201 to 5203, 5301, 5302, 290543/44, 380910, 382360.
4. Extra-EU trade.
Sources: OECD (2018a), System of National Accounts (database) and Annual Labour Force Statistics (database), http://stats.oecd.org/; UN (2018), UN Comtrade (database), https://comtrade.un.org/; Eurostat (2018), Annual National Accounts Main Aggregates (database) [nama10_a10] and Labour Force Annual Survey (database) [lfsa_egan2], http://ec.europa.eu/eurostat/data/database.

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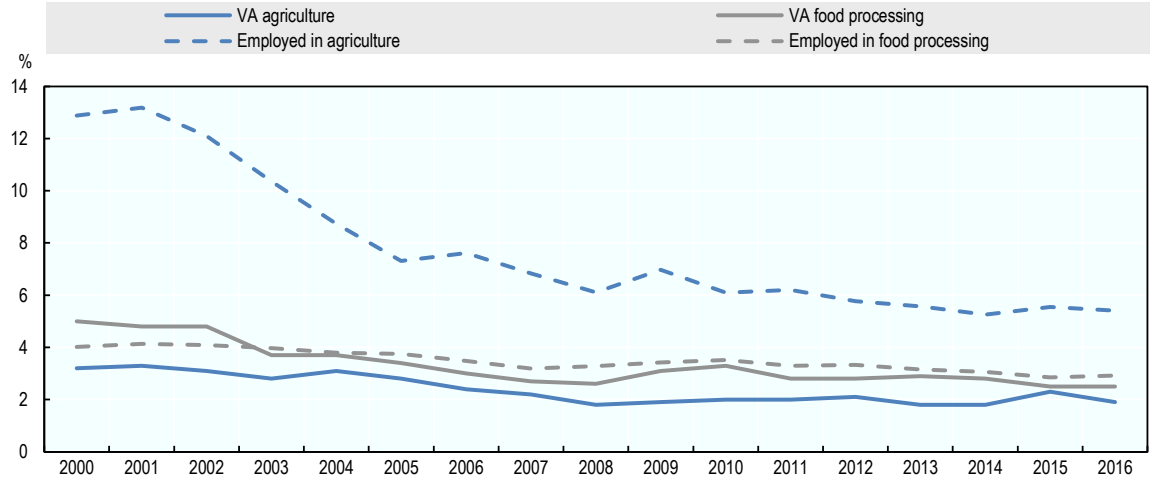
Although robust, the growth of the agricultural sector is outpaced by the overall economic growth. Hence the share of agriculture in Latvia's economy has declined from 3.2% of Gross Value Added (GVA) in 2000 to 1.9% in 2016 and the share of the food processing industry[3] is halved to 2.5% (Figure 2.3). The decline of the share of agriculture in the workforce was more rapid than that in GVA, from 12.9% in 2000 to 5.1% in 2017 (Eurostat, 2018; MoA, 2018), whereas employment in the food processing sector was down from 4% in 2000 to 2.9% of total employment in 2016 (Eurostat, 2018).

Figure 2.3. Share of agriculture and food processing in the economy in Latvia, 2000 to 2016



Note: Agriculture includes crop and animal production, hunting and related service activities (A01). Food processing includes the manufacture of food products, beverages and tobacco products (C10-C12).
Sources: CSB (2018), Total gross value added by kind of activity (database) [IKG10_06], www.csb.gov.lv; Eurostat (2018), National accounts employment data by industry (database) [nama_10_a64_e], http://ec.europa.eu/eurostat/data/database.

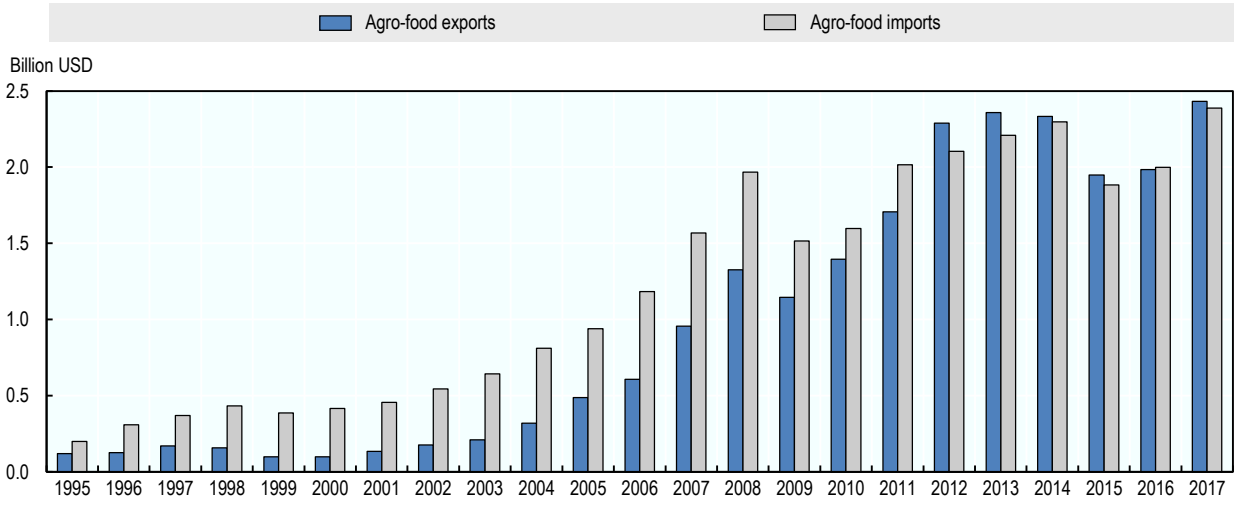
StatLink https://doi.org/10.1787/888933913074

The share of agro-food products in Latvian exports has doubled since Latvia's accession to the European Union (Figure 2.4). In 2017, it represented 17% of Latvia's foreign trade and exceeded the average in EU and OECD countries, comparable to the levels of Denmark and Lithuania (Figure 2.2). After a moderate decline to about 10% in the early years of EU accession, the share of agro-food imports in total imports resumed pre-accession levels at 12.5% in 2008 and represented 15% in 2017. The rapid increases in agro-food export and import values result from commodity prices converging to higher EU price levels and to higher volumes traded through the wider market outlets.

The total area of Latvia is 6.45 million ha, of which 96% is land. In 2015, agricultural land accounted for 29% of the total area of Latvia (i.e. 2.3 million ha, of which 1.9 million ha is accounted for as utilised agricultural area — UAA) (Figure 2.5). The forest cover has increased in the past 25 years and forests currently occupy approximately half of the total land area (CSB, 2017), while swamps represent about 3.4% of the total land area and some areas historically farmed are idle (SLS, 2018). Latvia ranks second in the EU28, behind Lithuania, for arable land per capita (Table 2.1).

The country's available internal freshwater resources amount to approximately 17 billion m^3, nearly 8 500 m^3 per capita, close to the OECD average and nearly three times the EU28 average figure. With high levels of water resources per capita, land drainage and related melioration systems play a more important role than irrigation for Latvia's agriculture.

Figure 2.4. Value of agro-food trade in Latvia, 1995 to 2017



Note: The definition of agro-food trade does not include fish and fish products. Agro-food codes in H0: 01, 02, 04 to 24 (excluding 1504, 1603, 1604 and 1605), 3301, 3501 to 3505, 4101 to 4103, 4301, 5001 to 5003, 5101 to 5103, 5201 to 5203, 5301, 5302, 290543/44, 380910, 382360.
Source: UN (2018), UN Comtrade (database), https://comtrade.un.org/.

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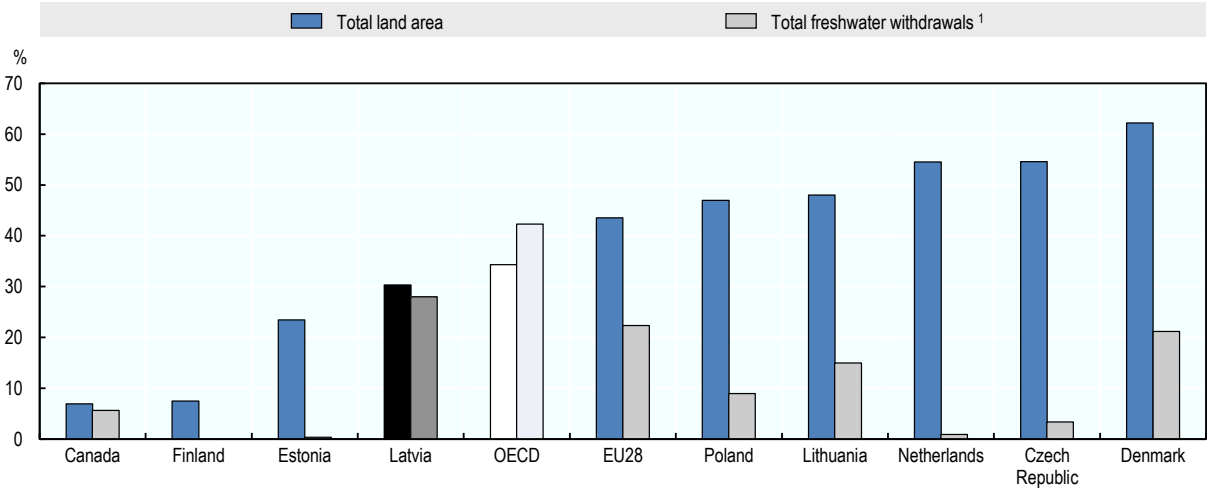
Figure 2.5. Share of agriculture in natural resources in Latvia, 2015



Notes: Countries are ranked according to shares of total land area.
1. For the total water withdrawals, 2015 data were replaced by the nearest available year: by 2013 for Canada and by 2014 for the Netherlands. For Finland, data are not available. The OECD and EU28 aggregates were calculated based on the most recent available data.
Sources: World Bank (2018), *World Development Indicators* (database), http://data.worldbank.org; OECD (2018a), Water: Freshwater abstractions, Environment (database), http://stats.oecd.org/; Eurostat (2018), Annual freshwater abstraction by source and sector (database) [env_wat_abs], http://ec.europa.eu/eurostat/data/database.

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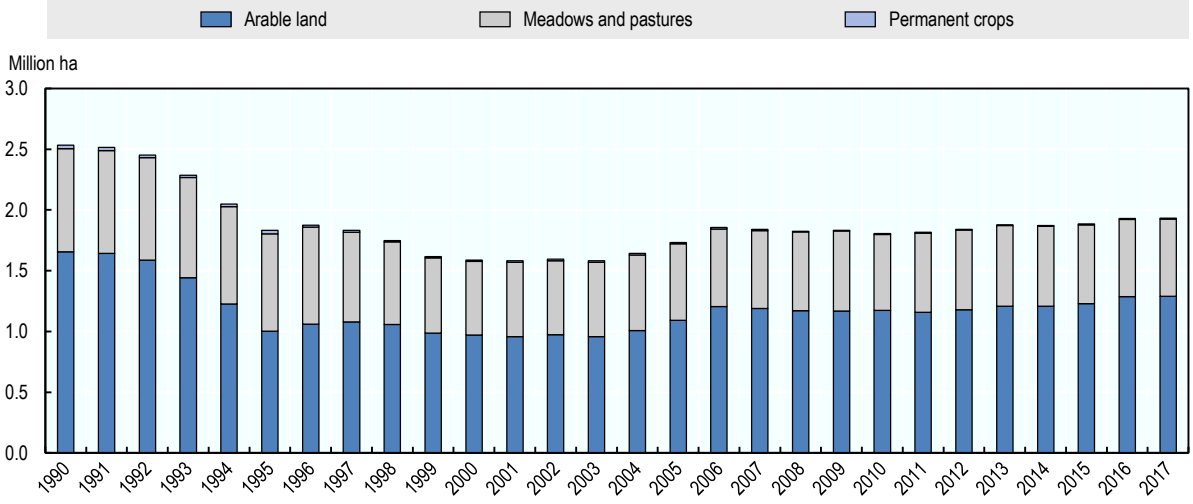
Land use changes

After a sharp decrease, from 2.5 million ha in 1990 to 1.6 million ha in 1999, the UAA expanded between 2004 and 2006 but stayed below pre-1990 levels (Figure 2.6). This increase is partly explained by the introduction of the EU Common Agricultural Policy's (CAP) area payments and by the widened market opportunity for the farm sector that resulted from EU accession. Until 2014 only land that had been identified as responding to specific conditions[4] prior to 30 June 2003 within the UAA and was available for farming, was eligible for CAP payments. Notwithstanding, other land converted to agriculture became eligible for payments after 2014.

Currently the total agricultural land area covers 2.3 million ha of both utilised and unutilised agricultural land, including areas overgrown with bushes and trees (CSB, 2017). An assessment carried out in 2014 by the LLU estimates the potential for Latvia's UAA to expand to up to 2 million hectares. Idle areas could be brought into either agricultural or forest usage (SLS, 2018) or any other sustainable land use, in line with the EU assessment on the consequences of farmland abandonment that result in uniform ecosystems and biodiversity loss under certain conditions (EU, 2011).

Figure 2.6. Development of utilised agricultural area in Latvia, 1990 to 2017



Note: Utilised agricultural area consists of arable land, meadows and pastures and permanent crops.
Source: CSB (2018), Farm structure survey and agricultural census, Land use (database) [LSSA13_II02], http://data1.csb.gov.lv.

StatLink https://doi.org/10.1787/888933913131

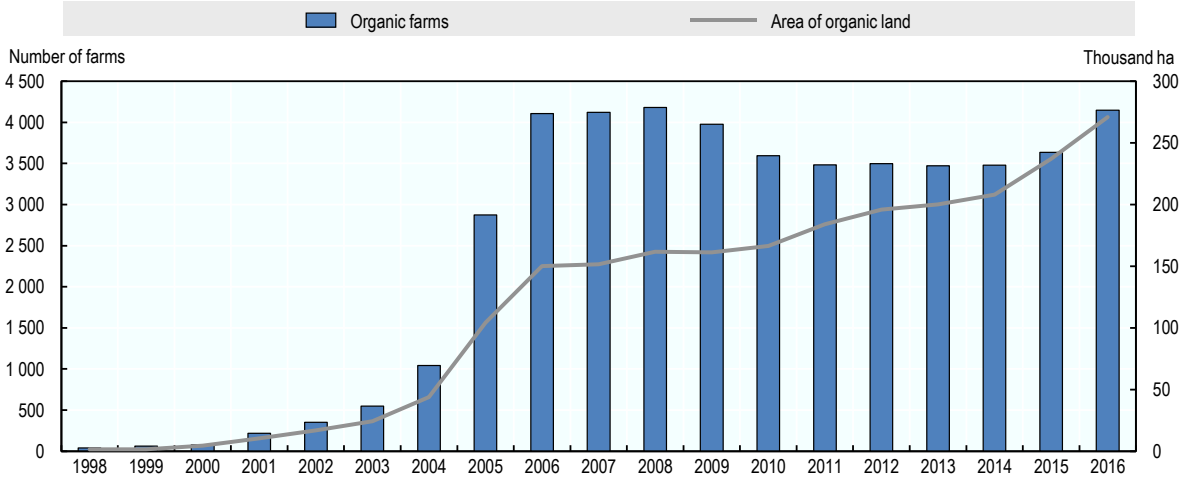
In 2017, the share of arable land reached 67% of utilised agricultural land, compared to 60% in 2003, mostly reflecting cereal production growth. Permanent meadows and pasture land accounted for 33% and the area of permanent crops was relatively small (0.4%) (Figure 2.6).

In 2016, there were fewer than 70 000 farms in Latvia, only half their number in 2000. Farms with less than 5 ha have decreased by 67%. Small farms; typically with one or two livestock units, often non-commercial, account for most outgoing farms. The number of specialised farms has dropped most rapidly in dairy and pig farming. Growth opportunities are limited for smaller farms facing increased production costs and lack the

capacity to invest in new production systems and land. More attractive employment opportunities outside agriculture and abroad, as well as an ageing farmer population with no successors have also contributed to this decline.

The area under organic farming was slightly above 271 000 ha in 2017, which is about 14% of total UAA, more than in most EU Member States. Perennial grassland, meadows and pastures and cereals make up the largest share of area under organic farming while dairy farming leads in the organic livestock sector (MoA, 2018). The rapid development of certified organic agriculture in Latvia began with the introduction of CAP organic farming payments after accession to the European Union in 2004 (Figure 2.7). From the use standpoint, organic products sales also increase every year, however supply exceeds demand as part of the organic production is sold to conventional processors. This is the case for half (52%) of organic milk and eggs production. Whereas a larger share of organic meat and grain are valorised as organic 65% and 70% respectively in 2017 and 88% of organic vegetables reach consumers in the organic value chain (MoA calculations based on Agricultural Data Centre (ADC) data, 2018).

Figure 2.7. Development of organic farming in Latvia, 1998 to 2016



Sources: MoA (2012), MoA (2017).

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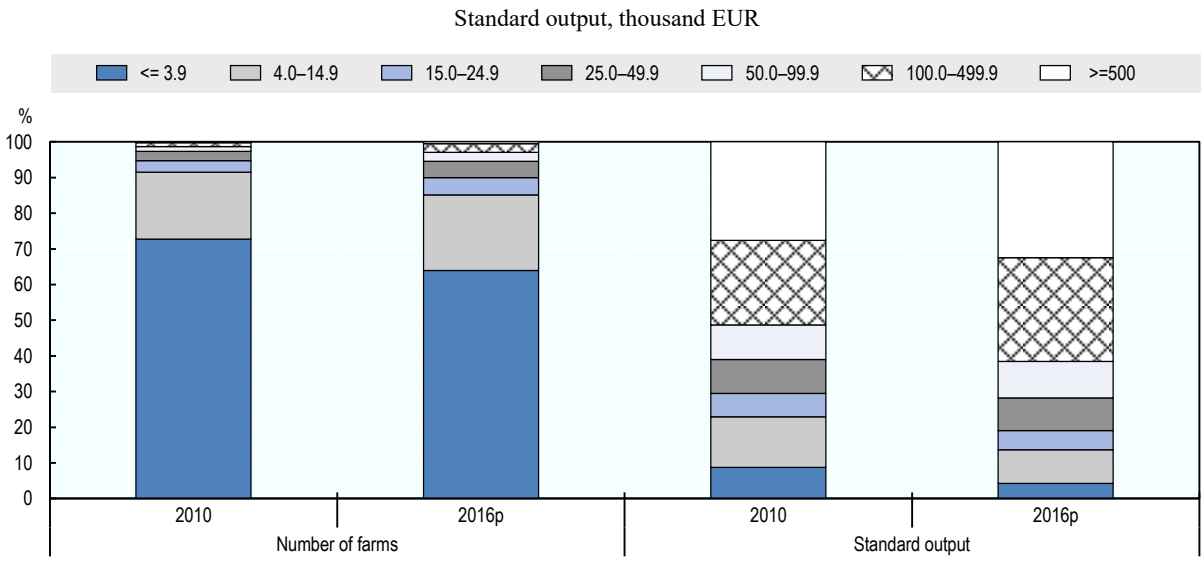
Agriculture in Latvia has a dual structure. While 64% of farms have a standard output below EUR 4 000, the standard output exceeds EUR 100 000 in nearly 3% of farms. These farms contribute 62% of the total agricultural standard output and their contribution is growing (Figure 2.8). Farms with 100 ha and more in production account for 3.5% of the total number of farms and hold more than half of the UAA (CSB, 2017). At the other end of the spectrum 90% of farms hold less than 30 ha of UAA, altogether they used about 30% of the total UAA in 2013. Non-commercial farms market no agricultural production; they include households with agricultural land, kitchen gardens and subsistence and hobby farms. They typically hold less than 30 ha and account for 46% of all farms in 2016, a 16% decline since 2010 (Table 2.2).

Figure 2.8. Distribution of farms and standard output in Latvia, 2010 and 2016



Note: Data for 2016 are provisional.
Source: CSB (2018), Farm structure survey and agricultural census, Economically active agricultural holdings (database) [LSSA13_I07], http://data1.csb.gov.lv.

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Table 2.2. Distribution of farms by share of production marketed in Latvia, 2010 and 2016

	2010		2016	
Share of production marketed	Number of farms thousands	Share	Number of farms thousands	Share
0%	46.0	55%	32.3	46%
Less than 10%	4.9	6%	3.8	5%
11 to 25%	4.4	5%	3.1	4%
26 to 50%	8.9	11%	7.5	11%
51 to 75%	6.1	7%	5.4	8%
76 to 99%	10.9	13%	13.7	20%
100%	2.2	3%	4.2	6%

Source: CSB (2018), Farm structure survey and agricultural census, Economically active agricultural holdings (database) [LSSA13_I06], http://data1.csb.gov.lv.

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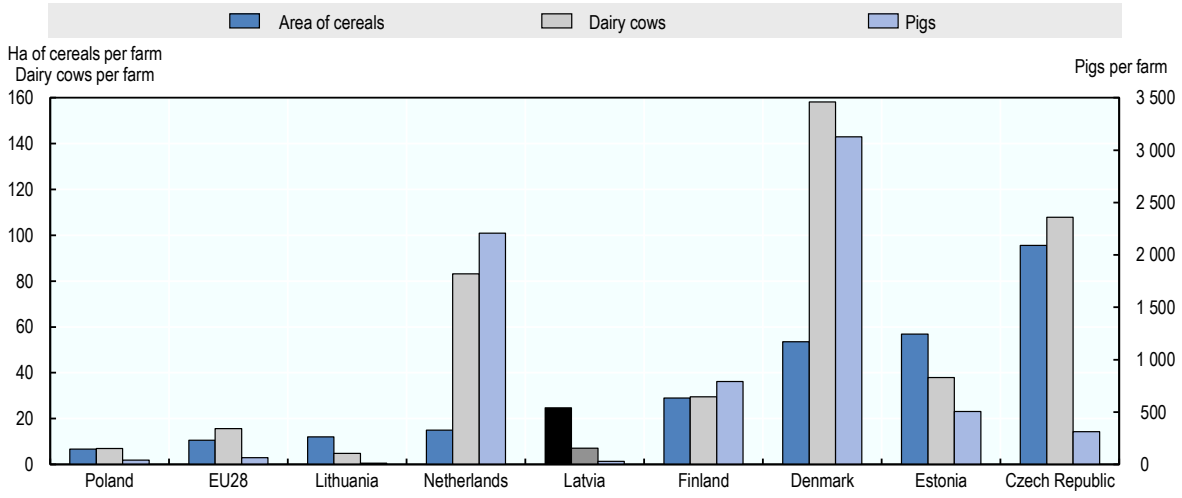
At the same time, average farm-sizes have increased. In 2016, the cereal farm size was 31 ha, the average dairy farm held 9 dairy cows and a significant increase was also observed in pig farms, with an average of 76 pigs per farm, compared to 11 pigs in 2005. Compared to other EU countries, the average farm size in Latvia is still one of the lowest in dairy and pig farming, while the average size of cereal farms in Latvia exceeds the EU average size considerably (Figure 2.9).

Despite the fall in the number of farms, the structure of farm ownership is practically unchanged since 2000; most farms in Latvia are owned by a natural person as the sole holder (98.3%) and only 0.2% of farms are owned by a legal person (CSB, 2017). Nearly half of the total UAA used by commercial farms is rented. This share compares to 44% in 2003 (EU FADN, 2017).

Figure 2.9. Average farm size in cereal, milk and pig production, 2013



Note: Countries are ranked according to average cereal farm-size.
Source: Eurostat (2018), Farm Structure Survey (database) [ef_m_farmleg], http://ec.europa.eu/eurostat/data/database.

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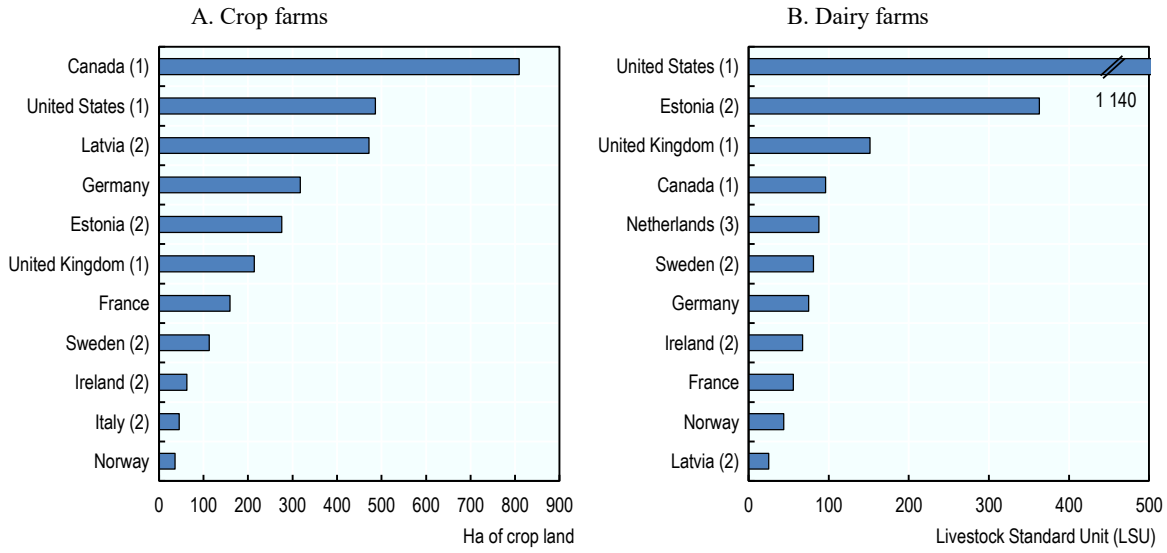
Based on analysis of the FADN survey, which covers farms with a Standard Output higher than EUR 4 000, the mid-point farm size in crop farms in Latvia was 472 ha in 2010, which is higher than most represented countries (Figure 2.10, Panel A). Alternatively, the mid-point farm size for crop farms falls to 7 ha when taking into account all farms declared for the CAP area payment. In the dairy sector, and based on the analysis of the FADN, the mid-point farm size was 25 livestock units, which is the smallest indicator among the analysed countries (Figure 2.10, Panel B).[5]

Figure 2.10. Developments in mid-point farm size, 2010



Notes: Panel A: The mid-point farm size applied to crop farms is the hectare-weighted median. It corresponds to a farm size that separates the farm size distribution into two parts: 50% of the total area of the national farmland operated by the crop farms of a larger size and the other 50% by the crop farms of smaller size than the hectare-weighted median. Panel B: The mid-point statistics used to measure the distribution of dairy farm size is the livestock unit-weighted median.
1. Data for 2010 are replaced by the nearest available year: by 2011 for Canada, by 2009 for the United Kingdom (England) and by 2012 for the United States.
2. Based on sample data. For Latvia and Estonia, it excludes farms with a Standard Output less than EUR 4 000, that is 64% of Latvian farms.
3. For the Netherlands, data are on all farms having cropland and dairy cows, respectively.
Source: Bokusheva and Kimura (2016).

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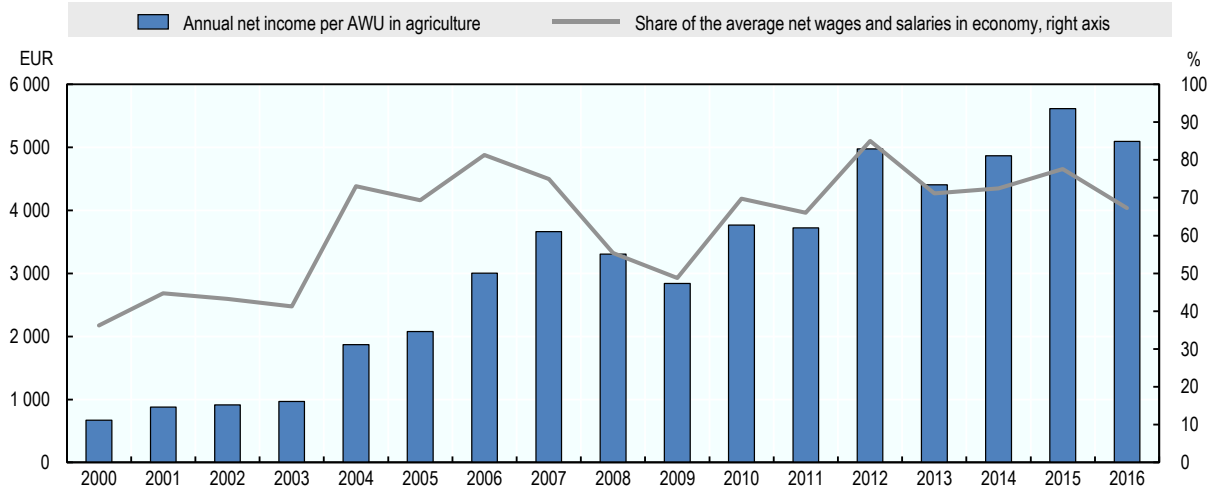
Farm income and wealth

Agricultural income in Latvia has increased significantly in real terms, from less than EUR 1 000 net annual income per full time employee (for all labour) in 2003 to EUR 5 100 in 2016. About 76% of the total labour input in Latvian agriculture is unpaid family labour. While the annual income for all labour compares to 67% of the economy wide average net wages and salaries (Figure 2.11) the net average salary of paid labour in agriculture, forestry and fishing is almost aligned (96%) with the average salary level in economy at EUR 7 572 annually in 2016 (CSB, 2017). The net average agricultural income takes into account agricultural support and income taxes. The most rapid increase was observed in 2004, when it almost doubled with the introduction of CAP support after accession to the European Union (MoA, 2009). Currently, Latvian farmers' income compares to about 50% of the EU28 average farmer income (Eurostat, 2017d).

The income distribution by size groups of farms shows that the highest incomes per work unit are earned by farms with a Standard Output above EUR 100 000, where they are almost twice higher than the overall average (Figure 2.12). Small farm holders, especially in the smallest group, rely on sources of income outside farming.

Figure 2.11. Net agricultural income in Latvia, 2000 to 2016



Sources: AREI EAA (2017); CSB (2017), Social Processes (database) [DIG020], http://data1.csb.gov.lv.

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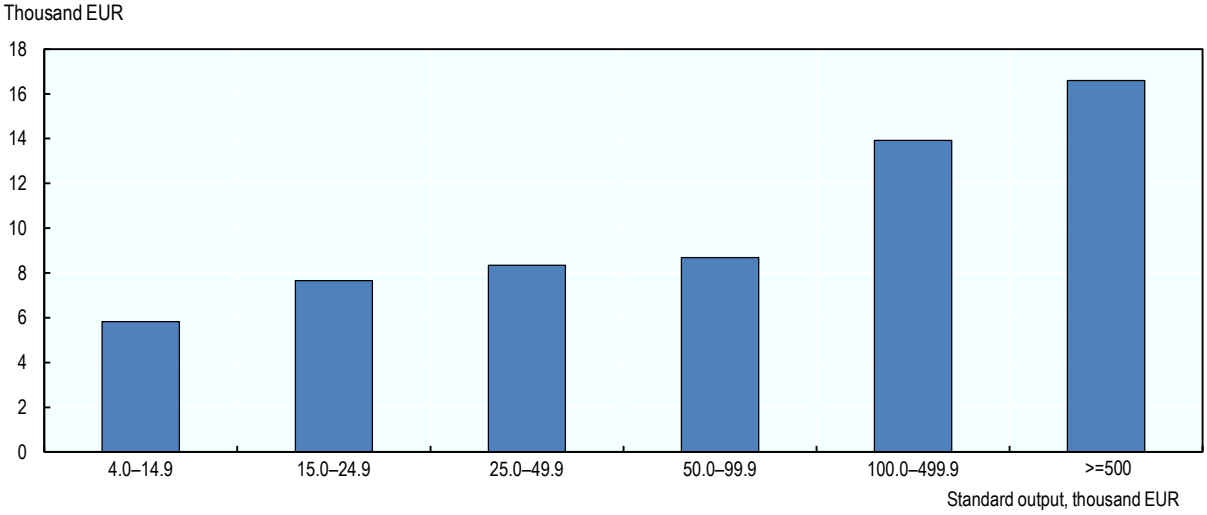
Figure 2.12. Gross income in agricultural farms per size groups in Latvia, 2016

Gross annual income per annual work unit (AWU) in agricultural farms



Note: Gross income is calculated from net value added subtracting rents and interest payments.
Source: AREI FADN (2017).

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The food processing and retail

Food processing is a large contributor to Latvia's relatively small manufacturing sector. In 2017, it contributes one-fifth of manufacturing value added (MoA, 2018).

The Latvian food culture is based on local products. In turn, the Latvian food industry is mainly focused on the internal market and offers local consumers a large variety of local products. About 65% of the food and drink industry production is consumed on the domestic market. Food processing and retail serve a population who, on average, spend

26% of their monthly income on food. The average food basket is composed of meat products (24%), dairy products and eggs (19%), bread and grain products (15%) and vegetables (13%) (CSB, 2018).

About 1 100 enterprises operate in the food and drink processing sector of Latvia, 30% more than in 2005. This mostly reflects an increased number of enterprises with less than nine employees and fewer businesses in other groups (CSB, 2017). Compared to 2000, the contribution of the food processing industry to the economy has declined in terms of employment and value added. The sector's share of employment was down from 4% to 3.1% of total employment in 2014 (Eurostat, 2018) and its share in total value added was halved, down to 2.5% in 2014 (CSB, 2017) (Figure 2.3). Food retail is an important component of the retail sector: it accounts for 16% of retail employment and 41% of retail turnover in 2017; a 3.9% increase compared to the previous year.

Less than 2% of food processing enterprises have more than 250 employees; they contribute about one-third of the total turnover of the food sector in Latvia. While a similar structure is observed in other countries, the average turnover across all size-classes of the Latvian food industry is among the lowest in the European Union (Table 2.3).

Table 2.3. Structure of the food and drink industry, 2015

Share of enterprises and turnover in the total food industry and average turnover

		Number of persons employed				
		0-9	10-19	20-49	50-249	>= 250
Lithuania	Enterprises, %	71.7	9.8	8.9	7.5	2.1
	Turnover, %	1.4	1.9	7.4	25.3	64
	Turnover per enterprise, EUR million	0	0.4	1.9	7.6	68.7
Denmark	Enterprises, %	57.3	21.7	10.6	8.4	2.1
	Turnover, %	2.4	2.4	6	23.1	66.2
	Turnover per enterprise, EUR million	0.7	1.9	9.5	46.6	542.8
Netherlands	Enterprises, %	77.6	9.5	6.3	5.5	1.1
	Turnover, %	3.1	2.5	7.1	32.9	54.4
	Turnover per enterprise, EUR million	0.5	3	13.1	70.4	558.1
Latvia	Enterprises, %	69.7	9	10.3	9.2	1.7
	Turnover, %	3.3	2.7	12.2	49.2	32.6
	Turnover per enterprise, EUR million	0.1	0.5	1.7	7.9	28.2
Czech Republic	Enterprises, %	82.3	6.5	6	4.3	0.9
	Turnover, %	3.6	3.3	9.7	43.1	40.3
	Turnover per enterprise, EUR million	0.1	0.7	2.4	14.8	69
Finland	Enterprises, %	76	9.2	8.6	5.2	1
	Turnover, %	3.7	3.3	10	26.6	56.3
	Turnover per enterprise, EUR million	0.3	2	6.5	28.8	305.4
Estonia	Enterprises, %	66.5	10.9	10.9	10	1.8
	Turnover, %	4.2	4.1	10.1	51.1	30.5
	Turnover per enterprise, EUR million	0.2	1.1	2.6	14.4	47.3
Poland	Enterprises, %	70.7	9.8	9.8	7.8	1.9
	Turnover, %	4.9	2.9	7.5	28.9	55.7
	Turnover per enterprise, EUR million	0.2	1	2.6	12.8	102

Note: Countries are ranked according to the shares of the turnover in enterprises with 0-9 persons employed.
Source: Eurostat (2018), Structural Business Statistics (database) [sbs_sc_sca_r2], http://ec.europa.eu/eurostat/data/database.

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The processing of dairy products (25% of total turnover), and meat and meat products (22%) have been Latvia's main food processing sectors. In 2015, 44 companies operated in the milk processing industry and had an average turnover of EUR 8.4 million per company. There were 151 enterprises involved in meat processing, with an average turnover of EUR 2.1 million (CSB, 2017).

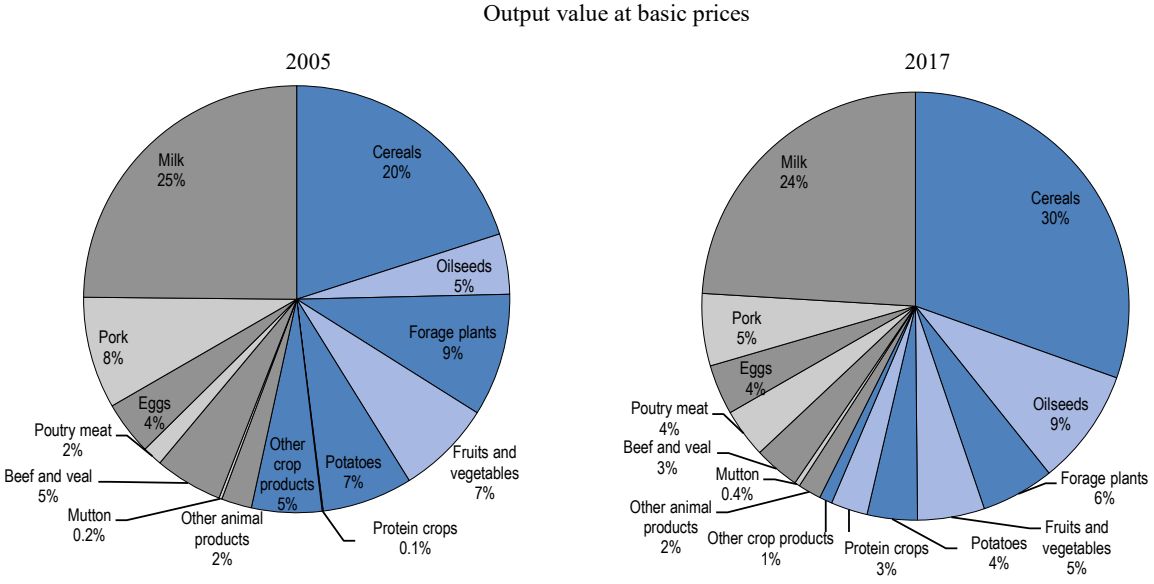
The small size of the domestic agricultural production, combined with a weak freight infrastructure, seem to limit opportunities to scale up or develop processed food products. Furthermore, having very few internationally recognised brands and a small-scale production capacity limit export opportunities in non-price based competition. As is the case for other sectors, better integration in global value chains would help overcome domestic market size limitations and improve prospects for the Latvian food industry (OECD, 2017a).

2.3. Agricultural output and trade

Output

Overall crop production contributes 57% of the total value of Latvian agricultural goods output in 2017, an increase from 53% in 2005. Cereals and dairy farming make up most of Latvia's agricultural output, they account for 30% and 24% respectively of the total agricultural goods output in 2017, while the share of meat production was about 13% (Figure 2.13).

Figure 2.13. Structure of agricultural goods output in Latvia, 2005 and 2017



Note: Commodities are grouped by sector then sorted according to their output levels in 2017. Numbers may not add up to 100 due to rounding.
Source: Eurostat (2018), Economic accounts for agriculture (database) [aact_eaa01], http://ec.europa.eu/eurostat/data/database.

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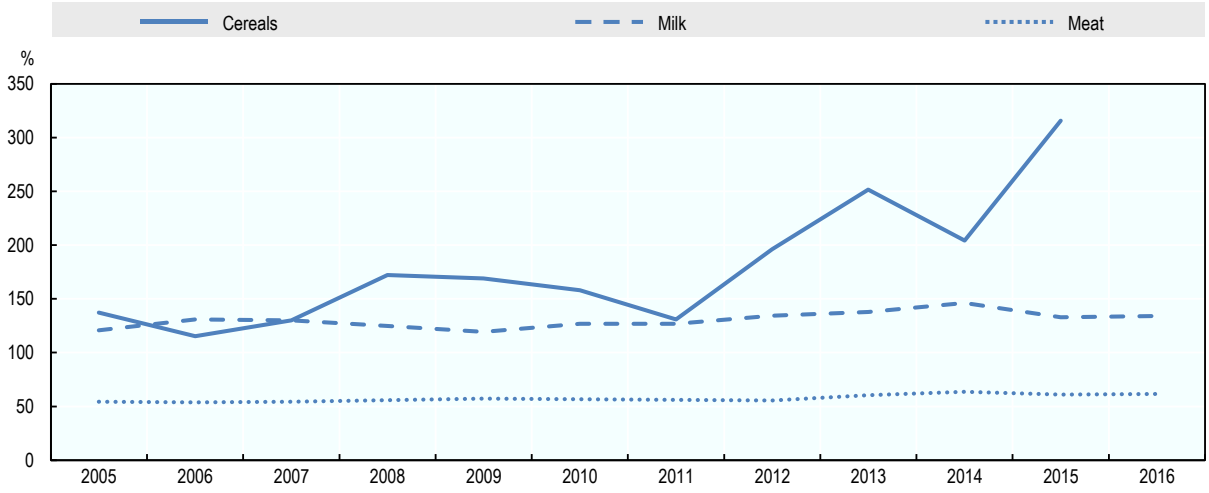
Latvia's cereal production is export oriented and the sector produces more than three times the level of domestic consumption (Figure 2.14). The increase in milk production combined with the more rapid increase of deliveries have strengthened the sector's export capacity of both processed and raw milk. Raw milk makes up more than half of dairy exports, primarily exported to Lithuanian dairy processing enterprises.

The meat sector has a smaller share in Latvia's agricultural output and while individual commodity shares have changed over time, pig meat remains the primary meat commodity produced. Production is below domestic needs for pig and poultry meat.

Figure 2.14. Developments in cereal, milk and meat self-sufficiency in Latvia, 2005 to 2016



Note: Self-sufficiency is calculated as volume produced less total domestic consumption (in primary product equivalent).
Source: RSS (2017), Agricultural product balance sheets.

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Trade

Beverages, cereals, dairy, fish and fruits are Latvia's five most traded agro-food commodity groups and together make up more than half of Latvia's agro-food trade. Beverages are Latvia's largest agro-food imports (18%) re-exported in a large proportion, while imports of fruits, fish, meat, cereals and dairy each account for 6% to 8% (Table 2.4). Latvia's exports of cereals and beverages each account for around 20% of the total agricultural and food export value in 2016. Dairy products and fish[6] contribute a significant proportion, 10% and 6% respectively. In terms of trade balance of agricultural and food products, the most positive contribution is made by cereals, followed by dairy products, oilseeds, beverages, meat and fish products, as well as live animals with a significantly smaller contribution (Table 2.4). According to the UN Comtrade database, the negative trade balance was reversed in 2012; however, the trade surplus has narrowed since (Figure 2.4).

Table 2.4. Export and import of agricultural and food products in Latvia, 2016

CN groups	Export	Share in agro-food exports	Import	Share in agro-food imports	Balance	Total Trade X+M
	million EUR	%	million EUR	%	million EUR	million EUR
22 Beverages, spirits and vinegars	397.1	20	362	18	35.2	759.1
10 Cereals	403.5	21	124.3	6	279.2	527.8
04 Dairy products, eggs, honey	189.9	10	121.5	6	68.4	311.4
03 Fish[1]	113.7	6	145.9	7	-32.2	259.6
08 Fruit	60.1	3	148.9	8	-88.8	209
23 Residues and waste from food industry	78	4	123.6	6	-45.5	201.6
02 Meat	60	3	129.4	7	-69.4	189.4
19 Preparations of cereals, flour, starch or milk	83.1	4	87.6	4	-4.6	170.7
21 Miscellaneous edible preparations	51.7	3	112.3	6	-60.6	164
16 Preparations of meat and fish	95.6	5	62.4	3	33.3	158
07 Vegetables	61	3	92.5	5	-31.5	153.5
12 Oil seeds	99.1	5	51.3	3	47.8	150.4
20 Preparations of vegetables and fruits	45.3	2	72.1	4	-26.8	117.4
09 Coffee and tea	44.8	2	71	4	-26.1	115.8
18 Cocoa and cocoa preparations	31.3	2	60	3	-28.7	91.3
15 Animal or vegetable fats and oils	23.2	1	60.4	3	-37.1	83.6
17 Sugars and sugar confectionery	17.6	1	60.3	3	-42.7	77.9
06 Live trees and plants	25.4	1	37.7	2	-12.3	63.1
01 Live animals	44.9	2	13.1	1	31.8	58
11 Products of milling industry	32	2	21.1	1	10.9	53.1
05 Other animal products	2	0	5.7	0	-3.7	7.7
13 Lac, gums, resins	1.1	0	3.7	0	-2.5	4.8
14 Vegetable planting materials, other vegetal products	0.6	0	1.9	0	-1.2	2.5

Notes: Commodities are ranked based on their total trade values (sum of exports and imports).
1. Exports exclude fish products unloaded from Latvian fishing vessels in foreign countries. These account for EUR 12.7 million.
Source: CSB (2017), Foreign trade in goods (database), http://data1.csb.gov.lv.

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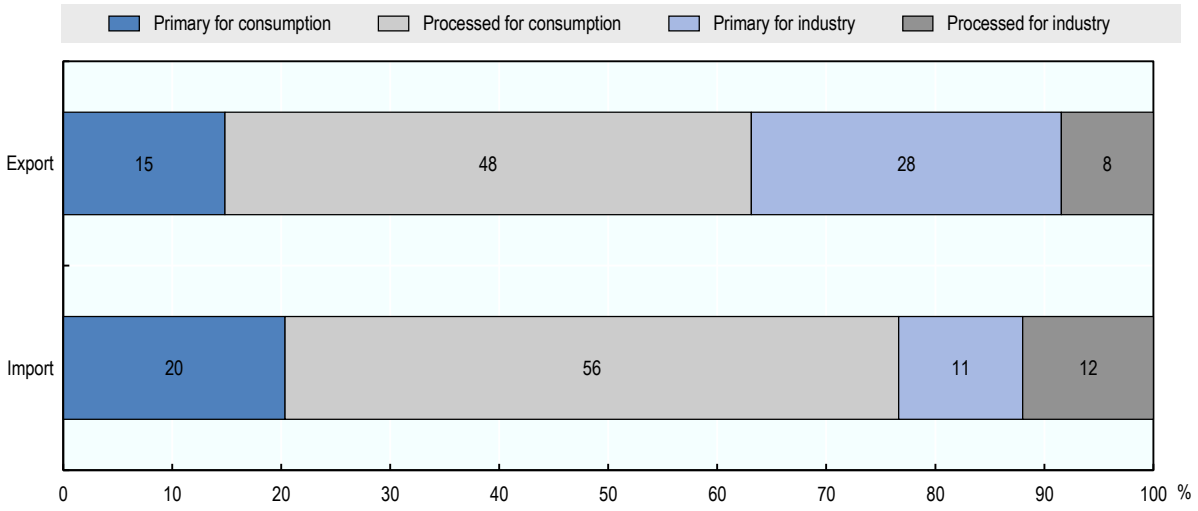
Households' final consumption absorbs 77% of agro-food imports, of which processed products alone account for more than half of the total agro-food imports. Latvia mainly exports processed agricultural and food products for household consumption and primary products for processing (Figure 2.15).

The European Union is Latvia's main trading partner. In 2017, it was the export destination for 57% of Latvian agro-food products, of which 28% to other Baltic States, and sources 90% of Latvian imports. Lithuania alone accounts for more than one-fourth and, together with Estonia, the two Baltic States account for 37% of Latvian imports and Poland another 10%. The share of export to the Russian Federation amounted to 20% in 2017 (Figure 2.16).

Figure 2.15. Composition of Latvian agro-food trade, 2017



Note: Numbers may not add up to 100 due to rounding. The definition of agro-food trade does not include fish and fish products. Agro-food codes in H0: 01, 02, 04 to 24 (excluding 1504, 1603, 1604 and 1605), 3301, 3501 to 3505, 4101 to 4103, 4301, 5001 to 5003, 5101 to 5103, 5201 to 5203, 5301, 5302, 290543/44, 380910, 382360.
Source: UN (2018), UN Comtrade (database), https://comtrade.un.org/.

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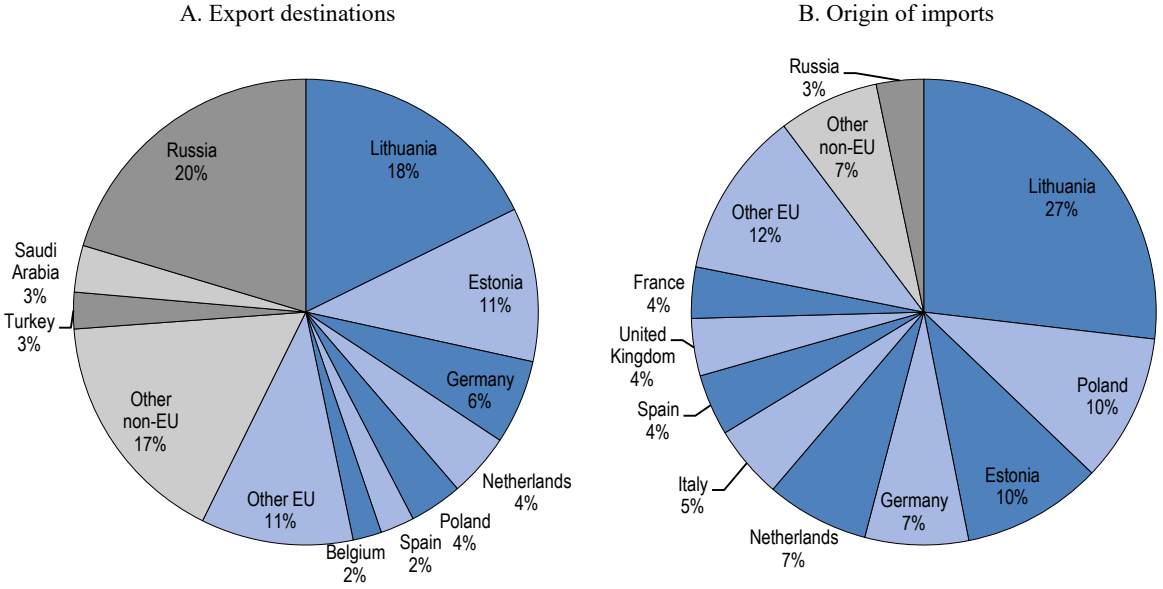
Figure 2.16. Latvia's main trade partners for agricultural and food products, 2017



Note: Numbers may not add up to 100 due to rounding. The definition of agro-food trade does not include fish and fish products. Agro-food codes in H0: 01, 02, 04 to 24 (excluding 1504, 1603, 1604 and 1605), 3301, 3501 to 3505, 4101 to 4103, 4301, 5001 to 5003, 5101 to 5103, 5201 to 5203, 5301, 5302, 290543/44, 380910, 382360.
Source: UN (2018), UN Comtrade (database), https://comtrade.un.org/.

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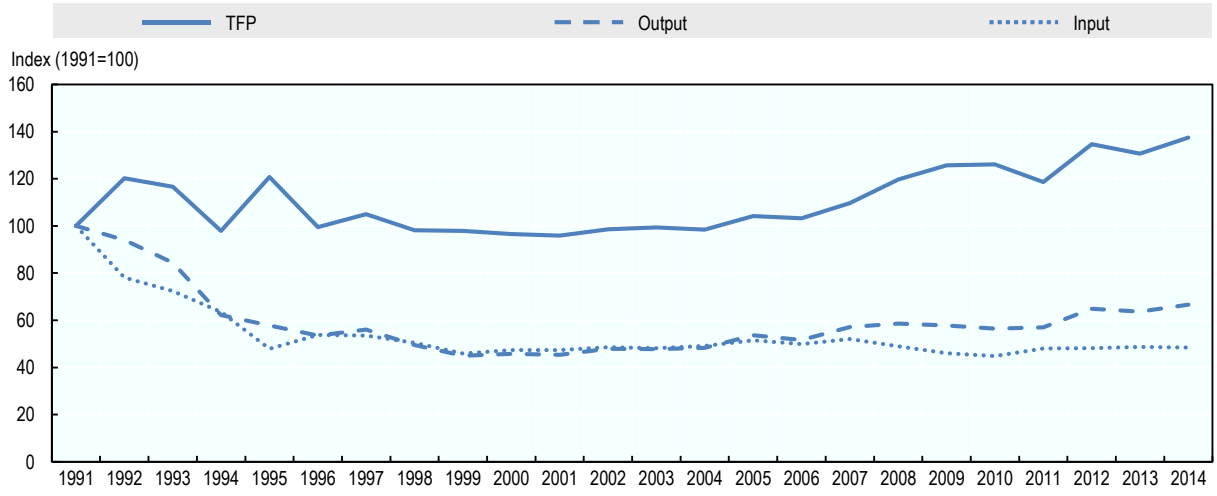
2.4. Trends in productivity

In the 1990s, Latvian agriculture was characterised by a negative trend in output and input. Since the early 2000s, the TFP growth has been key to output recovery as inputs have declined on average while output growth has been positive (Figure 2.17).

Figure 2.17. Developments in the TFP of primary agriculture in Latvia, 1991 to 2014



Source: USDA (2017), *Economic Research Service, International Agricultural Productivity*, www.ers.usda.gov/dataproducts/international-agricultural-productivity.aspx.

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As shown in Table 2.5, the negative average input growth masks different paths of input elements. On average and since 1991, labour has declined, while the growth of machinery has been positive. The average growth of the land area and of fertiliser use have been positive during 2004-14 and livestock numbers have stabilised (Table 2.5).

Advanced production technologies apply in some parts of the sector and increase labour productivity. Since joining the European Union, the volume of on-farm investment has increased significantly. In the period from 2004 to 2016 approximately EUR 3.2 billion was invested. Around 65% of investment in holdings have been in machinery and equipment (including transport vehicles), while 30% in buildings and construction. While around two-thirds of investments has been made thanks to investment support, other measures have also contributed. The investment support for the RDP 2007-13 alone has contributed to an increase in labour productivity in agriculture by around EUR 2000 per annual work unit (AWU). Investment has contributed to a 3.5 times increase in agricultural incomes during the period from 2003 to 2017 and the average income for full-time employees has increased by more than six times (from EUR 970 to 6250/AWU). The value of output has increased 2.65 times (Eurostat, 2018). By investing in the most productive seed materials and animals of breeds with higher genetic material in herds, crop yield and milk yield have also increased.

While labour efficiency is less of an economic concern for about half of the agricultural producers who are engaged in non-commercial farming, Latvian commercial farms face increasing domestic production costs, in particular labour, land and inputs. They also face costs imposed by weak transport infrastructures and distance to first consumers and

export destinations. The weather conditions combined with the short vegetation period are also part of the production costs equation together with changing market conditions and distortions created by the differences in support levels in, and choices of instruments by, EU Member States. Recourse to risk management tools is part of the farm-level management response-package together with productivity investment choices that contribute to the farm competitiveness through time.

The agricultural TFP growth in Latvia from 1991 to 2014 was the most rapid among the Baltic countries, and part of the faster growth countries when compared to other EU Member States (Figure 2.18).

Table 2.5. Decomposition of TFP growth of primary agriculture in Latvia, 1991-2003 and 2004-14

Average annual change, $LN(X_T/X_{(T-1)})$

	Output	Labour	Land	Livestock	Machinery	Fertiliser	Feed	Total inputs	TFP
1991-2003	-0.067	-0.043	-0.055	-0.116	0.015	-0.116	-0.058	-0.060	-0.007
2004-14	0.027	-0.061	0.010	0.000	0.006	0.038	0.001	-0.006	0.033

Source: USDA (2017), *Economic Research Service, International Agricultural Productivity*, www.ers.usda.gov/data-products/international-agricultural-productivity/.

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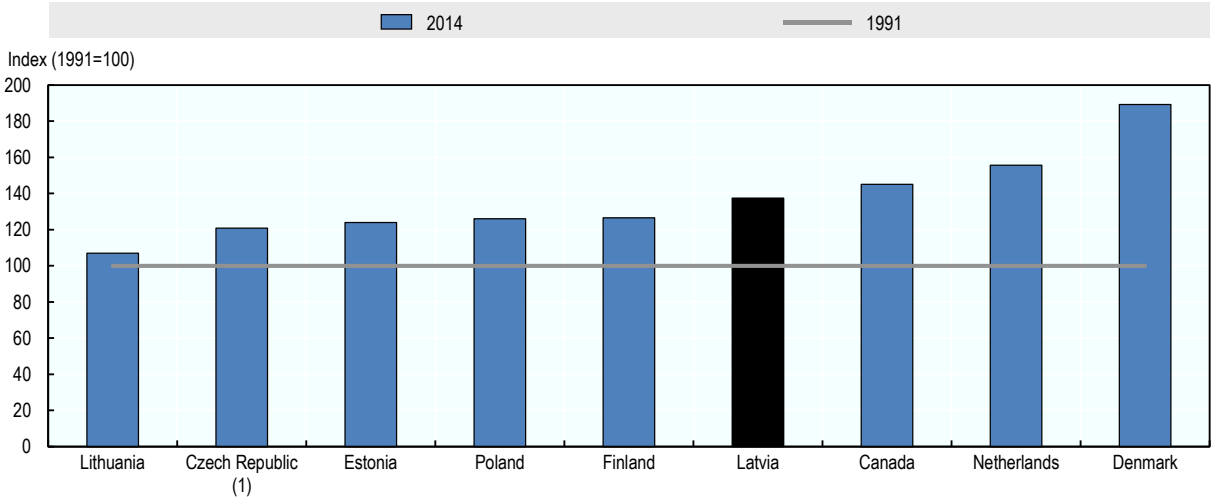
Figure 2.18. Agricultural Total Factor Productivity growth, 1991 and 2014



Note: 1. Data for the Czech Republic and the Slovak Republic are aggregated under "Czech Republic".
Source: USDA (2017), *Economic Research Service, International Agricultural Productivity,* www.ers.usda.gov/data-products/international-agricultural-productivity/.

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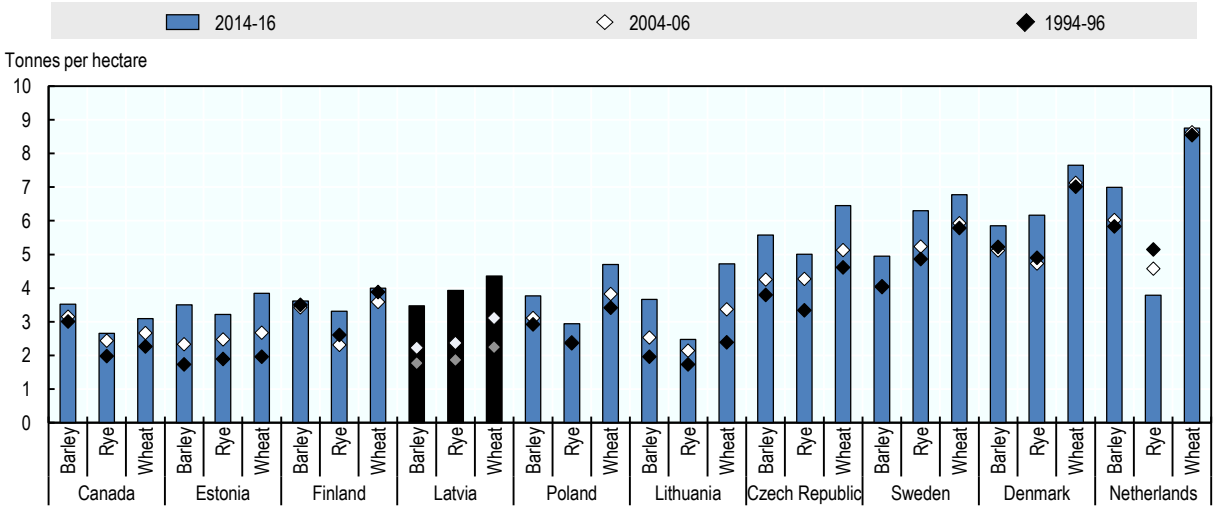
Crop yields

During the last 25 years, cereal yields, mostly wheat, have nearly doubled in Latvia. The fastest yield increase was observed in the most recent five years. In 2015, thanks to favourable weather conditions, wheat yield hit a record five tonnes per ha (CSB, 2017). Although wheat yield in the Baltic States has increased faster than in the other analysed countries it still lags considerably behind the more intensive agricultural systems such as Denmark and the Netherlands (Figure 2.19). Rapeseed yields increased almost by half from 2004 (CSB, 2017). Rapeseed production is export-driven and feeds into the development of the EU, mostly German, biofuel sector (CSB, 2017).

Figure 2.19. Developments in cereal yields, 1994-96, 2004-06 and 2014-16



Note: All cereals harvested for dry grains. Countries are ranked according to wheat 2014-16 levels.
Source: FAO (2018), *FAOSTAT, Crops* (database) [Yield], www.fao.org/faostat/en/.

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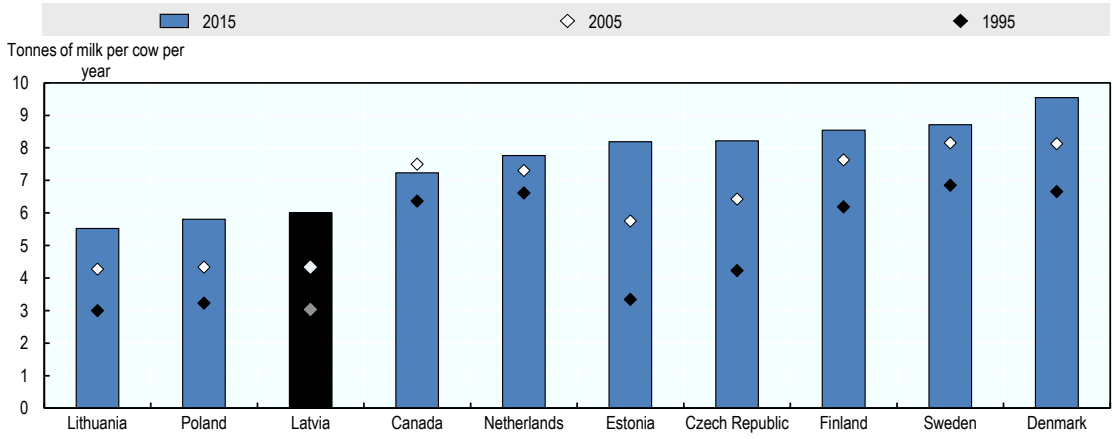
Milk yield

Despite fewer numbers of dairy cows, the increase in yields in a more intensive and efficient dairy sector allowed a higher volume of milk to be produced. The average milk yield in Latvia grew by 4% annually and reached 6.2 tonnes per cow per year in 2016 (CSB, 2017). Compared to other countries, Latvia's milk yield is still about 30% less than the more productive countries represented in Figure 2.20.

Figure 2.20. Developments in milk yield, 1995, 2005 and 2015



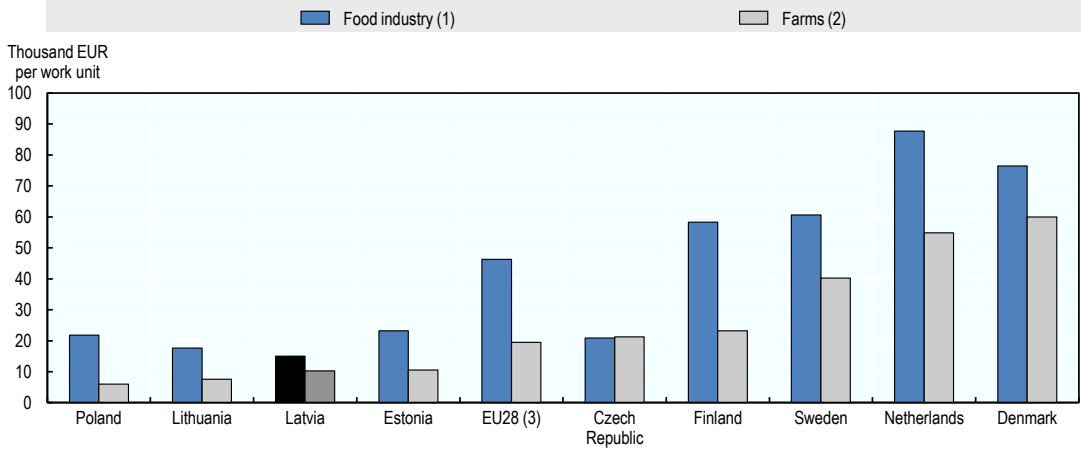
Note: Countries are ranked according to 2015 levels.
Source: FAO (2018), *FAOSTAT, Livestock Primary* (database) [Yield: Milk, whole fresh cow], www.fao.org/faostat/en/.

StatLink https://doi.org/10.1787/888933913397

Food processing

The food processing labour force was reduced by one-third since 2005. Despite substantial productivity growth, labour productivity in the Latvian food processing sector is very low, in line with other sectors of the economy and only slightly higher than in the primary sector (OECD, 2017a and CSB, 2017). Labour productivity in both the primary and food processing sectors is lower than the EU averages (Figure 2.21).

Figure 2.21. Labour productivity in food manufacturing industry and farms, 2016



Notes: Countries are ranked according to farm labour productivity levels.
1. Value added at factor costs. Work unit refers to number of persons employed.
2. Farm net value added. Work unit refers to annual work unit.
3. For the food industry data, the EU28 data refer to 2015.
Sources: Eurostat (2018), *Structural business statistics*, Annual enterprise statistics by size class for special aggregates of activities (NACE Rev. 2) (database) [sbs_sc_sca_r2], http://ec.europa.eu/eurostat/data/database; EU FADN (2018), Farm Accountancy Data Network (database), http://ec.europa.eu/agriculture/rica/database/database_en.cfm.

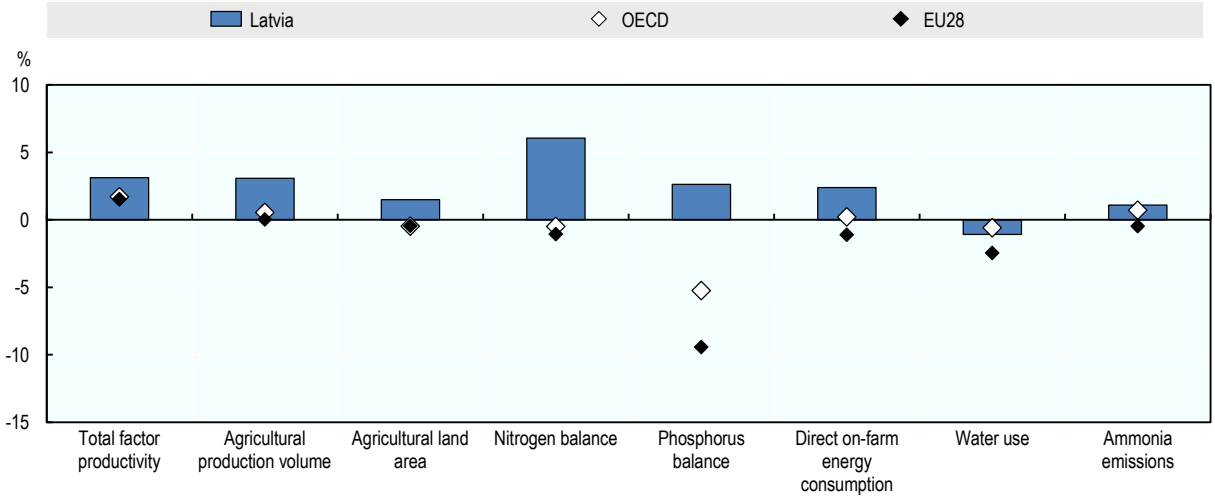
StatLink https://doi.org/10.1787/888933913416

2.5. Trends in natural resource use and the state of the environment

Latvia's agricultural production is shifting from non-commercial[7] to commercial farms. Commercial farms use more intensive production methods to achieve optimal yields. They can rely on the use of more advanced technologies to reduce emissions and to achieve emission decoupling from production growth. Although the use of mineral fertilisers has increased, nitrogen consumption in Latvia per ha of agricultural area remains one of the lowest among the EU countries (Figure 2.22).

Figure 2.22. Latvia's agri-environmental performance, 2002-04 to 2012-14

Average annual percentage change 2002-04 to 2012-14, or nearest available period



Note: OECD and EU28 averages are calculated based on individual country indicators. Their coverage may vary for each indicator depending on data availability for their respective member countries.
Sources: OECD (2017c), Agri-environmental Indicators (database); Eurostat (2015), Agri-environmental indicators (database) [t2020_rn310] for nitrogen and phosphorus balance for EU countries, http://ec.europa.eu/eurostat/data/database; OECD (2015), Environment (database) for water use; and USDA (2017), *Economic Research Service, International Agricultural Productivity* for total factor productivity, www.ers.usda.gov/data-products/international-agricultural-productivity/.

StatLink https://doi.org/10.1787/888933913435

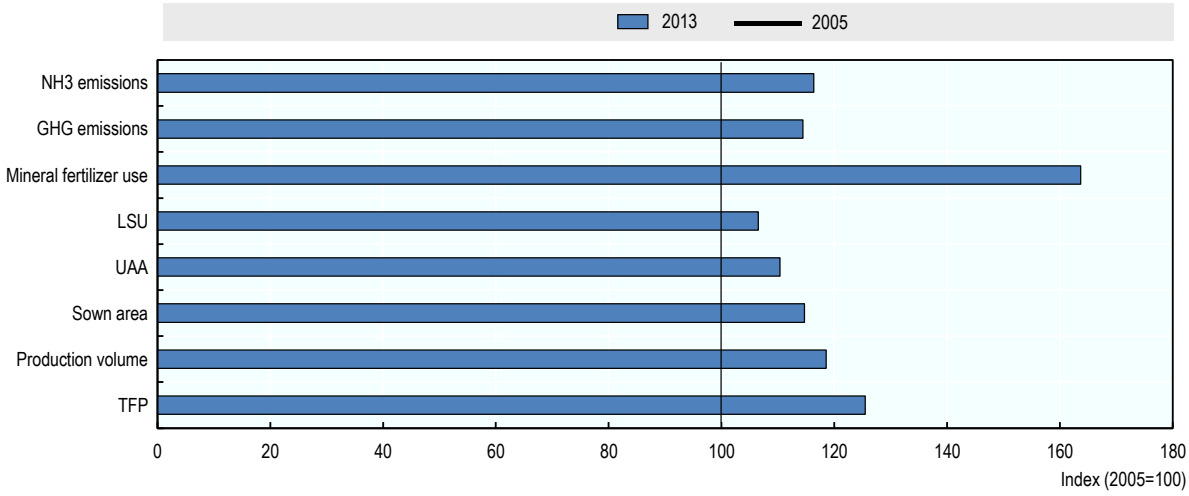
Agri-environmental performance

About half of Latvia's agricultural land is used for production. The other half is used either extensively for pastures and meadows or not used. Soil types that are present in agricultural land are mainly brown soils, anthrosols, gleyed, and alluvial soils.

With the growth and intensification of agricultural production in Latvia, the environmental load has increased but from a low level (Figure 2.23). While noting that harmonised data on pesticide use are not available, the use of pest and disease protection products is expected to be limited under cold temperatures and to bear little weight overall on the environmental load of Latvia's agriculture. Output growth has been facilitated by the considerable increase in the use of mineral fertilisers in Latvian agriculture (but still one of the lowest in the European Union), among other factors. Growth in agricultural output exceeded the growth in land use and animal numbers as the TFP has increased. The increased GHG and ammonia emissions from agriculture

exceeded the growth of the sown area and livestock units, but was slightly less rapid than the growth of the commodity production volume. Emissions per unit of output decreased in Latvia, this suggests successful decoupling of production from emissions.

Figure 2.23. Development of agri-environmental performance in Latvia, 2005 and 2013



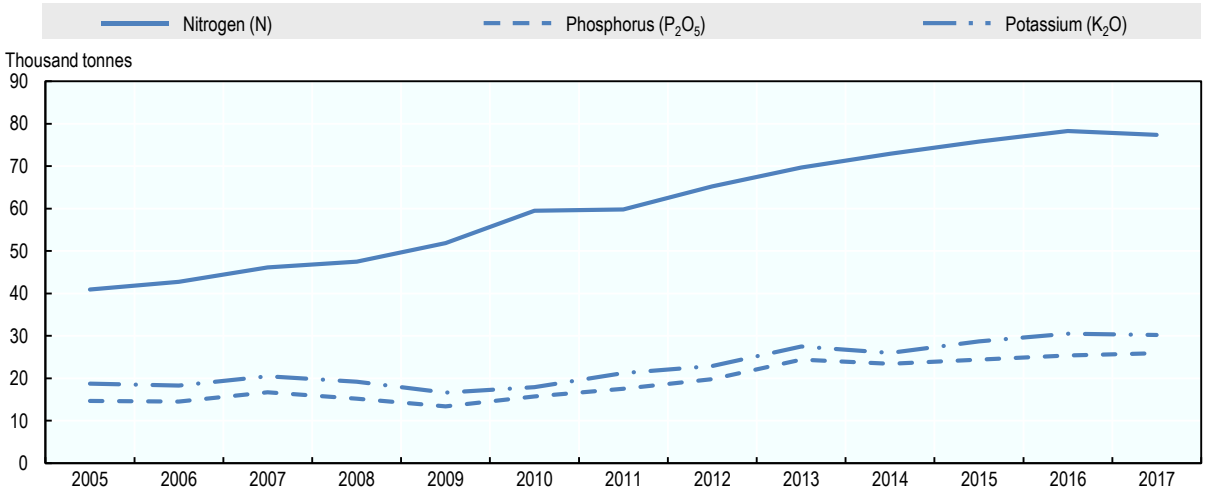
Sources: Eurostat (2018), Farm Structure Survey (database), http://ec.europa.eu/eurostat/data/database; CSB (2017), Farm structure survey and agricultural census (database), http://data1.csb.gov.lv; UNFCCC (2017), Latvia's National Inventory Report; CEIP (2017), Latvia's Informative Inventory Report 2017; USDA (2017), *Economic Research Service, International Agricultural Productivity* for total factor productivity, www.ers.usda.gov/data-products/international-agricultural-productivity/.

StatLink https://doi.org/10.1787/888933913454

Inputs

Since 2005, mineral fertiliser use, mostly nitrogen, has increased, from very low levels and at a faster pace than the growth of the area sown (Figure 2.24). Should this pace be pursued, it could cause environmental concern in the future. In comparison to other EU countries, Latvia has one of the lowest levels of nitrogen use per agricultural area; 63% of the EU28 average level in 2016 (Figure 2.25). At the same time, the use of organic fertilisers in Latvian agriculture has decreased both in total amounts used and per ha of sown area: in 2016, there were 13% less organic fertilisers used per ha than in 2005 (-39% compared to 1995) (CSB, 2017).

Figure 2.24. Development of the use of mineral fertilisers on agricultural crops (as 100% of nutrients) in Latvia, 2005 to 2017



Note: Industrially produced fertilisers used on agricultural crops as basic fertilising and additional fertilising, expressed as 100% of nutrients, in which nutrients mainly are in a form of easily deliquescent minerals.
Source: CSB (2018), *Agri-environmental indicators* (database) [MGG010, MGG020], www.csb.gov.lv.

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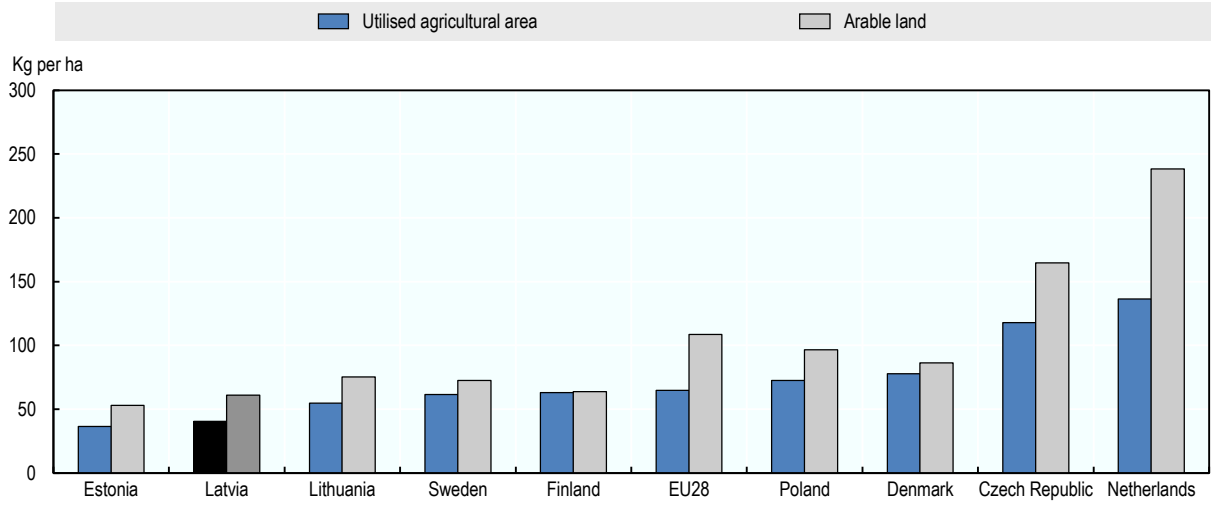
Figure 2.25. Inorganic nitrogen use per agricultural area, 2016



Note: Consumption of inorganic nitrogen per hectare of UAA and arable land. Countries are ranked according to their levels of inorganic nitrogen use per utilised agricultural area.
Source: Calculation based on Eurostat (2018), *Agri-environmental indicators* (database) [aei_fm_usefert] and *Farm structure* (database) [ef_lus_main], http://ec.europa.eu/eurostat/data/database.

StatLink https://doi.org/10.1787/888933913492

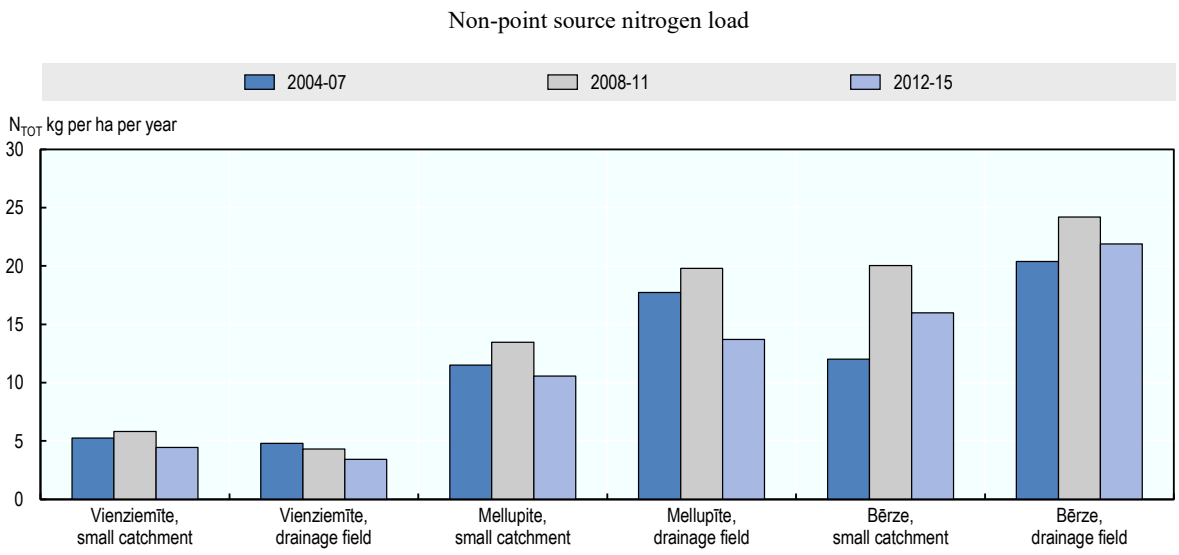
Water quality and quantity, water use evolution through time, infrastructures

Latvia's water resources are abundant. In 2014, groundwater resources in Latvia were assessed to constitute 4.7 billion m^3 a year, while the total internal renewable surface water resources amounted to 16.5 billion m^3 a year (FAO, 2017b). Total freshwater abstraction in Latvia, mostly sourced in surface water, as reported in the OECD Agri-Environmental Indicators database was 177 million m^3 in 2015, of which about one-fourth by the grouping of agriculture, forestry and fishing. Crop and animal production accounted for less than 2.9 million m^3 (OECD, 2017c).

Surface waters are monitored for quality and mainly rated as good. In the period 2012-15, the average annual concentration of nitrates was below 50 mg/l. According to Groundwater quality monitoring, the concentration of nitrates in most boreholes and wells at the depth of five metres did not change significantly. However, considerable deterioration in water quality was reported in some specific sites that was attributed to agricultural intensification, while the quality improved in other sites (Figure 2.26).

Latvia's report on the implementation of the Nitrate Directive in 2012-15 concludes that the average annual concentration of nitrates was stable (EEA, 2016). Science based norms for mineral fertilisers for crops are defined (MoA, 2017b) and water quality monitored, particularly in vulnerable zones and on agricultural land.

Figure 2.26. Nitrogen leakage and its long-term changes in agricultural runoff monitoring stations in Latvia, selected years averages



Source: EEA (2016), "Report to the European Commission", http://cdr.eionet.europa.eu/lv/eu/nid/envwir7mw/LV_Final_Nitrate_Report_161216.pdf.

StatLink https://doi.org/10.1787/888933913511

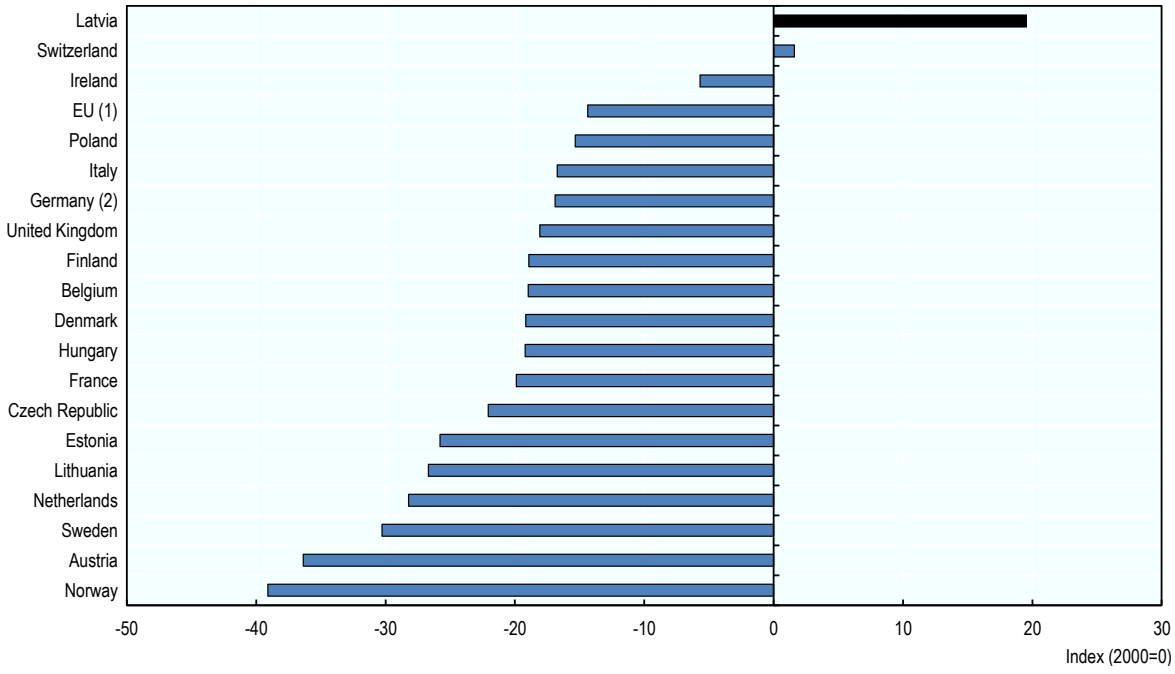
Water resources are abundant and little use is made of irrigation. According to Eurostat, 630 ha of agricultural land was irrigated in 2013 (Eurostat, 2017c). It should be noted that some irrigation infrastructures developed in the past are no longer used. Grassland and permanent pastures used 42% of the irrigated area in 2010 and the rest was used for growing open field vegetables, potatoes and permanent crops (Agricultural census, 2010).

Recourse to irrigation and drainage systems has been identified as one means of climate change adaptation.

Biodiversity evolution

Biodiversity and its evolution are difficult to assess and farmland birds are often used as a proxy-indicator. The average farmland bird index in Latvia in the 2012-14 period increased compared to 2000 (Figure 2.27), however index-value fluctuations and even deterioration are observed in other time periods. The *ex post* evaluation of the Rural Development Programme (RDP) for 2007-13 finds evidence that farmland bird population improved in territories where payments of the second Axis of the CAP Pillar 2 were implemented[8] while some other indicators of biological diversity quality have deteriorated (AREI, 2016). The botanical quality of grassland habitats is one such example.

Figure 2.27. Development of farmland bird index, 2012-14 compared to 2000



Notes: 1. EU aggregate changing according to the context.
2. For Germany, data refer to 2011-13 average.
Source: Eurostat (2017a), *Environment and energy* (database) [env_bio2] and *Agri-environmental indicators* (database), http://ec.europa.eu/eurostat/data/database.

StatLink https://doi.org/10.1787/888933913530

Ammonia, Nitrogen oxides and Greenhouse Gas Emissions

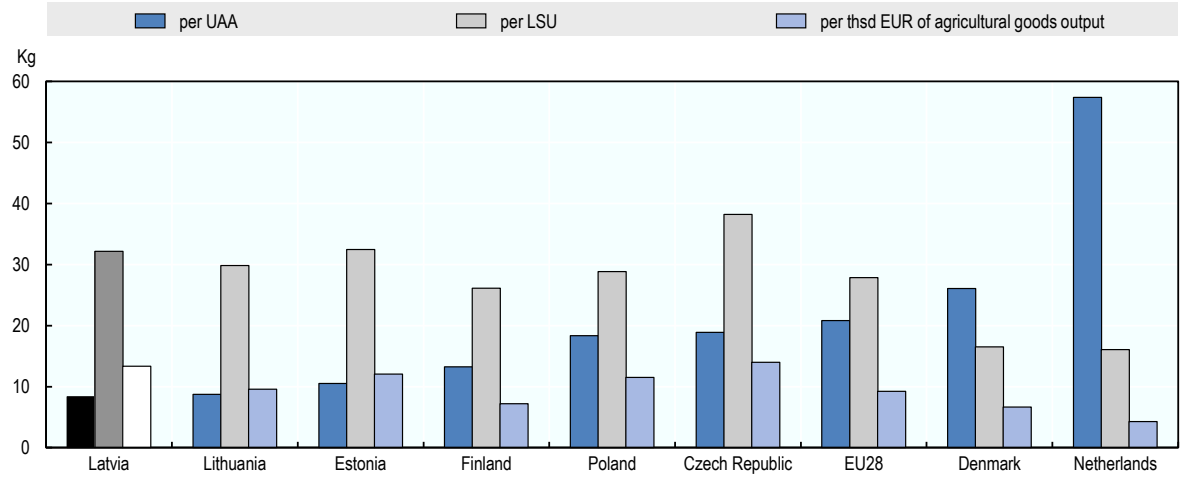
Latvia's agricultural emissions of ammonia, NOx and GHG reflect the sector's evolution. They have significantly decreased in the past 25 years. This was due to the notable drop in the number of livestock as well as the abandonment of agricultural land. There was a subsequent drop in the use of nitrogen fertilisers during the 1990s while transitioning to a market economy. Although the trend has reversed with Latvia's accession to the European Union, emissions remain below their levels in 1990.

Compared to other EU countries, Latvia's aggregate emissions of ammonia and GHG per UAA are low. However, if accounted for in terms of emissions per agricultural goods output value both indicators are among the highest and, should the current growth trends be continued, environmental degradations could occur (Figure 2.28).

Ammonia emissions

The agricultural sector is the largest contributor of ammonia emissions in Latvia, 86% in 2015. After accession to the European Union, mineral fertiliser use has increased and so have total livestock numbers although more recently and to a lesser degree. In 2015, NH_3 emissions from agriculture, while remaining below 1990 levels, were 20% higher than in 2005 (CEIP, 2017). These emissions are mainly linked to agricultural soil and barnyard manure management, where emissions from crop production and agricultural soils slightly exceed those from manure management (CEIP, 2017). Ammonia emissions are bound under EU directive No 2016/2284 and Latvia has a 1% reduction target by 2030 compared with 2005 levels. Mandatory and voluntary measures are offered to achieve this target. Conditions of good agricultural practice with a view to reduce ammonia emissions are part of the mandatory measures. The conditions were adapted based on research carried out in 2016 on the effectiveness of ammonia emission reduction measures in agriculture. The conditions include measures reducing ammonia emissions from crop and animal production. At the same time, farmers will be informed of regulatory requirements and recommendations regarding the environmental protection from the pollution caused by agriculture.

Figure 2.28. Ammonia emissions in agriculture per agricultural area, livestock and output, 2013



Note: Countries are ranked according to per UAA levels.
Sources: Eurostat (2017a), Agriculture and environment (database) [ef_m_farmleg]; and Eurostat (2018), Farm Structure Survey (database), http://ec.europa.eu/eurostat/data/database.

StatLink https://doi.org/10.1787/888933913549

Greenhouse Gas emissions

Agriculture is the second largest contributor to Latvia's GHG emissions after the energy sector. The 2 740 tonnes of CO_2 equivalent emissions from agriculture in 2015 account for almost a fourth of total GHG emissions (excluding Land Use, Land Use Change and

Forestry - LULUCF). GHG emissions from agriculture are sourced from agricultural soils (61%) to which organic soils contribute about half (52%), enteric fermentation one-third (31%), and, less significantly, manure management (7.2%) and liming and urea application (0.9%). The LULUCF's total GHG emissions were 1 377 tonnes of CO_2 equivalent in 2015. Since 2010, the sector is a net source of GHG emissions due to emissions from organic soils in cropland, forest land and grassland and also to the decrease of the net CO_2 removals in living biomass in forest land (UNFCCC, 2017).

Climate change: Climate conditions

Latvia has experienced a relatively stable increase in average air temperature over the past 50 years (1961-2010) along with the growth of minimum and maximum temperature values. Despite higher temperatures, a statistically significant prolongation of the growing season has not been observed so far. Rainfall patterns have changed and higher than "seasonal norms" drought episodes are followed by higher than "seasonal norms" rainfall. Overall, the average seasonal precipitations have increased, in particular in winter and summer (LEGMC, 2017).

If the current trend continues, crop cultivation would be more impacted than animal husbandry. Current evaluations have identified a number of risks associated with climate change, including risks of disease and pest dissemination; lower plant resistance; productivity and quality loss (MoEPRD, Silava, LUA, 2016). Benefits could include a longer growing season and associated varieties of plant and animal production.

In this context, Latvia's Adaptation to Climate Change Strategy 2030 is under preparation to come into force in 2018-19. The Strategy requires all government areas to promote systematic climate change risk-benefit assessment and management (Section 4.1).

The main adaptation measures identified include the diversification of cultivated plants; the maintenance and the renewal of drainage systems; the introduction of varieties resistant to climate change and implementation of appropriate technological measures; monitoring the dissemination of organisms harmful for cultivated plants and animals and introduction of integrated plant protection; as well as insurance (MoEPRD, Silava, LUA, 2016).

2.6. Summary

- The territory of Latvia is among the (eight) smallest OECD members. It is sparsely populated by a mostly urban, ageing and declining population. The total population of Latvia decreased by 20% between 1997 and 2017.
- Looking back, in the past 25 years, Latvia transitioned from central planning to a market economy, joined the European Union in 2004 and in 2014 it adopted the Euro as its currency. These events have significantly contributed to the evolution of Latvia's economy and agriculture.
- Latvia joined the OECD in 2016. At that time, Latvia was one of the (three) smallest OECD economies, one of the (six) least populated and characterised by one of the (seven) lowest GDP per capita among OECD countries.
- Latvia's economy is small and open. Its 5-year average real growth in 2016 exceeds the OECD average by nearly 1 percentage point.

- Trade matters for Latvia's economy. Exports of goods and services make up 58% of GDP and imports 57%, both above the OECD average. The current account balance is positive and Latvia ranked first most open OECD economy for trade in services in 2017.
- Characteristics of the economy as a whole apply to and may be exacerbated in agriculture and food processing. For example, the low labour productivity in the economy also affects these sectors. High demand for labour in urban areas and higher unemployment in rural areas may instigate labour shortage in agriculture and food processing.
- About 76% of the total labour input in Latvian agriculture is unpaid family labour.
- In the 1990s, agriculture output was dwindling and input use was low. EU membership, the associated wider market access and CAP payments gave the sector momentum to grow as evidenced by many indicators.
- Agriculture and food processing have grown, yet at a slower pace than the overall economy. Latvia's agriculture contributes higher, although declining, shares to GDP and employment than the OECD and EU averages. The share of food processing in GDP has declined, although much slower than in employment.
- There has been a strong and sustained agricultural TFP growth, although from very low levels and the sector has not yet reached its efficiency and productivity potential.
- Cereals and dairy farming make up most of Latvia's agricultural output. Cereal production is export oriented. Cereals and beverages are the main agro-food export commodity groups.
- The farm structure is dual; cereal farms are mostly large and livestock farms are smaller than average EU farms.
- 46% of farms do not market their production. These include households with agricultural land, kitchen gardens and subsistence and hobby farms. Their share is declining.
- There is a potential for UAA growth, possibly in competition with forestry.
- Since the introduction of CAP organic farming payments, the number of farms and the total certified organic agriculture area increase each year, the land area under organic production has nearly doubled in the past ten years. Sales of organic products also increase every year, however part of organic production, ranging from 52% of organic milk and egg production to 12% of organic vegetables, is sold to conventional processors.
- Latvia's environmental performance is high and no area of national concern has been identified. However, the environmental load of agriculture has increased and agricultural output growth has been facilitated by the considerable increase in the use of mineral fertilisers, from very low levels. GHG and ammonia emissions from agriculture have increased too. Current trajectories of increasing environmental pressures from agriculture could, if continued, cause damage in the future.

- Latvia enjoys high levels of land and water availability. 600 ha have an irrigation infrastructure. The maintenance and renewal of drainage systems has been identified as one means of climate change adaptation, while due consideration should be given to the possible environmental impacts of such measures, in particular on organic soils.
- Better data availability would allow a more accurate monitoring of evolutions and improve policy relevance. Specifically, indicators on farm income and on environmental performance (particularly data on pesticide use and GHG emissions) should be developed.

Notes

[1] The temperature average high is at 17ºC in July and average low at -4.6ºC in February. The highest precipitations, 78mm on average, occur in July and August

[2] Calculated as the average of the shares of agro-food imports and exports in total trade.

[3] Food processing includes the manufacture of food products, beverages and tobacco products (C10-C12).

[4] The conditions on agricultural land were that it complies with the definition of arable land, permanent grassland and permanent crops and that it has been maintained in a state suitable for grazing or cultivation.

[5] The FADN source used for Latvia and Estonia in 2010 excludes farms with a Standard Output less than EUR 4 000. These farms represent 64% of Latvian farms. Unlike the FADN, data of the ADC covers all farms. When excluding farms that do not market their production, it estimates the dairy farms mid-point farm size at six dairy cows in 2015.

[6] It should be noted that the share of fish exports is underestimated as fish products unloaded from Latvian fishing vessels in foreign countries are not included. These account for EUR 12.7 million.

[7] In 2016 non-commercial farms, i.e. farms that market no agricultural products, represent 46% of all Latvian farm holdings (CBS). They typically occupy less than 4.9 ha and, altogether, use 2.2% of the UAA.

[8] Rural Development (Pillar 2) of the CAP 2007-13 was structured in four Axes. The second Axis included agri-environmental and animal welfare payments, Natura 2000 payments, payments to farmers in areas with natural handicaps, payments for afforestation, payments for protecting biodiversity in specific sites, and support to non-productive investments.

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Chapter 3. Economic stability and quality of institutions in Latvia

This chapter gives an overview of the performance of the overall economy, macroeconomic developments and challenges, and the governance and institutions. Macroeconomic policy environment

3.1. Overall economic performance and medium-term growth prospects

Latvia is a small open economy located in the Baltic region of northern Europe. Latvia has been a member of the European Union since 2004, of the Eurozone since 2014 and of the OECD since 2016.

In the 1990s, Latvia's economy went through a major economic downturn as it transitioned to a market economy (OECD, 2015). After its accession to the European Union in 2004, the economy of Latvia grew by more than 10% annually until 2007. The subsequent period was one of recession caused by an unsustainable current account deficit, the collapse of the real estate market and the large debt exposure in the midst of a global financial crisis. Since 2010, the situation has improved and Latvia's economic growth has resumed (OECD, 2017a).

Economic reforms have progressed and Latvia appears to be the country which has taken most action on structural reform priorities and ranks first on the reform responsiveness indicator in the 2017 OECD "Going for growth" (OECD, 2017b). Latvia has adapted to the challenging international environment caused by the Russian Federation ban on EU exports. The current account balance has improved since the 2008 pre-crisis level (OECD, 2017a). The 2017 economic survey of Latvia notes the country's recovery from the global crisis and highlights opportunities for public action to achieve better convergence in living standards and more inclusive growth (Box 3.1 summarises the main findings of the *OECD Economic Surveys: Latvia 2017*).

Government finances are solid and government expenditure is low (Table 3.1). The government debt-to-GDP ratio stood at 40.6% in 2016, lower than in many OECD countries. Under the National Development Plan 2014-20 (NDP 2020) a tax reform is underway until 2018, by which tax revenues are planned to be increased to 30% of GDP, the size of the shadow economy reduced and the efficiency of the State Revenue Service improved (Annex 3.A).

Table 3.1. Latvia's key macroeconomic indicators and their projections

Indicators	2014	2015	2016	2017 (e)	2018 (e)	2019 (e)
	EUR billion current prices	Percentage changes, volume (2010 prices)				
GDP at market prices	23.6	3.0	2.2	4.6	4.1	3.6
Real private consumption expenditure	14.5	2.5	3.3	4.1	4.1	3.9
Government final consumption expenditure	4.1	1.9	2.7	4.1	3.4	2.8
Memorandum items:						
General government financial balance (% of GDP)		-1.4	0.1	-0.5	-0.9	-0.9
Current account balance (% of GDP)		-0.5	1.4	-0.8	-0.9	-1.9
Exchange rate, EUR per USD		0.9	0.9	0.9	0.8	0.8
Consumer price index, harmonised index 2010		0.2	0.1	2.9	2.6	2.6
Unemployment rate (% of labour force)		9.9	9.6	8.7	7.9	7.7
General government gross debt (% of GDP)		46.6	50.5	48.4	48.1	47.9

Note: (e) Underlying assumptions of the projections are described in Annex A.1 of the Source report.
Source: OECD (2018a), "Latvia", in *OECD Economic Outlook*, Volume 2018 Issue 1, https://doi.org/10.1787/eco_outlook-v2018-1-31-en.

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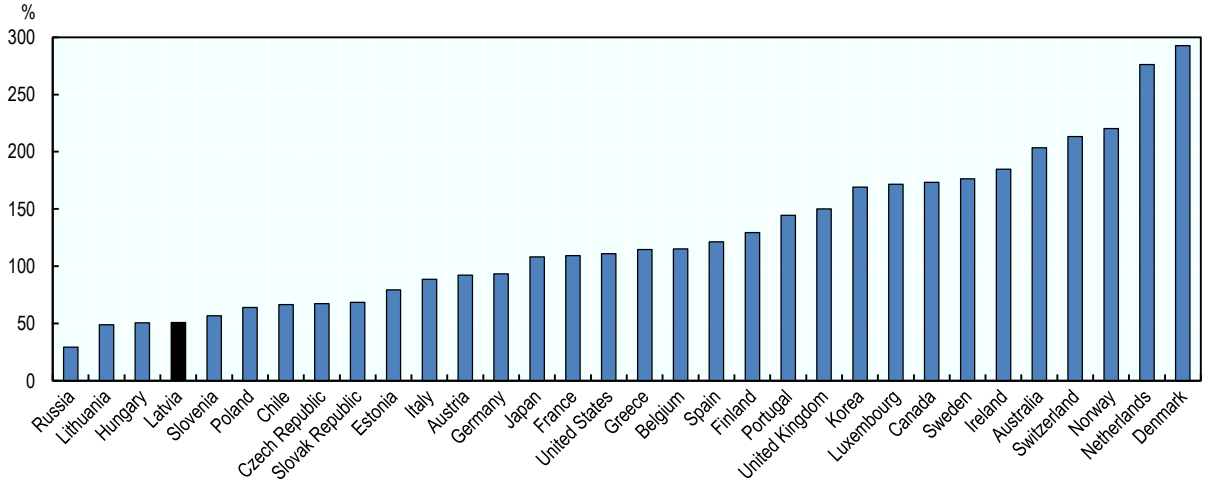
Income and productivity are below levels in high income OECD countries. Emigration continues but has slowed. The young and qualified account for more than half of emigrants.

Unemployment has gradually fallen from a peak 20% in 2010 to 8.7% in 2017 (CSB, 2017) and the OECD forecasts its continued decline (Table 3.1). The OECD finds that Eastern rural areas contribute the most to unemployment lasting for more than one year. The high long-term unemployment in rural areas contributes to higher poverty. Furthermore, the OECD foresees that the high operating costs of second pillar private pension funds will lower living standards for today's workers when they retire (OECD, 2017a).

Wages have increased since 2011 (CSB, 2016). Household consumption is robust and household debt as a share of net disposable income has decreased from 89.2% in 2010 to 52% in 2015, ranking lowest in OECD economies (Figure 3.1). Private consumption is expected to contribute the most to Latvia's demand-led economic growth in the medium term (MoF, 2015; OECD, 2017a).

Figure 3.1. Household debt, 2015

As a percentage of net disposable income



Source: OECD (2018b), *Household debt (indicator),* https://data.oecd.org/hha/household-debt.htm.

StatLink https://doi.org/10.1787/888933913568

Box 3.1. Main findings of the *OECD Economic Surveys: Latvia 2017*

The survey notes a robust economic growth, progress in structural reforms, lower, yet high, unemployment, rising wages, solid government finance, financial markets confidence and low private indebtedness as well as good environmental outcomes. It also notes a low level of R&D, weak innovation activity and a high productivity gap with more advanced economies, continuous youth emigration and a wide informal sector.

The survey notes that, despite improved performance, Latvia's skill shortage and weak innovation capacity confine exports to low value-added goods. It finds higher productivity and higher wages in firms that are integrated in GVCs and recommends addressing the skill mismatch and widespread informality through policies that encourage capital and labour flow to firms with high growth

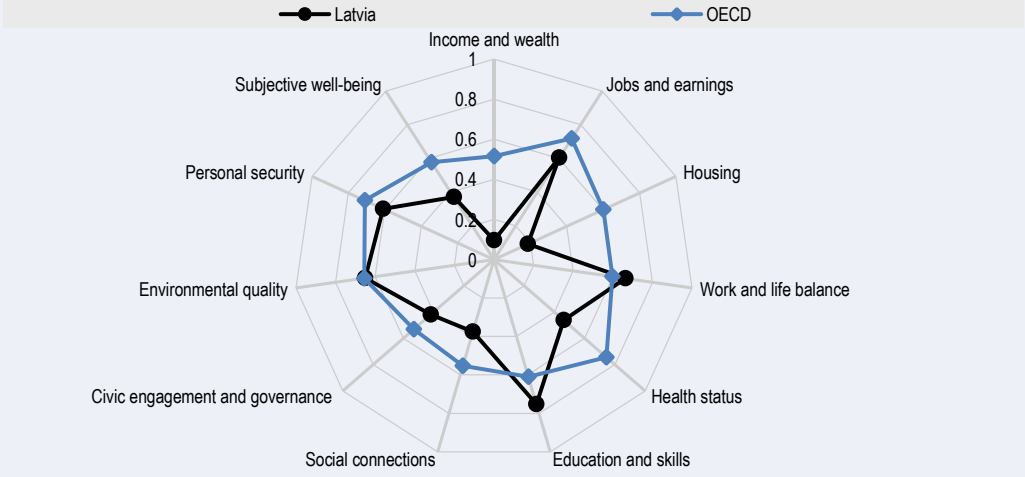
potential, for example, through better allocation of credit and mobility of workers.

The survey finds that widespread poverty is sustained by high long-term unemployment, weak social safety nets and high labour taxes for workers on low pay. It underlines local differences in unemployment and poverty, which are much higher in the eastern rural areas. Furthermore, transport and access to health care are also more limited in rural areas.

The survey recommends to mobilise additional government spending to improve low-income households' access to housing, to health care and to education and training, for example with grants and income support to vocational and university students from low-income families.

OECD Well Being indicators rank Latvia above the OECD average for Education and skills and Work and life balance, and close to the OECD average for environmental quality and Jobs and earnings (Figure 3.2). But Latvia ranks well-below average in terms of Housing, Health status and Income and wealth.

Figure 3.2. Latvia's Well Being indicators



Note: Each well-being dimension is measured by one to four indicators from the OECD Better Life Index database. Normalised indicators are averaged with equal weights. Indicators are normalised to range between 1 (best) and 0 according to the following formula: (indicator value – minimum value)/(maximum value – minimum value). "Civic engagement and governance" includes two indicators: stakeholder engagement for developing regulations and voter turnout.
Source: OECD (2016), "OECD Better life index", in *OECD Economic Surveys: Latvia 2017*.

StatLink https://doi.org/10.1787/888933913587

Box sources: OECD (2017a), *OECD Economic Surveys: Latvia 2017*; Yashiro et al. (2017) "Moving up the global value chain in Latvia", *OECD Economics Department Working Papers*, No. 1438, http://dx.doi.org/10.1787/3a486c5e-en.

As a small and open economy, Latvia is exposed to developments in neighbouring economies – the European Union and also to a smaller extent the Russian Federation. While exports of goods to the United Kingdom have grown in 2016 and 2017, the decision of the United Kingdom to leave the European Union may affect both export prospects in the medium term and return migration. Latvia has successfully diversified its export products and destinations to compensate for the drop in exports to the Russian Federation (OECD, 2017a). Traditional bioeconomy sectors; agriculture, forestry, fishery, food, and wood processing[1] accounted for 57% of the total value added by the primary

and secondary sectors[2] in 2014 and made up 56% of the value of all exported goods in 2016, this share is 40% when deducting re-exports (Eurostat, 2017).

Government measures for promoting economic growth and jobs

Latvia's fiscal deficit has declined from 1% of GDP in 2015 to 0.7% in 2017 and while the government has kept a strict cap on spending and fiscal deficit objectives, the 2015 economic survey of Latvia, taking into account the low-interest environment, had made the case for a deficit of 1.5% of GDP to increase government spending on investments in economic and social infrastructures which boost inclusive growth without raising the debt-to-GDP ratio (OECD, 2015). The 2017 Survey reinforced the point and noted that social spending is low and not targeted to the poorest (OECD, 2017a).

In this overall context, the government has identified the following priority directions for development:

- Increase the share of state defence funding to 2% of GDP in 2020.
- Promote the sustainable and balanced development of sectors and continue to revise tax load on labour.
- Reduce income inequality through adjustments to taxation, to minimum wage and social allowances for dependent persons and families with children.
- Increase tax revenue up to one-third of GDP mainly through improved tax collection.

The NDP 2020 operationalises these priority directions through the following three vectors for development: Economic growth, Population welfare, and Development and regional growth. It is implemented by government ministries to address objectives as diverse as improving the transport infrastructure and facilitating access to higher education or reducing out of pocket health care payments. The Plan also funds transitional state aid and investment promotion measures in agriculture as well as activities to combat the shadow economy (MoF, 2015) (Annex Figure 3.A.1).

Main components of global competitiveness

Based on the World Economic Forum's (WEF) aggregate Global Competitiveness Index (GCI) for 2017/18, Latvia ranked 54th among 138 countries. While Latvia's rank has declined compared to previous evaluations, the macroeconomic environment indicators have improved and are higher than the EU28 average (Figure 3.4).

In terms of business sophistication, Latvia is behind its neighbours Lithuania and Estonia as well as the OECD average and the gap is widening. While participation in global value chains (GVCs) has improved, the share of companies that participate in knowledge-intensive sectors remains low. Skill mismatch and widespread informality prevent firms from moving up the GVCs. The share of domestic value embodied in foreign final demand is lower than in neighbouring Lithuania and Estonia and significantly lags behind the OECD average (Yashiro et al., 2017; Benkovskis et al., 2017)

Latvia's 4th rank on "Flexibility of wage determination" highlights workers' mobility across economic activities at low cost and wage flexibility. The indicator may merely reflect the labour forces' low level of skills and may deteriorate with the generalisation of the minimum wage (Chapter 5).

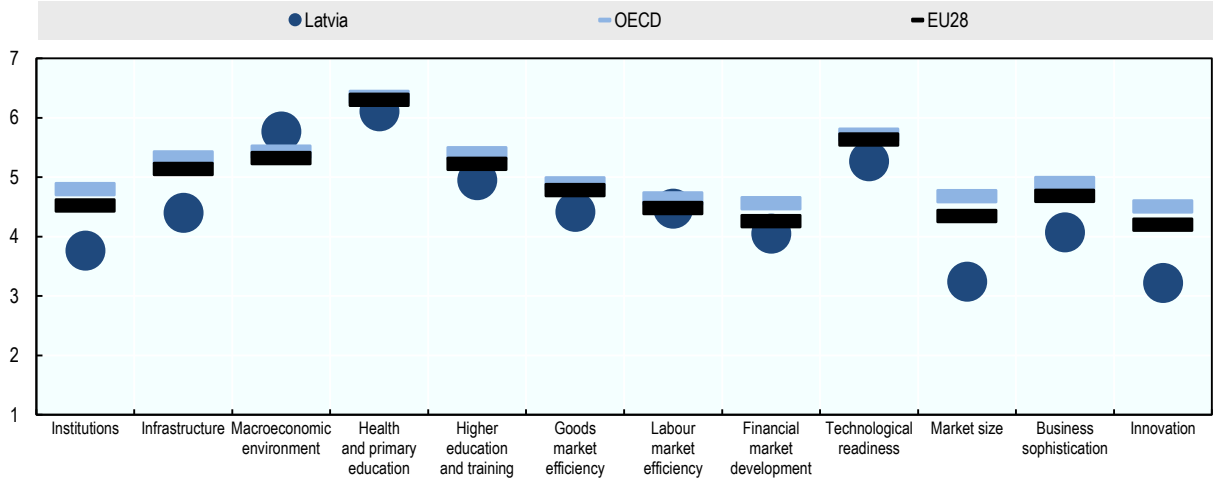
Latvia's score in innovation (83rd place) remains low and the productivity gap vis-a-vis high-income countries increases. According to Eurostat, Latvia's gross domestic expenditure on research and development (R&D) in 2015 was one of the lowest (0.6%) in the European Union; the EU28 average was 2% (Eurostat, 2017). Another factor limiting the innovation performance of Latvian firms is the low co-operation between businesses and higher education and research institutions (Chapter 7).

Recent policy initiatives aim to foster co-operation between research institutions to develop new products. The EU-funded Applied Research Grants programme, the Post-doctoral Research Grants programme and the support programme for the Modernisation of Higher Education and Research Infrastructure are also mobilised to improve innovation. Steps have also been taken to stimulate mobility of workers between the private and the public sector (OECD, 2017a). Initiatives are also in place to foster co-operation between research and food producers and processors.

Compared to the EU28 and OECD averages, Latvia's overall performance in global competitiveness can be improved (Figure 3.3). Considering Latvia's small domestic market and limited innovation infrastructures this can be achieved by better integration in Global Value Chains as recommended by Yashiro et al. (2017).

Figure 3.3. Global Competitiveness Index: All components, 2017-18

Scale from lowest (1) to highest (7) performance



Note: Indices for EU28 and OECD are the simple average of member-country indices.
Source: WEF (2017), *The Global Competitiveness Report 2017-2018: Full data Edition,* http://reports.weforum.org/global-competitiveness-index-2017-2018/.

StatLink https://doi.org/10.1787/888933913606

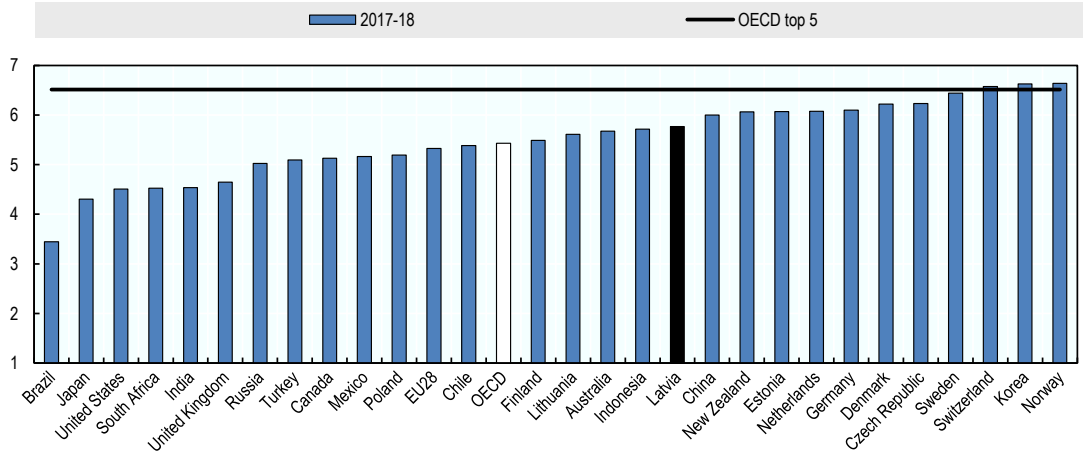
When considering the components of "Macroeconomic environment", the Global Competitiveness Index's 3rd pillar, Latvia's performance is high and stable. It exceeds both the EU28 and OECD averages, although it is below the OECD top 5 performers (Figure 3.4).

According to WEF GCI, inefficient government bureaucracy, tax rates and tax regulations are the most problematic factors for doing business in Latvia (Figure 3.5). The NDP 2020 aims to reduce red tape, to contain the informal economy from 24% of GDP in 2015 to

21% of GDP in 2018 (MoF, 2017), to ensure a predictable tax system, to improve the operation of the judicial system and to increase the efficiency of state administration (Annex Figure 3.A.1). The 2017 economic survey of Latvia also made several recommendations to combat the informal economy and to improve the enforcement of tax law (OECD, 2017b).

Figure 3.4. Global Competitiveness Index: Macroeconomic environment, 2017-18

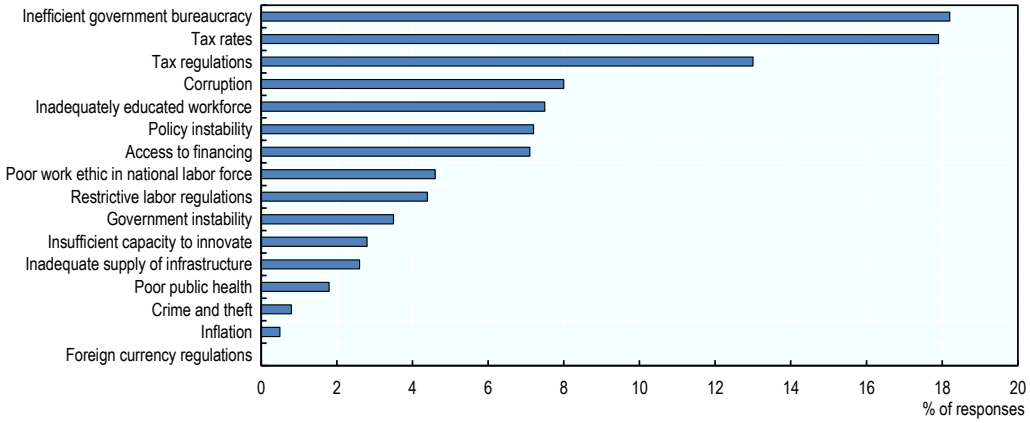
Scale from lowest (1) to highest (7) performance



Note: Indices for EU28 and OECD are the simple average of member-country indices. OECD top 5 refers to the average of the scores for the top 5 performers among OECD countries (Norway, Korea, Switzerland, Sweden and Luxembourg).
Source: WEF (2017), *The Global Competitiveness Report 2017-2018: Full data Edition,* http://reports.weforum.org/global-competitiveness-index-2017-2018/.

StatLink https://doi.org/10.1787/888933913625

Figure 3.5. Most problematic factors for doing business, 2017-18



Note: From the list of factors, respondents to the World Economic Forum's Executive Opinion Survey were asked to select the five most problematic factors for doing business in their country and to rank them between 1 (most problematic) and 5. The score corresponds to the responses weighted according to their rankings.
Source: WEF (2017), http://reports.weforum.org/global-competitiveness-index-2017-2018/countryeconomy-profiles/#economy=LVA.

StatLink https://doi.org/10.1787/888933913644

3.2. Governance and quality of public institutions

Governance consists of the traditions and institutions by which authority in a country is exercised. In the early 1990s, Latvia experienced an unprecedented change from a planned economy to a market-oriented one. Basic institutions of a market economy and monetary stability were established by the mid-1990s. Despite serious regional economic (1998) and global financial (2007-08) crises, today, while there is room for improvement, Latvia's governance performance is significantly better than the average of its regional neighbours in non-OECD countries.

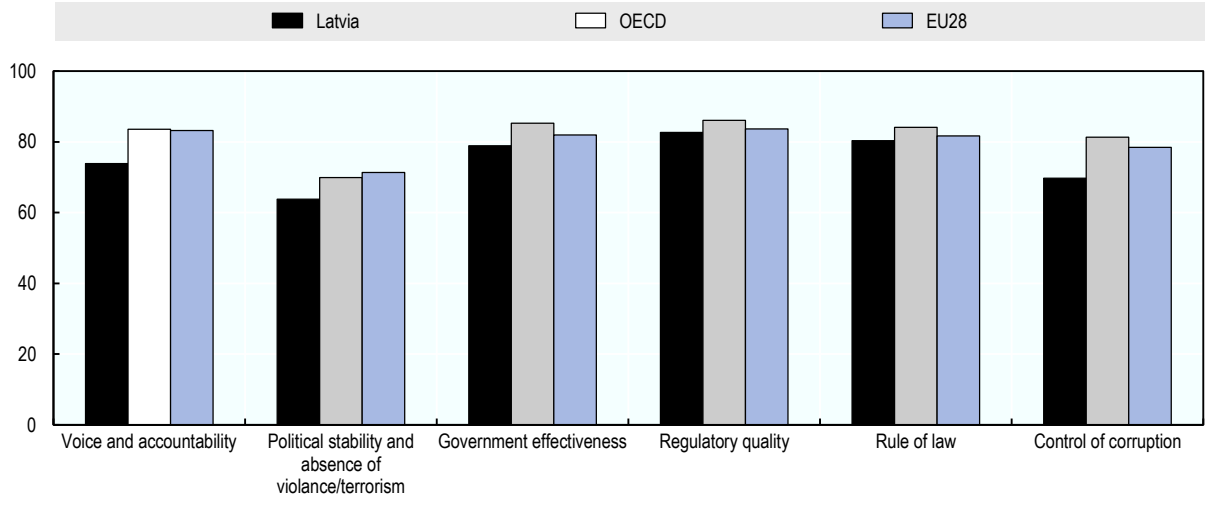
Regulatory process, transparency, clarity and predictability of governance and institutions

The World Bank (WB) Worldwide Governance Indicators (WGI) include six broad dimensions of governance, namely voice and accountability; political stability and absence of violence and terrorism; government effectiveness; regulatory quality; rule of law; control of corruption.

Overall, Latvia's performance in the six dimensions of the WGI is above average (Figure 3.6). According to the WGI, Latvia ranks quite well in the quality of public institutions with the highest – 83 (percentile rank 0 to 100) - in "Regulatory quality", which captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Latvia scores lowest (64) in "Political stability and absence of violence/terrorism", which measures perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism.

Figure 3.6. Worldwide Governance Indicators: Components, 2017

Percentile rank: lowest (0) to highest (100)



Source: World Bank (2018), World Bank's Worldwide Governance Indicators, http://info.worldbank.org/governance/wgi/index.aspx#reports.

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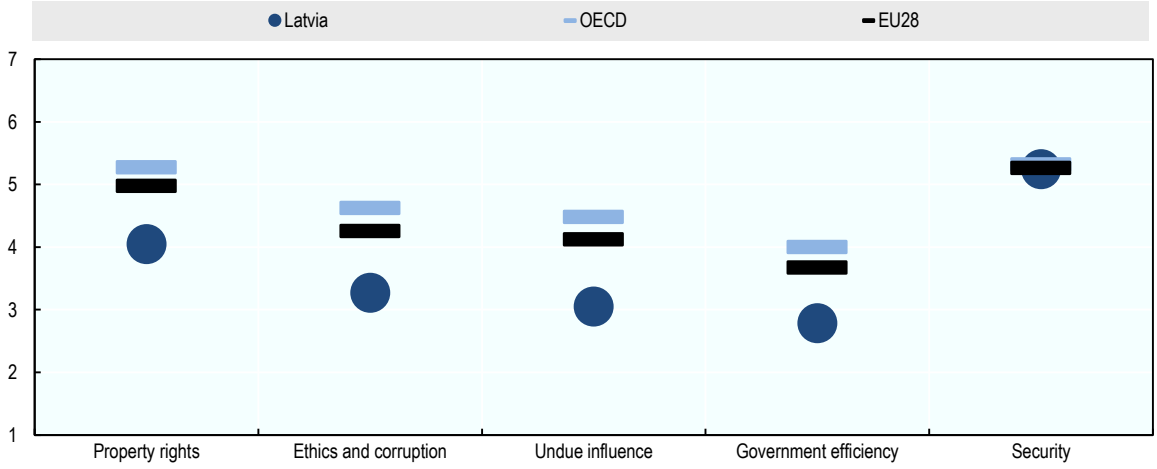
The legal and administrative framework within which individuals, firms, and governments interact has a strong bearing on competitiveness and growth. Figure 3.7 shows the performance on the five components of the "Index of public institutions" in Latvia, OECD average and EU28. Latvia's "Government efficiency" scores lowest (2.8 on a 7-points scale). The efficiency of the legal framework in settling disputes and challenging regulations is the weakest component and points to the necessity of improvements. Also, "Undue influence" (3.1 on a 7-point scale) resulting from the low judicial independence and favouritism in decisions of government officials indicates that regulatory processes in Latvia need to be more consistent and predictable. These points were also highlighted in the 2017 economic survey of Latvia recommendations as a means to ensure the independence and expertise of the judicial system (OECD, 2017b).

Compared to the OECD and EU28 averages, Latvia's score for public institution GCI is rather low. Despite the Public Administration Reform Plan 2020 introduced in 2017 (MK, 2017), and a broad range of reform initiatives to strengthen the judicial system, trust in public institutions is generally low in Latvia (World Economic Forum, 2017).

Figure 3.7. Global Competitiveness Index: Public institutions index by components, 2017-18

Scale from lowest (1) to highest (7)



Notes: Indices for EU28 and OECD are the simple average of member-country indices.
1) Property rights refers to the average of the indices: Property rights and Intellectual property protection. 2) Ethics and corruption refers to the average of the indices: Diversion of public funds, Public trust in politicians and Irregular payments and bribes. 3) Undue influence refers to the average of the indices for: Judicial independence and Favouritism in decisions of governmental officials. 4) Government efficiency refers to the average of the indices for: Wastefulness of government spending, Burden of government regulation, Efficiency of legal framework in settling disputes, Efficiency of legal framework in challenging regulations and Transparency of government policymaking. 5) Security refers to the average of the indices for: Business costs of terrorism, Business costs of crime and violence, Organized crime and Reliability of police services.
Source: WEF (2017), *The Global Competitiveness Report 2017-2018*, Full Data Edition, http://reports.weforum.org/global-competitiveness-index-2017-2018/.

StatLink https://doi.org/10.1787/888933913682

Environmental and natural resources concerns in institutions and the decision making process

One of the priorities of the Ministry of Environmental Protection and Regional Development (MoEPRD) is the effective use of natural resources. In 2016, the rates of

Natural Resource Tax (NRT) were increased by 20-100% compared to the previous year to encourage more efficient use of natural resources. In 2017-20, it is planned to further increase NRT on waste disposal thus promoting waste sorting and recycling.

Public procurement accounts for 20% of GDP. The environmental and natural resources' sustainability of institutions are part of Latvia's Green public procurement plan (GPP) since 2014 – a process whereby public authorities evaluate and take into account life-cycle costs when procuring specific groups of products, services and works (MoEPRD, 2015a). Green public procurement accounted for 19% of all public procurements in 2015, however it decreased to 13-14% in 2016 and 2017. In July 2017, the plan was amended to extend the scope of mandatory application of GPP requirements and criteria[3] (MoEPRD, 2018).

The promotion of GPP in Latvia is part of policy planning documents such as the Sustainable Development Strategy of Latvia until 2030 which provides that state and local government procurement tender criteria should include energy efficiency and product life-cycle analysis considerations and the NDP 2020 that requires a wider provision of energy-efficient and ecological products and services in public procurement. The promotion of GPP is one of the environmental policy targets under the Environment Policy Guidelines 2014-20 developed by the MoEPRD (MoEPRD, 2015b).

Mechanisms for ensuring policy coherence and transparency

By joining the Open Government Partnership (OGP) in 2011, Latvia committed to promoting clearly identifiable administrative, legal and public change through shaping and strengthening a people-friendly, effective, open and fair public administration in the country. Latvia is currently one of 75 countries participating in this initiative. Currently Latvia's OGP's third National Action Plan is proceeding. The plan was developed with contributions from public institutions, civil society and other partners in a process led by the State Chancellery. It promotes the open government values – transparency, accountability, public participation and use of technologies and innovations. Twelve commitments contribute to open, responsible and inclusive public institutions. The plan gives priority to transparency and awareness of the state and local government budget expenditures, to openness in the management of public corporations, to developing a socially inclusive portal for legal drafting, to publicity in the field of public procurement, to increased understanding of lobbying and openness of lobbying in state institutions and to the implementation of the values and ethical principles of state administration.

The NDP 2020, the Government Action Plan, the Guidelines for the Corruption Prevention and Combating 2015-2020, the Information Society Development Guidelines for 2014-20, the National Identity, Civil Society and Integration Policy Guidelines for 2012–18 and other relevant national level planning documents contribute to the implementation of OGP objectives (The State Chancellery of Latvia, 2016 and 2017).

Although the role and influence of Latvia's civil society in decision-making have considerably increased since 2011, they are not yet considered as sufficient or satisfying to all stakeholders.

3.3. Summary

- Latvia's macroeconomic performance is stable and exceeds EU28 and OECD averages. It is characterised by solid government finances, financial markets'

confidence and low private indebtedness as well as good environmental outcomes.

- The budget is balanced and public debt is one of the lowest in the European Union. The introduction of the euro has reduced the risk of currency fluctuations.
- Reforms aimed at effective public administration are underway and the 2017 "Going for Growth" reform indicator has ranked Latvia as a top reformer, which confirms the positive trend in the overall development of the country.
- Membership of the European single market widens market opportunities for Latvian businesses.
- Low innovation capacity and business sophistication are intertwined with continuous emigration, mostly of the youth, and a wide informal sector. These factors influence the medium-term productivity and competitiveness of Latvia.
- Rural areas have higher unemployment, higher poverty and less developed transport infrastructure and access to health care than urban areas.
- Overall governance indicators in Latvia comply with the requirements of a modern state. The quality of public institutions in Latvia slightly lags behind the EU28 and OECD averages mainly due to a less efficient legal framework.
- Since 2011 Latvia's government is striving to improve the quality of public institutions. Efforts are ongoing and progress is observed.

Notes

[1] NACE A, B, C10, C11, C12, C16, C17, C31 and C32.

[2] NACE sectors A, B, and C.

[3] GPP is mandatory for copying and graphic paper, office IT equipment, office furniture, food and catering services, cleaning products and services, indoor lighting, street lighting and traffic signals.

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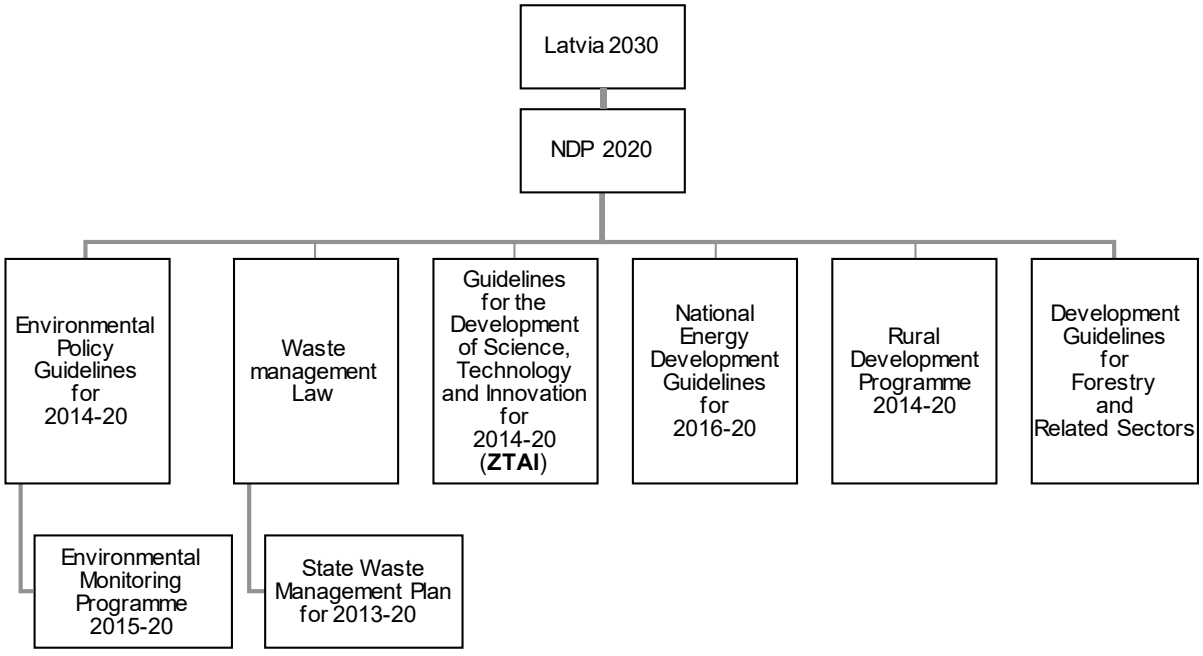
Annex 3.A. Institutional Background

Annex Figure 3.A.1. Legislative framework and domestic policy instruments of relevance to innovation in agriculture and food sector



Source: Based on background report prepared by LLU.

Chapter 4. General incentives for investment in Latvia

This chapter reviews general incentives for firm-level investments, stemming from regulations governing entrepreneurship, access to natural resources and products and processes, and policies related to trade, investment, finance and taxation.

4.1. Regulatory environment

The overall regulatory environment establishes basic conditions within which all firms, including farms, input suppliers and food companies, operate and make investment decisions. Competitive conditions in domestic markets, including low barriers to entry and exit, can encourage innovation and productivity growth, including through their impact on structural change. Regulations may also enable or impede knowledge and technology transfer directly, contributing to more or less innovation, including in sustainability-enhancing technologies (OECD, 2015).

Regulatory environment for entrepreneurship

The government of Latvia endeavours to develop an "Outstanding Business Environment" as a strategic objective of the NDP 2020 (Annex Box 4.A.1) (National Development Plan 2014-20, 2012). This overall strategic objective has been interpreted as reduced red tape, reduced share of the informal economy and reduced corruption, improvement of the operation of the judicial system and increased efficiency of state administration (Cross-Sectoral Coordination Centre, 2012).

At the same time, the Ministry of Economy's Action Plan for Enhancing the Environment for Entrepreneurship encompasses various measures aimed at enhancing the environment for entrepreneurship (MK, 2017). The plan is developed in co-operation with the Employers' Confederation of Latvia, the Latvian Chamber of Commerce and Industry, the Foreign Investors Council and sectoral ministries.

The Action plan reports on progress made, with a declared objective to improve Latvia's score in the World Bank's Doing Business[1] indicators. Latvia ranked 19th among 190 countries in 2018 (Table 4.1), and 8th among EU Member States with regard to the business environment for entrepreneurs. While Latvia scores best performer for import procedures, average best performances were noted with regard to getting credit and paying taxes. As part of the "Law on Credit Bureaus" adopted in 2015, credit information bureaus contribute to the availability of credit information and credit risk management in Latvia (Law on Credit Bureaus, 2015).

Table 4.1. Latvia's ranking in the World Bank's Ease of Doing Business, 2018

Topics	DB 2018 Rank
Overall score	19
Starting a Business	21
Dealing with Construction Permits	49
Getting Electricity	62
Registering Property	22
Getting Credit	12
Protecting Minority Investors	43
Paying Taxes	13
Trading across Borders	25
Enforcing Contracts	20
Resolving Insolvency	53

Note: The rank indicates Latvia's position from 1 (easiest) to 190 (most difficult).
Source: World Bank (2016), *Doing Business 2018: Reforming to create jobs*, www.doingbusiness.org/~/media/WBG/DoingBusiness/Documents/Annual-Reports/English/DB2018-Full-Report.pdf.

StatLink https://doi.org/10.1787/888933914632

According to the OECD Product Market Regulation indicator (PMR), Latvia's overall level of restrictiveness on key regulations is slightly higher than OECD and EU28 averages (Figure 4.1, Panel A). In 2013, state control at 2.02 was below the OECD average of 2.16, whereas barriers to entrepreneurship and barriers to trade and investment in Latvia, respectively at 2.03 and 0.77, were higher (more restrictive) than the OECD averages of 1.69 and 0.54 (Figure 4.1, Panel B).

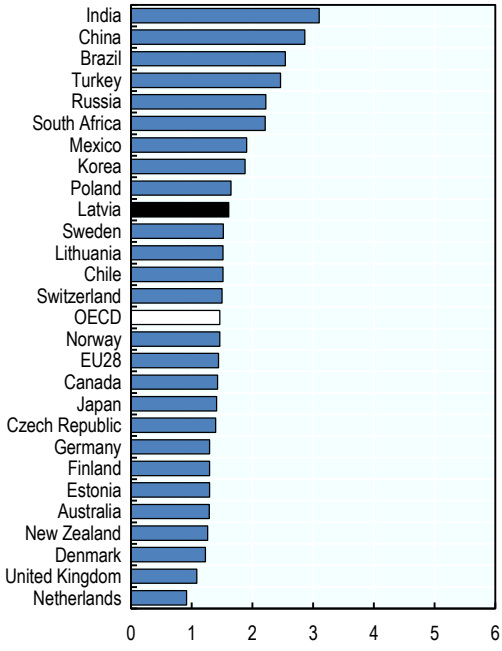
Latvia's regulatory protection of incumbents is less restrictive than both the OECD and EU28 averages, whereas the regulatory procedures and administrative burden on start-ups are higher in Latvia (Figure 4.2).

As illustrated in Figure 4.3 on barriers to entrepreneurship, Latvia scores slightly better (less restrictive) than the OECD top 5 performers on a couple of areas, while it is largely behind (more restrictive) than the OECD top 5 performers with regards to the licence and permits system and administrative burden for both corporation and sole proprietor firms.

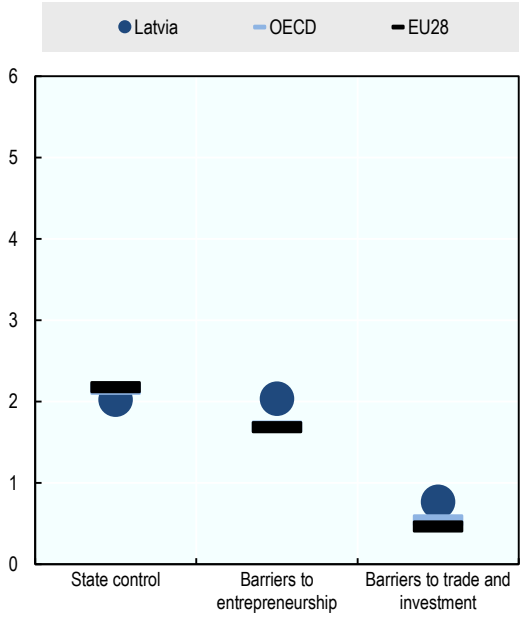
Figure 4.1. Integrated Product Market Regulation Indicator, 2013

Scale from least (0) to most (6) restrictive

A. Integrated PMR index, international comparison



B. Integrated PMR index, by components



Note: OECD Product Market Regulation (PMR) indicators measure key regulations in the areas of state control, barriers to entrepreneurship, and barriers to trade and investment. Indices for EU28 and OECD are the simple average of member-country indices. The 2013 update of the database is the latest available.
Source: OECD (2014), Product Market Regulation Database.

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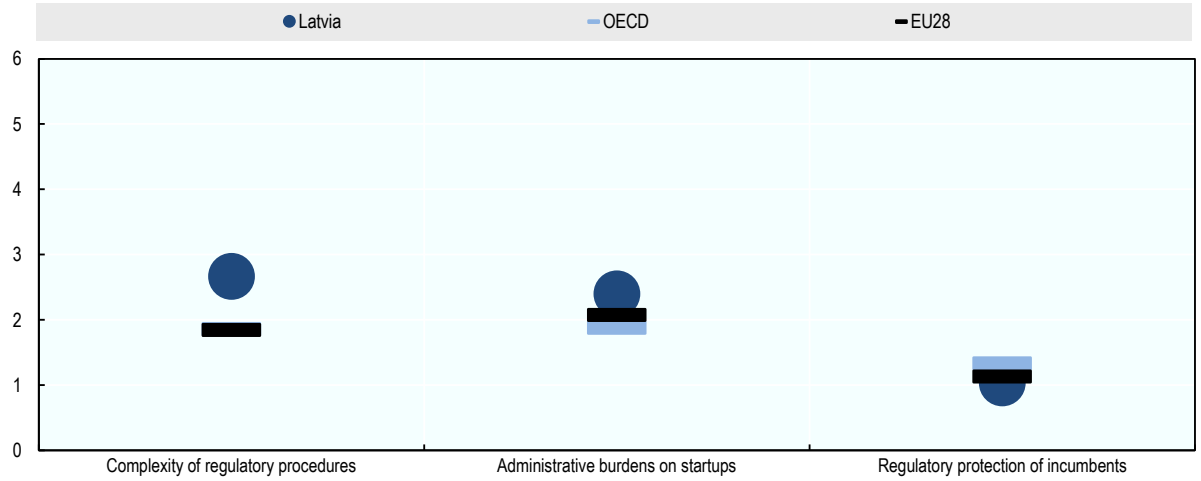
Figure 4.2. Product Market Regulation Indicators: Barriers to entrepreneurship by main groupings, 2013

Scale from least (0) to most (6) restrictive



Note: Indices for EU28 and OECD are the simple average of member-country indices. The 2013 update of the database is the latest available.
Source: OECD (2014), Product Market Regulation Database.

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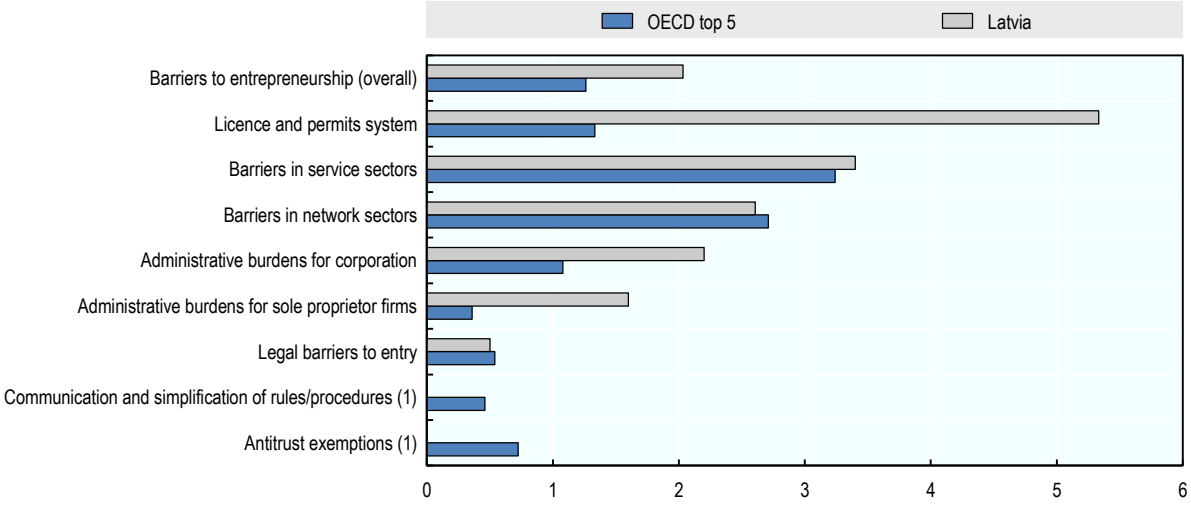
Figure 4.3. Product Market Regulation Indicators: Barriers to entrepreneurship by detailed components, 2013

Scale from least (0) to most (6) restrictive



Notes: OECD top 5 refers to the average of the scores for the top five performers among OECD countries (Slovak Republic, New Zealand, Netherlands, Italy and United States). The 2013 update of the database is the latest available.
1. For communication and simplification of rules/procedures the PMR score of Latvia is zero (i.e. least restrictive). For antitrust exemptions the PMR scores of Latvia are zero.
Source: OECD (2014), Product Market Regulation Database.

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The competition policy in Latvia generally complies with EU principles. The Competition Council ensures free and fair conditions for every market actor and oversees competition in every sector of the national economy, including agriculture and agri-food industries. Public utilities in the energy, electronic communication, postal, household waste management and water management industries are regulated by the Public Utilities Commission. The Commission, which is independent from national and local government, oversees the development of providers of public utilities, determines the methodology for calculation of tariffs and sets them, promotes competition in the regulated sectors and supervises their compliance with the conditions of the licence among other activities. The Commission decisions may be appealed to a regional administrative court. Its decision-making body is appointed by Latvia's Parliament and it is served by an executive body (Law on Regulators of Public Utilities, 2001).

A significant number of companies have full state ownership, three of them playing an important role in agriculture (see Box 4.1 on State owned companies and Annex Table 4.A.1).

Box 4.1. State ownership of enterprises

The government of Latvia had full (100%) ownership of 65 companies in 2016. These in turn have established 74 daughter companies. The government's portfolio evolves as the government disengages or acquires controlling stakes in companies.

The assets of state-owned companies totalled EUR 8.73 billion in 2016. Energy, forestry, transport and storage, and telecommunications were the key industries in which state-owned companies operated in terms of company turnover, balance sheet assets and number of employees. In addition, a number of state-owned companies in the healthcare and culture sectors significantly contributed to the provision of public services (Cross-Sectoral Coordination Centre, 2017).

Three state owned enterprises play an important role in the agricultural sector. Meliorprojekts State Ltd and Ministry of Agriculture Real Estate Ltd (MoA-RE), the two are 100% government owned and offer infrastructure services. The third, the Latvian Rural Advisory and Training Centre Ltd (LLKC), government owned by 99.32%, offers advisory services and knowledge transfer (Annex 4.A).

Meliorprojekts and MoA-RE operate in rural development, sustainable management of land and water resources, rural infrastructure maintenance, landscape preservation and environmental enhancement. Meliorprojekts provides engineering and construction design services and exercises state control over the implementation of functions of national significance including drainage construction. The MoA-RE provides the improvement of drainage infrastructure.

The LLKC provides general training on farm economics. It also offers private consultations and develops farm development plans (Cross-Sectoral Coordination Centre, 2017).

While no food processing company is state-owned, state-owned companies had a stake in 39 companies, of which two were engaged in the agri-food industry and five operated in agriculture in 2016. At the beginning of 2017, all seven entities were listed for the Privatisation Agency to sell the government owned stakes (Cross-Sectoral Coordination Centre, 2017; Privatisation Agency, 2017).

Financial details are provided in Annex Table 4.A.1.

Regulations on natural resources

General regulations governing access to and use of natural resources and the environment

In terms of Supervision, monitoring and impact assessment, Environmental protection falls under the following administrations:

- The Cross-Sectoral Coordination Centre, under the Prime Minister, is responsible for drafting, supervising and monitoring the implementation of the long-term Sustainable Development Strategy (Latvia 2030) and the NDP 2020.
- The Ministry of Environmental Protection and Regional Development is responsible for waste management, natural resources (except forests, fish and agricultural land which are under the supervision of the MoA) resources, pollution prevention and climate, as well as Green Public Procurement. Its agency, the Latvian Environmental, Geology and Meteorology Centre is responsible for the unified environmental information system (database) and for the national environmental reporting; while the State Environmental Service and the Nature Conservation Agency are the main institutions responsible for environmental control.
- The Ministry of Economy is in charge of energy including renewable energy.
- The MoA is responsible for forestry, agricultural and fishery policies and resources.
- Municipalities are responsible for numerous sectors related to resource efficiency: they organise and supervise the provision of utilities, the rehabilitation of mineral extraction sites and the determination of procedures for the utilisation of public-use forests and waters. Moreover, municipalities are responsible for the application of green procurement (European Environment Agency, 2015).

National targets set in Latvia 2030 comply with EU regulations and other international commitments (Table 4.2). Progress made in recent years suggests that most targets are achievable by 2030.

Over time, the monitoring of environmental performance has been extended and adapted to national priorities, objectives and regulations as well as EU and other international requirements. The regular monitoring of water quantity was started in 1875; monitoring was extended to regular surface water quality in 1946; to groundwater in 1959; to agricultural runoff in 1994 and to biodiversity in 2002. Furthermore, since 2006, three Environmental Monitoring Programmes have been carried out or are ongoing: in 2006-08; 2009-14; and 2015-20. Based on environmental monitoring, an information system is developed that allows to assess the performance of environmental protection measures and to identify the impacts of activities.

Table 4.2. Indicators and targets for natural resource use and the environmental state in Latvia's long-term and mid-term regulations

Indicator	Current state	National target	
		2020	2030
Share of energy produced from renewable resources in total gross energy consumption	37.1% (2013) [3]	40% [3]	50% [5]
Share of collected waste to be recycled	73% (municipal waste) 26% (hazardous waste) (2016) [1]	50% (municipal waste) [7] 75% (hazardous waste) [7]	80% [5]
Increase in resource productivity (EUR per tonne of dry matter content)	EUR 510 (2014) [8]	EUR 600 [2]	EUR 710 [5]
GHG emission reduction from non-ETS sectors (incl. transport, housing, agriculture and waste management) (% of emissions against base year (2005)	In 2015 +7% [4, 14]	+17% [12]	-6% [13]
Share of territory under specially protected area status	18% (2015) [6]	18% [6]	18% [5]
Proportion of agricultural land using organic farming	14% (2017) [11]	>15% [9]	>15% [5]
Share of managed agricultural land as a % of all agricultural land	87.9% (2011) [9]	95% [5]	-
Share of forest coverage	51% (2016) [10]	-	55% of total territory [5]

Sources: 1. CSB (2017b); 2. Cross-Sectoral Coordination Centre (2012); 3. MoE (2016); 4. EEA (2014), Latvian Environment Geology and Meteorology Centre (2017); 5. Sustainable Development Strategy (2010); 6. MoEPRD (2013a); 7. MoEPRD (2013b); 8. MoEPRD (2017a); 9. MoEPRD (2016a), NDP 2020 (2012); 10. MoA (2015); 11. Eurostat (2017d); 12. European Parliament and Council (2009); 13. European Commission (2016); 14. MoEPRD (2017b).

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Liability

As foreseen by the Law on pollution and the Natural Resource Tax law, different types of permits apply to activities that use underground resource or emit pollution into the environment, depending on their expected impact. In agriculture, polluting activity permits apply to animal housing, depending on the number of livestock units and the environmental sensitivity of the activity location. Similar polluting activity permits apply to fish farms. The permits are used to control and monitor polluting activities.

Waste management

In line with the EU Waste Framework Directive, the Waste Management Law prescribes procedures for waste management and the State Waste Management Plan for 2013-20 defines priority categories of waste to be collected, separated and further processed in a circular economy perspective and with an aim to reducing their harmful impacts on the environment and/or return it to the economy as a secondary material (European Environment Agency, 2015). Since 2006 more than EUR 170 million has been invested in waste treatment and disposal facilities (CSB, 2017c).

Biodiversity and Protected areas

Latvia is located in a transitional zone characterised by high biological diversity. Regulations apply to the access, use and management of natural resources. Altogether in Latvia, there are 683 specially protected nature areas, including 333 Natura 2000 sites that are under special state-level protection in order to safeguard and maintain the biodiversity (Nature Conservation Agency of Latvia, 2014). Outside protected territories, micro-reserves are established under the Law on the Protection of Species and Habitats to protect small-scale biologically rich areas. Farming and forestry activities on protected

areas are limited. They must comply with specific management practices, and compensations apply.

Land use and soil

Land use is influenced by regulations on land markets. The main institutions overseeing on land use include local governments, the Land Register, the State Land Service (SLS), the Land Fund, the State Joint Stock Company (JSC) Development Finance Institution Altum (Altum) and the Forest Stewardship Council.

In Latvia, local governments oversee transactions on agricultural land. Ownership rights on agricultural land and or any other real estate must be registered in the regional office of the Land Register in the district in which the land is located. From 1 January 2018, land property registration is subject to a written, free-of-charge, statement issued by the local government.

The National Real Estate Cadastre Information System, maintained by the SLS, registers and updates data about real estates, land parcels, constructions, groups of premises and their characterising information.

Land may be acquired by citizens or legal entities of the Republic of Latvia as well as those of EU Member States, of the European Economic Area and of the Swiss Confederation. Tax registered capital companies and their shareholders, be they natural or legal persons, from states with which the Republic of Latvia has entered into international agreements regarding the promotion and protection of investments can also acquire land.

While no additional restrictions apply to the purchase of land where farming or forestry is not the dominant land use, the Law on the Land Privatization in Rural Areas specifies that agricultural and forest land can only be acquired in conformity with the territorial planning of local governments (Law on Land Privatisation in Rural Areas, 1992). The maximum area for land ownership is set to 2 000 ha and 4 000 ha under certain circumstances. Conditions concerning registration, land use, tax debt, agricultural business plan and language certification apply to natural persons and to business owners or their legal representative. According to the SLS, 76% of the total agricultural land area was owned by citizens of the Republic of Latvia; in 2016, 0.1% was owned by non-citizens of the Republic of Latvia, 22.3% by legal persons, 0.5% by the national government, 0.8% by local governments, and 0.8% was under foreign ownership (SLS data).

The Land Fund of Latvia, managed by Altum, is formed by the agricultural land accumulated at national level and has pre-emptive rights on transactions of agricultural land (see Box 4.2 on Altum). From July 2015, when it was formed, up to the beginning of 2017, the fund has spent EUR 4.6 million overall for the purchase of 112 pieces of property in all regions of Latvia; a total 2 038 hectares, of which more than 40% in Zemgale. As of the beginning of 2017, 92% of the Land Fund's property was leased to farmers for agricultural expansion of their business, of which ten were young farmers (Altum data).

Agricultural land can be rented for a period that is not less than five years. Rental contracts must be concluded in writing and registered with the local government. From 1 January 2018, local authorities are allowed to rent, with a purchase option, agricultural land for agricultural use to natural persons having no other agricultural land. In this case, the land may be rented out for a period of 12 years, at a rate of 4.5% of the cadastral value of the property and the land may be purchased no earlier than the fourth year.

Forestry is regulated under the Development Guidelines for the Forestry and Related Sectors for 2015-20 (MoA, 2015). Forest owners can apply for two types of certification systems that promote sustainable forest management: the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC).

Box 4.2. JSC Altum

The State Joint Stock Company "Development Finance Institution Altum" (Altum) has three stakeholders: the MoF (40%), the MoE (30%) and the MoA (30%).

Altum is the operational institution for support programmes from public resources, including funding from the European Union (as part of the Rural Development Plan and structural funds) and other international institutions. Altum also attracts co-funding of projects.

Altum disburses state aid, administers loans, microcredits and credit guarantees disbursed to agricultural business (Section 6.4). Altum also provides accelerator funds and seed funding. It controls land market operations and co-finances infrastructure development.

State aid

Altum offers state aid from the national budget to various target groups with the help of financial tools (such as loans, credit guarantees, investing in venture capital funds, etc.). It operates within the boundaries allowed by EU state aid regulation (Section 3.1).

Land market intervention

Altum also administrates the Land Fund of Latvia that was established in July 2015. Altum also performs real estate lease, buyback, purchase, and sale or change transactions. It is one of the main institutions involved in land use is influenced by regulations on land markets (Sections 4.1 and 4.3).

Credit guarantee

Historically and up to 2014, the JSC "Rural Development Fund" (established in 1994) granted credit guarantees to farmers and other rural entrepreneurs of Latvia according to the loan agreements concluded with credit institutions. Credit guarantees were necessary to facilitate access to credit in the absence of sufficient collateral.

In 2015, Altum took over issuing guarantees for short-term and long-term loans granted by banks to rural entrepreneurs, agricultural producers, agricultural and forestry co-operative societies and processors of agricultural products, excluding entrepreneurs in financial difficulties. From 2016, banks, rather than entrepreneurs, contact Altum directly in case of insufficient collateral (Section 4.3).

Investment credit

Altum also offers Co-financing (mezzanine) loan programme. Co-financing (mezzanine) loans can be used to cover investment expenses related to the diversification of products with new ones, extension of capacity or a fundamental change in the overall production process, setting up of a new establishment or extension of the capacity of an existing establishment. The loan is given to companies (including agricultural companies excluding primary producers) and agricultural service co-operative societies (Section 7.3).

Altum's Accelerator funds are invested in innovative and early development start-ups with high growth potential, and their funding is provided over two stages, in the form of pre-seed and seed stage funding. The programme also includes agricultural sector companies and agricultural service co-operative societies (Section 7.3).

International participation

Altum also takes part in international infrastructure projects.

It represents Latvia's in the Baltic Investment Fund to which it contributed EUR 26 million. The Fund aims to increase Baltic States' enterprises' access to private and venture capital (Section 7.1).

Water

Based on EU Directives, water is regulated by the Water Management Law, the Law on Pollution, and the Marine Environment Protection and Management Law. Water quality and the sustainable use of natural water resources are also covered in the Environmental Policy Guidelines for 2014-20 (VARAM, 2013a). The guidelines suggest improvements to the water supply infrastructure and the implementation of the user-pays principle. Environmental policy also aims to preserve and enhance the quality of the sea environment, to protect the sea coast and to reduce the impact of economic activity on the sea environment.

Nitrates

Nitrate pollution is monitored and does not present a threat to the environment overall. In Latvia, nitrate vulnerable zones are identified in the Law on Pollution and Cabinet regulation No. 834 on the protection of water and soil from pollution with nitrates caused by agricultural activity. Increased requirements apply to these zones. The EC Nitrate Directive is included in this regulation.

Nitrate vulnerable zones occupy 825 870 ha, close to 13% of the total area or 43% of Latvia's UAA. Since 2001, special requirements regarding the dispersal of fertilisers, storage of manure and fermentation residues apply to farms located in these zones. Farmers who use 20 ha or more of agricultural land, and who grow vegetables, potatoes, fruit trees or fruit bushes with 3 ha or more of agricultural land in nitrate vulnerable zones, have a mandatory requirement to prepare crop fertilisation plans.

Climate change

Latvia's air quality is highly rated and no specific issues are identified. Latvia is engaged in international initiatives and has ratified the UN Framework Convention on Climate Change in 1995, the Kyoto Protocol in 2002, and the Paris Agreement in 2017. As an EU Member State, Latvia contributes to the EU GHG emission reduction targets. Latvia's agricultural sector is the second largest source of GHG emissions. Two planning documents are currently under preparation that should help take up the climate change challenges ahead.

The 2050 National Low Carbon Development Strategy is under preparation and expected to be adopted late 2018 or in 2019. It aims to drive change in production, lifestyle and consumption patterns that will reduce economy-wide GHG emissions and enhance resource efficiency. The Strategy is expected to impact innovation, improve health through less pollution, and to provide career and investment opportunities through green growth.

When it is adopted, Latvia's Adaptation to Climate Change Strategy 2030 will promote systematic climate change risk-benefit assessment and management so that climate

related risks, such as heavy rainfalls, cold and heat waves or rising sea level are reduced and potential benefits, such as longer growing seasons or higher average temperatures, harnessed.

Regulations on products and processes

Regulations on products and processes aim to protect human, animal and plant health and the environment. Environmental and health related regulations could support innovation by building consumer and societal trust in the safety and sustainability of new products or processes. However, unnecessary or dis-proportionate regulations can limit innovation and technological developments (OECD, 2015).

In Latvia, the regulatory framework on goods for human consumption follows and implements EU directives through a number of decisions, national laws and Cabinet regulations. Legal documents regulating the production of goods for human consumption fall under the responsibility of the MoA.

Food safety law

Latvia implements the EU food safety rules and regulations and has transcribed them into national laws on safety and hygiene; animal feed; animal welfare and health; animal identification and registration; information and labelling and consumer rights protection. The MoA oversees the administration and governance of food production and agri-food processes. The ministry co-operates with other ministries as well as various scientific and non-governmental organisations when preparing legal acts.

The **Law on the supervision of food handling** defines responsibilities of businesses handling food; criteria for food unfit for distribution; state supervision and control of the handling of food; and procedures for recognising or registering food establishments. This law is binding for those farmers who are engaged in the handling of food and are dealing with primary manufacturing of food, food acquisition, pre-treatment, treatment, processing, manufacturing, packaging, storage, distribution or transport. The law was amended in 2009-10 and business registration was simplified. Electronic means of communication between food enterprises and the Food and Veterinary Service are now accepted. Requirements for the direct supply of primary production of food of plant origin to final consumers in small quantities on local markets were also simplified (MoA, 2009).

The **Law on animal feedstuffs handling** lays down the requirements for industry employees, feed labelling, supervision and control.

The **Animal Protection Law** establishes animal welfare standards, prescribes the duties and responsibility of animal owners, and the **Veterinary Medicine Law** stipulates measures for the prevention, treatment and control of animal diseases.

The **Consumer Rights Protection Law** defines consumer rights and sets the general requirements for the labelling of goods. The **Latvian Administrative Violations Code** determines administrative requirements in agriculture, veterinary and food trade and determines the fine that shall be imposed in case of violation.

EU regulations requirements and national laws have been consolidated in Cabinet implementation regulations. The Food and Veterinary Service implements the controls and decides veterinary measures and sanctions on observed violations. In a context where African swine fever occurrences have been observed, the service's current priorities

include the **inspection of biosecurity requirements** in pig housings, t**he monitoring of the livestock welfare requirements** and **animal identification and registration.**

Organic practices and products

Organic farming plays an important role in Latvia. The sector is regulated by the EU Organic Farming Regulation and the regulation on organic production and labelling of organic products. In addition, national regulations apply that set eligibility criteria for financial support or define state fees to be paid by farmers. Organic farming is supervised by the Food and Veterinary Service, the State Plant Protection Service and the Rural Support Service. Two private institutions control organic farming: the association Environmental Quality and the state Ltd Certification and Testing Centre. The Association of Latvian Organic Agriculture represents the interests of farmers. In co-operation with the Food and Veterinary Service and the Consumer Rights Protection Centre, the MoA has produced relevant guidelines to inform producers and distributors about the legislative requirements pertaining to the use of words "bio" and "eko" in labelling food supplements, thus contributing to a single understanding of both words (MoA, 2016).

Assessment of regulatory impacts when developing new and reviewing existing regulations

Before producing new policy documents, the key principles of policy-making in Latvia as adopted by the Cabinet of Ministers (MK, 2006; MK, 2014), require to carry out a comprehensive analysis of adopted policy documents and legal acts in force (Latvijas Vēstnesis, 2017). In addition, under the Law on Environmental Impact Assessment, a strategic assessment of environmental impacts must be performed for new policy documents, including those on agriculture, forestry, fisheries, energy, manufacturing, transport, waste management, water resource management, telecommunications, tourism and mining.

Implementation of product and process safety regulation in food and agriculture

Food is one of the most regulated activities, as it directly affects consumers' health. In Latvia, all companies involved in the handling of food have to comply with the general food safety principles to ensure food safety. The responsibility for ensuring food safety lies with food business operators, who must determine the stages in food handling which are significant from the food safety perspective, monitor them and register the results in accordance with the Law on the Supervision of the Handling of Food and the Regulation (EC) No. 852/2004 of the European Parliament and of the Council. Food business operators are also encouraged to introduce Hazard Analysis Critical Control Point (HACCP) principles in their practice. In Latvia, guidelines on good hygiene practices for several economic activities and food and catering enterprises were produced to assist the introduction of HACCP principles in businesses, while the LLKC offers training seminars for those interested.

4.2. Trade and investment policy

Trade can facilitate the flow of goods, capital, technology and knowledge and contribute to the development of people needed to innovate. Openness to trade and capital flows is conducive to innovation, as it provides a larger market for innovators, reinforces competition, increases access to new technologies, ideas and processes, including from

foreign direct investment (FDI) and related technological spill-overs, and facilitates cross-country collaboration. Trade and investment openness can influence innovation throughout the food supply chain, from input suppliers to food service and retail firms. Input and output markets that operate effectively can foster productivity growth. Trade and investment openness can also facilitate the development of market mechanisms to foster more environmentally sustainable production (OECD, 2015).

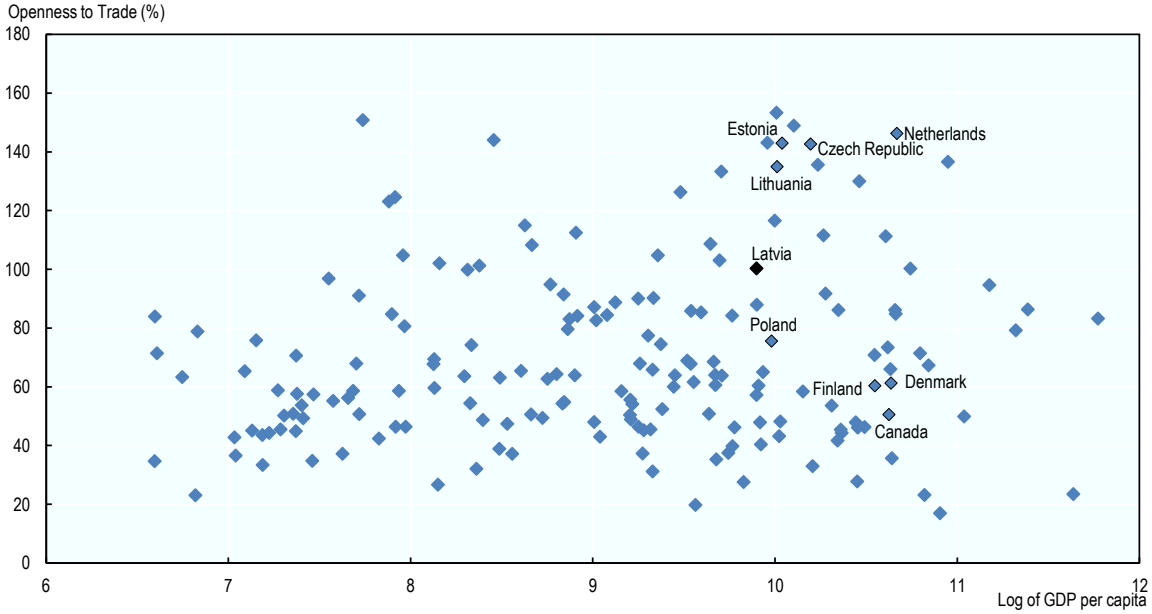
Trade policy

The European Union is a single market in that it offers its 28 members a single customs union with a single trade policy and tariff. Latvia, as a Member State enjoys access to the single market for domestic business outlets and market supplies and relies on the European Union for its foreign trade relations. These relations are based on multilateral trade agreements, which have been concluded in the framework of the WTO, bilateral trade agreements and EU unilateral trade preferences. In recent years, the European Union has placed great focus on strengthening bilateral relations with a number of trading partners.

Trade openness

Latvia is a small economy that relies on trade for its access to goods and services through imports and on exports for business outlets revenues. While trade openness and integration in global value chains bring many economic benefits, including increased technology transfer, transfer of skills, increased labour and total factor productivity and economic growth and development, Latvia is less exposed to trade than its peers (OECD, 2017). In 2012, Latvia's openness to trade is below that of EU countries with comparable levels of GDP per capita, while they are exposed to identical external trade conditions (Figure 4.4). This may be explained by market size but also by differences in domestic efficiency of customs and border procedures.

Figure 4.4. Openness to Merchandise Trade and GDP per capita, 2010-12



Note: "Openness to trade" is the value of merchandise trade (exports plus imports) as a percentage of gross domestic product (GDP). GDP per capita is calculated using purchasing power parity (PPP) in constant 2011 dollars.
Source: WITS (2017), http://wits.worldbank.org/visualization/openness-to-trade-visualization.html.

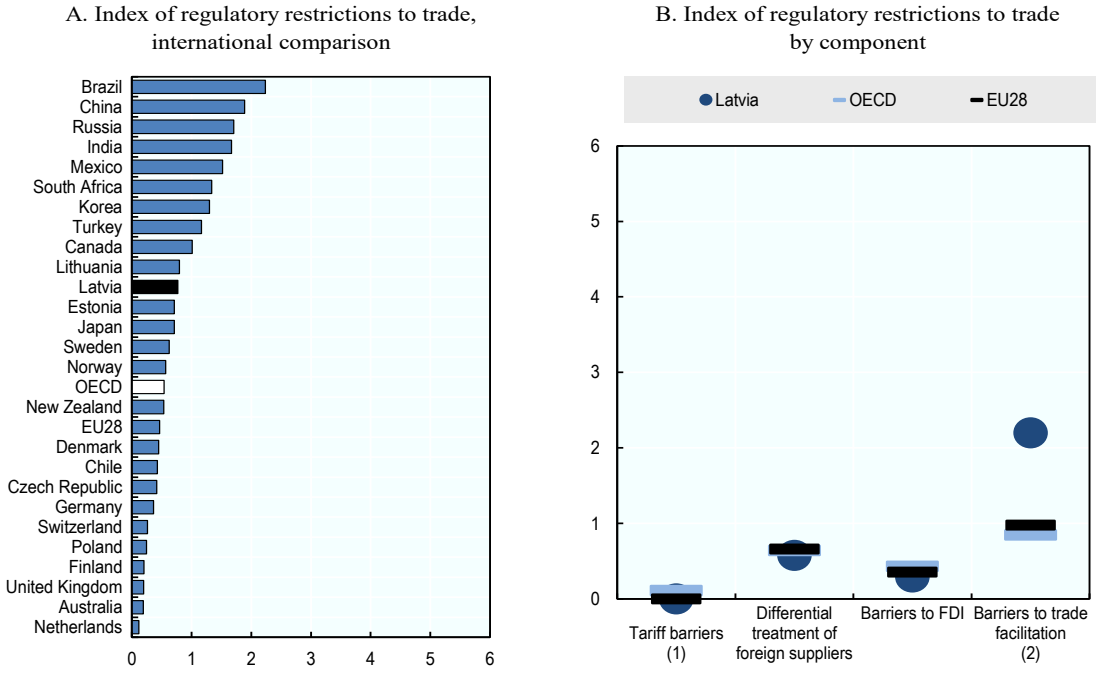
StatLink https://doi.org/10.1787/888933913758

Efficiency and effectiveness of customs and border procedures

OECD PMR indicators evaluate regulatory restrictions to trade and investment. They take into account tariffs, differential treatment of foreign suppliers, barriers to FDI and so-called barriers to trade facilitation.[2] The scores scale from 0 (least restrictive and most open), to 6 (most restrictive and least open). According to the index for 2013, regulatory restrictions to trade and investment in Latvia were minor — the score was less than 1 (0.77) but slightly more restrictive than the OECD (0.54) and EU28 averages (0.47) (Figure 4.5). Barriers to FDI in Latvia (0.29) were lower than the OECD (0.43) and the EU28 (0.36) averages, which indicates that Latvia is generally open to foreign investors and that foreign and domestic investors are treated equally. However, Latvia's index number of 2.20 for the use of internationally harmonised standards and certification procedures, and Mutual Recognition Agreements points to higher restrictiveness than other trade and investment relevant areas, and also higher than EU28 (0.98) and OECD averages (0.85) (Figure 4.5). When considering the OECD Trade Facilitation Indicators, while Latvia's performance is aligned with or close to the OECD and EU28 averages for most indicators, the trade community's involvement and the external and internal border agency co-operation face higher barriers as shown in Figure 4.6.

Figure 4.5. Product Market Regulation Indicators: Regulatory restrictions to trade and investment, 2013

Scale from least (0) to most (6) restrictive



Notes: Indices for EU28 and OECD are the simple average of member-country indices. The 2013 update of the database is the latest available.

1. The tariff barrier is based on an average of effectively applied tariff, scaled within a range between 0 and 6 points, whereby a tariff below 3% is attributed zero points and a tariff above 19.6%, 6 points.
2. Barriers to trade facilitation refer to the extent to which the country uses internationally harmonised standards and certification procedures, and Mutual Recognition Agreements with at least one other country.

Source: OECD (2014), Product Market Regulation Database.

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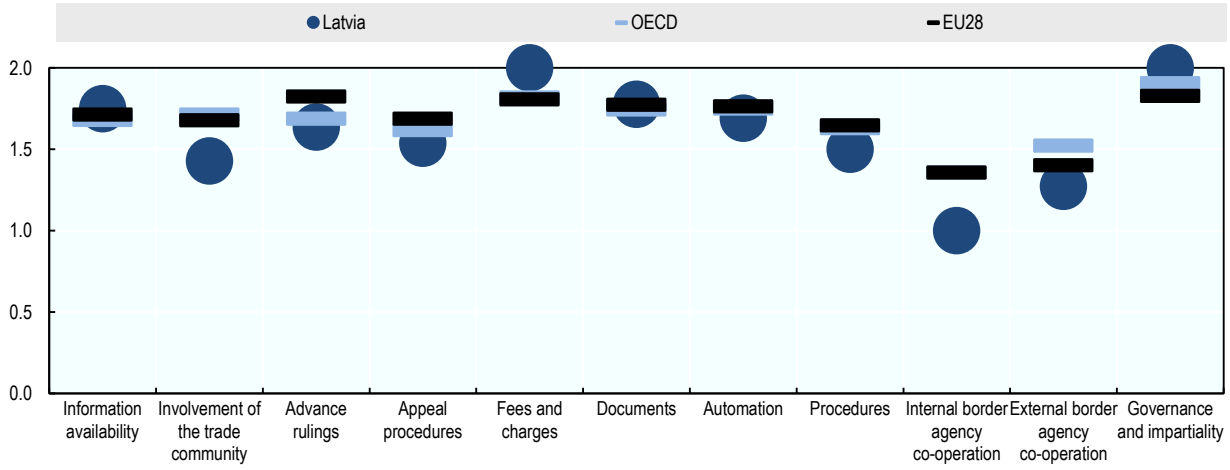
Figure 4.6. Trade facilitation performance, 2017

Scale from lowest (0) to highest (2) performance



Note: Indices for EU28 and OECD are the simple average of member-country indices. The 2013 update of the database is the latest available.
Source: OECD (2017e), *Trade Facilitation Indicators*, www.oecd.org/tad/facilitation/indicators.htm.

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Foreign Direct Investment (FDI) regulations

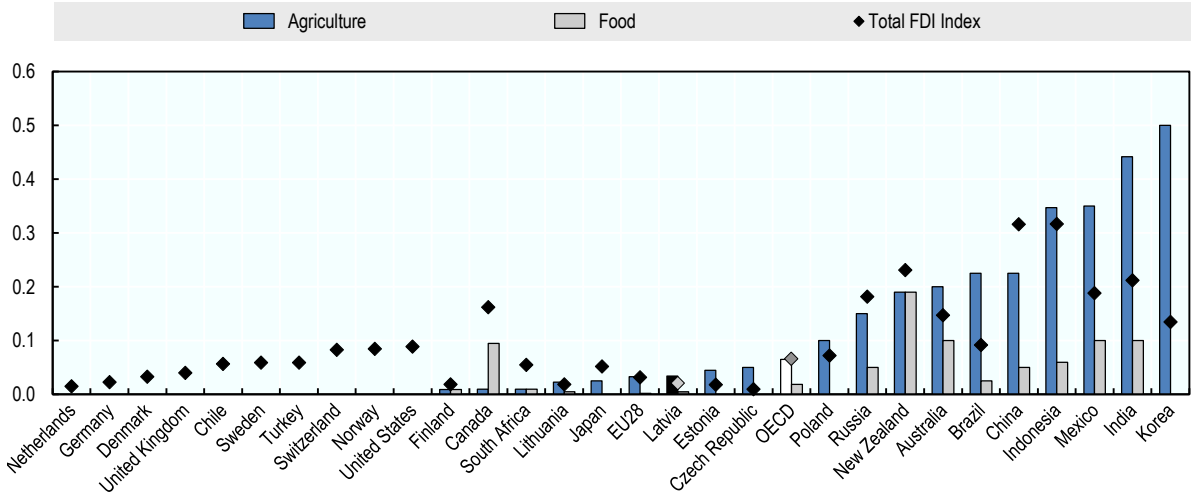
The FDI Regulatory restrictiveness index measured by the OECD describes Latvia as one of the countries with least restrictions to FDI (Figure 4.7). The scale of the index varies from 0 (least restrictive) to 1 (most restrictive). The FDI restrictiveness index for Latvia in 2017 was low at 0.021; lower than the OECD (0.066) and the EU28 averages (0.032). As regards FDI in the agriculture and food sectors, the index values (0.034 and 0.005, respectively) are lower than the OECD average (0.065 and 0.019, respectively), which indicates a low restrictiveness level, but slightly higher than the EU28 average (0.033 and 0.002, respectively). While a distinction can be made between agriculture and food to note much higher levels of restrictiveness in agriculture, as illustrated by Latvia's relative position in Figure 4.7. The restrictions with regard to agricultural land purchase are described under the Regulatory environment for entrepreneurship (Section 4.1).

In 2017, the total FDI inward stock in Latvia reached 57% of GDP, compared with 29% in 2005. This figure is slightly higher than the OECD and EU averages (Figure 4.8). In 2015 in Latvia, the FDI inward stock in agriculture, forestry and fishing was USD 674 million, while in the manufacture of food products, beverages and tobacco products it was USD 237 million.

In Latvia, in 2017, the total FDI inward flow reached 2.39% of GDP (or USD 723 million), a lower figure compared to 2005 (4.2%) but higher than the OECD average (1.58%) and the EU28 average (1.76%) (Figure 4.9). The FDI inward flow in agriculture, forestry and fishing in 2015 totalled USD 18 million, while in the manufacture of food products, beverages and tobacco products it was negative (-USD 26 million).

Figure 4.7. FDI Regulatory restrictiveness index by sector, 2017

Scale from least (0) to most (1) restrictive



Note: Four types of measures are covered by the FDI restrictiveness index: 1) foreign equity restrictions, 2) screening and prior approval requirements, 3) rules for key personnel, and 4) other restrictions on the operation of foreign enterprises. Countries are ranked according to Agriculture index levels. Indices for OECD and EU28 are the simple average of member-country indices.
Source: OECD (2017a), *FDI Regulatory restrictiveness index*, www.oecd.org/investment/fdiindex.htm.

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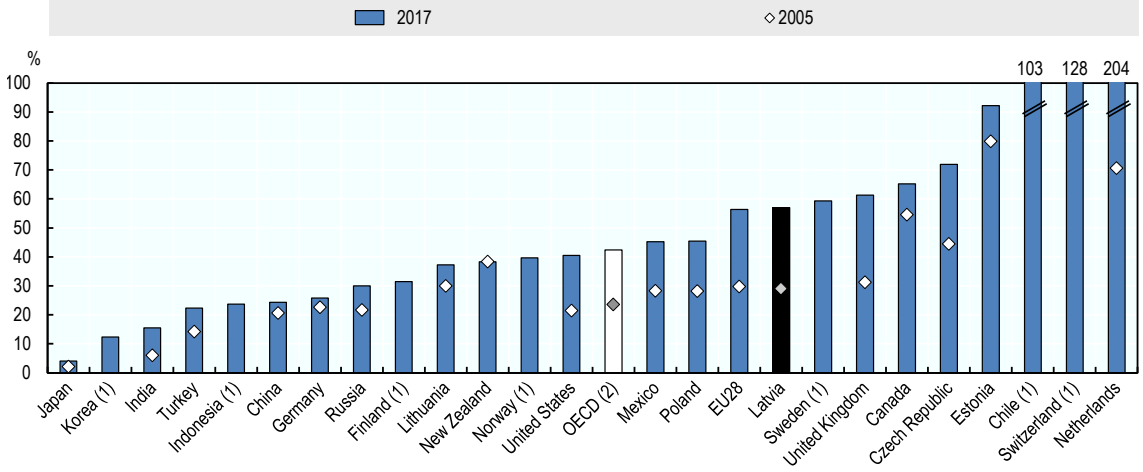
Figure 4.8. Total FDI inward stocks, 2005 and 2017

As a percentage of GDP

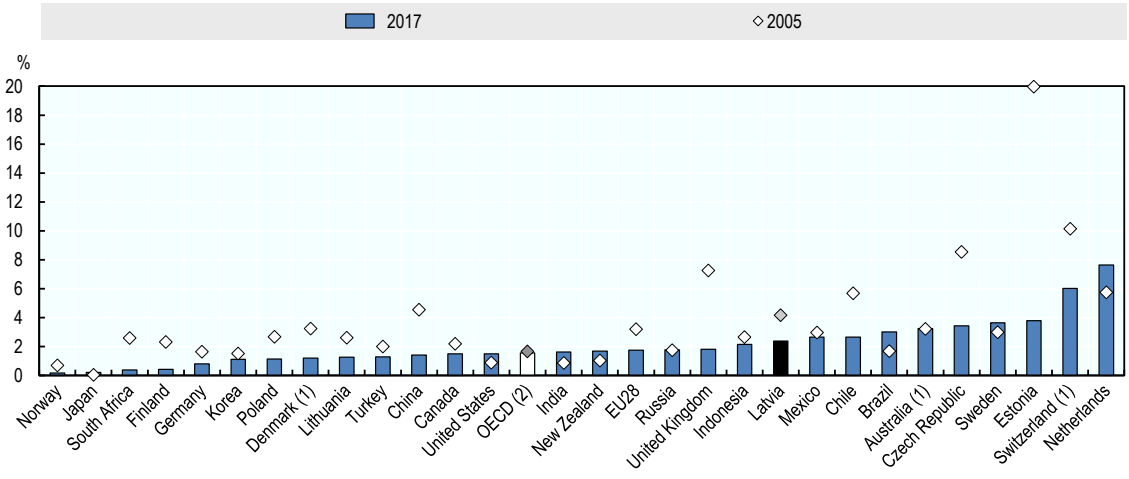


Notes: FDI stocks measure the total level of direct investment at a given point in time. The inward FDI stock is the value of foreign investors' equity in and net loans to enterprises resident in the reporting economy.
1. For Korea, Norway, and Switzerland, 2017 data are replaced by the nearest available year (2016). For Chile, Finland, Indonesia, Korea, Norway, Sweden, and Switzerland, 2005 data are not available.
2. OECD aggregate does not include Lithuania, as Lithuania was not an OECD member country at the time of preparation of this database.
Source: OECD (2018), *FDI stocks (indicator),* https://doi.org/10.1787/80eca1f9-en.

StatLink https://doi.org/10.1787/888933913834

Figure 4.9. Total FDI inward flows, 2005 and 2017

As a percentage of GDP



Notes: FDI flows record the value of cross-border transactions related to direct investment during a given period of time. Financial flows consist of equity transactions, reinvestment of earnings, and intercompany debt transactions. Inward flows represent transactions that increase the investment that foreign investors have in enterprises resident in the reporting economy less transactions that decrease the investment of foreign investors in resident enterprises.

1. For Denmark, 2017 data are replaced by 2015. For Australia and Switzerland, 2005 data are replaced by 2006.

2. OECD aggregate does not include Lithuania, as Lithuania was not an OECD member country at the time of preparation of this database.

Source: OECD (2018), *FDI flows (indicator)*, https://doi.org/10.1787/99f6e393-en.

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4.3. Finance policy

Efficient financial markets are one key instrument that enable balanced economic development. Access to financial services can be limited or unequal across regions and firms when financial markets fail or when risks are too high. Policies that improve the functioning of financial markets can facilitate productivity enhancing investments in agriculture and farm size growth. Policies may also facilitate access to funding for sustainability enhancing investments. Low cost loans and venture capital can also be an important source of funding for innovative firms with high growth sector potential (OECD, 2015).

Financial market development

According to the WEF Global Competitiveness Index (GCI), Latvia generally ranks lower than the OECD average in financial market developments (Figure 4.10, Panel A). The mean aggregated results for Latvia (4.2) are significantly lower than the OECD average (4.54) and only slightly lower than the EU28 average (4.25). The analysis of the index components shows that the availability of loans and venture capital availability have increased the fastest in the past five years. Venture capital availability has increased and scores 2.7, lower than the OECD average (3.4) (WEF, 2016). The legal rights index that encapsulates the strength of the credit system is the only component that scores higher than the OECD average (Figure 4.10, Panel B).

The banking system is regulated by the Financial and Capital Market Commission. The main regulations include the Credit Institution Law, the Regulations on the Issue of Credit Institution and Credit Union Operating Licences (FCMC, 2009).

Banks are the main source of financing for Latvia's entrepreneurs, mostly small and medium-sized and little information is publicly available to investors on the possibilities to invest resources in the development of these companies. In this context, the merger of the stock exchanges of the three Baltic countries into the Baltic Market may help improve the capacity for Latvian firms to raise equity. The OECD 2017 Economic survey of Latvia noted the small, yet growing, share of so-called alternative financing platforms; these include internet-based institutions (OECD, 2017).

In Latvia, in 2017 there were 16 credit institutions, and 7 branches of foreign credit institutions, functioning with an operating licence. Eighty-seven per cent of the large corporate loans are issued in one of the three largest banks (Swedbank, SEB Bank, Luminor Bank[3]), according to the loan portfolio, all of which have Scandinavian capital. The four largest commercial banks issued 75% of the total loans to medium-sized enterprises, 59% of the total loans granted to small enterprises and 67% of the total micro-enterprises' loans granted to small enterprises (Micune, 2016).

Domestic credit[4] provided by the banking sector in Latvia was reported at 81.5% of GDP in 2016, according to the World Bank development indicators (Figure 4.11); less than half the OECD average share and 1.8 times lower than the EU share in 2016.

At the same time private sector debt in Latvia is reported at 88.3% in 2016. The indicator has decreased by 34% compared with 2010, which was the peak year for the ratio domestic credit of GDP. In 2010, the credit burden grew due to the decline in GDP and only from 2011 domestic credit as percentage of GDP started to gradually decrease due to higher incomes and continuing decrease of credit liabilities.

The legal rights index measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitates lending. Over the past five years, scores for all the index components have gone up, the largest increase being for the availability of loans and access to venture capital (WEF, 2016).

Latvia's scores are low in financing through local equity markets and ease of access to loans, as well as in the reliability of banks and the regulation of securities exchanges. These figures may still reflect the impact of the 2008 financial crisis and banks' precaution in allocating credits. The OECD 2017 Economic survey of Latvia noted a likely increase in loan demands and yet banks' lending standards have not eased (OECD, 2017).

The value of stocks traded (percentage of GDP) is the total number of shares traded multiplied by their respective matching prices. According to the World Bank (2016c), in 2004, the value of stocks traded was reported at 1.1%, the figure has decreased since then reaching the level of 0.1% in 2012, which is the most recent year available for Latvia.

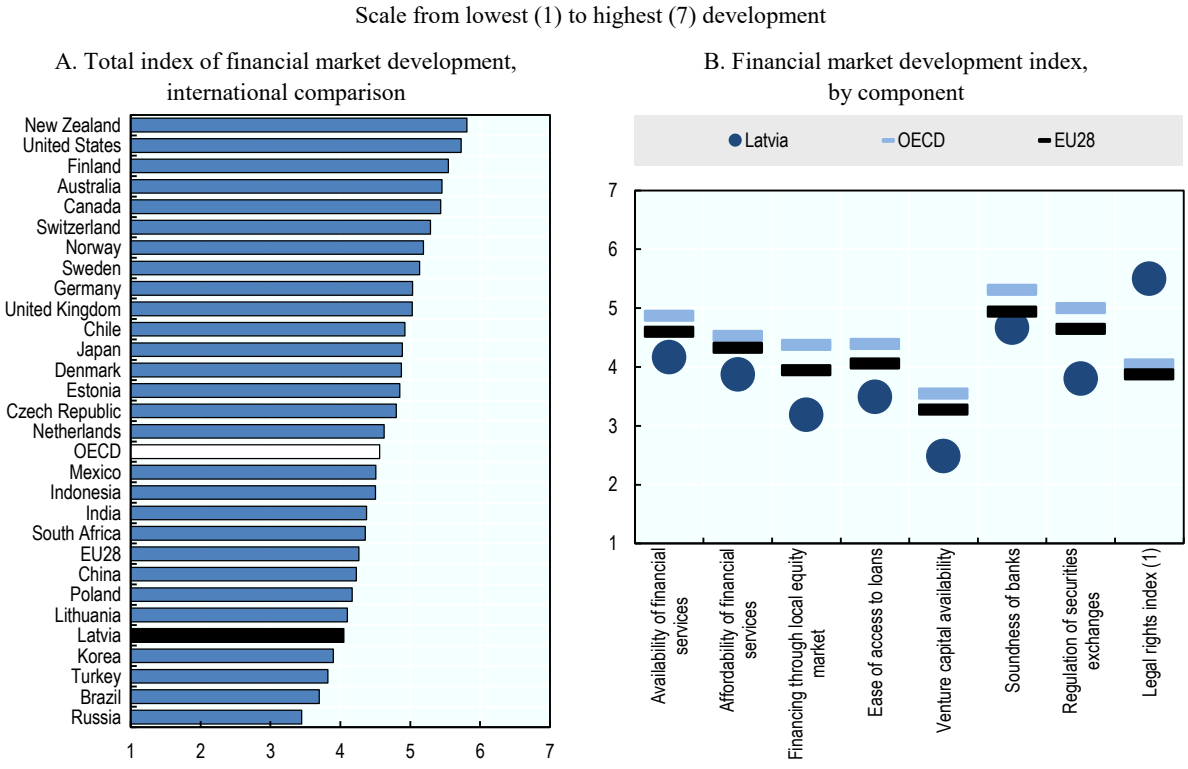
Commercial banks, as private credit institutions, allocate loans for agricultural businesses on individual commercial terms. Interest rates are set individually depending on several factors such as loan demand, types of deposits, bank decision on relief or more stringent loan terms, borrowers' loan history etc. The loan balance granted by credit institutions to companies operating in agriculture, forestry and fishing has increased over the past ten years. Although fluctuations are seen annually, the loan balance only exceeded pre-financial crisis levels in 2017 (Figure 4.12). The share of companies operating in

agriculture, forestry and fishing in total loans has grown steadily in recent years; from 5.9% at the end of December 2015 to 6.7% and 7.7 in 2016 and 2017 respectively (Figure 4.12) (Financial and Capital Market Commission, 2017).

Credit unions operate as another possibility to enhance the availability of financial resources for the population of Latvia, to promote regional development, and to facilitate the participation of the population in the national economy (Mazure, 2011). Co-operative credit unions play a dual role, since they are business companies established to perform the functions of a credit institution and to provide financial services to its members. These institutions allow agricultural businesses to receive financial resources faster, thus being a more cost-effective development solution. In Latvia, the activity of credit unions peaked in the years 2006-08 due to the economic ascent period and again in 2013.

Currently, 33 co-operative credit unions operate in Latvia, of which approximately 25 credit unions operate in rural territories (Mazure, 2016). The Latvia Credit Union of Farmers, founded in 2015, is the most recent.

Figure 4.10. Global Competitiveness Index: Financial market development, 2017-18



Notes: Indices for EU28 and OECD are the simple average of member-country indices.
1. The Legal rights index (1-to-12) is converted to a 1-to-7 scale.
Source: WEF (2017), *The Global Competitiveness Report 2017-2018: Full data Edition,* http://reports.weforum.org/global-competitiveness-index-2017-2018/.

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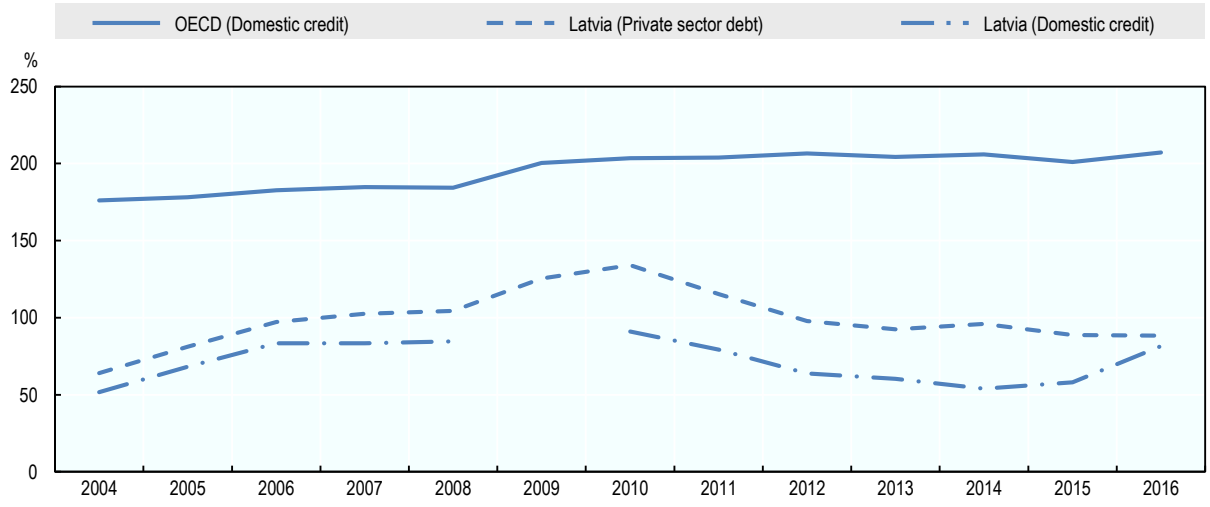
Figure 4.11. Domestic credit provided by financial sector and private sector debt, 2004 to 2016

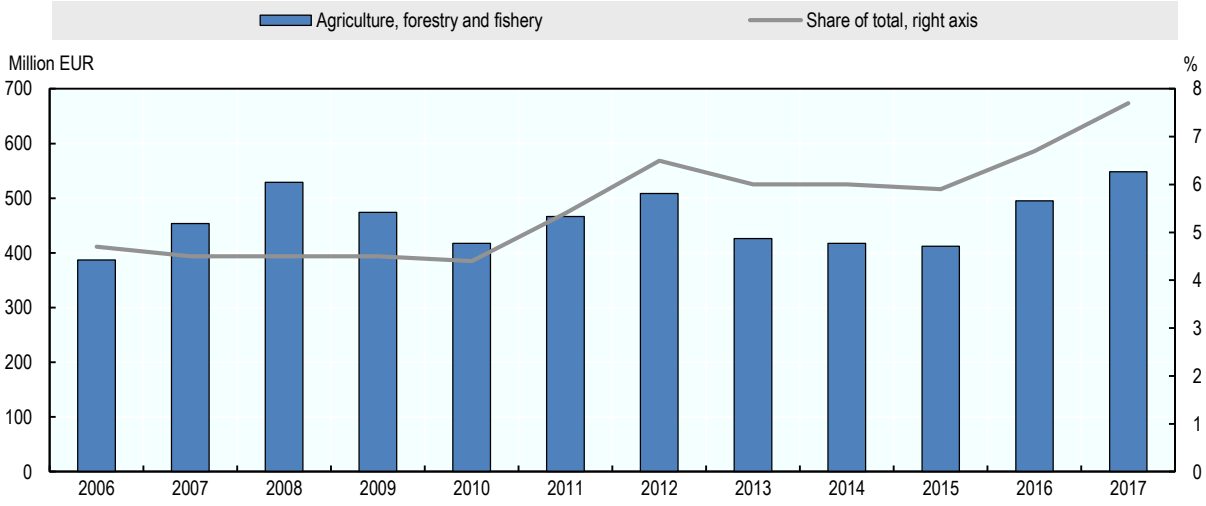
As a percentage of GDP



Sources: World Bank (2018), for Domestic credit provided by financial sector, https://data.worldbank.org/indicator/FS.AST.DOMS.GD.ZS; Trading Economics (2016), https://tradingeconomics.com/latvia/domestic-credit-provided-by-banking-sector-percent-of-gdp-wb-data.html; Eurostat (2016), for Private sector debt, http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tipspd20.

StatLink https://doi.org/10.1787/888933913891

Figure 4.12. Loan balance of companies operating in agriculture, forestry and fishing in Latvia, 2006 to 2017



Sources: Bank of Latvia (2018), www.bank.lv/component/content/article/4776-makroekonomisko-norisu-parskats; Financial and Capital Market Commission (2018), www.fktk.lv/lv/statistika/kreditiestades/ceturksna-parskati.html.

StatLink https://doi.org/10.1787/888933913910

Agricultural crediting

In Latvia, Altum is the operational institution for support programmes from public resources, including funding from the European Union (as part of the Rural Development Plan and structural funds) and other international institutions. Altum administers loans, microcredits and credit guarantees disbursed to agricultural business (Section 6.4). The shareholders of Altum are the Ministry of Finance, the Ministry of Economy and the Ministry of Agriculture.

SME growth loans and microloans for farmers

Small and medium enterprises (SME) growth loans are available to agricultural enterprises for investments and working capital, with reduced collateral requirements. The maximum amount of investment loan is EUR 2.9 million over 2 to 15 years, limited to 90% of the total project costs, while the maximum amount of loan for working capital is EUR 285 000, over two to five years. The interest rate is flexible and based on the six-month EURIBOR rate.

Microloans are available to start or develop small businesses for micro entrepreneurs and business start-ups that do not employ more than ten employees. The maximum amount of the loan is EUR 14 300 for investments and up to EUR 7 200 for current assets with a fixed annual interest rate of 5% to 8% and a repayment period of five years. The loans are easy to obtain while the collateral value must be more than 74% of the loan amount. It is possible to apply for a loan before the business is established and to receive several loans within the framework of the programme but not more than one loan during a calendar year (Altum, 2017).

Credit guarantees for rural entrepreneurs

Historically and up to 2014, the JSC "Rural Development Fund" (established in 1994) granted credit guarantees to farmers and other rural entrepreneurs of Latvia according to the loan agreements concluded with credit institutions. Credit guarantees were necessary to facilitate access to credit in the absence of sufficient collateral.

When it was established in 2014-15, Altum took over issuing guarantees for short- and long-term loans granted by banks to rural entrepreneurs, agricultural producers, agricultural and forestry co-operative societies and processors of agricultural products, excluding entrepreneurs in financial difficulties. From 2016, banks, rather than entrepreneurs, contact Altum directly in case of insufficient collateral.

Altum guarantees up to 80% of a maximum EUR 1 million loan amount for a period up to ten years. The guarantee may cover an investment and working capital loans. In the case of agricultural and rural development businesses, in most cases the guarantee is conditional to Common Agricultural Policy Pillar 2 support implemented by the Rural Support Service and is issued on the basis of new financial obligations (Altum, 2017).

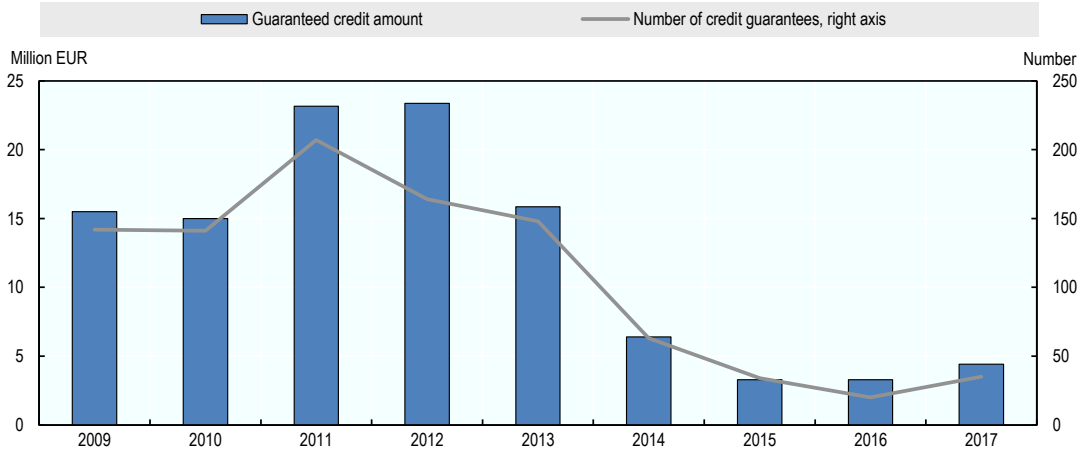
Credit guarantees are issued under the "Agricultural and Rural Development Credit Guarantee Programme" for the following measures:

- investments related to primary agricultural production and processing of agricultural products;
- establishment of a new holding or the transfer of ownership of an existing holding (young farmers);

- vocational training and information activities in accordance with the needs of the agricultural, forestry and food sectors;
- development and adaptation of agricultural and forestry infrastructure;
- fishing and aquaculture measures, including the addition of working capital to these measures and investments for fisheries activities;
- other measures for the development of agriculture and rural areas (acquisition of productive farms, acquisition of agricultural land, purchase of high-value animals, promotion of rural tourism and craft activities, replenishment of current assets to agricultural co-operative societies, etc.).

Overall, 3 473 agricultural and rural entrepreneurial loans worth EUR 144 million have been guaranteed from 1997 to 2016. In 2016, Altum issued 20 credit guarantees totalling EUR 2.35 million. The average guarantee amount was EUR 117 000, and the average premium paid for the issued guarantee was EUR 1 608 (MoA, 2018). The number of credit guarantees issued fell in 2011 when the State Mortgage and Land Bank, the largest issuer of loans guaranteed by JSC "Rural Development Fund", was reorganised. In 2014 Altum assumed the Fund's guarantee activities. However, the launch of Altum's co-operation with other banks was not successful and a new approach to the administration of guarantees had to be designed (Figure 4.13).

Figure 4.13. Number of issued guarantees and guaranteed loan amounts in Latvia, 2009 to 2017



Source: MoA (2018), https://www.zm.gov.lv/public/files/CMS_Static_Page_Doc/00/00/01/33/19/Gadazinojums.pdf.

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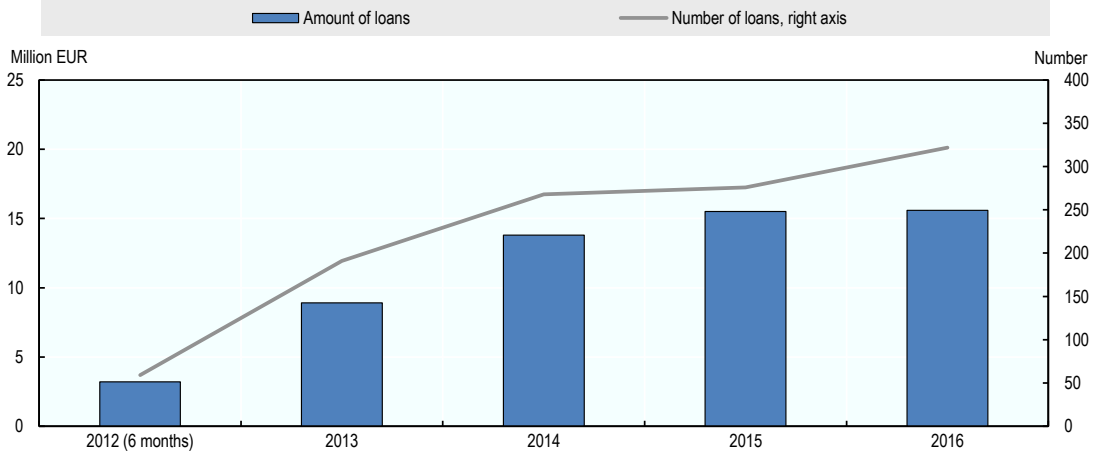
Working capital loans with fixed interest rate of 4% are disbursed for primary agricultural producers, agricultural co-operative societies and the fruit and vegetable producer groups. The loan amount can range from EUR 7 000 to EUR 1 million but for co-operative companies of agricultural services – up to EUR 2.9 million. The loan repayment period is up to two years and a private guarantee provided by the owner(s) of the company, holding at least 10% of shares can be used to secure the loan. The aim of the loan is to finance and strengthen the development of agricultural producers and providers of agricultural services (Altum, 2017). In total, 1 444 loans have been issued for the average amount of EUR 69 012.

The fishery and aquaculture sectors are not supported under the procedure stipulated by the Cabinet regulations for granting state aid for the purchase of current assets for agricultural production.

State loans for the purchase of agricultural land

Since 2012, loans are available to agricultural producers for the purchase of utilised agricultural land. Conditions apply on commodity produced and agricultural income; while young farmers are exempt (Altum, 2017). The maximum amount of loan for the purchase of one or more land plots is EUR 430 000 per entrepreneur and group of persons. The amount of loan cannot exceed 300% of the market value of the land to be purchased (in line with the evaluation performed by a certified evaluator). Additional collateral is required if the per hectare purchase price is more than 100% above the market value of the land. The interest rate consists of a fixed rate to which a flexible rate based on the price of the State Treasury resources is added. The number and the amount of loans have grown constantly (Figure 4.14). The overall budget was increased from EUR 40 million to EUR 70 million in 2016, the loan term extended from 20 to 30 years and the fixed interest rate was reduced from 2.5% to 2.2% per year (MoA, 2018).

Figure 4.14. Number and amounts of loans for the purchase of land in Latvia, 2012 to 2016



Source: MoA (2017), www.zm.gov.lv/public/files/CMS_Static_Page_Doc/00/00/01/10/04/fs-01usersLinda.BirinaDesktopAA2017_lauksaimniecibasgadazinojums.pdf.

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The Land Fund of Latvia

The Land Fund of Latvia, is administrated by Altum to buy property from current owners who cease activity on agricultural land. Land purchased by the Land Fund of Latvia is offered for sale or rent to entrepreneurs operating in the field of agriculture. The Fund started its operation on 1 July 2015 and within two years of operation it had purchased 112 properties in an area of 2 038 hectares for a total of EUR 4.6 million. In 2016, the Fund purchased 1 500 hectares of land (Altum, 2017).

4.4. Tax policy

Overview of the Latvian tax system

Box 4.3 contains an overview of the Latvian tax system. Latvia is characterised by a low tax proportion in terms of gross domestic product (GDP). In 2015, the average EU tax revenues amounted to 39.7% of GDP, whereas in Latvia the same proportion was only 30.6% (Eurostat, 2017c).

Relatively high labour taxes and very low capital taxes characterise the tax revenue structure in Latvia (World Bank, 2018) and when compared to other OECD members tax revenues from consumption (value-added taxes) were above average and income tax revenues, both personal and corporate, were below average (MoF, 2017).

Box 4.3. The Latvian tax system

The Latvian general tax system consists of 15 taxes. The relevant tax laws and the Law on Taxes and Duties define their application:

1. Personal income tax (a)
2. Corporate income tax (a)
3. Real estate tax (c)
4. Value added tax (VAT) (f)
5. Excise tax (g)
6. Customs tax
7. Natural resources tax (h)
8. Lotteries and gambling tax
9. State social insurance compulsory contributions (b)
10. Electricity tax
11. Microenterprise tax (a)
12. Vehicle operating tax (d)
13. Enterprise light-duty vehicle tax (e)
14. Subsidised electricity tax (until 31 December 2017)
15. Solidarity tax

Adjustment, exemptions and exceptions for agriculture

Within the general tax system, adjustments, exemptions and exceptions may apply to the agricultural sector:

(a) With regards to their income tax, agricultural producers choose to pay one of the three taxes on income from economic activities: personal income tax, corporate income tax or microenterprise tax.

- The personal income tax does not apply to income below EUR 3 000 from agricultural activity (crop production, animal production, inland waters fishery, horticulture) and rural tourism. Furthermore EU and national support are not subject to the personal income tax.
- A reduced tax rate of 15% applies on income acquired from 1 April to 30 November while performing seasonal work: planting of fruit trees, berry bushes

and sowing and planting vegetables, tending of sowings or plantings, harvesting, sorting of fruits, berries and vegetables. The tax is applied if the employment relationship does not exceed 65 calendar days, the total income does not exceed EUR 3 000 in the season and if 4 months prior to the commencement of the seasonal agricultural work the person has not had other employment.

- From 2018:
  - A new company income tax regime will enter into force whereby re-invested profit is not taxed;
  - Amounts received as state aid to agriculture or EU support for agriculture and rural development are deducted from the taxable base of the reporting year – by up to 50% and no more than the total taxable amount.

(b) Employers, employees and self-employed persons make social contributions, while personal income tax is deducted from wages of salaried employees in the sector.

(c) When applicable, producers of agricultural products pay the real estate tax:

- Buildings and engineering structures, used exclusively in agricultural production are exempt from the real estate tax.

(d) The vehicle operating tax and the enterprise light-duty vehicle tax:

- Agricultural producers pay 25% of the total rate of the transport vehicle exploitation tax for the transport vehicle, truck, trailer or semi-trailer.

(f) Producers in the agricultural sector also pay indirect taxes such as value added tax (VAT):

- From 2018 a reduced VAT rate of 5%, (compared to 21% general VAT rate) applies to fresh fruits, berries and vegetables (including peeled, cut and pre-packaged, but not cooked or otherwise prepared, for example, frozen, salted or dried).
- If they are not registered as value added tax payers, agricultural producers receive a 14% compensation of the value added tax upon delivering their own produced and unprocessed agricultural produce to processors of agricultural products or to eligible co-operative company, providing agricultural services, or for the State intervention purchase.

(g) Excise tax:

- The excise tax on diesel fuel applicable to agriculture is 15% of the full rate. From 1 July 2018 to 31 December 2019, the rate is EUR 55.8 per 1 000 litres, and from 1 January 2020, EUR 62.1 per 1 000 litres. A volume limit applies to the purchase at reduced rate of diesel fuel used in agricultural production. The volume limit depends on the crop, from 60 to 130 litres per hectare of cultivated agricultural land that has been declared and approved for the single area payments (SAP). Diesel fuel purchased under these preferential conditions is coloured to mark it visually.
- The excise tax on natural gas does not apply to agricultural use for heat supply of covered areas of agricultural land (greenhouses) and for heat supply of industrial poultry holdings (poultry house) and incubators.

(h) The natural resources tax applies to persons who carry out polluting activities.

A reform of Latvia's tax policy started on 1 January 2018 to reduce income inequalities for workers by transferring the tax burden to consumption and capital; to reduce the underground economy in the country; to consolidate the effectiveness of operations by the State Revenue Service; to secure the predictability of the tax system at least until 2021.

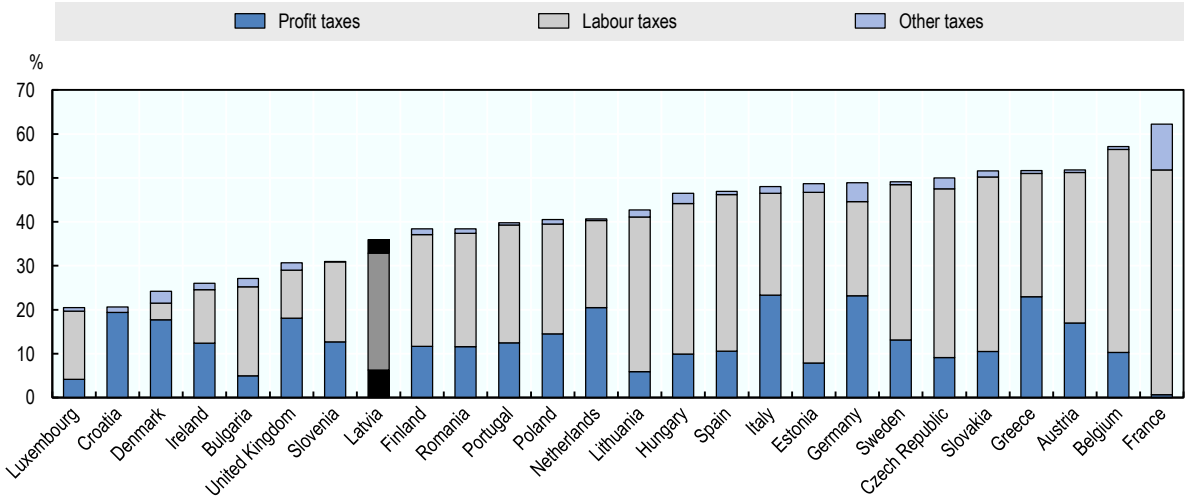
Taxes on corporate and personal income

The income tax system in Latvia is shaped by three types of taxes: corporate income tax, personal income tax and microenterprise tax.

Latvia's corporate income tax rate was one of the lowest in the European Union in 2015. The tax base was the adjusted profit or loss gained in Latvia or abroad during the taxation year and the base rate was set at 15% of the taxable income. However, taking into account labour taxes, business taxation amounted to about 30% of profits (Figure 4.15). Starting from 2018, under the new Corporate Income Tax law the corporate income tax rate is set at 20% for distributed profits and the tax is deferred until profits are distributed. The law is expected to encourage investments.

Figure 4.15. Total corporate tax rate, 2016

As a percentage of profit



Note: The evaluation uses a concept of a "case study company" defined on the basis of a set of criteria, including the legal form of business (limited liability), start date of operation (January 2012), geographic location (country's one or two largest business cities), origin of ownership (100% owned by domestic natural persons), type of activity (general industrial and commercial), size (own capital amount, number of employed, turnover, etc.). The total tax rate is the sum of taxes and contributions payable after accounting for allowable deductions and exceptions related to commercial profit of businesses before all taxes borne. The groups of taxes covered include: profit or corporate income tax; employer's social contributions and labour taxes; property taxes; turnover taxes and other (such as municipal fees and vehicle and fuel taxes).

Source: World Bank Group and PwC (2017), *Paying Taxes 2018 - The Global Picture, PwC, World Bank and IFC*, www.doingbusiness.org/data.

StatLink https://doi.org/10.1787/888933913967

Tax provisions for farms or agriculture-related businesses

While the general tax requirements apply to agricultural businesses; agricultural producers as well as other small and medium enterprise owners with a turnover below EUR 40 000 may opt for one of the three income taxes: personal income tax, corporate income tax or microenterprise tax. Whereas with a turnover between EUR 40 000 and EUR 300 000, the choice is between personal income tax and corporate income tax. Tax reliefs, exemptions and planning options are foreseen for agricultural businesses.

The personal income tax applies to all income.[5] Starting from 2018, a progressive income tax rate is introduced. While the rate is unchanged at 23% for income between EUR 20 000 and EUR 55 000, a lower rate of 20% is introduced for income below EUR 20 000 and a higher rate at 31.4% applies to income exceeding EUR 55 000. Agricultural incomes below EUR 3 000 are exempt, and so are EU CAP payments and agricultural national support (Box 4.3).

In 2017 corporate income tax (CIT) was payable by farm businesses with a turnover exceeding EUR 300 000 during the previous taxation year. They could reduce the taxable income by the full amounts received as the national support for agriculture or the European Union support for agriculture and rural development and a tax relief of EUR 14.23 per hectare of agricultural land used in agriculture applied.

In 2018, 50% of state aid for agriculture and European Union CAP payments, but not more than the total taxable amount, can be deducted from pre-tax income.

The microenterprise tax is used to reduce the administrative and tax load for microenterprises (especially for new businesses) and in the fields with low-income potential. The microenterprise tax applies to 15% of the business's turnover. The microenterprise tax combines state social insurance mandatory contributions, personal income tax and business risk fee for the microenterprise's employees. In 2016, there were 606 taxpayers engaged in the agricultural production with the status of a microenterprise tax payer.

Labour taxes

While, about 76% of the total labour input in Latvian agriculture is unpaid family labour, the income of paid employees in the sector is taxed under general terms. Compulsory labour taxes cover social insurance. They are paid by employers and employees, 24.09% and 11% respectively). An employer funded business risk state fee also applies (EUR 0.36 per employee per month in 2018).

Compulsory contributions to the State social insurance and personal income tax are deducted from the employee salary prior to taxation. Income is taxed progressively: the personal income tax rate for monthly salaries up to EUR 1 667 currently stands at 20%, income above EUR 1 667 per month is taxed by 23%. Amounts that exceed EUR 4 583 (EUR 55 000 a year) are taxed by 31.4%. The 31.4% rate is not applied during the taxation year, but in accordance with the summary procedures, by drawing up an annual income declaration.

In general, personal taxable income deductions apply for:

- 11% of state social insurance compulsory contributions;

- employer's contribution to private pension funds and life insurance (not exceeding 10% of annual gross income in total but not more than EUR 4 000 per year);
- annual differentiated[6] non-taxable minimum depending on the size of the income is phased-in. In 2018 the annual differentiated non-taxable minimum is applied to annual gross income from EUR 5 280 up to EUR 12 000, the upper threshold is raised to EUR 13 200 in 2019 and to EUR 14 400 in 2020. In 2018 the annual differentiated non-taxable minimum ranges from EUR 0 to EUR 2 400 (EUR 0 to EUR 200 per month) and is raised gradually to EUR 2 760 per year (EUR 230 per month) in 2019 and to EUR 3 000 per year (EUR 250 per month) in 2020;
- reliefs for dependent persons (EUR 200 per month per person in 2018, increased to EUR 230 and EUR 250 in 2019 and 2020 respectively).

The income of seasonal agricultural workers is subject to the Seasonal agricultural worker income tax and the tax rate is 15% (but not less than EUR 0.70 on each day of employment), provided that such income is derived in the period from 1 April to 30 November while performing seasonal work: planting of fruit trees, berry bushes and sowing/planting vegetables, tending of sowings or plantings, harvesting, sorting of fruits, berries and vegetables. The tax is applied if the employment duration does not exceed 65 calendar days, the total income does not exceed EUR 3 000 in the season and if the person has not had other employment during the four months preceding the agricultural seasonal work.

Real estate tax

The real estate tax payers are individuals who own, legally possess or use real estate in Latvia. The tax subject is land, edifices or parts thereof, as well as engineering structures used for economic activities. The real estate tax rate ranges from 0.2% to 3%. Generally, the tax is calculated considering the property's cadastral value or special value rural land if the area thereof exceeds three hectares. Local governments manage the real estate tax.

The real estate tax does not apply to edifices and engineering structures used solely in agricultural production as well as land covered by restored or grown forest stands (young growths).

In order to encourage the productive use of land, the tax rate (0.2% to 3%) can be raised by 1.5%, up-to 4.5%, on uncultivated agricultural land, except for land the area of which does not exceed one hectare or for which limited agricultural operations are set in line with the regulatory enactments.

In order to limit the rapid increase of the cadastral values of the agricultural land, from 2016 to 2025 special value is set for the agricultural lands exceeding 3 ha, namely, the increase of the cadastral value shall not exceed 10% of the cadastral value of the rural land set for the previous taxation year.

Vehicle taxes

The vehicle operating tax applies, with some exemptions, to all vehicles. The tax rates are determined depending on the information available on the vehicle registration certificate in accordance with the vehicle's CO_2 emissions or the gross weight of the vehicle, the engine capacity and the engine's maximum power. The tax does not apply to tractor machinery and automobile trailers and semi-trailers below 3 500 kg. Agricultural

producers pay only 25% of the total rate of the transport vehicle exploitation tax for the transport vehicle, truck, trailer or semi-trailer.

The enterprise light-duty vehicle tax is paid by businesses and farms, that own or possess a light-duty vehicle or a truck. The tax is set as a fixed monthly payment depending on the vehicle's registration date and engine displacement. The amount of the tax varies from EUR 120 to EUR 744 per year.

Consumption taxes

The Value-Added tax (VAT) standard rate for food in Latvia is set at 21%. For the delivery of certain goods (e.g. infant food, medicines, passenger transportation, tourism services, wood fuel and heating supply for households) a reduced tax rate of 12% is applied. Since 1 January 2018, a reduced VAT rate of 5% is applied for 3 years (after that an evaluation will be conducted) to fresh fruits, berries and vegetables (including peeled, cut and pre-packaged, but not cooked or otherwise prepared, for example, frozen, salted or dried vegetables).

The Value-Added Tax provides for both general and a special VAT scheme for transactions carried out inland by registered VAT payers. From 1 July 2016, the special VAT scheme (so-called reverse charge mechanism) in Latvia is also applied to the delivery of crops and industrial plants (including oil plant seeds) and mixtures of these goods (which are not normally used in the unaltered state for final consumption).

Agricultural producers that are not VAT payers receive a 14% compensation of VAT when delivering their own produced and untreated agricultural goods to processors, approved co-operatives, or State intervention purchase.

Excise taxes apply to alcoholic beverages, tobacco products, petroleum products, natural gas, non-alcoholic beverages and coffee, as well as electronic cigarette liquid.

However, a reduced rate of excise tax applies to diesel fuel used in agriculture. Diesel fuel purchased under these preferential conditions is coloured to mark it visually. The excise tax rate applied to agriculture is EUR 55.8 per 1 000 litres from 1 July 2018 to 31 December 2019 compared to a full rate of EUR 372. From January 2020, the tax rate will be EUR 62.1 per 1 000 litres, compared to a full rate of EUR 414 per 1 000 litres. Volume entitlements are calculated per hectare of cultivated agricultural land eligible to the Single Area Payments. They vary depending on the crop produced from 60 litres to 130 litres per hectare.

Environmental taxation

In 2015, environmental taxes in Latvia amounted to EUR 558.6 million (CSB, 2017a). In 2016, they represented 3.7% of the GDP, higher than the European Union average of 2.4% (Figure 4.16). Nonetheless, their composition is similar to the EU28 average, energy taxes make approximately three-quarters of environmental taxes, transport taxes are close to 20% and the pollution and resource taxes amounted to 3% (Eurostat, 2017b). In 2015, environmental taxes in agriculture reached 4% of the overall environmental tax amounts, compared to a 2% EU average (Eurostat, 2017a).

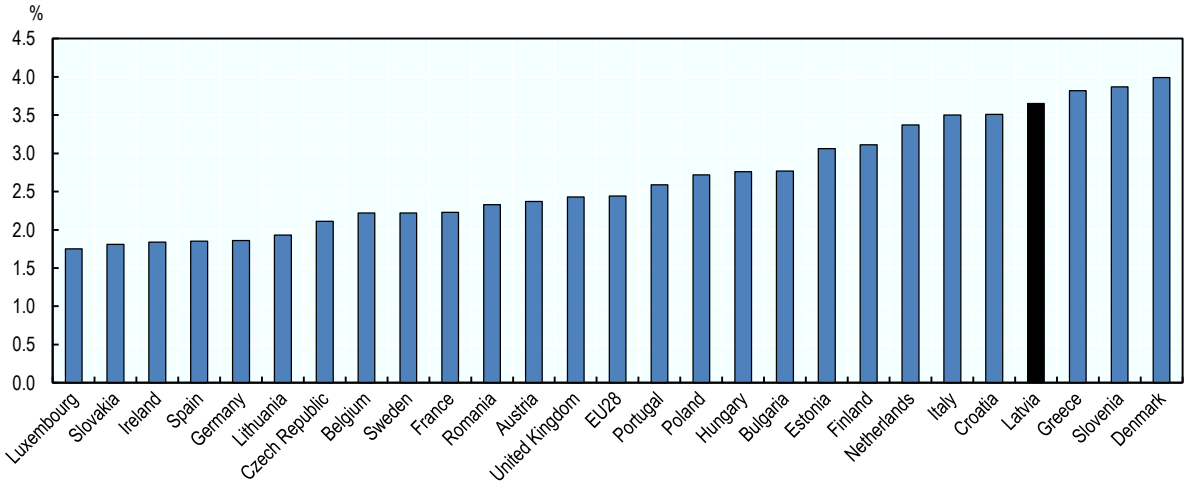
The natural resources taxes apply to a person who:

- acquires or sells taxable natural resources, emits pollutants that are environmentally taxable or landfills waste;

- sells or uses for economic activities goods harmful to the environment, or goods in packaging, as well as coal, coke and lignite (brown coal), and fireworks;
- utilises in its activities radioactive substances after the utilisation of which radioactive waste is created, that is necessary to store or to dispose of in the territory of the Republic of Latvia;
- registers vehicles permanently for the first time in Latvia to which the Management of End-of-Life Vehicles Law applies.

Figure 4.16. Environmental tax revenues, 2016

As a percentage of GDP



Source: Eurostat (2017a), Environmental tax revenues.

StatLink https://doi.org/10.1787/888933913986

Tax impact on investment

According to "The Global Competitiveness Report 2017-2018" by the World Economic Forum, Latvia ranks in 117th and 118th place among 137 countries in terms of the effect of taxation on incentives to work and to invest (WEF, 2017).

Until 2018, the low profit taxation explained Latvia's lower-than-average total tax rate – 35.9% in 2015 (Figure 4.15). This is partly because of the low corporate income tax rate and partly also because of tax allowances. Businesses in supported sectors (including the food industry), are entitled to a tax allowance of 25% of their overall initial long-term investment (up to EUR 50 million). A 15% allowance rate applies when the overall initial long-term investment amount is above EUR 50 million.

Following the corporate income tax reform in 2018, another essential factor for the promotion of investments is the new regime of the corporate income tax, that is, the tax shall not apply to the reinvested profit.

Tax incentives for private investment in R&D

Before the 2018 tax reform in Latvia, a taxpayer was entitled to reduce the income subject to corporate income tax by applying the increased coefficient of three to the

expenses amount in case of expenses incurred by an employee complying with the definition of scientific personnel or scientific technical personnel, directly related to research and development activities.

According to OECD analysis, in 2016, the level of R&D promotion with tax incentives in Latvia was high. In Latvia, B-index which describes the relevant level of tax incentive (pre-tax) per additional research and development unit to which companies with certain features are generally entitled, was determined at 0.3 in the group of companies with profit (OECD, 2017a).

However, the overall relief amount for R&D investments was rather low because in 2015 research and development expenses in Latvia were registered by 30 companies and the overall relief amount was EUR 421 100 (MoF, 2017).

The approach changed with the 2018 tax reform as the corporate income tax applies after profit distribution, therefore reinvested profit, including profit reinvested in R&D activities, is no longer taxed.

4.5. Summary

- With an overall positive picture, Latvia's regulatory environment performs less well than the OECD average and opportunities for improvement exist. Barriers to entrepreneurship remain in several areas that may hinder investment decisions. These include the licence and permits system and the administrative burden for both corporation and for sole proprietor firms.
- Conditions on agricultural land ownership reflect efforts to guarantee Latvian farmers access to land and the prevention of speculation on a support-eligible resource, i.e. land. Other instruments could be considered that may better address concerns and support a well-functioning land market.
- Indicators of financial market developments are significantly lower than the OECD average and only slightly lower than the EU28 average. The index components have all improved in the past five years, yet only the legal rights index is above the OECD average.
- The overall tax load in Latvia was considered to be moderate with a total tax and contribution rate at 36% of company profit in 2016. A tax reform introduced in 2018 plans to increase tax revenues to 30% of GDP. The reform is expected to reduce inequality, to reduce the size of the informal economy and to increase the efficiency of tax administration.
- Historically, the corporate income tax also provided for an allowance for research and development expenses. However, in reality the allowances were low and the 2018 reform of the corporate income tax should incentivise R&D investments with tax exemptions on reinvested profit and allowances for investment projects, including in R&D activities.
- In Latvia, there is a broad range of environmental taxes. While in recent years environmental taxes in Latvia represented 3.7% of the GDP, a higher ratio than the EU average of 2.4%, their composition is similar to the EU28 average; three–quarters of environmental taxes are levied on energy, to which transport add another 20%. In 2015, the agriculture sector contributed 4% of the overall environmental taxes.

- Agriculture complies with the overall requirements of the tax codes. However, reliefs and exemptions from several taxes are provided to agricultural activities, e.g. personal income tax allowance for agricultural producers, VAT compensation for unprocessed agricultural products, real estate and vehicle tax reliefs, diesel fuel enjoys a reduced excise tax rate and natural gas a full exemption. Diesel fuel bought under these preferential conditions is coloured to mark it visually. Furthermore, two-thirds of the sector's labour is unpaid family labour and hence receives no taxable income from the sector neither pays associated labour taxes and social security contributions.
- Funding for agricultural development in Latvia is sourced through European Union programmes, other international institutions, the state and Altum.
- The volume of loans granted by credit institutions to companies operating in agriculture, forestry and fishing has increased 1.3 times over the past ten years, constituting 6.7% of the total loan portfolio as of the end of December 2016.

Notes

[1] The World Bank's Doing Business indicators compare business regulation environments across economies and over time. Doing Business measures aspects of business regulation affecting domestic small and medium-size firms based on standardized case scenarios and located in the largest business city of each economy. (…)" (World Bank (2016), Doing Business 2018, more information at http://www.doingbusiness.org.

[2] In the OECD PMR database, barriers to trade facilitation refer to the extent to which the country uses internationally harmonised standards and certification procedures, and Mutual Recognition Agreements with at least one other country.

[3] Luminor Bank AS operates since 1 October 2017 and was established by merging DNB Bank and Nordea Bank

[4] Domestic credit provided by the banking sector includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net. The banking sector includes monetary authorities and deposit money banks as well as other banking institutions where data are available (including institutions that do not accept transferable deposits but do incur such liabilities as time and savings deposits) (World Bank, 2017).

[5] The tax applies to income gained from all labour relationships, income from individual enterprise, including agricultural or fishing farms, income from operations by individual merchant, as well as other types of income of a natural person.

[6] The lower the income the higher the non-taxable allowance. In 2018 a monthly income of EUR 440 (EUR 5 280 annual) before tax benefits from the maximum non-taxable allowance of EUR 200 monthly (EUR 2 400 annual). Whereas a monthly income of EUR 1 000 (annual EUR 12 000) has EUR 0 non-taxable allowance (https://www.vid.gov.lv/en/most-important-changes-affecting-employees-after-tax-reform).

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Annex 4.A. Background table

Annex Table 4.A.1. State ownership of enterprises in Latvia, 2016

Name	Short description of activity	Share of state, %	Annual turnover, EUR '000	Profit/ loss, EUR '000	Number of employees	Gender ratio in governance, women/men	Balance sheet assets, EUR '000
"Meliorprojekts" State Ltd	The main activity is the production and expert evaluation of construction designs for agricultural, forest and residential land amelioration systems and drainage structures, as well as the maintenance of the national amelioration cadastre	100.00	411.0	4.2	28	0/1	266.9
Latvian Rural Advisory and Training Centre Ltd	The main activity involves providing paid services to rural entrepreneurs in the field of accounting, finance acquisition and education as well as consultations in the agricultural, forestry and fisheries industries. The institution produces farm production development plans.	99.32	8 673.8	12.6	440	0/3	5 525.8
Ministry of Agriculture Real State Ltd	The main activity is the exploitation and maintenance of national amelioration systems and amelioration systems of national significance, the maintenance of the amelioration cadastre and 29 real properties.	100.00	4 843.5	18.5	143	0/3	11 400.8

Source: Cross-Sectoral Coordination Centre (2017).

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Chapter 5. Capacity building and public services in Latvia

Capacity building, including the provision of essential public services, is one of the main channels or incentive areas to support innovation and sustainable development. This chapter concerns three relevant policy areas: infrastructure and rural development policy; labour market policy; and education and skills policy.

5.1. Infrastructure and rural development policy

Broader rural development measures also affect sustainable agricultural development and structural adjustment. Increased off-farm income and employment opportunities mitigate farm household income risks, facilitate farm investment, and enable a wider range of farm production choices. Improved rural services, from banking to ICT, are important to ensure needed connectivity to suppliers, customers and collaborators. Rural policy can also attract innovative upstream and downstream industries, with possible spill-over effects locally. By reducing inequalities in economic development and access to services across regions, rural development policies improve the diffusion of innovation (OECD, 2015).

In a context of population decrease and concentration in urban areas, infrastructure and services planning for sparsely populated rural areas puts an increased burden on both central and local governments. This in turn reinforces the outflow of rural populations to urban centres. Connecting people to markets and providing information and services requires innovative solutions.

Quality of the physical infrastructure

Infrastructure investment is in line with the EU average and while infrastructures have improved, more needs to be done (IMF, 2018). Overall the quality of transport infrastructures is below the OECD average and while port and air transport infrastructures come close, the gap is wider for railroad and widens even more for road infrastructures (Figure 5.1, Panel A). The 2017 economic survey of Latvia stressed that transportation policies should address the strong regional disparities observed if inclusive growth is to be achieved in Latvia (OECD, 2017f). Long term investments aim to upgrade Latvia's physical transport infrastructure, co-financed by EU structural and investment funds.[1]

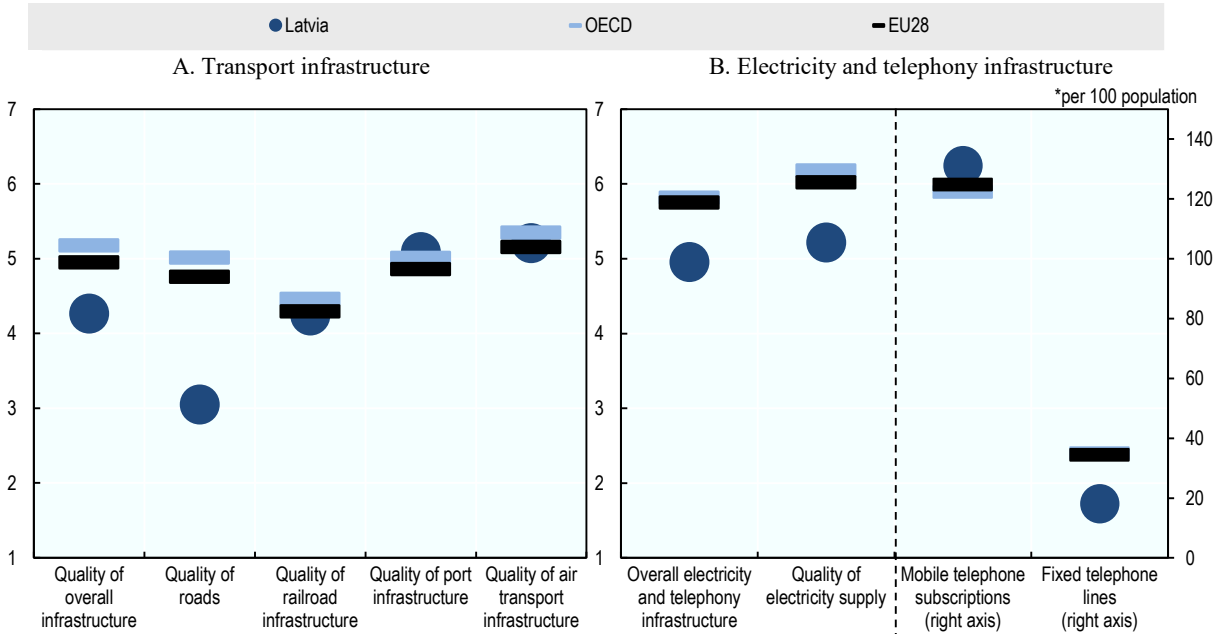
Despite major investments between 2005 and 2015 by which storage capacity was increased by 52%, the storage capacity is insufficient to absorb the robust cereals production growth and increased export volumes. Storage capacity is qualified as a serious potential concern for Latvian cereals and oilseeds crops (European Commission, 2017b).

Latvia's air transport infrastructure ranks 16th among EU infrastructures (Mobility and Transport, 2016). From 2012 to 2015, Latvia invested EUR 42 million in its air transport infrastructure; which is the 12th highest indicator among EU countries and 17th highest among OECD countries (OECD, 2017e). Riga International Airport offers Baltic States' passengers connections with cities throughout Europe and the world. In 2017, the airport at Liepaja also offered regular commercial transportations.

There are three major ports in Latvia and seven smaller ports. Ports benefit from significant tax rebates[2] to develop value added services and industrial projects. The port infrastructure handles more than 80% transit flow, it is well-developed and rated as slightly higher than the average of OECD countries (Figure 5.1, Panel A). Major ports are mainly used for the transhipment of transit cargoes, such as crude oil, fuel products, chemical and bulk cargoes, containers, Roll-on/Roll-off, metals as well as food products. They also handle most exports of agricultural products, including cereals and rapeseed.

Figure 5.1. Global Competitiveness Index: Quality of infrastructure, 2017-18

Scale from lowest (1) to highest (7) quality



Note: Indices for EU28 and OECD are the simple average of member-country indices.
Source: WEF (2017), *The Global Competitiveness Report 2017-2018*: Full data Edition, http://reports.weforum.org/global-competitiveness-index-2017-2018/.

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Latvia relies more on rail transport for freight than most other EU Member States (Eurostat, 2016). When considering cross-border rail freight, Latvia's 1 520 mm gauge railway lines seamlessly connect to rail infrastructures of Baltic neighbours as well as the Russian Federation and Belarus and, through these, to railway networks in other member states of the Commonwealth of Independent States and the east more generally. More than 80% of rail freight transits through ports to their final import or export destination. Transit freight includes exports from the Russian Federation to Western Europe and other destinations. Investments under the Connecting Europe Facility (CEF) framework co-finance the development of the regional "Rail Baltica" project and its connection to the European railway network under a Trans-European Transport Networks project (Rail Baltica, 2017).

While the density of the road infrastructure is qualified as adequate, their quality in rural areas ranks low compared to the OECD average. In 2015, 45% of Latvian state owned motor roads had bituminous pavement and 55% of roads had crushed stone and gravel pavement (MoT). More generally urban and intercity roads have bituminous pavements, whereas crushed stone and gravel pavement are mainly in rural areas (ITF, 2017). Domestic and EU structural and investment funds have been spent on improving road infrastructure in the past ten years. Despite investing about 1% of its GDP, one of the highest shares among OECD countries (CSB, 2017d), pressing needs remain and prioritisation is needed. The NDP 2020 aims to address these shortcomings.

The landscape of public transportation is similar; a generally well served capital city and main urban centres and less developed access in rural areas. The 2017 economic survey

of Latvia suggested that on-demand public transportation services may offer cost-effective ways to address needs (OECD, 2017f). A Concept for the public transportation post 2020 is under development. The draft Concept, a first such national document, provides for more effective and coordinated public transportation in localities with low population density and foresees a longer timeframe for reform so that the industry has time to adapt (Road Transport Administration, 2017).

The overall electricity and telephony infrastructures in Latvia rank lower than the OECD average (Figure 5.1, Panel B). Relatively high electricity prices for industry and a low-density electricity grid in rural areas may act as an obstacle to the installation of businesses (Eurostat, 2017a). However, Latvia's share of renewable energy production and consumption is one of the highest in the European Union. In 2014, 38.7% of the overall energy consumed was obtained from renewable energy sources, well above the EU28 average of 16% (CSB, 2015).

While the telephony infrastructure receives a low ranking, mobile phones are better ranked than the average for OECD countries and most of the Latvian territory has mobile network coverage (The Global Economy, 2016). This goes together with one of the lowest mobile communication prices in OECD countries (Measuring the Information, 2015). Similarly Latvia ranks high with regards to internet services. Internet coverage is available to more than 90% of households and public internet access points are available in cities and rural municipalities. Internet speed is ranked as good (Akamai's, Q1 2016 and Q1 2017 reports) and internet prices are among the lowest in the European Union (BIAC, 2015). The CSB reports that, in 2017, 97% of businesses used internet for their daily operations and 78% of the population used internet at least once a week (Science and Technology, 2016). The 2018 Europe's Digital Progress Report ranks Latvia 19th over 28 EU Member States, with progress in the shares of fast broadband subscriptions as well as the delivery of public e-services (EDPR, 2018). However, a digital gap remains between Latvian cities and rural areas (EDPR, 2018). In 2018 internet was used by 85% of the population in Riga and 75% in rural areas (Kantar TNS, 2018). Many public institutions offer, sometimes compulsory, e-services accessible to urban and rural populations alike. This is the case for applications to agricultural area support payments and for the e-health system for example.

Latvia has 626 ha of irrigated land (0.03% of the overall agricultural land) some of which are inherited from the past and not used. Considering the conditions in Latvia, the priority goes to drainage with regard to water related infrastructure investment (OECD Agri-Environmental indicators, 2017).

Infrastructure development priorities in the context of regional development

The Sustainable Development Strategy of Latvia until 2030 (Latvia 2030) and the NDP 2020 acknowledge the gap between urban and rural areas and emphasise the need for balanced development of the Latvian territory through the effective use of natural, economic and social resources available in each territorial unit. Along with traditional support and innovations in agriculture, there is funding allocated for business diversification in rural areas and effective use of cultural and social resources. They foresee investments in human resources, business environment and infrastructure and promote the activity and co-operation of local governments, entrepreneurs, non-governmental organisations and other stakeholders (Rural Development Programme, 2013).

Funding of infrastructure development

EU funds are the main source for infrastructure investments. These include European structural and investment funds (EAFRD, CF, and ERDF) and other instruments (Connecting Europe Facility, Exclusive Economic Zone). From 2014 to 2020, these funds will invest EUR 1.5 billion in the development of rural areas. Central and local governments generally supplement EU budgets to co-finance projects. Public Private Partnerships also contribute to infrastructure development.

Latvia's RDP 2014-20 under the CAP outlines Latvia's priorities for using approximately EUR 1.5 billion for the period from 2014 to 2020 (almost EUR 1.08 billion from the EU budget and nearly EUR 500 million from the national budget) (RDP, 2014, Summary of the National RDP, 2015) (Chapter 6). Infrastructure improvement is prominent in Latvia's RDP expenditure and about EUR 130 million are planned for investment in rural roads within the RDP Basic services measure (RDP, 2015).

The EU Cohesion Fund is the most significant EU financial tool for infrastructure improvement; its main priorities in Latvia are water management infrastructure and services, waste management, environmental infrastructures and promotion of environment-friendly energy, development of trans-European transportation network, development of sustainable transportation, development of motor roads, city transport, railroads, ports and airport infrastructure (Cohesion Fund, 2015). The European Regional Development Fund (ERDF) also invests in improving access to health, education and transport.

Public-Private Partnerships (PPP) in infrastructure development projects are an important instrument for reaching national goals. PPPs are regulated by the Law on Public-Private Partnership as an instrument of infrastructure development (Law on Public, 2009). Their development has been slow; identified obstacles include the high level of requirements for private investors, unsuccessful first attempts (such as the implementation of speed radars on the roads) and a low level of trust in the sustainability of such projects. However, several highly successful examples in the field of education, public services (heating supply, waste management), transportation, communications, and health, highlight the high potential of Public-Private Partnerships.

A PPP project has been launched to construct a new road infrastructure (Ķekava Bypass) using the Design-Build-Finance-Maintain model for the first time in Latvia for a transport infrastructure project. The launch of the public procurement process is expected at the end of 2018, the implementation of the PPP contract is to start in 2020 and the new constructed road infrastructure is planned to be available for use in 2023. A successful implementation of this project will be significant for the further involvement of the private sector in such projects.

Public services in rural areas

The "Regional Policy Guidelines 2013-2019" defines the "basket" of public services (health, culture, sports, education and social care) to be provided at each level of territorial settlement from parishes[3] and villages to development centres of international significance. More services are provided at higher levels of territorial settlement. The public services "basket" includes only those services that are suited for territorial differentiation and serves as a basis for planning of public services in municipalities.

Except for cities with a population exceeding 5 000 inhabitants, the whole territory of Latvia is deemed to be rural territory (RDP, 2014). In accordance with information

provided by the CSB, at the beginning of 2017, 68.3% of the population in Latvia lived in cities and 31.7% in rural areas (CSB Demography, 2017).

Territories classified in Latvia as rural areas are very different both in terms of population and infrastructure equipment. The territorial development index calculated by the State Regional Development Agency shows that there are signs of monocentric development in Latvia because a large part of the population and economic activities are concentrated in Riga and its vicinity (Territorial Development, 2015). The territorial development index reveals differences between several rural areas. For instance, according to national definitions, territories in the vicinity of the capital city of Riga legally and statistically are considered to be rural areas; however, in these areas territorial development indices have reached rather high values. This mainly can be explained by population mobility processes in the Riga vicinity resulting in the increase of economic activity, tax revenue and options to invest in infrastructure. These rural areas significantly differ from rural areas that are located far from Riga and especially from sparsely populated border areas, which are characterised by significantly lower levels of economic and social activities.

The Ministry of Environmental Protection and Regional Development considers that past investment in rural infrastructure may have lacked consistent territorial development plans (Regional Policy, 2013). The development of a central public service system under the State Regional Development Agency, by 2020, is expected to add medium term visibility and consistency in regional development planning (MK, 2015b).

Co-operation between non-governmental organisations and local governments results in the increase of delegation agreements. Local governments mostly delegate various social services to non-governmental organisations, e.g. care services, internet accessibly and consultations.

The experts from the Latvian Rural Forum emphasise that the main challenge for the rural development of Latvia is the transition to the approach that focuses on such development planning that is based on local population needs and resources, raising the responsibility of local populations for development of the area, reducing dependence on external funding and "top to down" defined needs of the rural community (Ādlers and Kudiņš, 2016). The co-operation networks among non-governmental organisations, farmers, entrepreneurs and local government that are aimed to find specific solutions for local needs in Latvia today can be regarded as a good practice.

The non-governmental organisations consolidate development of polycentric regions, establishing inter-district co-operation networks, e.g. establishing tourism routes that link several administrative territories. Some rural districts show good results in specialisation, namely, their projects and measures are focused on the development direction chosen by locals as their priority.

Although the service network in rural areas of Latvia currently cannot be regarded as homogenous, it has some growth potential as illustrated by the current co-operation practices and State-defined regional development guidelines.

5.2. Labour market policy

Labour market legislation

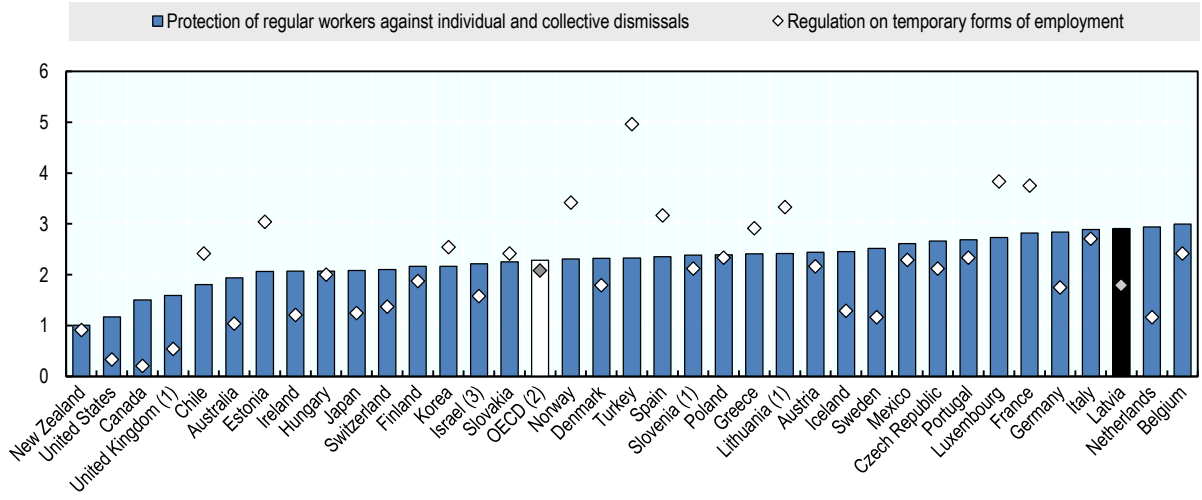
Labour relationships are governed by the Constitution of the Republic of Latvia (*Satversme*), international laws binding upon Latvia, Labour Law, Civil Law, Labour

Protection Law, and other regulatory enactments, as well as joint labour agreements and labour procedures. Latvia's labour policy contributes to the Europe 2020 Strategy.[4]

In 2015, the employment protection indicator against individual or collective dismissal in Latvia was one of the highest among OECD countries, only behind the Netherlands and Belgium (Figure 5.2). In terms of temporary jobs, the protection level for those working was lower than the average level in OECD countries.

Figure 5.2. Employment Protection Legislation Indicators, 2013

Index from least (0) to most (6) restrictive



Notes: 1. For Slovenia and the United Kingdom, data refer to 2014, while for Lithuania to 2015.
2. The OECD aggregate is the unweighted average for the 34 countries that were members of the OECD in 2013. It does not include Latvia and Lithuania.
3. The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.
Source: OECD (2016a), *Employment Protection Database*, www.oecd.org/employment/emp/oecdindicatorsofemploymentprotection.htm.

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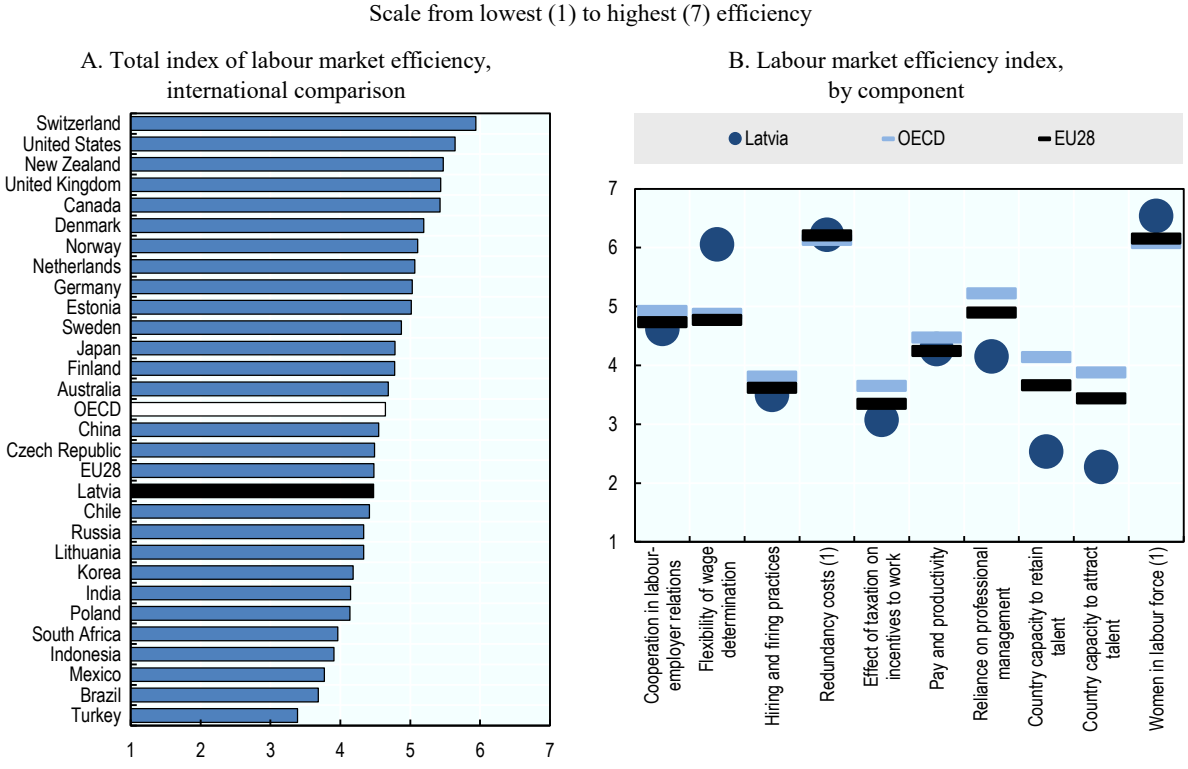
The Latvian Labour Law offers job protection to some segments of the labour force and enforces notifications conditions to the termination of an employment contract. The law foresees severance pay in the case of termination of an employment contract and conditions for collective redundancy. The severance pay ranges from one to four months of average earnings depending on the length of employment at the workplace. In the case of a partial reduction of the number of employees, those employees with higher performance results and higher qualifications are kept. For equal performance and qualifications, employees who have worked for a longer time and less protected social groups are kept.

Employment contracts may also be concluded for a specific duration, including seasonal work. Temporary contracts are not widespread in Latvia and 3% of the total number of employees have temporary contracts, compared to an EU28 average of 14.3% (Eurostat, 2017d). Other forms of contracts such as agreements concerning specific tasks are also less frequent.

Labour market efficiency

According to the World Economic Forum data, the labour market efficiency index in Latvia nears the average OECD and EU28 levels (Figure 5.3, Panel A). When looking at the individual components, Latvia's score is above or close to the OECD and EU28 averages for the flexibility of wage determination and the presence of women in the labour force, while wider gaps exist in a number of components (Figure 5.3, Panel B). Of particular relevance to innovation, the capacity to retain talent and the reliance on professional management are the two indicators where the largest negative gaps are observed (Figure 5.3, Panel B).

Figure 5.3. Global Competitiveness Index: Labour market efficiency, 2017-18



Notes: Indices for EU28 and OECD are the simple average of member-country indices.
1. Redundancy costs (weeks of salary) and Women in labour force (ratio to men) indicators are converted to 1-to-7 scale.
Source: WEF (2017), *The Global Competitiveness Report 2017-2018*: Full data Edition, http://reports.weforum.org/global-competitiveness-index-2017-2018/.

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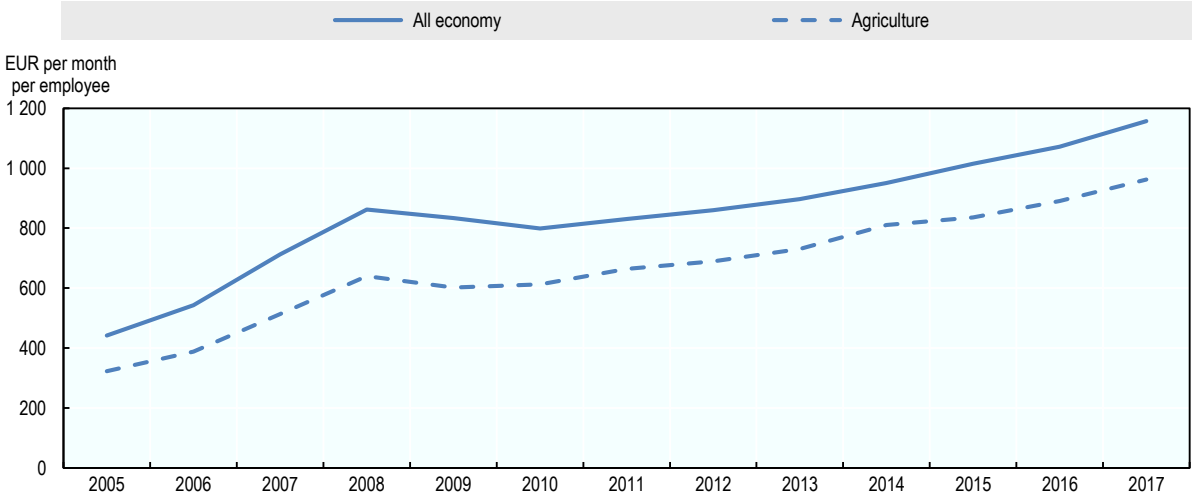
According to Eurostat, hourly labour costs in Latvia, at less than EUR 10, are comparable to Lithuania and Poland and well below the EU28 average of EUR 26 per hour (Eurostat, 2017c). Taxation has a high and negative effect on incentives to work, affecting mostly low wages. The 2017 Latvia economic review notes the recent reduction of the tax on low incomes and recommends further reduction that would benefit employment, reduce the share of informality and possibly slow young workers' emigration (OECD, 2017f).

A minimum monthly wage applies in all sectors and regions. In 2018, it is set to be EUR 430. In 2017, the average monthly labour costs in agriculture was EUR 962, compared to EUR 985 in food manufacturing and EUR 1 157 in the economy overall (CSB, 2017c). Labour costs in agriculture have increased since 2010 but remain below the average in the economy. Structural change and the development of technologically more advanced agricultural businesses have increased demand for a higher skilled workforce, and labour shortage close to farms contribute to increased labour costs. Gross wages and salaries make up 80% of the labour costs (Figure 5.4).

Figure 5.4. Average monthly labour costs per employee in Latvia, all economy and agriculture, 2006 to 2017



Source: CSB (2018a), http://data.csb.gov.lv/pxweb/en/Sociala/Sociala__ikgad__dsp_izmaksas/DI0012_euro.px/?rxid=298ccdb0-d955-4865-afb3-c3758a3a91fd.

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Attitudes concerning adult education have changed in Latvia and the share of adults willing to participate in education and training has increased from 24% in 2011 to 41% in 2016 – compared to the EU average of 21% and 26% over the same period (Eurostat, 2018). European Social Funds have been harnessed to finance adult education and lifelong learning.

Adult participation in education has accelerated since 2011 and nearly half of adults (47.5%, compared to an average EU28 of 45%) participated in formal and/or non-formal education in 2016; an increase by 15 percentage points (EU average increase 5 percentage points). While also growing, the share (44.6%) and participation (up by 14 percentage points) in adult education are slightly lower in rural areas. Non-formal education makes up the largest part of adult education both in cities and rural areas (Eurostat, 2018).

According to the Adult Education Survey carried out in 2016 by the CSB, 77% of lifelong learning participants declare that their participation is mainly work-related, with the aim to improve performance on the job and career opportunities. In 2016, 3.2% out of all job-related non-formal educational activities were in the field of agriculture, forestry, fisheries and veterinary.

Specific provisions for farm operators and workers

A wage can be paid to seasonal workers and taxes can be deducted in accordance with the general procedure; however, a special procedure may be applied to seasonal agricultural work. A seasonal agricultural income taxpayer must be employed in agricultural seasonal work not more than 65 calendar days in total with one or several employers, and the overall income may not exceed EUR 3 000.

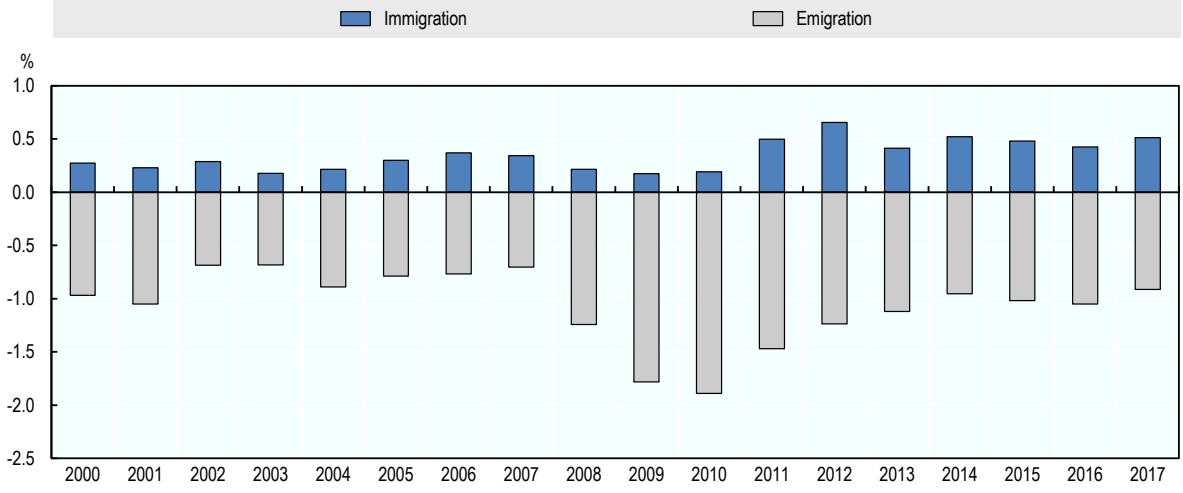
Workforce emigration and immigration

Latvia is a net emigration country – the number of people leaving the country is higher than the number of people moving to Latvia (Figure 5.5). A significant outflow of the population was experienced after the 2008 crisis explained by a sharp increase in unemployment – from 6.1% in 2007 to 19.5% in 2010 (CSB, 2018) - a significant reduction of salaries and the dramatic collapse of the real estate sector.

During 2008-16 total net immigration was about 170 000 persons. The European Union attracted more than 70% of long term migrants (CSB, 2018). The United Kingdom, Ireland, Germany and Norway have been the main destination countries.

Figure 5.5. Long-term immigration and emigration in Latvia, 2000 to 2017

As a share of total population



Source: CSB (2018), [IBG01, ISG02].

StatLink https://doi.org/10.1787/888933914081

While most employers in Latvia do not contract foreign workers abroad, migrant worker employment is growing. According to data collected by the Office of Citizenship and Migration Affairs (OCMA) the number of work permits issued to foreigners during the last four years has increased by 56%; in 2017 there were already 8 625 guest workers. According to the information provided by the OCMA, most workers are low- or medium-skilled, from Ukraine, Lithuania, the Russian Federation, Bulgaria and Belarus, and are mainly employed in rail and road transport, construction, computer programming and consulting, and catering services (GfK Custom Research Baltic, 2017; OCMA, 2016).

The MoE has approved a list of professions in labour shortage offering preferential conditions to attract foreign specialists. The list includes 237 professions and specialties. For professions on the list, the waiting-time before foreigners can apply to vacancies registered at the State Employment Agency (SEA) has been reduced from one month to ten working days.

State policy in creating new workplaces, re-qualification of workforce

At the national level, the SEA is tasked with reducing unemployment and supporting the unemployed and jobseekers. The SEA carries out both active employment and unemployment reduction activities along with various social and preventive activities, including training programmes (Section 5.3). Measures implemented in the labour market are reviewed and updated on a regular basis.

Latvia spends around 0.22% of GDP on economy-wide employment services and related Active Labour Market Programmes (ALMP). A very large part of ALMP funding (more than three-quarters in 2014) relies on external resources, notably the co-financing by the European Social Fund (ESF) (OECD, 2016b). EU projects are funded over the planning period from 2014 to 2020. They support the training of unemployed persons, the creation of subsidised workplaces, long-term unemployment reduction measures, forecasting short-term labour demand, promoting employment of young unemployed persons and the EURES (European jobs mobility network) activities in Latvia.

In 2016, Latvia started a new ESF project "Support for a Longer Work Life" (MoE, 2016). Another ESF project "Improving the Professional Competence of Employed" was started in 2017 with a total funding of EUR 27 million (EUR 23 million of ESF funding and EUR 4 million of state funding). The project is implemented by the State Education Development Agency (SEDA) to support more than 38 000 employed adults to improve their professional qualifications and competences. The programme provides support to employed persons from social risk groups (low skilled, pre-pension age etc.) in 12 priority sectors, including the food industry and agriculture. Since spring 2017, about 13 000 adults have participated in the programme.

5.3. Education and skills policy

Education policy affects innovation in at least three ways: a high level of education facilitates acceptance of technological innovation by society at large; innovation systems require well-educated researchers, teachers, extension officers, and producers to develop relevant innovations; it is generally easier for farmers and business operators with higher education and skills to adopt technological innovations. Continuous skills development (training, re-training, lifelong learning) is essential to improve the matching of skills to demand in an evolving agro-food sector where there is a need to adopt novel productivity and environmentally enhancing technologies and practices (OECD, 2013, 2015).

Latvia's education system has improved since independence in 1991 and more efforts are now needed to raise teaching standards and ensure that all students have access to a quality education (OECD, 2016b). The education system in Latvia is highly decentralised and influenced by multiple demographic factors that have contributed to declining student enrolment numbers in recent years; such as low birth rates, rural-to-urban migration and emigration. The overall education system needs to adapt to the changing demographic reality; hence, offering both a challenge and an opportunity to improve the quality of teaching in Latvia (OECD, 2017b). The 2017 economic survey of Latvia (OECD, 2017f)

identified Latvia's skill shortage as an impediment to business competitiveness and participation in global value chains.

The education system

Latvia's education system builds on eight levels of education from pre-school to higher education (Figure 5.6).

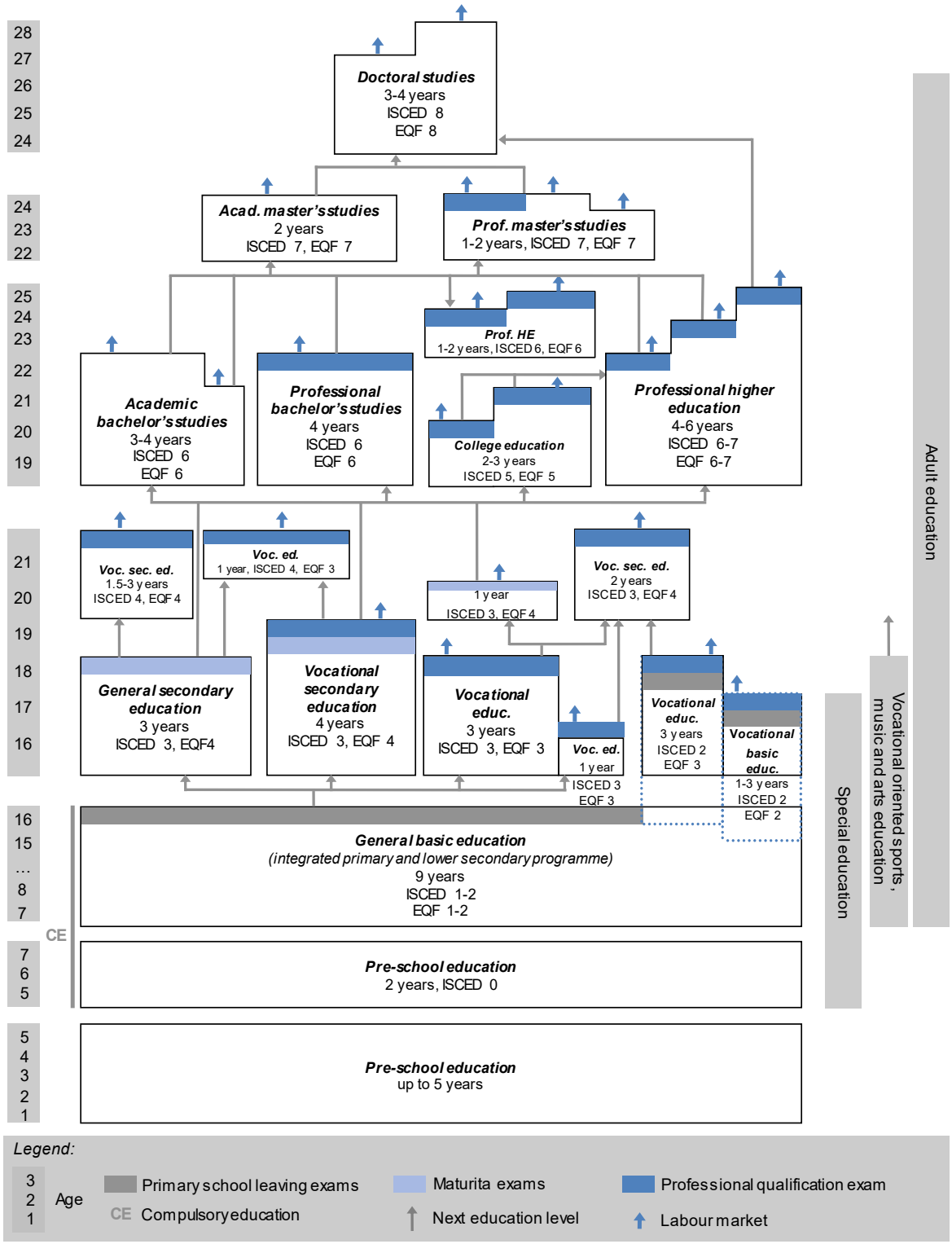
Agricultural education in Latvia is integrated into the secondary vocational education and tertiary education. General, vocational tertiary (higher academic and professional) education is provided at various levels of education:

- General education programmes cover pre-school up to upper-secondary education.
- The national curriculum is defined through the State Basic Education Standard and the State General Secondary Education Standard. There are four branches of general secondary education: general education; humanities and social science; mathematics, natural sciences and technology; and vocationally oriented education in arts, music, commercial science and sports.
- Vocational education programmes are provided starting at basic education and up to upper-secondary education; the compulsory content of vocational education is determined by the State vocational secondary education standard and vocational education standard; and by respective occupational standards.
- Tertiary education programmes are provided at higher education level and the general content is determined by the state 1st level professional higher education standard and 2nd level professional higher education standard, and academic education standard. According to the Law on Higher Education Institutions, the autonomy of an institution of higher education is expressed in the right to select the ways and forms for the implementation of the tasks.

The Vocational Education Law offers the framework for vocational education. According to the law, the level of vocational qualification reflects the theoretical knowledge and practical skills necessary to perform work corresponding to a certain level of complexity and responsibility. Vocational education is dispensed in vocational educational institutions implementing programmes leading to professional qualifications from the European Qualification Framework (EQF) level 2 to EQF level 4 (Country Background Report on Education System, 2015). The completion of the vocational programme is certified by a state qualification exam (VIAA, 2017).

The implementation of the European Social Fund project envisages investing nearly EUR 22 million in apprenticeship type schemes (nationally called 'work-based learning') and practice by 2024 (ESF funding – EUR 18.7 million and national co-financing EUR 3.3 million). It is forecasted that at the end of the project, 3 100 students will be involved in the work-based learning, while 11 025 students will have participated in practical training and practice placements in companies (MoES, 2016).

Figure 5.6. The education system in Latvia, 2018



Note: ISCED: International Standard Classification of Education; EQF: European Qualifications Framework.
Source: AIC (2018), Education in Latvia, www.aic.lv/portal/en/izglitiba-latvija.

The Employment Council was established in 2016 jointly by the Minister of Economy, the Minister of Education and Science and the Minister of Welfare. The Council addresses important issues for the labour market, including the quality of education and the impact of demographic trends. It offers a platform for discussion and finds solutions to improve key areas of relevance. These include the quality of education, the development of a lifelong learning system, improving Vocational Education and Training (VET), the promotion of STEM studies, the involvement of employers in the provision of the education offer and the improvement of skills and employability of young people. The Council considers increasing the capacity of competence centres for the provision of lifelong learning, especially in the local and regional aspect, effective, modern and high-quality vocational education. These issues are all important for the state and society for the growth of the national economy and the welfare of the society.

Those who have completed the general secondary education programme, as well as graduates from the four-year vocational secondary education programme, and from all vocationally oriented (sports, art and music schools) secondary education programmes can enter a higher education programme (ISCED-P-2011 level 5 and 6). The Academic Information Centre, provides an equivalence statement to those educated abroad (VIAA, 2017).

The admission to higher education is decentralised and, since 2004, admission depends on the results of the national centralised secondary education examinations. Higher education institutions (HEI) may set additional requirements concerning some specific prior education or training, special aptitude or previous qualification (for example, in arts, music, sports) (VIAA, 2017).

The system of higher education in Latvia is twofold as the Law on Higher Education Institutions sets a difference between academic and professional higher education. Universities and other institutions of higher education mostly run both academic and professional programmes. Tertiary level or higher education is provided in colleges and HEI, including universities. University-type HEI provide bachelors, masters and doctoral degree programmes. Publications in internationally quoted scientific journals are required before public defence of the thesis as an integral part of a doctoral study programme. The Council of Science appoints a Promotion Council and sets the procedures for an award of Doctor's degrees (AIC, 2012). At least 65% of the tenured staff in University-type institutions hold a PhD degree; publish in scientific periodicals covering areas of teaching and research implemented by the institution and which have divisions or research institutes performing scientific research (VIAA, 2017).

Governance and funding

The Parliament of Latvia (Saeima), the Cabinet of Ministers and the Ministry of Education and Science are the main decision-making bodies at national level. The Ministry of Education and Science (MoES) oversees the national network of education institutions, sets education standards and develops policy regarding teacher training content and procedures. In addition, branch ministries (including the MoA, the Ministry of Culture and the Ministry of Health) supervise and finance education institutions. Municipalities fund general education institutions (those that are not private). They are also in charge of separate vocational education institutions.

Education in Latvia is mainly financed by the national or municipal budget. While almost all students in primary and secondary institutions go to publicly funded institutions, approximately 40% of HEI are private, with public funding subject to agreements with

the Ministry (OECD, 2017b). The state covers tuition fees for a number of higher education students, as part of State Procurement. Students with higher performance receive state scholarship. Any student, conditional on nationality or residence permit, and who successfully studies in an accredited study programme may apply for a state guaranteed loan at lower than market rates.

The quality of education is assured through the accreditation of education providers and the licensing and accreditation of education programmes. In primary and secondary education, education institutions are accredited for six years, while educational programmes are accredited for two or six years. Accreditation may be refused if any of the following criteria is evaluated as "insufficient": curriculum, teaching quality, equipment and other material resources, human resources, security of learners (security and workplace safety), the work of the administration and personnel management (IKVD, 2017). Quality assessment of general and vocational education institutions (except pre-school, HEI and colleges) and educational programmes is carried out by the State Education Quality Service (IKVD) through an accreditation procedure (MK, 2015a).

External quality assurance of HEI and study fields, and licensing of study programmes is organised by the Academic Information Centre (AIC). There is no term for the accreditation of HEIs, while study fields are accredited for two or six years (AIC, 2015; MK, 2015a; MK, 2015c). The AIC has established a Quality Agency for Higher Education for the provision of these functions in line with the Standards and Guidelines for Quality Assurance in the European Higher Education Area. The AIC also promotes improvements in the internal quality assurance systems in HEIs, study fields and study programmes. Since June 2018, the AIC is a full member of the European Association for Quality Assurance in Higher Education (ENQA).

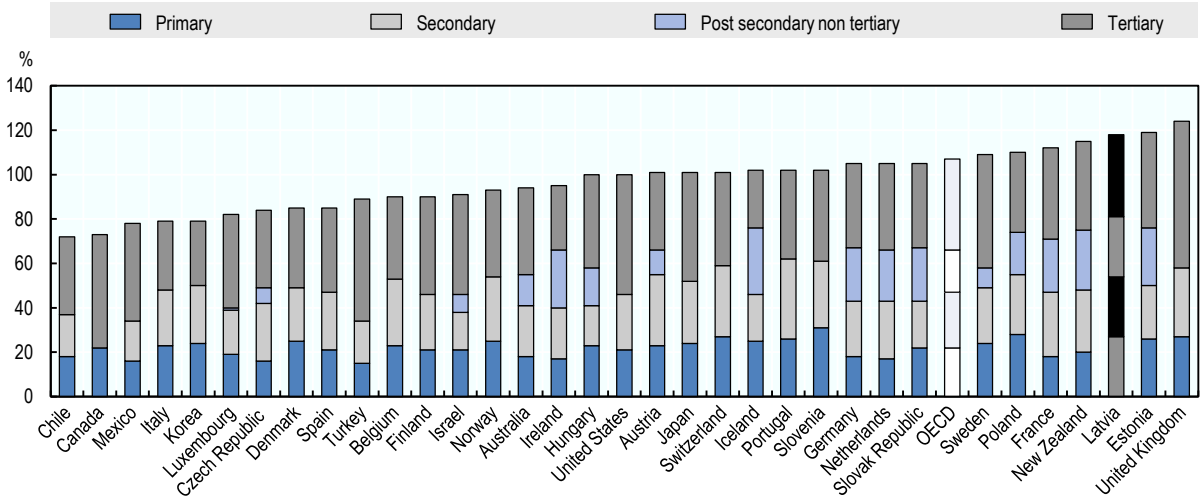
Compared to the average OECD annual expenditure per student of 107% of GDP per capita, Latvia spends 118% of its GDP per capita (Figure 5.7).

The share of Latvia's expenditure on education in primary to non-tertiary education is 8.5% of GDP (the OECD average was 8% in 2013), while in the tertiary sphere the respective figures are 2.6% and 3% (OECD, 2017c). In 2014, the public expenditure to GDP (6%) was above the EU average (5%) (EU, 2016). Public sources in OECD countries spend on average 4.4% of GDP on education institutions while in Latvia the respective figure was 3.8%. Tertiary education accounts for 1.4% in Latvia compared with 1.5% of GDP in OECD countries on average (OECD, 2017a). Private sector investment in higher education is also relatively low, with the exception of tuition fees paid by part-time and full-time students to private education institutions.

The collapse by more than 50% of public funding of higher education during the financial crisis of 2008 was accompanied by a simultaneous decline in research funding. This led to a reduction in budget-funded study places including those in agro-food specialities (MoES, 2014).

Figure 5.7. Annual expenditure per student by educational institutions for all services, 2013

As percentage of per capita GDP



Note: Total expenditure by education institutions from primary to tertiary levels of education. The OECD aggregate is the unweighted average of the 34 countries that were members of the OECD in 2013. It does not include Latvia and Lithuania. The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.
Source: OECD (2016c), *Education at a Glance*, http://dx.doi.org/10.1787/eag-2016-table103-en.

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A new model for funding higher education is being introduced in Latvia. The new financing model developed in 2015 based on the World Bank recommendations (World Bank, 2014) is intended to improve the efficiency of public spending in the field of higher education, promote higher education and research integration and ensure better quality accessibility and international competitiveness. The model consists of three pillars (Figure 7.3):

- Pillar 1: cost oriented basic funding allocated per number of field study places, number of mission professors/academic staff per field and weight in teaching and research.
- Pillar 2: performance-oriented funding allocated per number of graduates, number of incoming and outgoing students in teaching and bibliometric indicator, third party funds and number of PhD students in research.
- Pillar 3: innovation-oriented funding allocated on the basis of profile-oriented agreements in teaching and research supported by the EU Structural Funds.

Basic funding provides for the main part of operational costs, thereby enabling HEIs to perform their core tasks of teaching and research (Ziegele, 2013). The amount allocated per study place in each discipline or field (e.g. social science, medicine, etc.) is based on the costing relationship among the study fields (i.e. cost coefficients) and on the available budget for study places (basic funding).

In 2015, the government allocated EUR 5.5 million to Pillar 2 pilot projects based on achievements. The shares allocated for Pillars 1, 2 and 3 accounted for 60%, 20% and

20% respectively (MoES, 2016). The shares of funding in GDP are quite low, i.e. public funding accounts for 0.5%, private funding 0.3% and other funding (including the EU funding) 0.5% and the MoES has set a target of 1.5% of GDP to be reached by 2020 (MoES, 2016). In 2016 and 2017, it provided EUR 6.5 million per year. However, the amounts are below the levels necessary to implement the optimal development model recommended by the World Bank in its study. The international dimension of the new model is also limited. The only parameter related to internationalisation is the science-related funding from abroad.

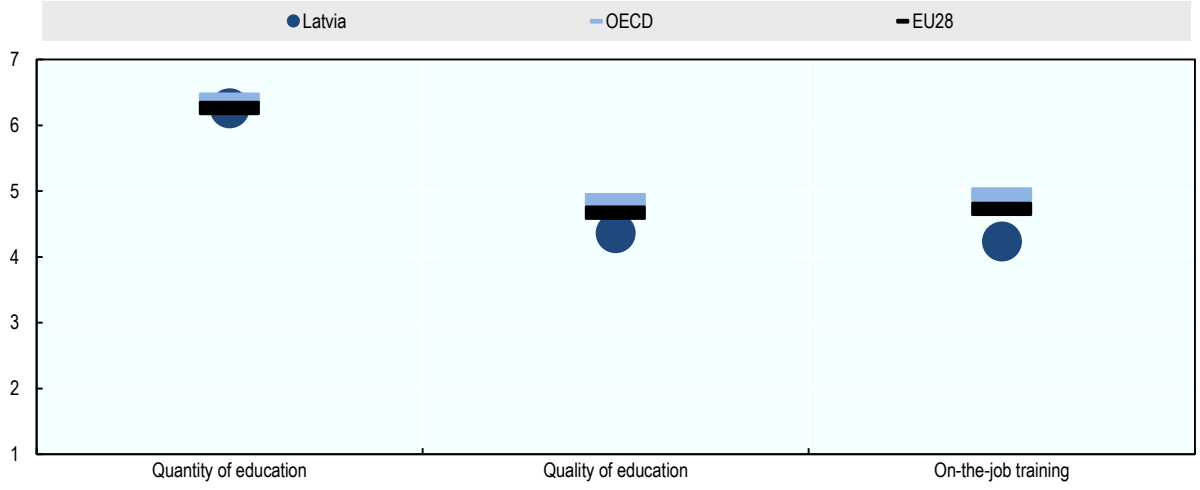
No additional national funding was granted through Pillar 3 in 2016 due to budgetary constraints (EU, 2016).

Overall performance

While according to business leaders, the quantity of higher education and training is high and aligned with the OECD and EU28 averages, Latvia ranks lower in terms of the quality of higher education and on-the-job-training (Figure 5.8).

Figure 5.8. Global Competitiveness Index: Higher education and training, 2017-18

Scale from lowest (1) to highest (7)



Notes: Indices for EU28 and OECD are the simple average of member-country indices.
1) The quantity of education index is based on secondary and tertiary education enrolment rates from UNESCO Institute for Statistics. 2) The quality of education index is based on responses from a WEF Executive Opinion Survey on how well the educational system meets the needs of a competitive economy; executives' assessment of the quality of math and science education in schools and the quality of business schools; and on how widespread Internet access in schools is. 3) The on-the-job-training index is based on survey responses on the availability of high-quality, specialized training services and the extent to which companies invest in training and employee development.
Source: WEF (2017), *The Global Competitiveness Report 2017-2018:* Full data Edition, http://reports.weforum.org/global-competitiveness-index-2017-2018/.

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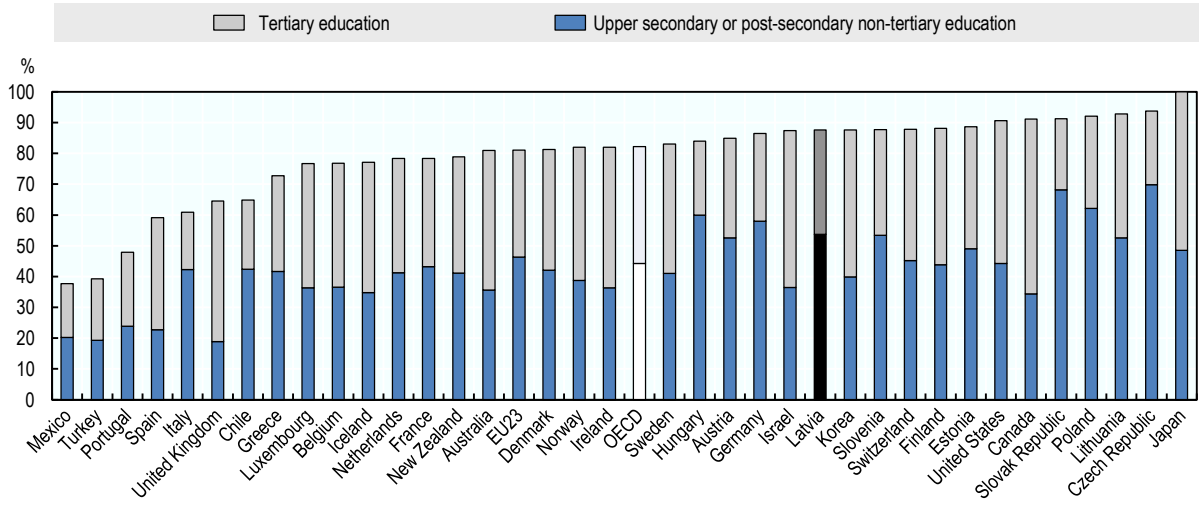
Educational attainment

On average across OECD countries, 82% of 25-64 year-olds have attained at least upper secondary education in 2016. In Latvia, educational attainment is 88%, which is above the OECD and EU23 averages (82% and 81% respectively) and one of the highest

indicators in the world. The share of population with upper secondary or post-secondary non-tertiary education is 54% in 2017 compared with on average 44% in the OECD and 46% in the EU23 average (Figure 5.9).

Figure 5.9. Upper secondary and tertiary attainment for 25-64 year-olds, 2017

As percentage of the population aged 25-64



Note: EU23 consists of countries that are members of both the OECD and the EU. The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.
Source: OECD (2018), *Education at a Glance 2018: OECD Indicators*, https://doi.org/10.1787/eag-2018-en.

StatLink https://doi.org/10.1787/888933914138

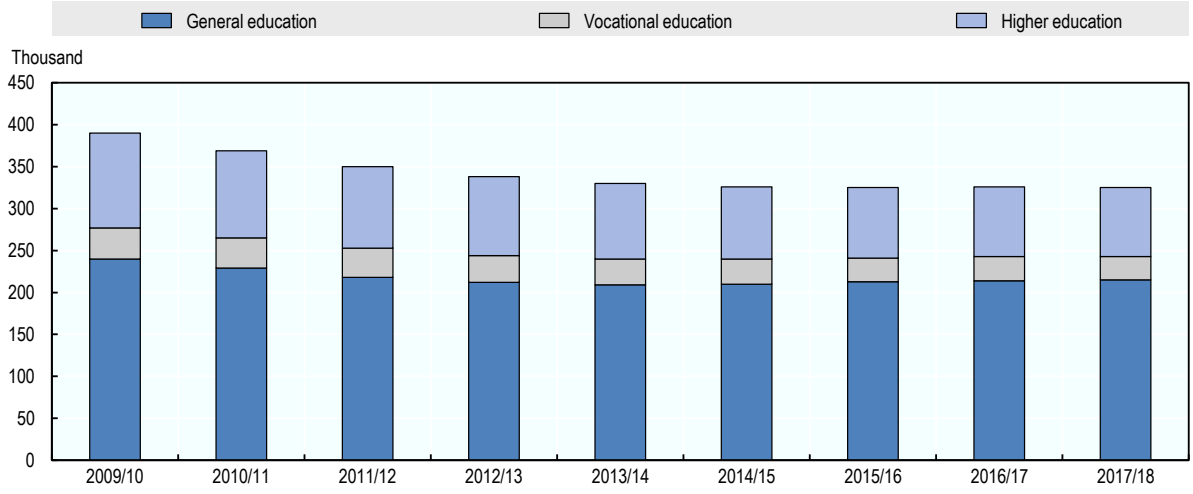
The share of Latvia's population aged between 25 and 64 with tertiary education is above the EU23 average, slightly lower than the OECD average level and lower than the best OECD performers (OECD, 2017a).

In 2016, among tertiary-educated adults in OECD countries, an average of 26% studied in STEM fields (science, technology, engineering and mathematics), while in Latvia the share is 22%, mostly in engineering, manufacturing and construction fields (15%) (OECD, 2017a). The share of STEM fields tertiary educated adults is expected to increase in the future as, in 2015, 27% of new entrants to tertiary education in Latvia chose a STEM field, a ratio equal to the OECD average – 18% in engineering, manufacturing and construction.

Changes in student demography

The education system in Latvia faces a demographic problem; the declining number of students from 390 000 in the academic year 2009/10 to 325 000 in 2017/18 is in part due to the ageing of population and to low birth rates (Figure 5.10).

Figure 5.10. Number of students in general, vocational and higher education in Latvia, 2009/10 to 2017/18



Source: CSB (2018b), Izglītības iestādes un izglītojamo skaits (mācību gada sākumā) (Education Institutions and Number of Students at the beginning of the Academic Year) (database), http://data.csb.gov.lv/pxweb/en/Sociala/Sociala__ikgad__izgl/IZ0010.px/?rxid=cdcb978c-22b0-416a-aacc-aa650d3e2ce0.

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Compared to 2009/10, there is 27% less students in 2017/18 in higher education and 24% less in vocational education, while numbers seem to have stabilised in these two sectors. The decline of the number of students participating in general education stopped in 2013/14; and although numbers increase slowly they have not yet reached 2009/10 levels.

Agricultural education

Availability of agriculture-related education programmes

Agricultural education in Latvia is available through both vocational and higher education programmes. Two HEI (among 17 state funded colleges in 2016-17) and 10 vocational education establishments provide agriculture related subjects (agriculture, animal husbandry, veterinary medicine, food processing, and apiculture). The Latvia University of Life Sciences and Technologies (LLU), under the MoA, is the only HEI specialising directly in agro-food related subjects.

The LLU is the fourth largest state HEI in Latvia and, according to the QS EECA rating, it is one of the leading universities of science and technologies in the Baltic Sea region, specialising in the sustainable use of natural resources aimed at the enhancement of quality of life for society (QS EECA, 2017). LLU implements programmes in agriculture, forestry, veterinary medicine, food technology, and landscape architecture as well as information technology, economics, social sciences, agricultural engineering, construction and pedagogy. It is a national university of a regional character covering both the region and state demand for highly trained specialists (LLU, 2017).

Two public colleges (Jekabpils Agro-business College and Malnava College) specialise directly in vocational study in agriculture and agro-business. Other vocational schools

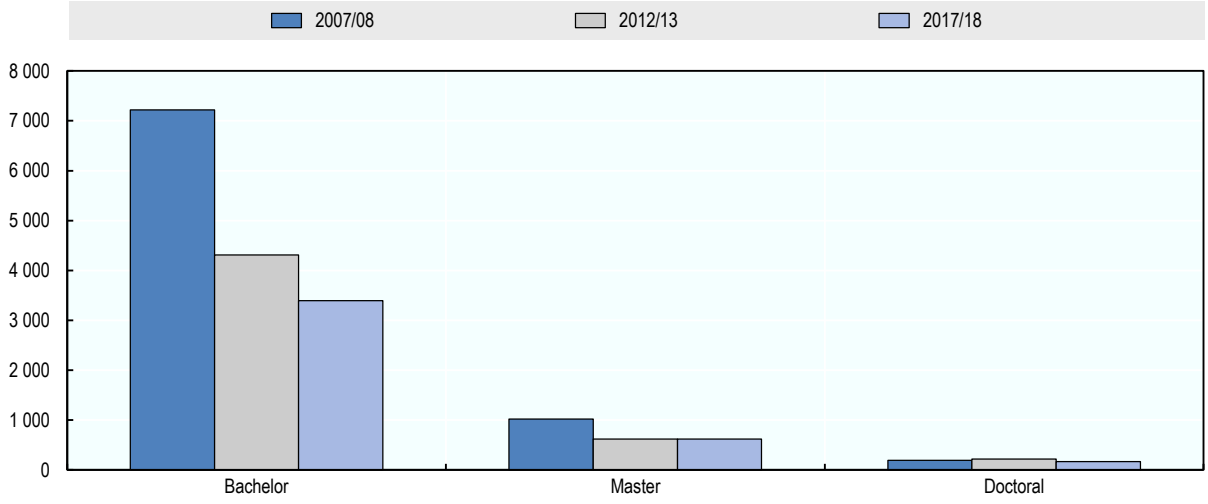
provide secondary vocational education in agriculture-related study programmes (rural property manager, plant husbandry technician, cultivator, horticulture technician, horticulturist, assistant in veterinary medicine, animal husbandry technician, agriculture machinery mechanic, beekeeper). On 1 October 2016, Malnava College had 1 047 students, an increase of 62% compared with 2010, while Jekabpils Agro-business College had 293 students, of which 50 studied agriculture. In 2017, the state limited liability company "Bulduri Horticulture Secondary School" became a structural unit of LLU.

The share of agricultural students in HEI and colleges fluctuated between 1.1% in 2009/10 to 1.8% in 2016/17, with its peak in 2014/15 when the share of agricultural students was 1.9% of the total number of students at tertiary level. The share of students in agriculture by vocational education programmes ranged between 2.7% in 2009/10 to 3.58% in 2016/17, the lowest and highest proportions being reached in 2011/12 and 2014/15, respectively 2.4% and 3.6%.

Agriculture enrolment trends

In line with the demographic downward trend in the entire education system of Latvia, the number of students studying at LLU has also decreased. The number of bachelor students has been halved since the academic year 2007/08. The number of Master level students and Doctoral students has also declined by 40% (-15.2%) (Figure 5.11). The comparison with the pre-crisis period reveals a decline in the number of LLU bachelor students by 52% (from 7 221 students in 2007 to 3 430 students in 2016) and master students by 40% (from 1 021 students in 2007 to 609 students in 2016). A slight decline (5% from 193 to 184 students) is observed also in the number of PhD students.

Figure 5.11. Number of students at LLU by level in Latvia, 2007/08, 2012/13 and 2017/18



Source: Latvia University of Life Sciences and Technologies, LLU (2018).

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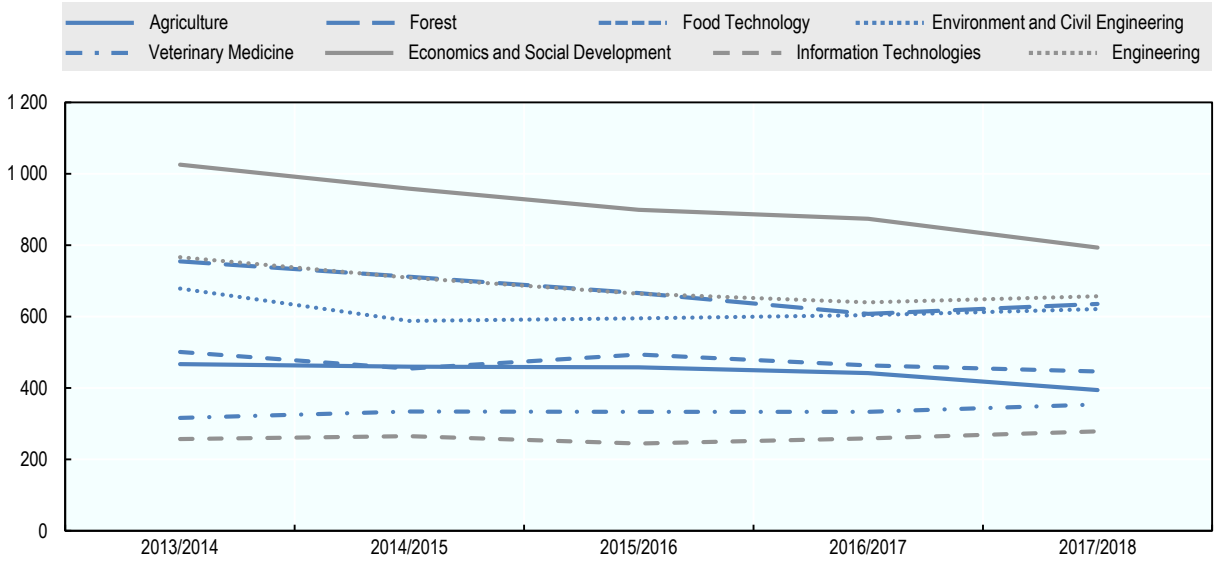
More recently, between academic years 2013/14 and 2017/18, the number of students studying agriculture related sciences has decreased by 16% (Figure 5.12) while the number of students participating in forest studies and in food technology studies has

declined by 16% and 11% respectively. The number of students studying veterinary medicine has increased by 12%.

The number of university students enrolled in social sciences has experienced the sharpest decline (-23%) between 2008 and 2017. A decline is also observed for the number of students in professional secondary education institutions (-28%).

Figure 5.12. Number of students at LLU by fields of studies in Latvia, 2013/14 and 2017/18



Source: Latvia University of Life Sciences and Technologies, LLU (2017), Gada pārskats (Annual Report), http://www.llu.lv/sites/default/files/2017-05/gada_parsk_12_4_2017.pdf.

StatLink https://doi.org/10.1787/888933914195

Meeting labour market needs in the agricultural sector

The demand for agricultural and veterinary medicine specialists is high in Latvia and in other European countries, driven by the spectrum of potential jobs from veterinary practices and agricultural and food companies to public administration, customs and border control and scientific institutions. Study programmes of all levels implemented by the LLU in agriculture, forestry, veterinary medicine and food technologies, specialise in areas of agricultural labour demand and meet the labour market skills requirements. The curriculum is developed in conjunction with employers in the sector, representatives of public training organisations as well as the State Examination Commission (LLU, 2013). The number of budget-funded seats in agro-food studies is consistent with the MoA calculations, which are based on labour market demand for agricultural sector specialists. In the academic year 2017/18, LLU has 634 budget-funded places in the agro-food sector, of which 470 places are allocated for bachelor studies, 147 for master studies and 17 for PhD studies.

Lifelong learning in the agricultural sector

In Latvia, the adult education policy is set out in the Education Development Guidelines for 2014-20. The Guidelines determine the course of action for the provision of qualitative and inclusive education. In parallel with these Guidelines, a number of other

policy and planning documents, both at national and European level determine the directions of education development (Parliament, 2014):

- The Growth Model of Latvia: A Person in the First Place is the long-term vision document that defines a human-centred growth model of Latvia emphasising knowledge and skills and their use as a growth resource.
- The Sustainable Development Strategy of Latvia until 2030 (Latvia 2030) is the hierarchically highest national level long-term development planning document, which commands a paradigm shift in education.
- Latvia's NDP 2020 is the hierarchically highest national medium-term development planning document that sets the medium-term priorities in the field of education and science, with emphasis on the development of competencies, research, innovation and higher education.
- Latvia's National Reform Programme for the Implementation of the EU 2020 Strategy defines the principle of lifelong learning, and proposes a number of structural changes and modernisation efforts to develop Latvia's scientific potential.
- The Inclusive Employment Guidelines for 2015-2020 promotes the level of education of the workforce and competitiveness in the labour market, with a particular focus on unemployed people who are not able to find work due to insufficient education. The Concept of Development of Latvian Higher Education and Higher Education Institutions for 2013-20 focus on the education quality assessment discussions with industry representatives in order to agree on a common vision on the most important issues.
- The Adult Education Management Model Implementation Plan for 2016-20 approved in 2016 sees to ensure access to quality education regardless of age, gender, previous education, place of residence, income level, ethnic origin and physical or mental condition. It is co-ordinated and monitored by an inter-sectoral consultative institution – the Adult Education Management Council. The Council consists of representatives from ministries involved in adult education and other organisations, as well as representatives from social and co-operation partners.

The Lifelong-learning Centre of LLU provides continuing education and professional development courses in agriculture, food technology, veterinary medicine and environment. The number of participants fluctuates depending on demand. The high demand of the agriculture and food production sector determined the growing interest in continuing education and professional development courses in 2013/14 (23 and 9) and 2016/17 (49 and 6) respectively. On average, 77% of course participants have graduated in agriculture related training.

As part of its activities in supporting the unemployed and jobseekers, the SEA offers both vocational and upskilling training programmes relevant to the agricultural (SEA).

Latvian Rural Advisory and Training Centre

The LLKC is a leading agricultural and rural business advisory service in Latvia with offices in 26 cities and towns. It provides advice and services related to production processes in crop and livestock farming, in forestry and fisheries industries as well as accounting and business planning to rural entrepreneurs and organisations. The LLKC

was founded in 1991. Its budget depends on the MoA (99% of shares) and the Latvian Farmers' Federation (1% of the shares). The strategic objectives of the Centre are as follows:

- promotion of rural development through raising the professional and economic knowledge of rural entrepreneurs;
- provision of organisation services for farm advice and training in all regions of Latvia;
- increase of competitiveness of the rural population in the European Union;
- provision of lifelong learning courses for employees working in institutions under the governance of the MoA.

The main task of the Centre is to inform the rural population about current developments in the agricultural sector. The Centre provides information relating to EU management requirements, best agricultural practices and environmental requirements on farms as well as information on support instruments. The Centre also collects information on agricultural and rural development indicators in the rural area of Latvia.

The LLKC acts as a bridge for co-operation between entrepreneurs, organisations, administration, education and research institutions, and the population representing different rural sectors. In addition, the Centre provides best practices to promote process efficiency, productivity and product quality enhancement, management of natural resources, and support for short food chains.

The lifelong learning programme offers participants with different initial education (basic, secondary, special, higher non-agricultural as well as agricultural).lifelong learning opportunities. Professional development programmes offer farmers and rural people the opportunity to retrain and develop a level of professional competence.

In addition to distance learning and webinars organised for young farmers, the Centre offers online or onsite training programmes and the possibility of live events broadcasting and other training courses and workshops for stakeholders.

The Centre and the LLU co-operate to provide on-the-job-training opportunities for LLU students, to develop joint training programmes and to provide consultation services. The Centre specialists participate at international scientific conferences held by LLU and have co-publications with the university researchers.

In 2016, the LLKC in co-operation with the LLU launched a training project, within the RDP 2014-20 Knowledge transfer measure, that offers training in four fields: agriculture, food products (except fishery products), forestry and co-operation. In 2016, the LLKC provided training in distance education in organic farming, distance learning in business basics and other specific agriculture related training courses (LLKC, 2017).

The Centre implements two accredited education programmes on "Basics of agriculture" and "Organic farming". Professional development courses include transportation of animals within the European Union, training for trade advisors for plant protection products, training for animal breeding specialists, training for milk sampling specialists, and animal welfare requirements for slaughter.

5.4. Summary

- Urban settlements host more than two-thirds of the Latvian population. They are endowed with better infrastructures and services than rural areas.
- Overall, the quality of transport infrastructures is below the OECD average and while port and air transport infrastructures come close, the gap is wider for railroad infrastructure and widens even more for road infrastructure.
- The port facilities are well developed and Riga airport is the biggest in the Baltic region. The rail system operates on a gauge railway line that seamlessly connects to neighbouring Baltic States and CIS countries, thus facilitating eastbound communications. Investments are planned to better connect it to the EU rail network.
- Road transport infrastructures serve urban areas better and are less developed in rural areas. Urban areas also benefit from better electricity and telecoms infrastructures. Whereas access to mobile phone coverage and internet services in rural areas comes close to urban levels.
- The storage capacity is insufficient to absorb the robust cereals production growth and increased export volumes.
- Labour market efficiency in Latvia is close to the average OECD and EU levels. Hourly labour costs in Latvia are comparable to Lithuania and Poland and well below the EU28 average.
- Labour regulation facilitates seasonal work.
- Labour taxation has been reduced. Further reduction would benefit employment, reduce the share of informality and possibly slow young workers' emigration.
- There is a high demand for skills in the whole economy, including food and agriculture. The employment rate is above the OECD and the EU average rates although unemployment is higher in rural areas.
- Latvia's education system consists of eight levels of education: from pre-school to higher education. Multiple demographic factors have contributed to the decline of student enrolment numbers in recent years; such as low birth rates, rural-to-urban migration and emigration.
- Overall, educational attainment is above the OECD and the EU averages and a higher share of the population has upper secondary or post-secondary non-tertiary education.
- At tertiary level, Latvia's attainment rate is slightly below the OECD average level. In particular, the share of Latvia's tertiary educated students in the STEM fields has been below the OECD and the EU average rates. However, more students have chosen STEM fields since 2015.
- Adult participation in training has increased significantly although from low levels and mostly in non-formal education. Measures that ensure the availability, accessibility and affordability of lifelong development opportunities both in qualifying and non-formal education should be strengthened.

- The agricultural education system is integrated into the general system and available at vocational and higher levels. It aims to respond to skills demand by adapting curricula, despite the overall decreasing number of students. Non-formal agricultural education opportunities also exist.
- Agriculture attracts a larger share of students today than it did in 2009/10. Agricultural students account for 1.8% of HEI and college students (1.1% in 2009/10) and 3.6% of students in tertiary education and vocational schools (2.7% in 2009/10).

Notes

[1] More information on EU Structural and Investment funds expenditure in Latvia can be found in https://cohesiondata.ec.europa.eu/countries/LV.

[2] http://www.rop.lv/en/for-clients-a-investors/laws-and-regulations/1020-law-on-application-of-taxes-in-free-ports-and-special-economic-zones

[3] A parish is the smallest official unit of territorial division in Latvia.

[4] Europe 2020, "A strategy for smart, sustainable and inclusive growth", https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:52010DC2020.

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Chapter 6. Agricultural policy framework

This chapter provides an overview of the agricultural policy framework and instruments. It gives an account of the EU Common Agricultural Policy (CAP) measures and their implementation in Latvia and also of Latvia's national policies and budget expenditure for agriculture. The chapter then reports trends on the level and composition of payments to producers and expenditure on general services to the sector. Finally, it discusses the likely policy impact on structural change, innovation, productivity growth and sustainability performance.

6.1. Overview

Since the accession of Latvia to the European Union in 2004, agricultural and rural development policy is implemented in accordance with the legislative provisions of the Common Agricultural Policy (CAP), taking into account the specific needs of Latvia. In the programming period 2014-20, the CAP Pillar 1, financed from the European Agricultural Guarantee Fund (EAGF), covers direct payments and market measures. By means of the CAP Pillar 2, the rural development support measures are being financed from the European Agricultural Fund for Rural Development (EAFRD) with national co-financing. Their implementation is ensured in compliance with measures of Latvia's national Rural Development Programme. Other sectoral development plans and climate change strategies are relevant to agricultural and rural development. They are summarised in Box 6.3.

6.2. Broad-based domestic measures

In Latvia, CAP direct payments have been available for farmers since 2004. The new system of direct payments, introduced by the CAP 2014-20 increases EU Member States' flexibility in the management and use of their allocated resources.

About half of Latvia's direct payments are channelled through the SAPS (Figure 6.1). Currently, eligibility depends on agricultural land that complies with the definition of arable land, permanent grassland and permanent crops and that has been maintained in a state suitable for grazing or cultivation (Box 6.1). In 2017, with a calculated average support of EUR 108 per hectare, Latvia ranks lowest among EU Member States and compares to the EU28 average of EUR 232 per hectare (Figure 6.7).

In addition to the broad based mandatory measures, Latvia opted for several new choice payments. These include the small farmers' support scheme and commodity specific coupled support, introduced in 2015. Thus, since 2015, in Latvia the direct payments are implemented as follows (Figure 6.1 and Box 6.1):

- The mandatory Single Area Payment (SAP) scheme is extended until 31 December 2020. It offers a uniform support rate per ha[1] of agricultural land to every farmer who maintains the land in a condition suitable for growing crops and grazing.
- The mandatory greening payment makes up 30% of the direct payments budget under Pillar 1. The greening payment is provided conditional on the implementation of three farming practices.
- The mandatory payment for young farmers.
- Among choice measures, Latvia has opted to support specific commodity sectors and offers 15% of the direct payments envelope to Voluntary Coupled Support (VCS) to thirteen commodity sectors (Table 6.1) with an overall budgetary envelope of EUR 35 million in 2017. Increases in the per unit payment rates of the VCS are announced.
- Latvia has also opted for the small farmers' payment scheme.

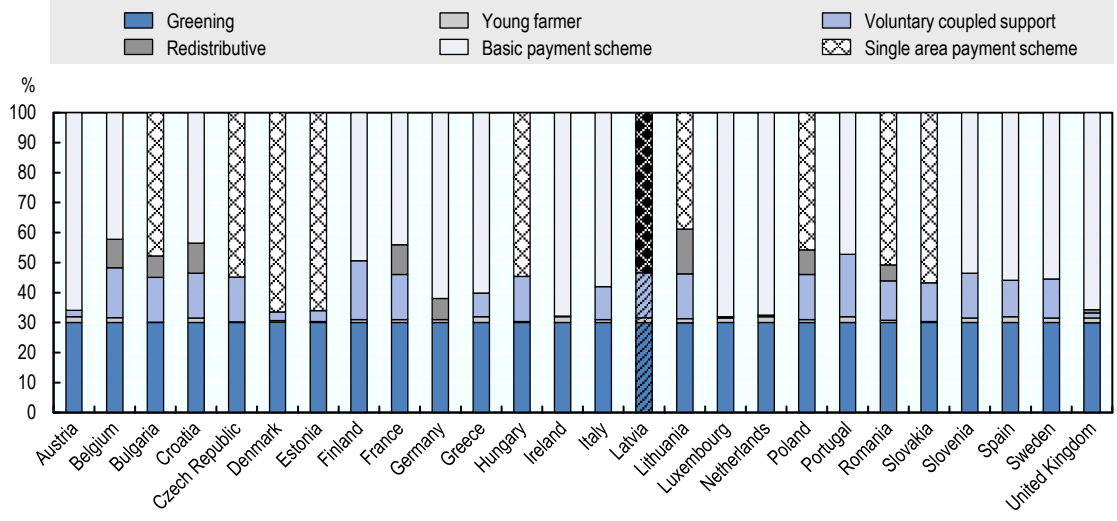
Table 6.1. Rates of direct payments in Latvia, 2017 and 2020

Direct payment schemes	Payment schemes		Budget 2017, EUR
	2017	2020*	
SAPS**	70 EUR/ha	93 EUR/ha	126 737 350
Greening payment	41 EUR/ha	55 EUR/ha	69 129 000
VCS for dairy cows	169 EUR/animals	224 EUR/animals	17 163 906
VCS for goats	57 EUR/animals	57 EUR/animals	120 954
VCS for bovine	75 EUR/animals	128 EUR/animals	4 136 679
VCS for sheep	23 EUR/animals	27 EUR/animals	554 510
VCS for starch potatoes	298 EUR/ha	324 EUR/ha	207 146
VCS for certified cereal seed	59 EUR/ha	59 EUR/ha	730 833
VCS for certified seed of grasses and fodder crops	66 EUR/ha	66 EUR/ha	291 392
VCS for certified seed potatoes	429 EUR/ha	429 EUR/ha	160 218
VCS for spring rape and turnip rape	37 EUR/ha	37 EUR/ha	1 003 315
VCS for vegetables	496 EUR/ha	615 EUR/ha	1 433 896
VCS for fruits and berries	135 EUR/ha	167 EUR/ha	870 414
VCS for protein crops	54 EUR/ha	70 EUR/ha	4 608 620
VCS for barley	43 EUR/ha	51 EUR/ha	3 282 767

Notes: *Provisional rates. ** Including amounts of payment for young farmers and small farmers' scheme.
Source: Based on RSS (2017a), EC (2015a), and EC (2015b).

StatLink https://doi.org/10.1787/888933914689

Figure 6.1. Distribution of funds amongst the direct payment schemes (excluding the small farmers' scheme), 2016



Note: Countries are ranked in alphabetical order.
Source: Based on EC (2016b), Direct payments 2015-20. Decisions taken by Member States: State of play as at June 2016.

StatLink https://doi.org/10.1787/888933914214

The mandatory direct payment for young farmers was introduced by the CAP 2014-20. It is attributed to natural and legal persons who set-up a farm for the first time. It adds to the SAP support payment and is limited to the first 90 ha. In 2017, 2 700 farms qualified for

the young farmers' scheme; 4.6% of all farms that applied for SAPS. The payment rate was constant at EUR 42.2 per hectare until 2017. Starting from 2018 it is fixed as 35% of the national average of all direct payments per ha in 2019.[2] The maximum duration of payments is five years.

The small farmers' support scheme has been implemented by 15 EU Member States, including Latvia. Implementation of the scheme is flexible and two EU Member States (Latvia and Portugal) have chosen to grant a lump sum payment to all applicants. In Latvia, the scheme is a simplified annual lump sum payment of EUR 500 per farm, and substitutes other EU direct payments. Farmers who own or legally possess at least 1 ha of land that conforms to the agricultural land criteria as defined above are eligible. There is no maximum area threshold. In 2016, 25.5% of the total number of applicants for direct payments participated in the small farmers' scheme (EU, 2017c). The cultivated land area amounted to 2.3% of the total area declared for CAP support. The enrolment of farmers in the small farmers' support scheme was completed in 2015 and no new entrants can apply.

Box 6.1. Summary eligibility conditions for direct payments

Conditions apply that determine farmer eligibility to CAP direct payments. Some conditions are uniform EU-wide while Member States are offered flexibility in implementation criteria as to others.

Criteria	Conditions and requirements
All beneficiaries, with exemption of those who participate in the small farmers' support scheme	Cross-compliance Greening requirements: maintenance of permanent grasslands
Arable land 10 ha and more	Greening requirements: crop diversification in addition to conditions above
Arable land 15 ha and more	Greening requirements: crop diversification plus maintenance of an EFA in addition to conditions above
Direct payments above EUR 2 000	Reduction of financial discipline
SAP above EUR 150 000	Reduction of payments above the threshold by 5%
Direct payments EUR 5 000 and more	Conditions for active farmer (discontinued in 2018)

Source: Based on MoA (2014a) and RSS (2017b).

The greening support payment is conditional to three agricultural practices:

- Crop diversification. Depending on farm area, farmers are required to grow one to three different crops.
- Defining an ecological focus area (EFA). Latvia applies the so called "forest exemption" together with three other EU Member States. The EFA requirement does not apply in parishes where forest covers more than 50% of the total land surface and the forest to agricultural land ratio exceeds 3 to 1. As a result, approximately 9% of the agriculture area is exempt from the EFA.
- Maintenance of the existing permanent grasslands and non-conversion of environmentally sensitive permanent grasslands. Irrespective of the size of the area, farmers are not allowed to plough or modify permanent grasslands that have been identified as protected environmentally sensitive grasslands (grassland habitats of significance for the EU or bird habitats). The requirement for reconversion of the permanent grasslands at individual level is activated only when the ratio of areas of permanent grassland to the total agricultural area at the national level decreases by more than 5% compared to a reference ratio.

A linear reduction, the **financial discipline**, applies to all EU direct payments above EUR 2 000

(EU, 2016a). In 2016, in Latvia, the financial discipline applied to almost 30% of applicants for the direct payments, reducing only 1% of the total amount of the direct payments at the national level.

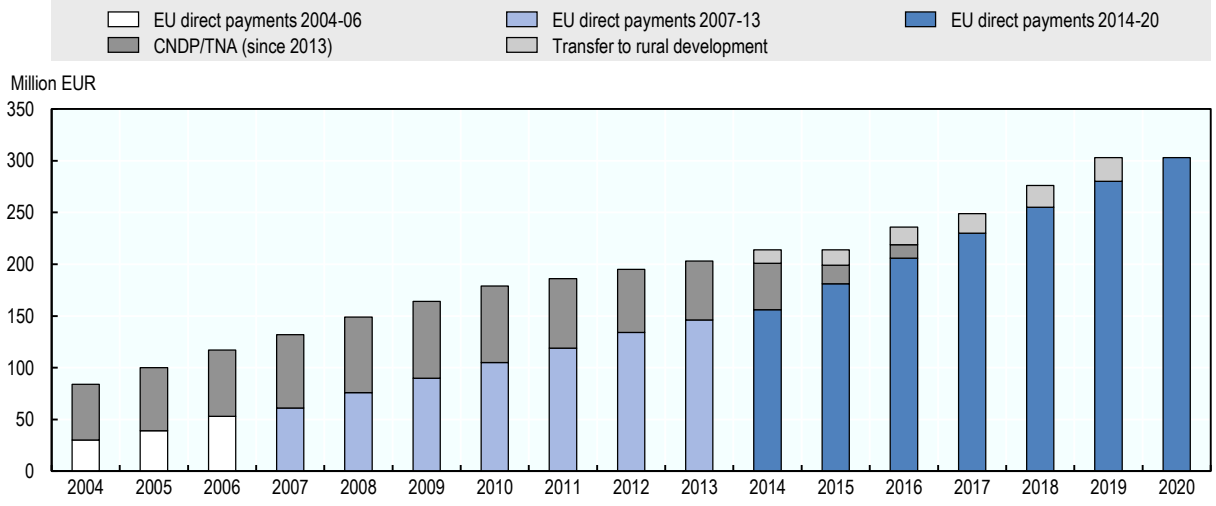
EU Member States are required to apply a minimum 5% reduction to single area payments in excess of EUR 150 000. Latvia, together with 15 other EU Member States, has chosen to apply the minimum requirement and to deduct labour costs (wages and taxes) paid in the preceding calendar year. In 2016, the reduction applied to 13 SAP beneficiaries.

From 2018, EU Member States can choose whether to limit payments to active farmers. Latvia, together with 18 other EU Member States has discontinued the active farmer condition.

Latvia has used the opportunity provided by Regulation No 1307/2013, to transfer funds between the two Pillars of the CAP and has transferred 7.46% of the direct payments envelope in Pillar 1 to the rural development measures in Pillar 2. By doing so Latvia compensated the reduction by 8% of EU funding of rural development for 2014-20. Pillar 1 payments are typically broad based while farm support in Pillar 2 includes farmer elected investment and conversion scheme through multi-year contracts among other schemes. These schemes bear the potential to impact farm productivity and competitiveness (Table 6.4).

Since the accession of Latvia to the European Union, the total amount of direct payments has grown considerably. Overall, in the period from 2004 to 2020, the amount of direct payments paid will reach EUR 3.2 billion of which 77% are EU funded direct payments. In the programing period 2014-20, EUR 1.7 billion will be available for farmers in Latvia in the form of direct payments (European Union and Latvia) (Figure 6.2).

Figure 6.2. Direct payments in Latvia, 2004 to 2020



Source: Based on MoA (2015) and MoA (2017b).

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As part of the transition to the CAP at the time of EU accession, Latvian farmers were attributed complementary national direct payments (CNDP) both for cultivated areas and agricultural animals (sheep, suckler cows and slaughtered bovine animals) and for marketed milk. Up to 2006, the complementary national direct payments were entirely output related. They stimulated production in certain sectors. Since 2007, a gradual decoupling of the CNDP from output was started. Since 2007, the payments for milk were fully decoupled and in 2009, the CNDP was fully decoupled in most sectors, except for suckler cows and ewes. From 2013, the transitional national aid (TNA) replaced the CNDP. The TNA is based on past sectoral benefits with no obligation to produce. At the choice of Member States, the TNA can be granted until 2020 and its amount is gradually reduced (OECD, 2017a). In 2017 and 2018, Latvia chose not to pay TNA for lack of public finance. The main objective of the CNDP and TNA for Latvia is to bring the level of support closer to the average EU direct payment level.

Based on MoA calculations, the average level of direct payments has increased from EUR 24 per ha in 2004 to EUR 131 per ha in 2016; about half the EU average of EUR 267 per ha in 2017 (EU, 2018). As a result of external convergence under the CAP 2014-20, the distribution of the support among Member States and regions gradually changes to reduce the gaps in the levels of support received by farmers in Member States. For the Member States which receive less than 90% of the EU average level of support, from 2015 the amount of payments is gradually increased, with a target per hectare payment of EUR 196 in 2020 (OECD, 2015b). However it is estimated that, as a consequence of the increase of the eligible area, combined with Latvia's choice measures[3] and the fixed Pillar 1 budget envelope, this target will not be reached in 2020 and the MoA estimates that the average direct payments level will be less than EUR 182 per ha.

6.3. Support to specific sectors

The VCS is the most important commodity specific support. It uses 15% of Latvia's direct payments envelope, a large part of which is captured by the bovine sector (both meat and dairy). Vegetables and seed potatoes receive the highest payments per hectares cultivated under crops. The VCS is also used to support the use of certified seeds of cereals, potatoes and grasses and fodder crops. The VCS attracts production to supported sectors and distorts the allocation of resources. As shown in an analytical exercise done with the CAPRI model, production increases in sectors receiving the VCS, thereby depressing producer prices and increasing pressure on resources and the environment (OECD, 2017b).

Latvia also implements the CAP voluntary schemes for the consumption in schools of fresh fruit, vegetables and milk. Up to July 2017, the "School milk" and "School fruit" programmes ran separately, as of August 2017 they run jointly as the "EU school scheme".

Under the "School milk" programme, implemented since 2004/05, children in pre-schools and schools have consumed about 30 million tonnes of milk and dairy products. Support paid within the programme amounts to EUR 17.94 million, including EUR 5.01 million (28%) of EU support. A national top-up to the programme budget was granted, providing for heat-treated milk with no sugar, flavourings and other additives, to be supplied free of charge to children in pre-schools and grades 1 to 9. Adjustments are made for older school children and other dairy products.

The "School fruit" programme implemented since 2010/11 covered 91% of children in grades 1-9. Under the programme 4 528 tonnes of fruits and vegetables were consumed in total and the support paid within the programme amounts to EUR 7 million, of which 75% is EU financing. Within the programme, fresh fruits and vegetables are supplied free of charge to school children. Schools, schools' catering companies, local municipalities or producers of fruit and vegetables can apply for aid under the "School fruit" programme in Latvia.

In the period from 2004 to 2016, market intervention was available in Latvia for the purchase of the following products:

- In 2004-10 a total of 78 211 tonnes of grain and 414 tonnes of butter were purchased into public intervention.
- In 2015-17 a total 5 154 tonnes of skimmed milk were purchased into public intervention and the stocks have not yet been disposed of.
- Currently, there are no intervention stocks of butter and grain in Latvia.

Support for the private storage of products:

- In 2005/14, contracts were concluded for private storage of 114 tonnes of long-keeping cheese.
- In 2015/16 contracts were concluded for private storage of 1 463 tonnes of skimmed milk powder.
- The support for private storage of butter and pork has not been used in Latvia.

In the period from 1 May 2004 to 31 March 2015, a system of milk production quota was operated throughout the European Union, including Latvia.

The EU temporary exceptional support for the livestock sector was granted several times during 2014-16, first as a response to the imports embargo introduced by the Russian Federation and subsequently as a mitigating tool against global dairy market disturbances. During this period, Latvian milk producers and owners of pig herds respectively received EUR 26 million and EUR 6 million of complementary national top-up.

The EU exceptional support for the fruit and vegetable sector was introduced in 2014 to mitigate the decrease in producers' income resulting from the Russian embargo. However, in 2015-16, fruit and vegetable prices were high and the amount paid out until now is only EUR 19 000. The support continued in 2017.

The EU support for producer groups and organisations in the sector of fruits and vegetables is made available for professional producer groups as well as agricultural and food industry structures, focusing on the provision of information and promotion of trade in agricultural products, developing and submitting agricultural product promotion programmes. Starting from 2016, the European Commission accepts, evaluates and makes a decision on granting or denying of the EU financing.

Box 6.2. Food quality schemes

EU and national quality schemes have been introduced to promote quality-food production in Latvia. These include:

1. Organic Agriculture scheme
2. Protected Geographical Indication scheme
3. Protected Designation of Origin scheme
4. Traditional Specialty Guaranteed scheme
5. National Food Quality Scheme

Besides the production of organic foods (Sections 2.3 and 6.3), Latvia implements EU and national food quality schemes.

Latvia takes part in the European Union wide schemes for agricultural and food products. These may be registered as Protected Geographical Indication (PGI), as Protected Designations of Origin (PDO) and as Traditional Specialty Guaranteed (TSG). The "Carnikavas nēģi" and the "Rucavas baltais sviests" are registered as PGI. The "Latvijas lielie pelēkie zirņi" is registered as PDO and the "Sklandrausis", "Jāņu siers", "Salināta rudzu rupmaize" are registered as TSG.

Along with the EU food quality schemes, Latvia has a national food quality scheme (NFQS). Under the NFQS all stages of the food chain can be traced, the product manufacturer is certified according to the NFQS criteria and the requirements of the final product is in retail or direct delivery of the final consumer. The NFQS products are identified by two logos.

Higher quality products and at least 75% of the raw materials has been obtained in a single country or region (one EU Member State or region), specified on the logo.	Higher quality products produced in full in a single country or region (one EU Member State or region), specified on the logo.

Products of NFQS cover a vast, well-recognisable assortment of products. Late in 2017, the NFQS had 152 participants covering more than 700 products. It provides the possibility for producers to produce and for consumers to receive higher quality products, which exceed the general standard of commercial products. In Latvia NFQS is recognized by two logos "Qualitative product" "Green Spoon" and "Bordeaux spoon". NFQS is open to all operators.

Source: MoA NFQS, 2018.

Several CAP instruments promote EU agricultural products both in the EU single-market and in third countries. The programmes can be developed on themes linked to food quality, safety and labelling to promote the high quality level of European food. In the period from 2005 to 2016, Latvia participated in eight programmes promoting biological products, milk products, honey, fruits and berries and ornamental plants with an overall budget of EUR 4 million. A new EU agriculture promotion campaign was started in December 2015 with the slogan "Enjoy, it's from Europe". Under the new promotion campaign two programmes from Latvia were granted an EU contribution for 80% of their total budget. The Latvian Central Dairy Committee's "TasteMilk" promotes Latvian dairy products in the People's Republic of China, the United Arab Emirates, the United States, Azerbaijan, Israel and Iraq. The total budget of the programme is EUR 3 million. The Irish Latvian Chamber of Commerce in 2018 launched a promotion programme of chocolate and confectionery in the United States and Canada "Sweet to States" with a total budget of EUR 1.3 million.

Box 6.3. Sectoral development plans and climate change strategy

The Development plan for the Latvian **milk sector** until 2020 covers the improved productivity and quality of milk production, processing and marketing milk into high value added and niche milk products and training of milk sector experts. Various EU and national support measures are mobilised to implement the strategy (MoA, 2012).

The Latvian **Bioeconomy** Strategy 2030 emphasises the significance of bioeconomy in the national economy and its role in addressing issues such as global food security, dependency on fossil energy resources and climate change. The Bioeconomy Strategy expands beyond the traditional bioeconomy sectors – agriculture and forestry (both equally important in the national economy), fisheries and aquaculture, food and wood industries, to new bioeconomy sectors such as chemical, pharmaceutical and textile industries. The strategy aims to stabilise employment in the bioeconomy at 128 000 people in 2015, to increase the sector's value added from EUR 2.33 billion in 2016 to over EUR 3.8 billion in 2030, and to increase exports from EUR 4.26 billion in 2016 to over EUR 9 billion in 2030 (MoA, 2016).

The Environmental Policy Guidelines 2014-2020 lay down general policy objectives for **climate change** – to ensure Latvia's contribution toward the mitigation of global climate changes and to facilitate Latvia's readiness to adjust to climate change and its impacts. The policy guidelines set a total emissions target of 12.16 Mt CO_2 equivalent by 2020. Measures implemented include the introduction of a low carbon economy, of sustainable management practices into agriculture and facilitating the production and the use of sustainable biomass in energy production by attracting national and EU financing. The MoEPRD implements a monitoring system to assess progress towards the target.

Research is underway on the "Analysis of GHG emissions from the agricultural sector and Economic assessment of GHG emissions mitigation measures". In addition, EU Member States report to the Commission on their current and future LULUCF actions to limit or reduce emissions and maintain or increase removals and storage. In 2016, Latvia prepared and submitted a progress report to the European Commission. As foreseen by EU decisions, Latvia has developed a crop- and grazing-management monitoring and reporting system.

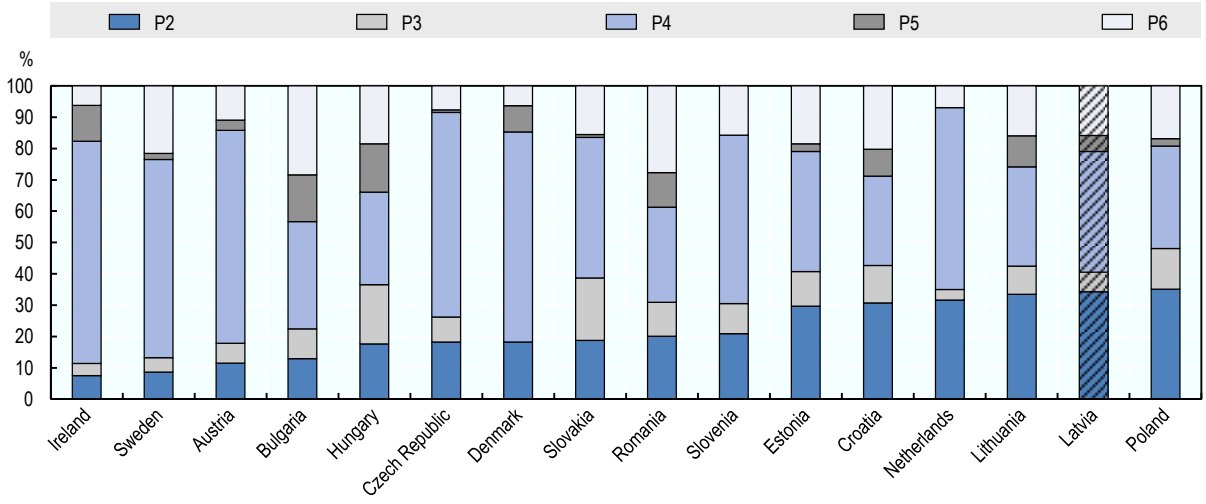
Latvia joined the international initiative "4 per 1 000: soils for food security and climate" in 2016. The initiative aims to increase the content of organic matter in soils and to facilitate their carbon uptake through agricultural activities that are adapted to local conditions. To reach this target, Latvia developed a digital soil database with support from the European Economic Area Financial

Mechanism. Work on generalising agricultural soil information and updating is ongoing. Latvia plans to establish a national soil information system that would be based on the digital soil database.

6.4. Measures targeting specific issues

Latvia's Rural Development Programme (RDP) defines the EU and national budget allocations to agriculture and rural development. Under the six CAP rural development priorities, Latvia has opted for the implementation of 16 support measures deemed to improve the competitiveness of farms and the management of ecosystems (Priorities P2 and P4 with respectively 34% and 39% of the total financing available in the programming period) (Table 6.2; Figure 6.3).

Figure 6.3. RDP expenditure by priorities in selected EU Member States



Notes: RDP expenditure over 2014-20, includes MS co-financing. There are six EU rural development priorities: P1 – Knowledge and innovation (is attributed throughout all priorities), P2 – Competitiveness, P3 – Food chain, P4 – Ecosystem management, P5 – Resource efficiency, climate change, P6 – Social inclusion, local development. Countries are ranked based on the share of Priority 2 expenditure (Competitiveness) in their total RDP expenditure.
Source: Based on EC (2017e), Rural development 2014-2020: Country files.

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One-third of the total RDP budget is earmarked for investments (Table 6.2). Support to areas facing natural constraints receives the second largest envelope (17% of RDP expenditure). The development and maintenance of organic agriculture (9%) and providing basic services in rural areas (8%) rank third and fourth in the total RPD expenditure.

Measures incorporated in the CAP RDP 2014-20 are described in detail in Box 6.4. In 2015-16, the implementation of the support measures was started (except the support for advisory services within the measure M02 and support for co-operation within measure M16) and overall EUR 201 million has already been utilised.

Table 6.2. Indicative budget of Latvian RDP 2014-2020

Million EUR

Measures	Priorities*						Technical assistance	Total	% of total
	P1: Knowledge and innovation*	P2: Competitive-ness	P3: Food chain	P4: Ecosystem management	P5: Resource efficiency, climate change	P6: Social inclusion, local development			
M01 - Knowledge		6.7		6.7				13.4	0.9
M02 - Advisory services		3.1		7.3				10.4	0.7
M04 - Investments		432.2	75.7		11.3			519.2	33.4
M05 - Restoring agricultural production potential damaged by natural disasters			5.0		16.4			21.4	1.4
M06 - Farm development		48.7			16.0	30.5		95.2	6.1
M07 - Basic services						126.6		126.6	8.2
M08 - Forest				5.6	31.3			36.9	2.4
M09 - Producer groups			2.8					2.8	0.2
M10 - Environment				111.6				111.6	7.2
M11 - Organic farming				151.9				151.9	9.8
M12 - Natura				24.1				24.1	1.6
M13 - ANC				267.5				267.5	17.2
M16 - Co-operation		19.7						19.7	1.3
M17 - Risk management			10.0					10.0	0.6
M19 - LEADER						79.1		79.1	5.1
M20 - Technical assistance							63.3	63.3	4.1
Total	**510.3**	**93.4**	**574.6**	**75.1**	**236.3**	**63.3**	**1553.0**	100.0	
% of total	32.9	6.0	37.0	4.8	15.2	4.1			

Note: Priority 1, Knowledge and innovation, is attributed throughout all priorities.
Source: Based on EC (2017e), Rural development 2014-2020: Country files (Latvia).

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Box 6.4. List of RDP 2014-20 measures

M01 Knowledge transfer and information actions
1.1. Support for vocational training and skills acquisition
1.2. Support for demonstration activities and information actions
1.3. Support for farm and forest visits

M02 Advisory services, farm management and farm relief services
2.1. Support to help benefiting from the use of advisory services

M04 Investments in physical assets
4.1. Support for investments in agricultural holdings
4.2. Support for investments in processing
4.3. Support for investments in the development of agricultural and forestry infrastructure

M05 Restoring agricultural production potential damaged by natural disasters and introduction of appropriate prevention
5.1. Support for investments in preventive actions aimed at reducing the consequences of epizooty and epiphytoty
5.2. Support for investments in restoring agricultural production potential damaged by epizooty and epiphytoty

M06 Farm and business development
6.1. Business start-up aid for young farmers
6.3. Business start-up aid for the development of small farms
6.4. Support for investments in creation and development of non-agricultural activities
M07 Basic services and village renewal in rural areas
7.2. Basic services and village renewal in rural areas

M08 Investments in forest area development and improvement of the viability of forests
8.1. Support for afforestation, supplementing partially overgrown agricultural land and their tending. Afforestation and tending
8.3./8.4. Support for prevention and restoration of damage to forests from forest fires and natural disasters and catastrophic events
8.5. Support for investment in improving the resilience and environmental value of forest ecosystems

M09 Setting up of producer groups and organisations
9.1. Setting up of producer groups and organisations

M10 Agri-environment and climate
10.1. Payment for agri-environment and climate commitments
10.1.1. Maintaining of biological diversity of grasslands
10.1.2. Application of environmentally friendly practices in horticulture
10.1.3. Stubble field in winter
10.1.4. Development of conservation environment by growing nectar plants

M11 Organic farming
11.1. Payment to convert to organic farming practices and methods
11.2. Development of organic farming

M12 12.2. Natura 2000 and Water Framework Directive payments

M13 Payments to areas facing natural or other specific constraints
13.2. Compensation payment for other areas facing significant natural constraints

13.3. Compensation payments to other areas affected by specific constraints

M16 Co-operation
16.1. Support for the establishment and operation of operational groups of the EIP for agricultural productivity and sustainability
16.2. Support for the development of new products, practices, processes and technologies
16.3. Support for the development of rural tourism

M17 17.1. Crop, animal and plant insurance premium

M19 Support for LEADER local development (CLLD – community led local development)
19.1. Support for preparation
19.2. Support for implementation of operation under the CLLD
19.3. Support for inter-territorial and transnational co-operation
19.4. Support for running costs of local activity group and animation of the territory

M20 Technical assistance.

By the end of the programming period 2007-13, an *ex-post* evaluation of the Rural Development Programme 2007-13 was carried out (RDP 2007-13) and conclusions and proposals produced by the *ex-post* evaluation were taken into consideration when drawing up the RDP for the new programming period (Box 6.5). For the RDP 2014-20 the *ex-ante* evaluation incorporates context analysis, conformity of programmes, convergence and assessment of results as well as strategic environmental impact.

Box 6.5. Evaluation of Latvia's Rural Development Programme

The RDP 2007-13 *ex post* evaluation, the *ex ante* evaluation of RDP 2014-20 and the RDP 2014-20 chapter on SWOT assess the impact of support measures on innovations, on the sustainable use of resources and on the structural changes in the sector (Latvian State Institute of Agrarian Economics, 2016; Latvian State Institute of Agrarian Economics, 2013a; MoA, 2014b).

With regard to innovations Latvia's ranking is one of the lowest among EU Member States. The major drawback identified is an insufficient co-operation among research institutions and rural entrepreneurs-practitioners who implement research results into practice. The evaluations suggest that the quality of knowledge transfer and advisory services must be improved in order to facilitate the implementation of innovations. This could be done by matching advisory measures to farmers' needs, ensuring access to science, including the latest scientific developments, facilitating their practical implementation and monitoring and evaluating advisory measures.

Farmers and entrepreneurs in other sectors must be provided not only with basic traditional knowledge, training, skill acquisition measures and advisory services, but also with the opportunities for sharing experience and peer learning, such as farm and forest visits. Topics such as economic and environmental management and application of environmentally and climate friendly agricultural and forestry practices and sustainable use of natural resources could be demonstrated.

While Latvia's GHG performance is one of the best among EU Member States, evaluations recommend to continue support to manure storage; organic farming and precision farming. A considerable amount of CO_2 from the atmosphere can be stored in soils by applying different agricultural practices. These must be implemented. Forest management can also contribute to CO_2 sequestration. A rational use of land resources would require to invest in the development of qualitative, more productive and more resistant forest stands and to convert partly overgrown,

low-productivity agricultural land areas into productive forests.

While support for setting up new agricultural businesses facilitates the emerging of young and knowledgeable farmers, the evaluations find that the amount of financing earmarked for the measure is not sufficient to achieve the planned outcome. The measure is forecast to have a low impact on the sector's development and the evaluations recommend to prioritise economically sustainable projects with a higher impact of employment in rural areas.

Support for the development of small farms is assessed as effective. However, eligibility conditions are complicated and require a business plan implemented under the guidance of an adviser. The risk exists of developing ineffective production. Furthermore the amount of available support is not sufficient to restructure the economic activity. The measure would be more effective if resources were flexible in time to enhance more investments in fixed assets.

Support for investments in agriculture, forestry and food processing must prioritise the production of new products and application of new practices and technologies. Rural holdings need support for investments that are linked to farm restructuring, to machinery and diversification, to the acquisition of energy effective equipment and the efficient use of resources. Thus, production efficiency will increase and market risks diminished. To achieve a sustainable use of resources, it is necessary to differentiate the support rates applied to the investment projects, depending on their environmental impact and the volume of innovations.

Sources: Latvian State Institute of Agrarian Economics, 2016; Latvian State Institute of Agrarian Economics, 2013a; MoA, 2014b.

In addition to EU funding, support from the national budget is provided to agriculture under the so-called state aid. The EU Regulation No 702/2014/EU defines categories of state aid in the agricultural and forestry sectors and in rural areas that are compatible with the internal market (EU, 2014).

Under Latvia's Agricultural and Rural Development Law, domestic support instruments include: a) credit; b) taxes; and c) support to producer groups.

Credit support to agriculture is implemented to: 1) acquire current assets needed for agricultural production; 2) acquire agricultural land for the production of agricultural commodities; and 3) provide credit guarantees for a successful implementation of projects within rural development measures (Section 4.3)

Agricultural producers are entitled to several tax exemptions and reduction, including income tax on lower incomes, real estate tax, diesel fuel and natural gas excise taxes, VAT and labour taxes (Section 4.4).

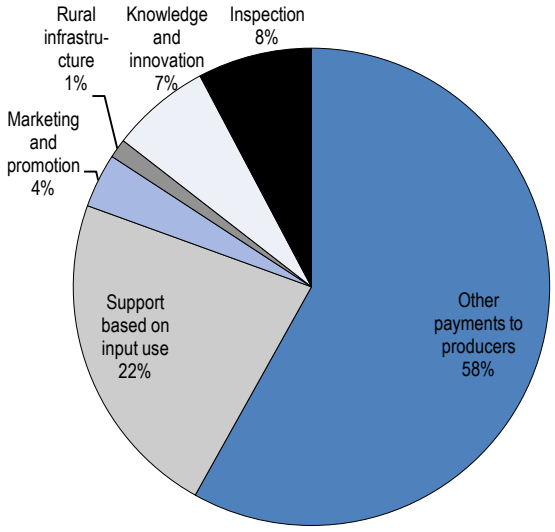
To encourage co-operation, support from the national budget has been attributed to facilitate investments and the establishment of new co-operative companies since 2000. In the period from 2004 to 2016, the total amount of the national support paid was EUR 367 million. Part of it (EUR 72 million or 20%) is classified as general services to the sector in the OECD definition of support from agricultural policy. The major share (40%) is paid to institutions carrying out controls and certification in the sector of agriculture (Figure 6.4).

Funding is also available within measures of the CAP Rural Development Programme. In 2016, the eligible co-operative companies, providing agricultural services, united 4 499 members (farm holdings) with the total turnover EUR 405 million.

Most of national support is delivered to producers, including support based on input use, which includes credit subsidies and diesel fuel excise tax relief of EUR 39 million

(Figure 6.4). During Latvia's EU membership, the amount of support has fluctuated and its composition changed (Figure 6.5).

Figure 6.4. Composition of national support to agriculture in Latvia, 2004-16



Note: Numbers may not add up to 100 due to rounding.
Source: Based on MoA (2017a) and MoA (2017c).

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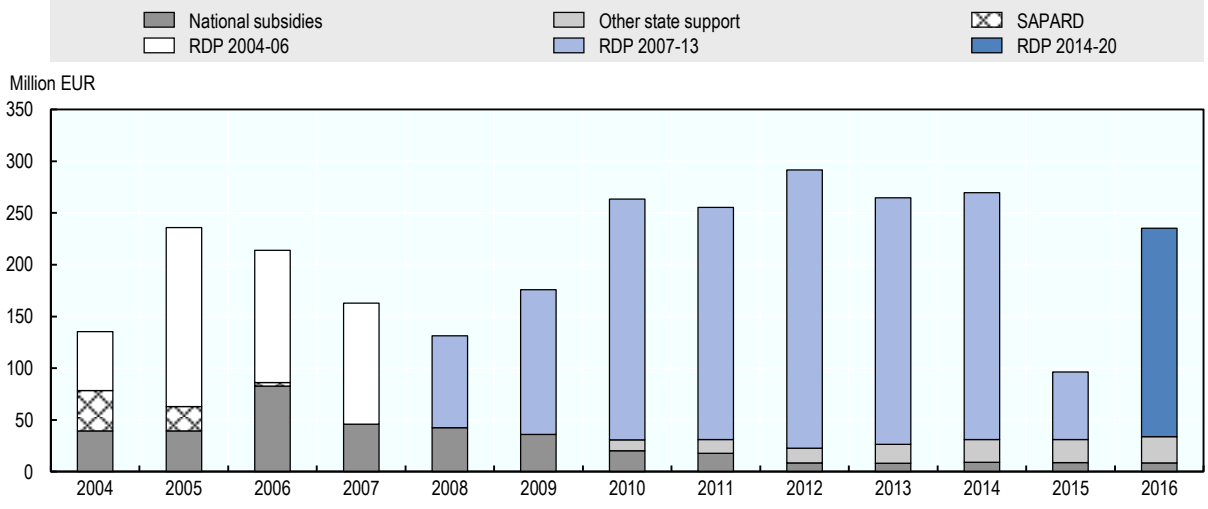
Figure 6.5. Domestic support in Latvia, 2004 to 2016



Source: Based on MoA (2017a), "Annual agriculture reports 2004 to 2017".

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Latvia's RDP supports knowledge transfer and information measure and advisory services. The introduction of innovations also benefits from RDP support to Co-operation (Box 6.3) and to participation in working groups of the European Innovation Partnership

(EIP) (Section 7.5). The measure enables a closer co-operation among producers, advisory and research services, facilitating a wider use of the available innovation measures and a more rapid and wider implementation of new solutions.

In 2008, a new subsidy for insurance policy replaced the previous agri-climatic disaster payments. Support is granted from the national budget to cover 50% of the insurance policy costs of crops and productive agricultural animals. From 2008 to 2016, more than EUR 7 million was paid under this scheme. Within the RDP 2014-20, farmers can receive a compensation to cover the actual costs of insurance policies under the support to "Crop, animal and plant insurance premium".

At the same time, compensation takes place for natural disasters that may discourage farmers to allocate resources to risk management instruments. Latvia has opted for CAP RDP measures aimed at "Restoring agricultural production potential damaged by natural disasters and introduction of appropriate prevention measures". This measure reduces incentives for farmers to engage in on-farm risk management actions.

Under Latvia's RDP, investment support is granted for the diversification to non-agricultural activities and also for the development of rural tourism by encouraging the co-operation between small economic operators (microenterprises) in rural tourism. The production of biogas is no longer proposed in Latvia's RDP 2014-20.

In Latvia, 50% of farm managers are older than 55 years of age and support is provided for business start-ups under the young farmer scheme. Under certain conditions, young farmers receive additional support for investments.

The construction of new barnyard manure storages and the use of precise technologies that ensure reduction in GHG emissions and ammonia emissions are also supported by the RDP 2014-20.

In addition to the agri-environmental measure described in Table 6.3, the tax on natural resources is an important policy instrument (Section 4.4). The natural resources tax applies to emission in the environment of taxable polluting substances. Taxable activities include animal sheds where, animal units are reared for commercial purposes (including storage and use of solid manure, liquid manure, slurry and silage juice as well as collection of drainage of waste water). In vulnerable zones, the tax applies to sheds that house ten and more animals, in vulnerable zones the number is brought down to five.

In the period after Latvia's accession to the European Union, a considerable increase in output quantity and value and productivity was achieved in agriculture. Farm income is heavily dependent on support, the mean share of support in the income in 2004-16 was 67% (Figure 6.6).

In 2017, in Latvia, the amount of support under CAP measures paid in agriculture reached EUR 343 million, 52% through direct payments and 45% for rural development, the latter has a higher share than in most other EU Member States (i.e. 30%) (Figure 6.7).

Table 6.3. Agri-environmental measures in Latvia's RDP

Support measure	Type of support	Proportion in total area declared for SAP in 2016, %	Support rates, EUR per ha
Maintaining of biological diversity of grasslands	Compensation of foregone income and additional costs linked to fulfilment of the commitments	2	55; 83-330
Application of environmentally friendly practices in horticulture		0.3	74-364
Stubble field in winter		5	87
Development of conservation environment by growing nectar plants		-	89
Organic farming	Partial compensation of foregone income and additional costs linked to the commitments, undertaken when converting to organic farming or maintaining organic farming practices.	16	97-485
Natura 2000 in forest territories	Compensation of foregone income and additional costs linked to fulfilment of the commitments and constraints laid down for Natura 2000 territories	2	45-160

Source: Based on MoA (2014b).

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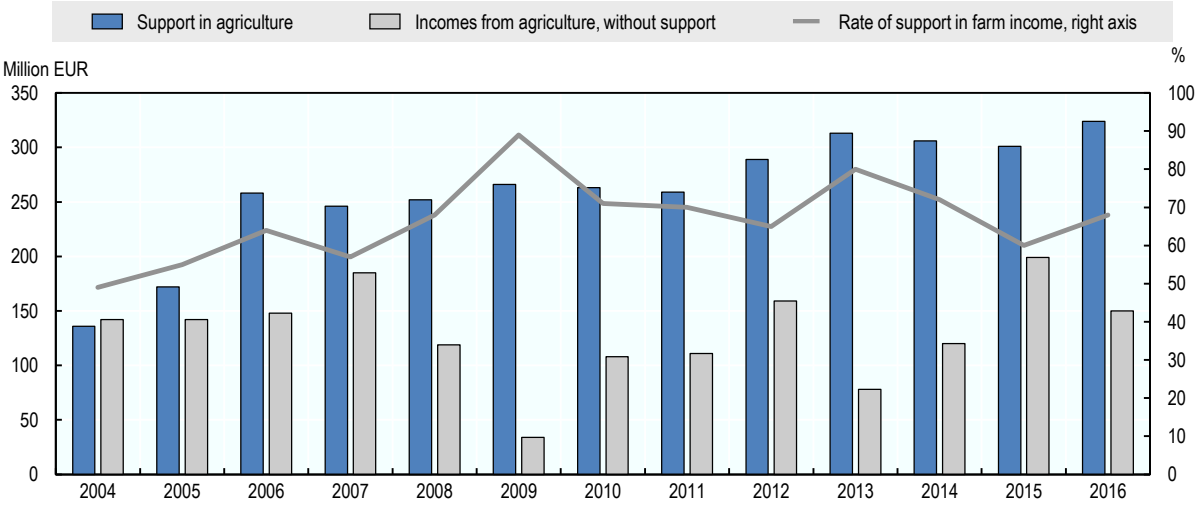
Figure 6.6. Support and farm income in Latvia, 2004 to 2016



Note: Farm income is net of wages paid.
Source: Based on MoA (2017a), Annual agriculture reports 2004 to 2017.

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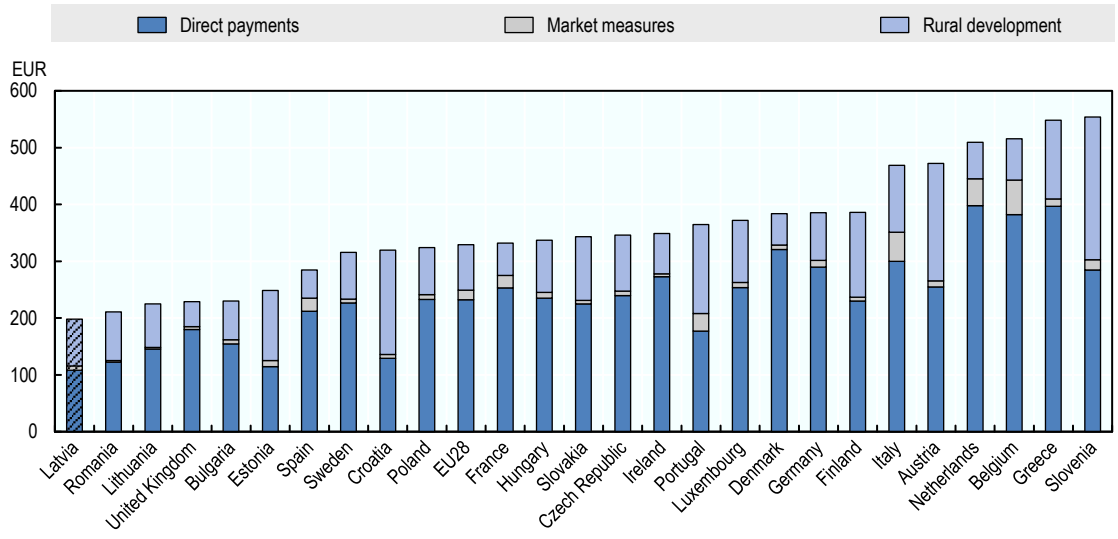
Figure 6.7. CAP expenditure per hectare, 2017



Note: Countries are ranked according to the sum of EU payments per hectare of utilised agricultural area.
Source: Calculations based on European Commission (2018), Agriculture and Rural Development Statistical factsheets and Eurostat (2018), Hectares of utilised agricultural area.

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The support to measures facilitating structural changes has been assessed as one of the most successful farm development facilitating means; the beneficiaries of this support have shown the best indicators of economic growth, including, an increase in added value and turnover (Latvian State Institute of Agrarian Economics, 2013b). The structural changes resulted in increased areas of agricultural land used by farms (Table 6.4).

Table 6.4. Evaluation of the net added value by selected RDP 2007-13 measures in Latvia

EUR

Support measure	Public expenditure for farm	Increase of net added value	Increase of net added value for 1 000 EUR* of public funding
Support for young farmers	34 196	3 325	138
Modernisation of agricultural holdings (investment support)	46 908	-3 543	-108
Farm restructuring	2 211	999	643
Enterprise creation and development (support for diversification of activities)	107 050	63 602	845

Source: Latvian State Institute of Agrarian Economics (2013b).

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6.5. Summary

- In Latvia, the bulk of agricultural and rural development support is provided within the CAP, mostly through the uniform per hectare support under the SAP scheme. Direct support granted to specific commodities has gradually been reduced since 2004 and it made up a fifth of Pillar 1 payments in 2016.
- Agricultural support accounts for a considerable share (more than 60%) of the average farm income of Latvian agricultural holdings.
- Less than half of Latvian farms are commercial farms. While support offers a stable and predictable income, mostly to those who hold eligible land, it influences production choices and the allocation of resources in that it may keep unproductive farmers in the sector and divert resources from more efficient agricultural holdings.
- Latvia has the lowest rate of EU financed agricultural expenditure per hectare. The national budget finances CAP instruments used to fill the gap with the average EU per hectare payment, as foreseen in EU regulations.
- In accordance with EU agricultural state aid rules, the sector is also supported by several national policy instruments, including support to credit and tax exemptions.
- Latvia's RDP funds have been redirected to farmer-elected programmes with higher environmental constraints, thus encouraging and compensating for the provision of public goods.
- The CAP rural development programme also supports farm level investments to improve the overall performance and competitiveness of agricultural holdings, to facilitate business start-ups, to the growth of small farms and to the diversification of activities in rural territories.
- Policy signals received by farmers may be contradictory and detrimental to the longer term productivity and competitiveness of the sector. Latvia has chosen to redirect part of the funding of the broad based uniform per hectare direct payments in Pillar 1, which are least distorting, on the one hand, to farmer elected medium-term contractual schemes under Pillar 2, which contribute to farms' modernisation and improved environmental performance and on the other hand, to attribute the maximum allowed budget to production-distorting direct support to specific commodities in Pillar 1.

Notes

[1] The same support rate applies to all eligible hectares of agricultural land.

[2] In Latvia, the national average of all direct payments is EUR 168.81 per hectare in 2019.

[3] Latvia implements the Voluntary Coupled Support Scheme and uses 15% of its direct payments budget under Pillar 1 to fund this choice measure.

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Chapter 7. Latvian Agricultural Innovation System

This chapter describes the Latvian Agricultural Innovation System and outlines recent changes. It first provides an overview of the general innovation system; describes agricultural innovation actors and their roles in the system; outlines changes in roles and changes in themes; presents main policy instruments and monitoring mechanisms; and discusses views in the general public on agri-food innovations. It then describes main trends in public and private investments in R&D, mechanisms of funding and mechanisms to foster knowledge markets and networks. The next section presents an overview of policy incentives for the adaption of innovation, outlines the role of training and advisory services at farm level, and provides some information on adoption rates in primary agriculture and food processing. Finally, the last section outlines the participation of agricultural R&D actors in regional and international co-operation.

7.1. General innovation profile

Agricultural innovation systems (AIS) are increasingly integrated in the economy-wide innovation system. Innovations in processes and organisations, developments in Information and Communications Technology (ICT) are relevant to all sectors and a well-functioning AIS can help ensure good use of public funds, improve collaboration between public and private participants, including across national borders, and a more demand driven system that is responsive to the needs of "innovation consumers" (OECD, 2015).

General innovation framework

Latvia has three national horizontal strategic planning documents that encourage innovation, entrepreneurship and sustainable development (see Annex 3.A for more details). More specifically, **Latvia 2030**, which is the long-term framework law, encourages export-oriented and innovation based growth through policy instruments that facilitate research co-operation between scientists and businesses, promote innovation programmes and participation in international R&D. In the context of the agriculture sector, Latvia 2030 emphasises a more efficient use and management of Latvia's natural resources capital (Parliament of the Republic of Latvia, 2010).

The **NDP 2020** (Annex 3.A), implements the directions set in Latvia 2030 to develop a highly productive and internationally competitive business sector as well as research- and innovation-based jobs. It harnesses new technologies to use natural resources more efficiently and sustainably. In relation to innovation, the NDP 2020 attempts to approach the Europe 2020 strategy[1] goal to invest 3% of the EU gross product in R&D and seeks to increase R&D investment to 1.5% of GDP by 2020 (MoE, 2011). While there has been no progression of the ratio from 0.6% in 2008, euro-value figures have increased in line with GDP growth (EC, 2016b). Also in support of Latvia's innovation capacity, the NDP 2020 aims to improve the research infrastructure, facilitate co-operation between higher education, science and the private sector and ease research and innovation take-up by businesses; commercialise innovation through patents, encourage the creation and production of high added-value innovative and internationally competitive products (NDP 2020, 2012).

The Guidelines for the Development of Science, Technology and Innovation for 2014-2020 (**ZTAI**) developed by the Ministry of Education and Science set the investment trajectory to reach these objectives. The ZTAI sets the innovation policy objectives and action lines necessary to upgrade Latvian science, technology and innovation to a competitive level (MoES, 2013b). It defines the funds required (government and foreign financial instruments), supporting tax initiatives and identifies indicators to monitor progress. The document includes the Research and Innovation Smart Specialisation Strategy (RIS3) that provides for the consolidation of research and innovation resources in five knowledge areas where Latvia has comparative advantages, with the objective to achieve science and technology driven economic growth.

The five areas are:

1. A knowledge-based bioeconomy
2. Biomedicine, medical technologies, biopharmacy and biotechnologies
3. Smart materials, technology and engineering systems
4. Smart energy
5. ICT

At the sectoral level, the main strategic document is the **Guidelines for National Industrial Policy 2014–2020**. This medium-term policy planning document covers all sectors of the economy and defines the goals and directions of economic growth promotion. The guidelines identify the key national priorities, action lines and activities focused on sectoral development, availability of financing, innovation and export promotion as well as the improvement of the business environment. The guidelines put forward four elements of particular relevance to innovation: knowledge capacity, innovation supply, innovation demand and business take-up of innovation (MoE, 2013).

The **Latvian Bioeconomy Strategy 2030 (LIBRA)** is the long-term (2030) national strategy enabling a knowledge-intensive bioeconomy. LIBRA was developed by the MoA in co-operation with researchers of the Latvia University of Life Sciences and Technologies (LLU). It will deliver Latvia's contribution to EU objectives set in flagship initiatives such as the "Innovation Union" and the "Resource Efficient Europe" under Europe 2020 and in the European Bioeconomy Strategy and its associated Action plan (MoA, 2017a). The Latvian bioeconomy sectors are to contribute high value added to the economy, increase exports and employment. And, at the same time, enhance environmental quality, including biodiversity and contribute to climate change mitigation and adaptation. By 2030, the sectors' production would weigh more than EUR 9 billion and employ 128 000 people (MoA, 2017a).

A number of measures under Latvia's Rural Development Programme 2014-20 (RDP) under the CAP also contribute to the competitiveness of the sector by improving the infrastructure and on-farm management capacity through advisory and training services. More broadly the RDP contributes to innovation capacity, improved environment and mitigation of and adaptation to climate change (MoA, 2013).

General innovation performance

Opportunities for progress exist for Latvia's innovation performance (EC, 2016a and OECD, 2016). In general, the innovation level in Latvia is relatively low, as shown both in the European Innovation Scoreboard 2018 (EC, 2018) and the Global Competitiveness Report 2017–2018 (WEF, 2017a).

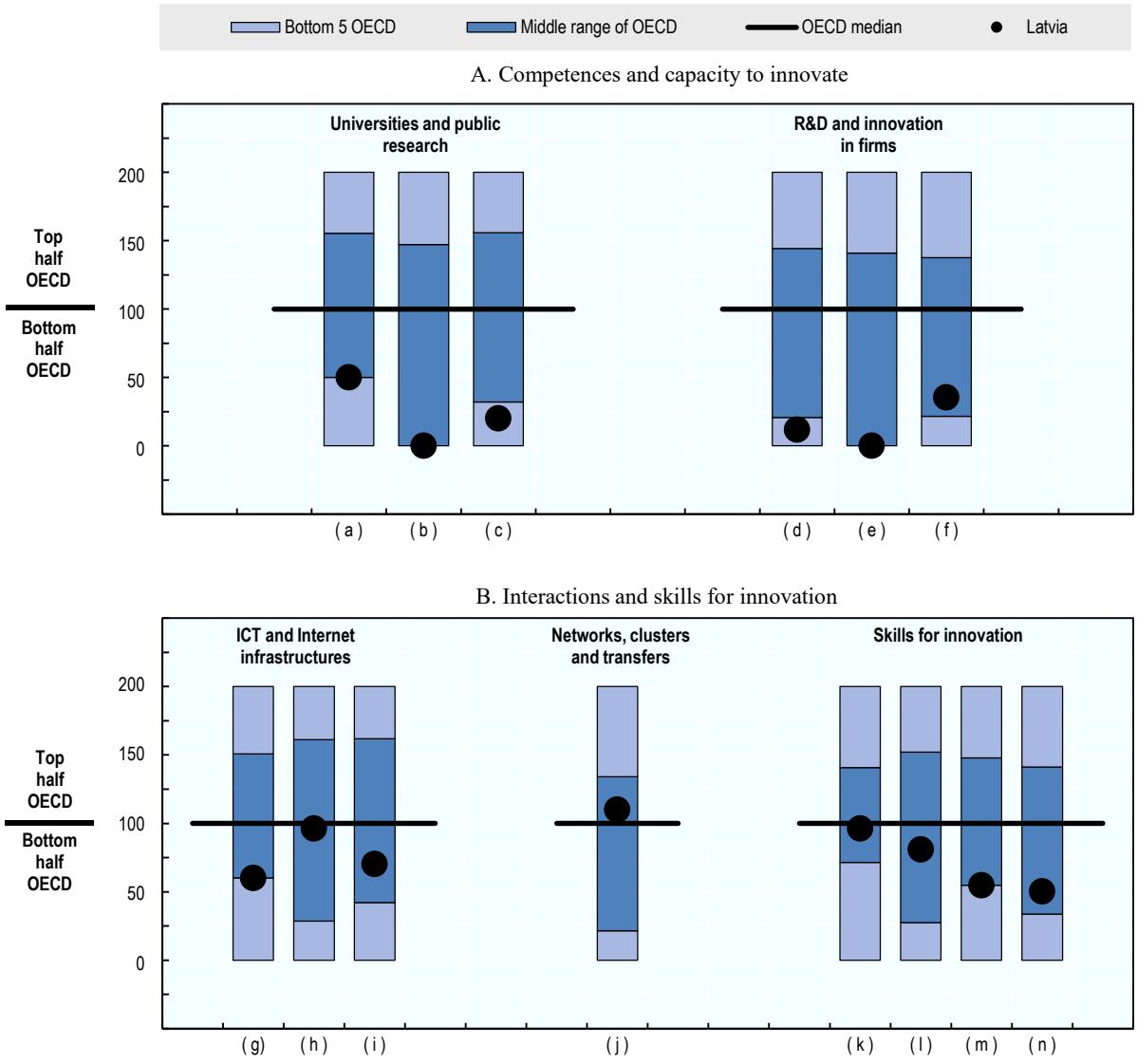
The European Innovation Scoreboard 2018 notes improved performance since 2010 in all composite indicators. It also identifies a number of areas of the innovation system in Latvia where performance has declined; including firm investments, SME innovation, intellectual assets and trade. Based on the indicator of highly cited scientific publications, Latvia, Croatia, Bulgaria and Romania appeared to be EU Member States with a weaker science base. Latvia also had a very low R&D intensity and innovation output indicator.

The Baltic Innovation Fund (BIF) is a 'Fund-of-Fund' initiative of the European Innovation Fund (EIF). It brings together funding from the governments of Lithuania, Estonia and Latvia (operated by Altum in Latvia) to boost innovation equity investments in Baltic SMEs over 2013-17. The BIF is endowed by EUR 130 million to which the EIF contributes EUR 52 million and each participating Baltic partner EUR 26 million on par (BIF, 2018).

Issues identified by the *OECD Science, Technology and Innovation Outlook 2016* include the unfavourable business environment, the insufficient supply of venture capital as well as the insufficient government expenditure in R&D; all indicators are below the average OECD index (OECD, 2016).

Figure 7.1. Comparative performance of Latvia's national science and innovation systems, 2016

Normalised index of performance relative to the median values in the OECD area (Index median = 100)



Notes: 1. Universities and public research: (a) Public R&D expenditure (per GDP), (b) Top 500 universities (per GDP) and (c) Publications in the top journals (per GDP).
2. R&D and innovation in firms: (d) Business R&D expenditure (per GDP), (e) Top 500 corporate R&D investors (per GDP) and (f) Triadic patent families (per GDP).
3. ICT and Internet: (g) Fixed broadband subscriptions (per population), (h) Wireless broadband subscriptions (per population) and (i) E-government development index.
4. Networks, clusters and transfers: (j) Industry-financed public R&D expenditure (per GDP).
5. Skills for innovation: (k) Tertiary education expenditure (per GDP), (l) Adult population at tertiary education level (%), (m) Top 15 year-old performers in science (%) and (n) Doctoral graduate rate in science and engineering (%).
Source: OECD (2016), "Latvia", in *OECD Science, Technology and Industry Outlook 2016*, https://doi.org/10.1787/sti_in_outlook-2016-en.

StatLink https://doi.org/10.1787/888933914347

All indicators related to the gross domestic expenditure in R&D (GERD) as a percentage of GDP point to low performance compared to the OECD averages and are closer to the OECD bottom 5 performers (Figure 7.1). Latvia spent about 0.6% of GDP on R&D in 2015, which is about half Latvia's target and three times less than the averages in EU28 (1.96%) and well below the OECD countries' average (2.4%) (OECD, 2017). Furthermore, the number of triadic patent families and publications in the top journals per GDP is much lower than in OECD countries in average. The share of Latvian business R&D in GDP (0.24%) is also below the OECD median (1.63%) and lower than the EU average (1.23%) (OECD, 2014).

The facts are acknowledged and corrective actions are needed to eliminate deficiencies and promote mutual interaction between all innovation systems stakeholders – business, science and education as well as financial and legislative systems (MoES, 2014a).

Communicating science

Efforts to promote science mostly use traditional channels such as journalism (newspapers, magazines, TV, radio) and events; fragmented use is made of web-based tools. Well known researchers contribute to popularising discoveries and inventions through radio and TV programmes. Innovation in agriculture including the sustainable use of land resources, healthy food production, creation of new products and technologies, are among the scientific topics covered. The *Ilustrētā zinātne* (Illustrated Science) is Latvia's most popular science magazine (Vīķe, 2015). Every month, the *Lauku Lapa* (**Rural Magazine**) reports on news stories in rural development and agriculture and on regulatory developments. It is prepared by the National Rural Network (VLT) and is also available in electronic form as *Lauku e-lapa* (**Rural E-Magazine**) (VLT, 2017). More than 5 000 paper copies are distributed throughout Latvia, 14 000 recipients receive the e-magazine and 172 000 users have visited the VLT homepage in 2017 (of which 92 114 had previously visited and 80 768 were new).

Events are frequently organised to communicate on science, including public lectures, debates, science cafés and festivals. Higher education institutes (HEI) often initiate and organise such events. Examples in Latvia include Science Café discussions and "LU Open Minded" lecture cycles organised by the University of Latvia to engage with the audience in an informal setting. The annual **European Researchers' Night** is important in promoting science to the general public. The event offers an opportunity to showcase scientific achievements in an attractive way and to participate in different experiments and simulations with scientists and to exchange ideas. The leading Latvian universities, scientific institutes and other research-related organisations in Latvia take part in the event. National authorities often collaborate with non-governmental organisations, for example, since March 2014, the Young Scientists Association, in co-operation with the Boris and Ināra Teterev Foundation and the Latvian Academy of Sciences, travels to regional schools, colleges and universities to speak about science and scientists.

Every year **international exhibitions (fairs)** in agriculture are organised. The Riga Food fair, in September, is the most popular event. It brings together food producers from across Latvia and other countries, and offers networking opportunities to agricultural producers, food manufacturers, scientists and research institutions and consumers. In 2017, 720 companies from 35 countries presented their products to 40 000 visitors. Other agricultural fairs include the Spring and the Autumn fairs, organised by the Exhibition service A.M.L. Ltd in co-operation with the MoA where farmers can be informed about farming techniques, agrochemical and soil science solutions, animal husbandry, livestock,

farm equipment, fodder harvesting technologies, novelties in horticulture, etc. Seminars and discussions about innovations in agriculture are organised (Pavasaris, 2018, Rudens 2018). Nature Expo agricultural international fair (international agriculture, horticulture and forestry fair) and TechIndustry (international exhibition of mechanical engineering, metalworking, automation, electronics, electrical engineering, production materials, instruments and new technologies) are also well-known fairs.

Agricultural organisations and associations, as well as scientific institutions and research farms organise annual seminars, Rural Days and demonstration events to inform farmers about news in various agricultural sectors. The LLU scientific institutions regularly organise Rural Days devoted to particular cultivated plants and growing these plants. Thus, the LLU Institute of Horticulture performs the Interreg Baltic marine region programme project "Non-technological and Technological Innovation Capacity Development in Growing and Processing Fruits in the Countries of the Baltic Region", which includes the organisation of Rural Days at the Institute's garden several times a year. Similar activities are performed in all agricultural sectors, including cattle breeding. Thus, the Animal Breeders' Association of Latvia in collaboration with the LLU study and research farm "Vecauce" annually organises events for popularising the dairy sector "Cow Festival".

Agricultural **competitions** take place annually. The *Sējējs* (Sower) prize, organised by the MoA for the past 25 years, celebrates a lifetime contribution to agriculture. Other prizes include "Farm of the Year", "Food Production Company of the Year", "Young Successful Farmer", "Organic Agriculture", "Science in Practice, Innovation", etc. The "Environment Science Award" has several categories, including the "New Environmental Scientist" and the "Bioeconomy Prize" which rewards the production of an innovative product with high added value. The Latvian Academy of Sciences organises several competitions and awards prizes for contribution to the development of science.

The LLU organises the annual awards ceremony "Entrepreneur for the Future" to honour entrepreneurs in Latvia, who, in co-operation with LLU scientists, have contributed innovations to the economy or Prizes are awarded in three categories, including bio-science – for contribution to agriculture, forestry and veterinary medicine research and/or studies. The LLU in co-operation with local governments also organises regional scientific contests for high school pupils (in grades 10, 11 and 12). An annual conference is also organised where students can present their research work, covering various research themes including agriculture, environmental and earth science, biology, etc.

Several science centres, ZINOO, have opened in Latvia with the support from the European Economic Area and Norway Grants.[2] They offer interactive exhibitions where visitors take part in scientific experiments. The ZINOO also take part in the Days of Technical Innovation in co-operation with the Riga Technical University.

Up to September 2017, the EU framework Programme for Research and Innovation "Horizon 2020" had supported 20 projects in Latvia (Horizon 2020).

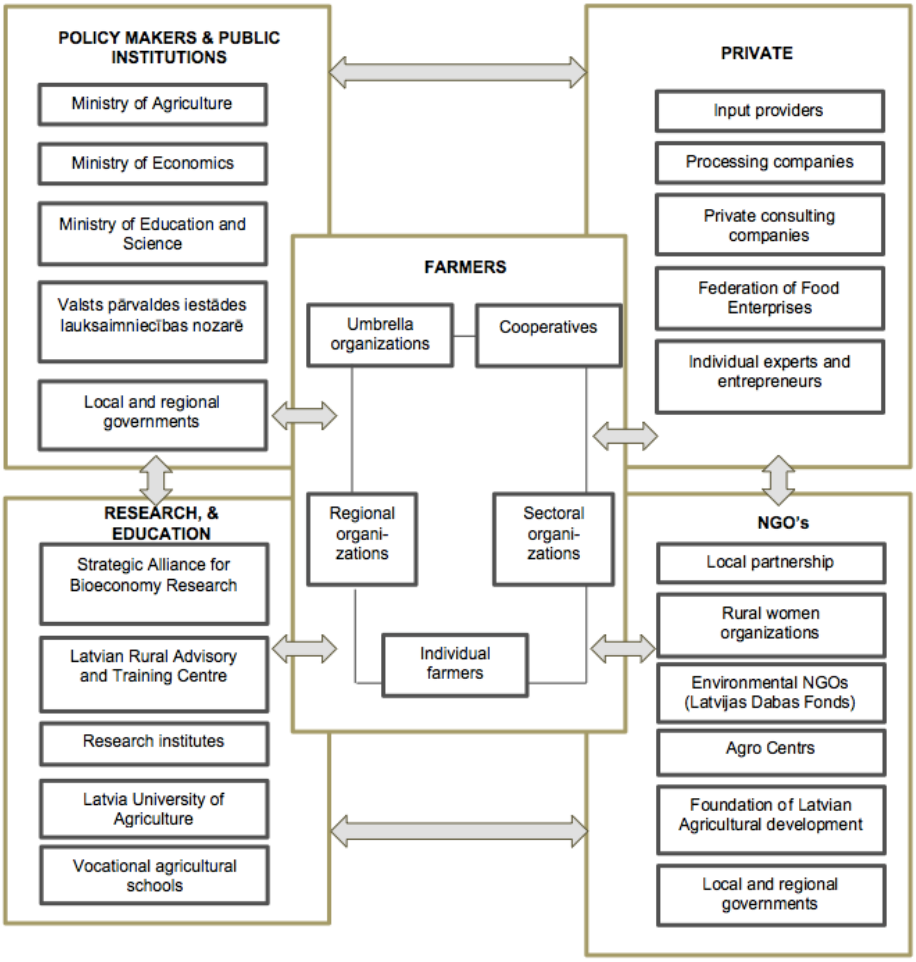
7.2. Actors, institutions and governance of agricultural innovation systems

The AIS involves a wide range of actors who enable, guide, fund, perform, implement, inform and facilitate innovation (Annex Table 7.A.1). The key players include policy-makers, researchers, teachers, advisors, farmers, private companies, consumers, non-profit organisations, and markets (OECD, 2015). The Latvian AIS involves the traditional providers of research, extension and educational organisations, which are structured and

governed through agricultural, science and education policies (Figure 7.2). Various formal and informal learning and innovation networks are present, which often connect knowledge actors of different organisational and sector backgrounds (Tisenkopfs et al., 2011).

The transition to an innovative economy requires strengthening the Latvian innovation system by overcoming deficiencies and promoting interaction between all stakeholders in the innovation system – entrepreneurs, science and education as well as financial and legislative systems (MoES, 2013b).

Figure 7.2. Actors of the Latvian agricultural innovation system



Source: LLU, based on Zēverte-Rivža et al, 2015.

Government

The **government** manages the innovation system; it elaborates the innovation policy, and monitors and implements innovation programmes. It contributes funds to R&D and education budgets, and innovation support to businesses. Together with the **Latvian Association of Local and Regional Governments** (LPS) the government distributes funds for agricultural programmes, promotes local production in local markets, etc.

Monitoring and evaluation mechanisms are the same as for all policies and institutions in Latvia. However, no mechanism is in place to evaluate the performance of the whole food and agriculture innovation system.

The **Ministry of Economy (MoE)** defines the innovation policy and co-ordinates its implementation. The Investment and Development Agency of Latvia (LIAA) promotes business development by facilitating more foreign investment as well as increasing the competitiveness of Latvian entrepreneurs in both domestic and foreign markets.

The **Ministry of Education and Science (MoES)** elaborates the science and technology development and innovation policy and co-ordinates its implementation. In the process, the MoES co-operates with the MoE and other sectoral ministries, and consults sectoral associations and social partners when necessary.

The **Ministry of Welfare (MoW)** develops national policy for the reduction of unemployment, participates in the development of employment policy and the improvement of the career development support system, as well as co-ordinating the development of proposals for active employment measures (including training of the unemployed).

The Public Employment Service of Latvia (NVA) provides assistance to the unemployed, job seekers and people at risk of unemployment to promote their competitiveness in the labour market according to their needs and abilities. The Service implements and administers active labour market policy measures to reduce unemployment.

The **MoA** develops and organises the implementation of agricultural, forestry and fisheries policy. Under the MoA, the LLU and its subordinate public entities lead scientific centres in bio-science and create innovation in agriculture and in the food industry. These include the Institute of Horticulture and the Institute of Agricultural Resources and Economics – and the LLU LLC Latvian Plant Protection Research Centre and the Institute of Food Safety, Animal Health and Environment.

The Rural Support Service, is the National regulatory institution subordinated to the MoA and operating in the field of agriculture. It make significant contributions to the agricultural innovation system by assessing and disbursing EU and national support funds and accounting and controlling of their use.

Every year the MoA signs a memorandum of agreement with the **Latvian Academy of Agricultural and Forestry Sciences (LAAFS)**. The two institutions join efforts in linking higher education, science and practice, research in the field of agriculture, rural development and forestry science, organisation of joint conferences and other events, popularisation of scientific achievements, information exchange between scientific structures, farmers' organisations and experts, promotion of international scientific collaboration as well as implementation of other significant measures (LAAFS, 2017).

Research, education and knowledge

In 2015, 91 scientific institutions were registered in the Register of Scientific Institutions in Latvia, covering all science disciplines. Of those scientific institutions, 15 worked on agricultural research topics, 8 of which are State-funded and receive basic research funding to cover the basic infrastructure and administration costs (MoES, 2015b).

After an external evaluation performed in 2013 and following its recommendations, the MoES consolidated scientific institutions in 2015 into the Strategic Alliance of Bioeconomy Research (MoES, 2015c). In the sector of agricultural sciences (similarly as

in other disciplines) the number of scientific institutions was reduced in 2015 and bigger research units were created:

- Four crop farming research institutes (the State Priekuli Plant Breeding Institute, the State Stende Cereals Breeding Institute, the Latvian State Institute of Agrarian Economics, LLC "Latgales Lauksaimniecības zinātniskais centrs" (Latgale Scientific Centre of Agriculture) were consolidated into the Institute of Agricultural Resources and Economics; a derived public entity attached to the LLU.
- The Latvia State Institute of Fruit-Growing was merged with other public and private scientific institutes to create the Institute of Horticulture; a derived public entity attached to the LLU.
- The Research Institute of Agricultural Machinery and the Research Institute of Agronomy were attached to the LLU (MoES, 2014c).

These changes were aimed at decreasing the fragmentation of funding and increasing the research excellence and the international competitiveness of the scientific institutions in Latvia. The reforms were supported by EU structural funds (ERDF) co-funding.

The **Strategic Alliance of Bioeconomy Research** (BPSA) facilitates R&D in the agro-food sector. It was established in September 2014 and consolidated in 2015 (as described above). The BPSA consists of 8 scientific institutions related to agriculture, food production, forestry and fisheries (Table 7.1). It co-operates with the industry to develop new internationally competitive products and innovative production methods for manufacturing, and to expand the intellectual capacity of the sector (MoA, 2016).

The **Latvia University of Life Sciences and Technologies** (LLU) is one of the six universities in Latvia. The LLU implements research in different sectors of the economy specialising in bio-science (agriculture, veterinary medicine, forest science), engineering (food technology, agricultural and forestry engineering, environment and water management, land management and land surveying, landscape architecture and planning, construction); sustainable rural development and environmental protection (regional impact of climate change and adaptation and social sciences agrarian and environmental economics, regional development and administration). The LLU also implements study programmes in agriculture, forestry, veterinary medicine, woodworking, biomaterials based construction, power engineering based on the use of renewable resources, water treatment and distribution, water and land resources management, nature tourism, food industry and biochemistry, ICT (LLU, 2016). The LLU's development strategy for 2015-2020 underlines the importance of developing and enacting national, international and interdisciplinary research projects to develop new technologies and innovations and integrate them into the study curriculum it dispenses (LLU, 2015).

LLU scientists work in the united European Research Area (ERA), developing the potential of scientific activity for conducting national and international research. They also promote the introduction of innovative, knowledge-based and economically efficient technologies in Latvia's economy, especially in the bioeconomy, which is one of Latvia's RIS3 areas.

The **LLU Advisory Convent (Board)** brings together 17 representatives of several sectoral companies and associations who have advisory rights in the university. The Board takes strategically important decisions and secures ties between society and university. The LLU Convention is elected by the LLU Senate, and the meetings are held

not less frequently than twice a year. Adviser proposals and decisions are published on the LLU website.

The **Institute of Agricultural Resources and Economics** was setup by bringing together three agricultural research institutes; the State Priekuļi Plant Breeding Institute, the State Stende Cereals Breeding Institute and Latvia State Institute of Agrarian Economics. The new institute is supervised by the LLU. The AREI covers the sustainable use of agrarian resources and rural area development. Its long-term objective is to create new knowledge in the field of bioeconomy and enhance the agricultural and food sector competitiveness and sustainability. Its activities include scientific research work in cereals breeding, grain cultivation and other fields of organic and conventional farming. It explores new knowledge, new products and innovative technologies in crop production and provides scientific basis and expertise in various sectors of crop production (AREI, 2017; AREI, 2016).

The **Institute of Horticulture** (DI) is the leading fruit-growing research institution in Latvia. It has become the centre of the horticultural science in Latvia, performing topical and priority research in the field. It creates knowledge, develops new products and innovative technologies that support the competitiveness of Latvian horticulture and its processed products in the context of sustainable rural development The research results are regularly passed on to Latvian commercial fruit growers and the fruit processing industry as recommendations, innovative products and technologies (DI, 2016). The **Latvian Plant Protection Research Centre** carries out scientific research work on plant protection in the agro-climatic conditions of Latvia (LAAPC, 2016).

The **Institute of Food Safety, Animal Health and Environment (BIOR)** is a national research centre that develops innovative research methods and creates new "applicable" knowledge in the field of human and environmental health, food, fisheries and veterinary medicine sciences (BIOR, 2015). It offers a large variety of scientific work – fundamental and applied studies as well as the development of methods and technologies for fostering human, animal and environmental health, animal welfare, safe food circulation and for preservation of fish and water resources. The Institute covers chemistry science, environmental science, public and environmental health, fisheries and veterinary medicine science. The Institute co-operates with educational institutions, governmental institutions, companies and scientific institutes in Latvia and abroad (BIOR, 2017).

The LLU's Technology and Knowledge Transfer Division facilitates knowledge transfer and co-operation between scientists and commercial associations. It also ensures the protection of intellectual property and the marketing of LLU research results (LLU, 2016).

The **Latvian Rural Advisory and Training Centre** (LLKC), leads agricultural and rural business advisory services in Latvia with offices in 26 regional cities. The LLKC has a consultative and educational role in relation to the implementation and transfer of innovation in the agricultural sector in Latvia (LLKC, 2016). It is established by the MoA and Latvian Federation of Farmers. In 2016 it had more than 22 000 customers and partners, the average number of employees was 440, and its turnover EUR 8.7 million (paid service and public funding ratio – 50-50). The LLKC educates, informs and carries out research. It provides advice to rural entrepreneurs, organisations and people operating in agriculture, fishery and other fields of rural business. Its services relate to production processes, accounting and business planning (LLKC, 2016).

In 2008, the LLKC initiated the VLT to inform the public and potential beneficiaries about the rural development policy and funding opportunities, to promote innovation in agriculture, food production, forestry and rural areas, to facilitate setting-up rural businesses and co-operation among rural populations and organisations involved in rural development and the regulatory authorities. The Latvian VLT has an open membership to natural and legal persons engaged in rural development. It brings together agricultural and forestry organisations, local action groups, environmental organisations, non-governmental organisations in rural areas, municipalities, youth organisations, research institutes, etc. In 2017, there were approximately 18 000 participants in VLT organised events. The VLT publishes the *Lauku Lapa* (Rural Magazine) and the electronic *Lauku e-lapa* (Rural E-Magazine) (VLT, 2017).

Other scientific institutions – the University of Latvia (LU), the Riga Technical University (RTU), the Riga Stradins University (RSU), the Daugavpils University (DU), and the Latvian Institute of Aquatic Ecology (LHEI) – provide indirect contributions to the development of the bioeconomy science.

Two public colleges (Jekabpils Agro-business College and Malnava College) specialise directly in vocational study in agriculture and agro-business; other vocational schools provide secondary vocational education in agriculture-related study programmes (more information on agricultural education in Chapter 5). The Malnava College offers the first level higher professional education in agriculture through its "Entrepreneurship in agriculture" study programme and trains qualified business specialists in agriculture (Malnava College, 2017).

Private sector

Private sector can influence education and research institutions directly by exposing their needs related to agriculture (e.g. necessity for new products, improvement of products, skilled labour etc.). Private education and research institutions collaborate to address existing problems and needs. A number of farmer organisations offer their members knowledge and advice, agricultural education and research. Furthermore, they influence policy making.

The **Latvian Agricultural Organization Cooperation Council** and the **Farmers Parliament** are the most prominent organisations. The Latvian Agricultural Organization Cooperation Council unifies 58 producers' organisations including 7 multi-sectoral organisations and 51 sectoral organisations. It represents more than 15 000 producers (LOSP, 2017). The Association collaborates with territorial partners – district farmers' unions, which unite people from small towns, farmers and other socially active people. The **Farmers Parliament** unites professional commercial producers, reaching nearly 900 members, who together produce more than half of Latvia's total agriculture output (Farmers Parliament, 2017). Most of the other farmers' groups are commodity-based organisations and serve to spread, exchange and create knowledge within specific agricultural sectors (Šūmane et al., 2013).

Co-operatives also deliver new knowledge and innovations. The grain co-operative *Latraps* is the largest agricultural co-operative. It has 948 members and its main activities are pre-treatment, storage and wholesale of grain and oilseed rape. The milk producers' co-operative *Piena ceļš* also acts as input provider (Šūmane et al., 2013; Šūmane and Tisenkopfs, 2008). The umbrella organisation, the **Latvian Association of Agricultural Cooperatives,** facilitates information exchange among its 50 member-organisations and provides them with training and advice with the help of its own experts (LLKA, 2017).

The MoA and representatives of farmers' organisations have established the **Advisory Council for Agricultural Non-Governmental Organizations,** a consultative and co-ordinating body that promotes making and implementing a balanced and sustainable agricultural policy. The Council contributes to regulatory and policy planning documents on issues related to agricultural policy and rural development. It facilitates co-operation and information exchange between food manufacturers and the rural population, farmers associations, national and local governments. It also formulates national opinions in relation to EU draft legislation in agriculture and related sectors (MoA, 2015). Nine leading Latvian agricultural societies are represented in the council: the Farmers Parliament, the Latvian Association of Agricultural Cooperatives, the Association of Agriculture Statutory Companies, the Latvian Federation of Food Processing Companies, the Latvian Association of Organic Agriculture, the Latvian New Farmers' Club, the Latvian Federation of Farmers, the Farmer Alliance (By-laws of the Advisory Council for Agricultural Non-Governmental Organizations, 2015).

Farmer organisations and food industry also formulate research demand. In the last decade, several industry and inter-body platforms have been established with the aim to promote collaboration between scientists and producers and to stimulate innovations in agriculture and food production. The most prominent platforms in the agro-food sector are the **Latvian Federation of Food Companies (LPUF)** (established in 2004) and the **Latvia Food Technology Platform (LPTP)** (established in 2007). These platforms improve communication between research organisations and agricultural producers and try to influence the research agenda.

The LPUF is the only multi-sectoral Latvian food processing non-governmental organisation that brings together food companies and professional associations. It represents producers in state and non-governmental organisations, defends the interests of its members in the development of local and international regulatory acts and provides informational support to its members. The LPUF's Latvian Food Quality Centre offers seed support for the development of new products and technologies in the food sector that will attract co-financing of EU structural funds up to 80%. The LPUF also organises seminars and training in the agro-food sector.

The LPTP is a joint operation of the LPUF and the MoA and it bases its activities on the European Food Technology Platform "Food for Life" principles. The LPTP brings together the food industry, scientific institutions, legislative institutions, control institutions and universities.

Technology services also contribute to the AIS and have an active role to play. They are eligible for funding from the European Innovation Council (Box 7.1).

Box 7.1. European Innovation Council (EIC) Farming Pilot in Latvia

Three Latvian SMEs, of which one develops precision farming, are part of the 242 innovative companies receiving funding under the SME instrument of the EIC pilot.

The AgricCloud 2 brings together three businesses from Latvia, Hungary and Germany. The project spans from 2016 to 2018 with a total budget of EUR 1.4 million to pilot test (in six businesses) and market (in five EU countries) the cloud-based precision farming management system AgriCloud.

AgriCloud offers a holistic precision farming by combining processed data collected from agronomic sensors, machinery and service companies with expert knowledge on plant nutrition for improved fertilisers and herbicides use and efficient machinery utilisation and workflow management. The expected yield gains and reduction of chemical use would allow amortisation of the AgriCloud investment within 1 to 2 years.

Source: http://www.agricon-baltic.com.

7.3. Public and private investments in agricultural R&D

Research in Latvia is highly dependent on public funding. Three ministries are directly responsible for the governance of agriculture science in Latvia: the MoES, the MoE and the MoA. Various funding mechanisms are available; the most important are basic research funding, national grants and projects and EU structural funds.

Priorities for agricultural research and development

National research in agriculture is very much aligned with EU research priorities. The MoA mainly funds research topics for which national results are required within the CAP at EU level or by the NDP 2020 at the national level. No common research strategy exists and the private sector is not involved in defining the national agriculture research priorities (Rivža-Zēverte et al, 2015).

Building on the priorities of the EU research and innovation programme Horizon 2020, the Latvian government adopted six priority areas in science in 2013 for the period 2014-17. Two priority areas are relevant to agricultural sciences and forestry; Environment, climate and energy, and Research and sustainable use of local resources (MoES, 2014b). The priorities were adapted to societal and geopolitical changes that have taken place in Europe and nine new priority directions were approved in December 2017 under the title "On Priority Directions in Science 2018-2021". Of the nine priority directions: **research and sustainable use of local natural resources for the development of a knowledge-based bioeconomy** is the most relevant to agriculture while **strengthening security of energy supply, development of the energy sector, energy efficiency** and **climate change, nature protection, environment and sustainable transport** are also related, and **culture of knowledge and innovations for economic sustainability** refers to innovations for economic sustainability (MoES, 2018). The **knowledge-based bioeconomy** is also one of the research priorities of RIS3 which shapes the Latvian capacity for innovation.

Latvia's Rural Development Programme is also a means to develop the scientific potential for agriculture and forestry, as well as knowledge transfer at all stages of production (Box 6.4). Most agricultural research in Latvia is **applied research** carried out in close co-operation with practitioners and taking into account farmers' needs. While it

is positive that research results can be applied in practice, fundamental research is needed and should be reinforced (Rivža-Zēverte et al, 2015).

Research funding instruments

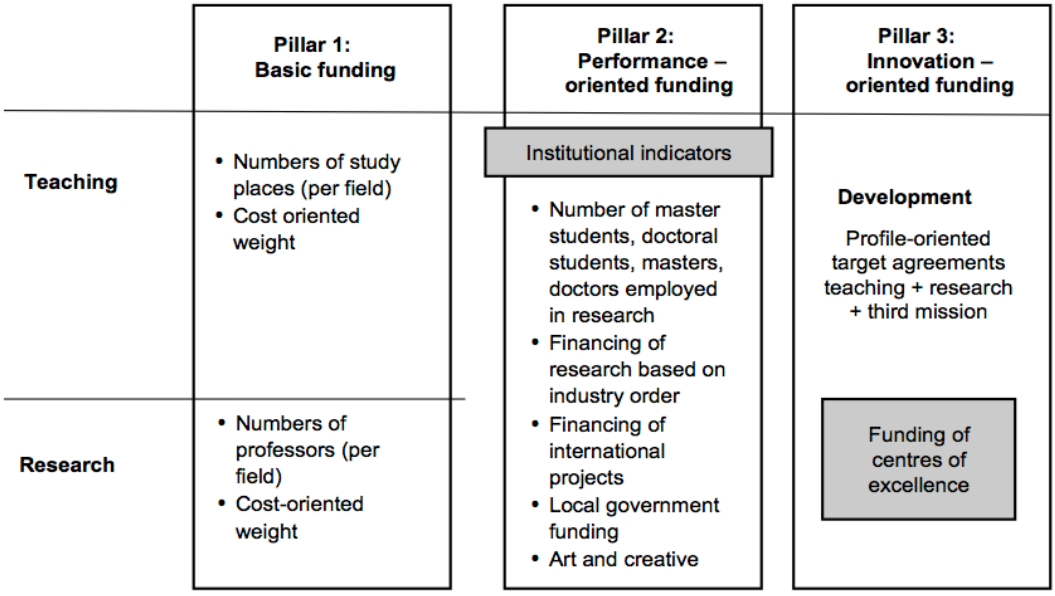
The MoE, the MoES and the MoF together with sectoral ministries are responsible for the strategic planning and the supervision of the public research funding streams and horizontal policies. They distribute EU funds through the Central Finance and Contracting Agency (CFCA, 2017). As for national funds, these are mainly distributed directly or through the Study and Research Administration (SRA), the SEDA and the Latvian Council of Science. These institutions are responsible for research administration and expertise (MoES, 2017).

While both state and private institutions carry out research in Latvia, only public institutions are entitled to receive a **basic research funding** (**institutional funding**) from the state budget. The basic research funding (institutional funding), distributed by the MoES, aims to provide research institutions operational stability and the ability to raise competitive funding from various sources. National grants and projects, distributed mainly through the MoES and the MoA, are the main public agricultural research funds (Zēverte-Rivža et al., 2015). Project tenders from the state budget include calls for projects from sectorial ministries - in agriculture science they are mostly from the MoA and the Ministry of Environmental Protection and Regional Development (MoEPRD) - and grants from the Latvian Council of Sciences and State Research Programmes.

Since 2015, the 3-pillar funding model is implemented in Latvia (Figure 7.3). **Basic research funding** is attributed for a period of six years, based on several elements: funds needed for the maintenance of the scientific institution; salaries of the scientific personnel (senior researchers, researchers and scientific assistants); and the scientific development coefficient of the institution (MK, 2013). The scientific development coefficient is computed based on the scientific results of the institution in the previous year, including the number of R&D projects, publications, patents and plant breeds, and PhD and MSc theses completed (MoES, 2016c). Scientific institutions receiving basic research funding must undergo an international assessment of their operations. In 2017, 22 state scientific institutions received basic research funding (institutional funding), EUR 23 million, of which less than 8% went to agricultural-related institutions: the LLU, the AREI and the DI (Table 7.1).

HEIs also receive **performance funding** in line with their accomplishments and according to unified criteria. The awarded funding may be used by the HEI for their development needs, including supporting students' innovation projects, research and creative work (Figure 7.3). In 2017, EUR 6.5 million were awarded to 14 HEI and colleges which showed high success in involving students and new scholars in research and creative activities, carried out international research projects and co-operated with entrepreneurs; among them, LLU received EUR 450 530.

Figure 7.3. Implementation of the 3-pillar funding model in Latvia



Source: MoES.

Scientific institutes can also compete for national grants and projects that are allocated from the state budget mainly through the MoES and MoA (Zēverte-Rivža et al., 2015). **Competitive funding** is allocated to research projects under State Research Programmes, the Latvian Science Council, the Fundamental and applied research programme, EU research programmes and bilateral co-operation programmes (MoES, 2016c).

In the 2014-17 period, there were 10 new and 4 extended **State Research Programmes**. The share of agricultural and forestry research in State Research Programmes funding for 2014-17 was 19% of the EUR 21 million total financing (MoES, 2014b). One project, the **"**Agriculture resources for sustainable, qualitative and healthy food production in Latvia" (AgroBioRes), is relevant to agriculture with a total funding of EUR 2 million (Zēverte-Rivža et al., 2015), and another, the "Forest and earth entrails resources study and sustainable use – new products and technologies" (ResProd), is relevant to forestry and land resources, with funding of EUR 2 million.

In 2015, the **Latvian Council of Sciences** funded 9 collaborative projects with a total budget of EUR 1.2 million and 65 thematic research projects with EUR 3.2 million. One project was funded in agriculture on technologies of sustainable berry production (EUR 163 000) and five thematic projects related to agriculture and forestry science with an average grant of EUR 61 000 (Latvian Council of Science, 2015). While the topics receiving research grants from the Latvian Council of Science are mostly related to plants, some funds go to renewable energy production from agricultural inputs, animal diseases, and animal feeding (Kokorevičs et al., 2014).

Research in Latvia relies heavily on EU funding. These include structural funds for science infrastructure (ERDF), PhD and MSc study grants (ESF), thematic project funding, etc. These funds are distributed by the MoES through calls for proposals. The CFCA controls the implementation of projects, while funding is managed by the CFCA or the SEDA. The MoE is responsible for the planning of the distribution of EU structural funds targeted to increasing the competitiveness and export capacity of businesses and

new product development and innovation. The funding is managed through the LIAA and the CFCA controls its use (Zēverte-Rivža et al., 2015). All enterprises can apply for these types of funding, including those that work in the areas of agriculture and/or food processing, excluding primary agricultural producers.

Other important streams of funding include the **EU Research Framework programmes** and **Horizon 2020**. However, the share received by agricultural science is lower than the share of basic research funding (Zēverte-Rivža et al., 2015). In recent years, scientific institutions compete increasingly for funding by the EU Horizon 2020 programme, Interreg and other EU research programmes or outside EU funds, as a result of financial constraints and government incentives.

One problem of the financing system of Latvian research projects is that the proportion of funding for bottom-up research (fundamental and applied research projects) projects of the total public funding is very low, which indicates excessive reliance on EU funds for investments.

Table 7.1. Most relevant funding measures for AIS in Latvia

Types of funding and programmes	Purpose	Financing / connection with AIS	Operators	Allocation method and periodicity
State funding				
Basic Research Funding (institutional funding)	Institutional stability and continuity of research activity	Established registered research institutions and HEI, including those working in the area of agriculture - **EUR 23 million** in 2017	Central planning by MoF: budget appropriation; Direct administration by MoES: calculation, allocation performers	Formula based on input and output indicators; research of academic staff (1/8 of professors work load); annual allocation
State Research Programmes	High impact, industry relevant research in priority areas of national development (mission-oriented)	1) "Agriculture resources for sustainable, qualitative and healthy food production in Latvia" (AgroBioRes) – **EUR 2.2 million** 2) "Forest and earth entrails resources study and sustainable use – new products and technologies" (ResProd) – **EUR 2.2 million**	Central planning by MoF; Selection and supervision by MoES; Expertise by LCS; Administration by SRA	Open call and selection every 4 years; Annual allocation per programme
Fundamental and Applied Research Grants	Scientific and technological advances, solutions in topical research areas	Technologies for sustainable berry production – **EUR 16 000** Five thematic projects related to agriculture and forestry science - average grant **EUR 61 000**	Central planning by MoF; Appropriation by MoES; Selection and supervision by LCS; Administration by SRA	Competitive, project-based; Open call and selection every 4 years; annual allocation per project
EU funding				
Structural funds for R&D (ESF, ERDF)	Programme-specific: strategic development, improvement of governance, modernisation of infrastructure, renewal of human capital, etc.	Grants for applied research projects; Grants for postdoctoral research	Central planning by MoF; Selection and supervision by CFCA. Programme design by MoES, MoE MoF, MoES etc.; Administration by CFCA or SEDA	Project–based competitive funding; 2-3 open calls per implementation period

Source: MoES (2017).

Trends in public expenditures on R&D

While Latvian gross domestic expenditure on R&D (GERD) has increased significantly in the past 16 years; R&D expenditures as a share of GDP in Latvia is low (0.44% in 2016) compared to the average share of R&D expenditures in EU countries (1.93%) and OECD countries (2.34%) in 2016 (Figure 7.4). This share is well below the NDP 2020 target of 1.5% of GDP by 2020. The means put forward by the NDP 2020 include the development of innovation, of the research infrastructure, the improved collaboration between higher education, research and the private sectors to facilitate research and innovation transfer into business (NDP 2020).

Analysing Gross domestic expenditure on research and development (GERD), R&D funding has shifted from the state budget to foreign sources; mainly EU structural funds (during the latest five years, foreign funding forms about half of all sources of funding) (Figure 7.5, Panel A).

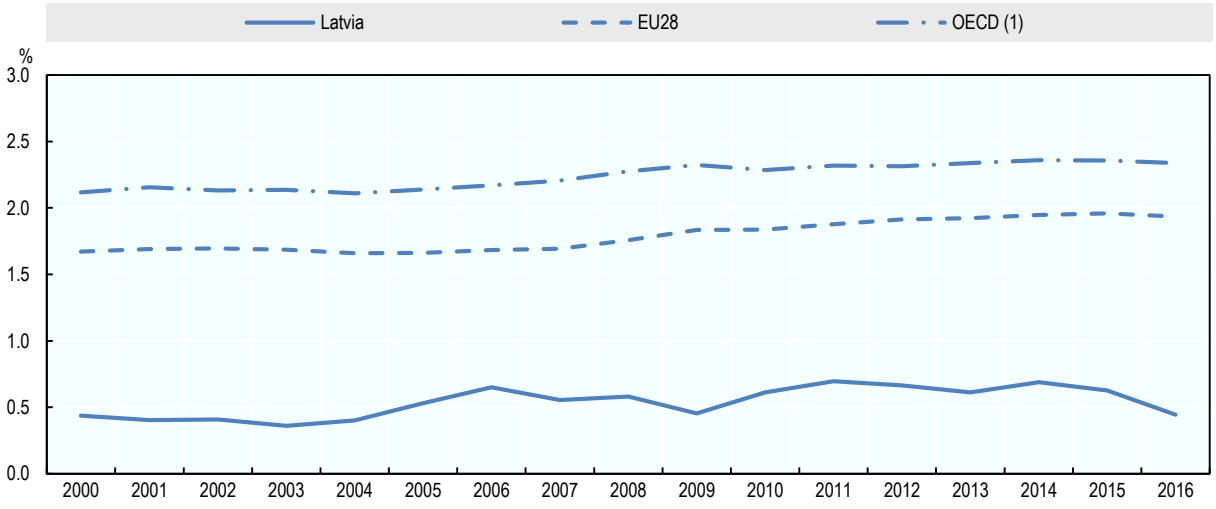
The cross-section analysis of R&D funding shows that, in Latvia 40–50% of research expenditure is in higher educational establishments (Figure 7.5, Panel B), whereas, the business sector holds a very small share. The likelihood of commercialising innovation increases if it is carried out by business. When an innovation is commercialised, it can increase income and value-added and facilitate growth (Kazāks et al., 2014). This means that the proportion of business investment in R&D from the GDP must be strengthened. Conversely, the participation of the private sector hinders the performance of the strategic plan most significantly when tested against the achievement of the 1.5% GDP target for 2020.

Starting from 2004, when Latvia joined the European Union, EU funding programmes have increased R&D expenditure involving not only government and HEI but business enterprises as well. In 2005, more European financing was available and at the same time national financing for agricultural science increased through the programmes of the MoA and the MoES. However, as from 2006 funding for agriculture research declined and the sharpest decrease in R&D expenditure was in 2009 (by 40% compared to the previous year), which was the first year of financial crisis in Latvia. A gradual increase was observed starting from 2010.

The total Government budget allocation for R&D (GBARD) has increased from EUR 14 million in 2000 to EUR 67 million at its highest point in 2008. In the context of the economic crisis, in 2010 it fell by 43% compared with 2008 and was only EUR 52 million in 2016. The share of agriculture in the GBARD was 21% in 2016. The total GBARD for agriculture shows the same trends as total GBARD – a decrease from 2009 to 2012 and resumed growth since (Figure 7.6).

Figure 7.4. Gross domestic expenditure on R&D, 2000 to 2016

As a percentage of GDP



Notes: Gross domestic expenditure on R&D (GERD) is defined as the total expenditure (current and capital) on R&D carried out by all resident companies, research institutes, university and government laboratories, etc., in a country. It includes R&D funded from abroad, but excludes domestic funds for R&D performed outside the domestic economy.
1. The OECD aggregate is the unweighted average for the 35 countries that were members of the OECD in 2016. It does not include Lithuania.
Source: OECD (2018), Main Science and Technology Indicators (database), http://stats.oecd.org.

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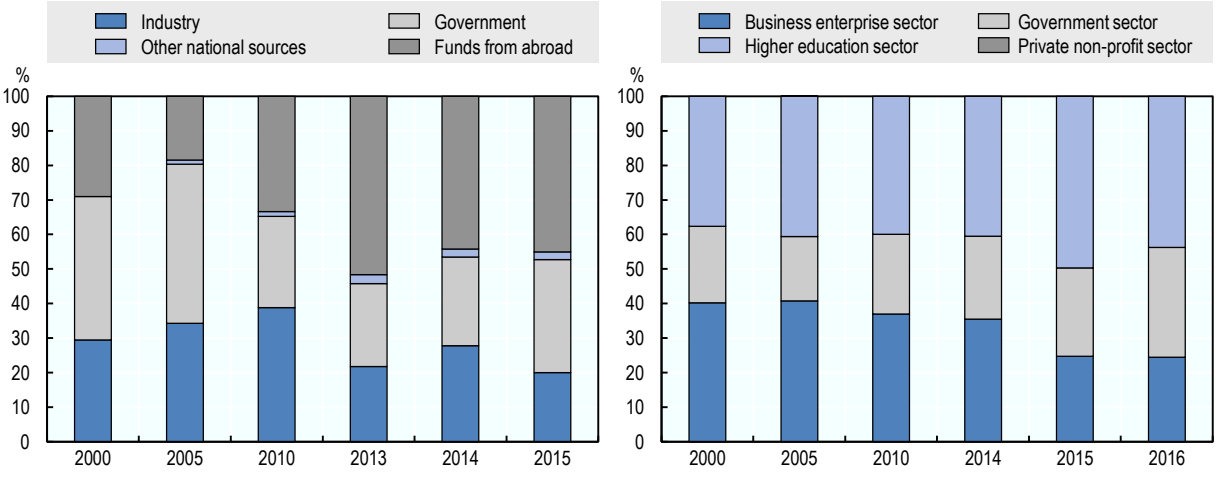
Figure 7.5. Gross domestic expenditure on R&D in Latvia by sector of performance and source of funds, selected years

A. By source of funds

B. By sector of performance



Source: OECD (2018), Research and Development Statistics (database), http://stats.oecd.org.

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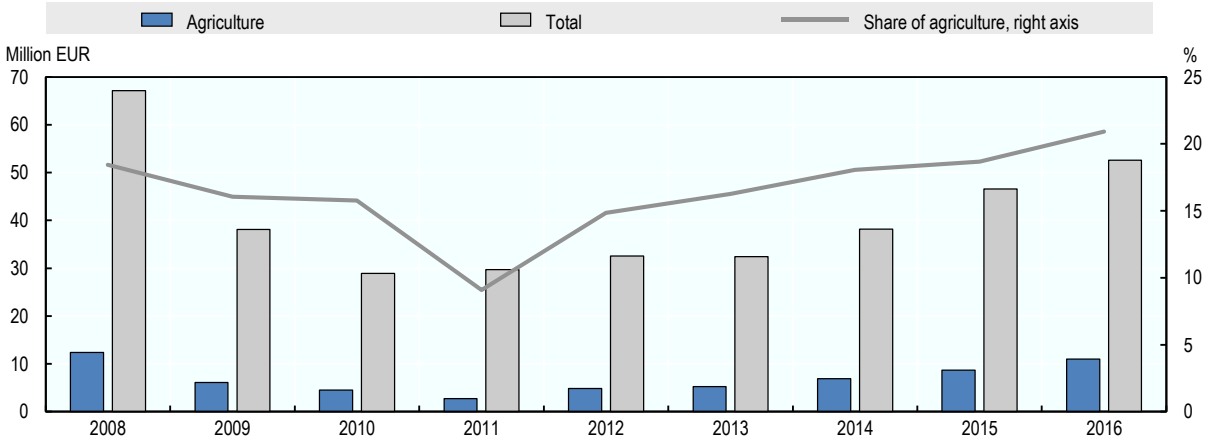
Figure 7.6. Government budget allocation for R&D in Latvia, 2008 to 2016



Note: Government budget allocation for R&D (GBARD) is a funder-based approach for reporting R&D, which involves identifying all the budget items that may support R&D activities and measuring or estimating their R&D content.
Source: OECD (2017), Research and Development Statistics (database), https://stats.oecd.org/.

StatLink https://doi.org/10.1787/888933914404

Support to knowledge infrastructure

Between the 1980s and 2004, the research infrastructure in the state scientific institutions and higher educational establishments underwent very little renovation. In the EU funding planning periods for 2004-06 and 2007-13, a total of EUR 127 million was invested in the modernisation of research infrastructures of the state scientific institutions, of which EUR 107 million from EU structural funding (ERDF) (MoES, 2016b). Less than 10% of EU funding was invested in the modernisation of research infrastructures in scientific institutions related to agriculture (Table 7.2).

Table 7.2. EU funding for modernising science infrastructure in the state scientific institutions in agriculture in Latvia

Aggregated 2004-06 and 2007-13 planning periods, million EUR

Scientific institution	Total amount of EU funding attracted for modernising science infrastructure	Total amount of ERDF attracted for modernising science infrastructure
LLU	6.8	5.9
Institute of Horticulture (DI)	1.8	1.6
Institute of Food Safety, Animal Health and Environment (BIOR)	1.2	1.1
State Priekuli Plant Breeding Institute	0.4	0.3
State Stende Cereals Breeding Institute	0.3	0.3
Latvian State Institute of Agrarian Economics	0.1	0.1
Total	**127.4**	**106.9**

Source: MoES (2016b).

StatLink http://dx.doi.org/10.1787/888933914765

During the 2004-06 planning period, EUR 36 million of EU structural funds, including EUR 27 million (ERDF), were used for "**Support to modernising science infrastructure in the state scientific institutions"**. Support was offered for modernising research equipment and infrastructure in the state institutions that perform scientific research in the priority directions in science. The investment aimed to enable the transfer of research results, including technologies, into the industrial sector and to attract human capacity in the Latvian research sector. These investments were targeted to areas where research potential existed and options for collaboration between the research and the business sector were identified, and only a few were relevant to agricultural research infrastructures: material science (8 projects); organic synthesis and biomedicine (10 projects); wood processing technology and forestry science (5 projects); information technologies (6 projects); astronomy (3 projects); environmental sciences, biology and ecology (6 projects) (MoES, 2016b).

In Latvia, during the period of 2007-13, nine **Research Centres of National Significance** (*Valsts nozīmes pētniecības centri*, VNPC) were established to ensure collaboration between EU scientific institutions with a total funding of EUR 91 million, including EUR 80 million from ERDF and the remaining co-financing from scientific institutions. Funding was directed, *inter alia*, to the Research Centre of National Significance for the Use of Agricultural Resources and Food (actual eligible expenses – EUR 8 million), the Research Centre of National Significance for Forest and Water Resources (actual eligible expenses – EUR 10 million) and the Research Centre of National Significance for the Acquisition and Sustainable Use Technologies of Power and Environmental Resources (actual eligible expenses – EUR 12 million) (MoES, 2016b).

In 2014, the **"Development of the Institutional Capacity of Scientific Institutions"** was decided, which included the consolidation of scientific institutions with a total funding of EUR 11 million. As a result nine agro-food scientific institutions were reorganised and two new scientific institutions, the DI and the AREI, were created as spin-off public entities subsequently attached to the LLU (Table 7.3).

In the 2014-20 period, EU structural funds will support the strengthening of the institutional capacity of scientific institutions and the improvement of their performance and management efficiency. Of the overall envelope of EUR 120 million, the LLU and its institutions would receive EUR 17 million and the BIOR EUR 6 million (MoES, 2016).

Table 7.3. Main support to knowledge infrastructure in Latvia

Characteristics	Aim	Total funding, million EUR	ERDF funding, million EUR (share of total funding)
EU structural funds 2004-06 and 2007-13 for modernising science infrastructure in the state scientific institutions	Modernisation of research infrastructure of the state scientific institutions	127.45	106.94 (84%) *Less than 10% invested in modernisation of research infrastructure in scientific institutions related to agriculture*
EU structural funds 2004-06 "Support to modernising science infrastructure in the state scientific institutions"	Modernisation of research equipment and infrastructure in the state institutions that perform scientific research in the priority directions in science	36.08	27.01 (75%)
EU structural funds 2007-13 "Research Centres of National Significance"	Concentration of resources and investments, including the creation of a common infrastructure for the development of VNPC and the consolidation of scientific institutions	91.36	79.93 (87%)
MK resolution "Development of the Institutional Capacity of Scientific Institutions"	Facilitation of internationally competitive science and research-based modern higher education, concentration of resources in the best national scientific institutions and universities as centres of knowledge	11.2	11.2 (100%)
EU structural funds 2014-20 "Increase Scientific and Innovative Capacity of the Latvian Scientific Institutions by Investing in Human Resources and Infrastructure"	Support for the creation or development of research infrastructure in Latvian smart specialisation strategic areas	120.25 Among the potential funding recipients are the LLU and its institutions (total planned project expenditure EUR 16.72 million) and the BIOR (total planned project expenditure EUR 6 475 654 million)	102.96 (86%)

Source: MoES (2016b).

Considerable investments were made by the European Union for the improvement of infrastructure in the LLU. In 2010-14, the **"Modernisation of the Latvian Agricultural University Study Infrastructure"** was carried out with ERAF funding for a total amount of EUR 17 million. The project achieved the reconstruction and renovation of individual buildings and infrastructures and the construction of new buildings. The most modern **veterinary hospital** in the Baltics was established, where both veterinary practice and practical teaching of students takes place. The project also included the creation of a building for the **Faculty of Food Technology** and its provision with modern equipment for ensuring efficient research and studies.

Using the EU structural funding sources, the **Laboratory complex for the needs of the Soil and Plant Science Department of the Agricultural Faculty** of the LLU was modernised, including the reconstruction of the main building, renewal of the greenhouse complex and basement as well as significant investments made in improving the equipment so that the complex could be used as a study and research base for LLU students and scientists. Equipment and tools were acquired for bioanalytic, chemical, molecular genetics, biotechnological and engineering technological studies in the areas of agriculture and food. The goal of the reconstruction was to create a modern material and

technical basis for the development of agriculture and food science and raise their competitiveness.

The LLU project **"Strengthening the Research, Development Infrastructural and Institutional Capacity of the LLU and Scientific Institutions under its Supervision"** will receive EUR 17 million to increase its capacity and concentrate the research resources of the LLU and its research institutions: the Breeding Institutes and the Institute of Agricultural Resources and Economics (IARE). The key activities of the project involve the modernisation of the research infrastructure of all LLU research institutions and the renovation of scientific apparatus and research laboratory equipment. In addition the project funds 20 jobs.

The BIOR will receive EUR 6 million to modernise its equipment and construct a new building for the Fish Resource Research Department. The funds will also be used to develop a strategy for research infrastructure users to create opportunities for the researchers and visiting researchers of the institute to make scientific discoveries and designs and to participate in international projects and consortiums.

By 2021, it is planned to invest over EUR 3.3 million of ERAF funds in the improvement of engineering science and natural science study environments for the acquisition of new study materials, as well as IT and study premises equipment, including repairs in classes, modernisation of the Wi-Fi and renewal of software, as well as extending the range of materials at the LLU Fundamental Library and improving the study environment, and extending research options at the Faculty of Veterinary Medicine.

Trends in private expenditures on R&D

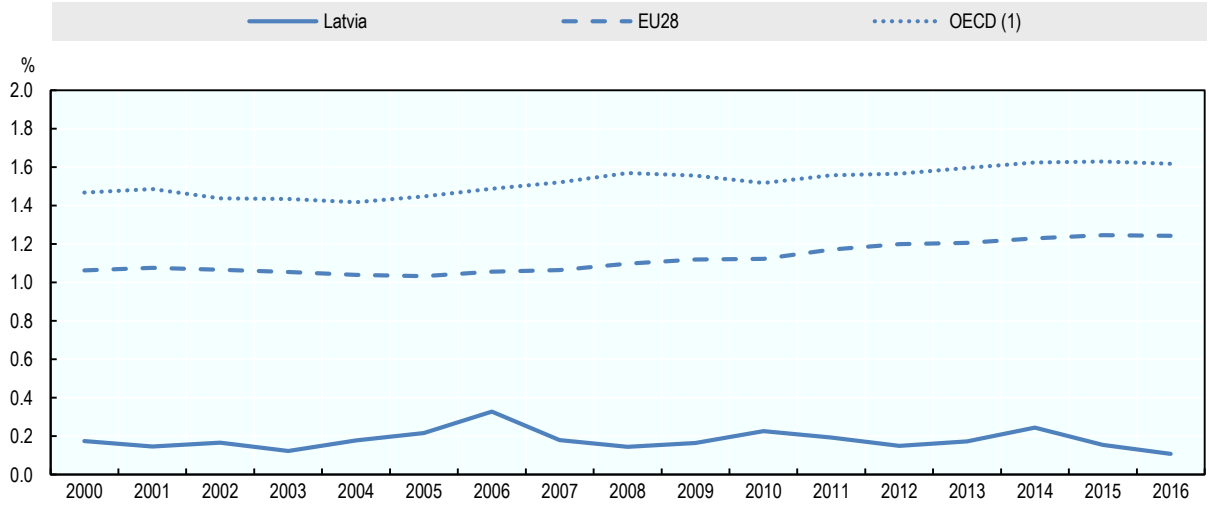
While data on business expenditure on R&D (BERD) is not available for the food and agriculture sectors in Latvia, general trends may be representative of agro-food companies. Economy-wide BERD as a percentage of GDP in the analysed period (2000-16) has fluctuated, and decreased since 2014. Its share in GDP is still much lower than the OECD and EU28 averages in 2016 (Figure 7.7). This can possibly be explained by the lack of financial resources to cover the cost of own-research and the small size of the market outlet. Nevertheless, there are several success stories where unique products have been created that are also exported.

While food and agriculture producers value the creation of new local varieties and food products, the sectors have not invested in innovation. Farmers have embraced policy incentives, including CAP investment subsidies and national credit subsidies, to purchase new machinery and upgrade their farms with new technologies including ICT. They have invested in buildings and increased their productivity and sustainability (Section 2.5 and Table 6.4).

Private R&D funding for agriculture is insufficient and several reasons can be put forward; in a context of mostly small agricultural businesses, the cost of innovation, the risk involved, the lack of market incentives and the absence of collaboration between the business sector and scientific organisations (Žubule and Davidova, 2016).

Figure 7.7. Business enterprise expenditure on R&D, 2000 to 2016

As a percentage of GDP



Notes: Business enterprise expenditure on R&D (BERD) is the measure of intramural R&D expenditures within the business enterprise sector (regardless the sources of R&D funds).
1. The OECD aggregate is the unweighted average for the 35 countries that were members of the OECD in 2016. It does not include Lithuania.
Source: OECD (2018), Main Science and Technology Indicators (database), https://stats.oecd.org/.

StatLink https://doi.org/10.1787/888933914423

Public incentives to private investment in agricultural R&D

The main support programmes for innovation development, including those for agricultural or food processing enterprises include: 1) competence centres programme, also used for the acquisition of research and innovative equipment; 2) technology transfer programme, which includes innovation vouchers, and engagement of highly qualified employees; 3) implementation of new products into production; 4) innovation motivation programme; and 5) support for training of employees (MoE, 2018).

From 2011 to 2013, EUR 53 million of EU structural funds were used to support the creation of six **Competence Centres** to facilitate collaboration between the research and industrial sectors, undertaking projects to develop new products and technologies and to introduce them in production. As a result, companies created 180 new, innovative products in co-operation with scientists.

The funds are continued and another EUR 64.3 million are planned from 2014 to 2020 to support eight competence centres. One competence centre deals with the introduction of innovations in the agriculture and food sectors – the **Food competence centre of Latvia.** With the help of the Food competence centre of Latvia, it is possible to receive support for the development of new products and technologies in the food sector, attracting co-financing of EU structural funds up to 80% (total amount of EUR 5.4 million from 2011 to 2018, including EUR 3.2 million of ERDF funding). The initial aim to support at least 11 entrepreneurs from 2016 to 2018 was exceeded and by September 2018 there were 32 research projects and 29 entrepreneurs supported. From 2019 to 2021, the Centre will receive ERAF funding of EUR 4.7 million for the development of new products and technologies, which includes support for cross-sectoral co-operation.

The **Cluster Programme** receives state and EU support to facilitate collaboration between business and research, and educational and science dissemination organisations, thus facilitating innovation and the creation of high added value products and innovations, as well as growth of export volumes. In Latvia there are now 14 clusters, of which one is related to a sector linked to agriculture (production of food and drinks) – **Food products quality cluster**. The cluster consists of 53 members – private companies, BIOR and the Food Competence Centre of Latvia (LPUF, 2018). In this EU fund programming period, the main objective of the cluster programme is to promote the export of cluster companies. Until 2020 clusters will receive EUR 6.2 million of ERAF support (total funding of the programme). At present, funding has been allocated to six cross-sectoral clusters and eight sector clusters, including the Food products quality cluster. It is expected that the total export volume of the 14 clusters approved should increase by EUR 300-400 million (Aleksejenko, 2017).

As part of the EU programme "Support for training of employees" the MoE provides **support for employee training.** In the context of agriculture and food sector innovation, the Latvian Federation of Food Companies organised training for agriculture and food enterprises of all sizes within the project "Training in the food and related industries – skills development" from July 2016 to 31 December 2018. The total funding for the project was EUR 1.4 million, of which EUR 0.9 million was ERDF funding.

The MoE's LIAA offers various EU funded support programmes to facilitate innovation. These include the **creation of regional business incubators** for new, viable and competitive companies. Micro, small and medium companies, including in the food processing sector, can obtain funding for business start-ups through incubators. Incubators provide support to launch and develop businesses with co-funding for consultations, training and activities on general business issues, mentor support and grants.

The **innovation voucher** programme offers micro, small and medium businesses from EUR 5 000 to EUR 25 000 to develop new, or improve existing, products, technologies or services in collaboration with a research institution or university.

Likewise, support by the LIAA is provided for **start-up companies** that meet several characteristics set in the definition of a start-up, including innovative features. The support is provided through grants for engaging highly qualified employees for the development of new products and technologies (up to EUR 200 000, up to 45%), fixed tax payment per employee (EUR 259 per month to VSAOI) and, in addition, up to 100% company income tax discount, no payment of IIT (for employees).

In addition, the corporate income tax is waived for the acquisition or creation of new production technological equipment, as well as the investment in research and development. Any sector companies (including agricultural sector companies), which have invested in research and development where the expected result has innovative elements or prevention of technological indeterminacy, may benefit from company income tax remission. Despite this measure private sector R&D remains very low.

The **Enterprise Europe Network** (EEN) offers consultations on international technology transfer and innovation issues. It is the world's largest support network for small and medium-sized enterprises, including agricultural businesses, with international ambitions. The EEN is active in more than 60 countries worldwide. It brings together 3 000 experts from more than 600 member organisations. Member organisations include: technology poles, innovation support organisations, universities and research institutes, regional

development organisations, and chambers of commerce and industry. Individual businesses cannot become EEN members, but they can enjoy the many services offered (e.g. EEN provides links with local innovation stakeholders, information on innovation-related policies, support programmes, innovation audits and strategy advice, technology and innovation brokerage services, advice on access to finance for innovation support to access funding programmes etc.). It is co-financed under the EU's programme for the competitiveness of SMEs (COSME) and the EU Framework Programme for Research and Innovation Horizon 2020 (Horizon2020) (EEN, 2018).

Altum's **accelerator funds** programme includes agricultural sector companies and agricultural service co-operative societies (Box 4.2). Pre-seed investment – up to EUR 50 000 per company –funds the establishment of a company, including the development, study, assessment and confirmation of a product or business activity model. Seed stage investment – up to EUR 250 000 per company – supports projects that have successfully emerged from the acceleration stage and are ready for further business growth funding, including the development of a product or business activity model.

As part of its **co-financing loans (mezzanine)** programme Altum offers loans to companies (including agricultural companies excluding primary producers) and agricultural service co-operative societies (Box 4.2). The maximum amount of a co-financing loan is up to EUR 5 million, and it cannot exceed 45% of the total project costs (for loans from EUR 2 million to EUR 5 million, the maximum amount cannot exceed 35% of the total project costs). The minimum amount is EUR 50 000 (Altum, 2018).

Role of public procurement and other "pull mechanisms" in research funding

Pull mechanisms incentivise the private sector to work towards a defined goal. Pull mechanisms reward successful innovation *ex post*, compared with push mechanisms, which fund potential innovations *ex ante* and do not link funding to specific outcomes. Push mechanisms lower the cost of innovation, they include R&D funding through projects or institutions. Pull mechanisms include innovation prizes, patent buyout, and reward research output tax credits on sales (OECD, 2013).

The Latvian innovation system is based mainly on push mechanisms and few pull instruments are available. The "Export and Innovation Prize" competition, organised by the MoE, rewards Latvian companies for their good results in the production of new and exportable products, or the provision of high quality local products to local markets, or the introduction of innovations and development of industrial design. The international competition "Quality Innovation Prize" helps innovators obtain professional assessment for their innovations and increase innovation recognition. It raises the competitiveness of participants' projects thanks to the innovation assessment they receive both at the national and international levels, as well as professional assessment of international experts.

In recent years, public procurement has gained popularity worldwide and particularly as a policy instrument in the European Union. It is one of the main mechanisms to strengthen the innovation performance of European businesses (Cepilovs, 2014). The public sector can cover a range of roles on the demand side: acting as a direct buyer and user of innovative products or services; facilitating adoption of innovative solutions through regulation or support of private demand; or through provision of information regarding new technologies and stimulating their adoption. The European Commission noted that Latvia's public procurement has so far not stimulated innovation (EU, 2016). The use of central purchasing for local authorities and innovation-oriented procurement are low. Public procurement for innovation is largely absent in Latvia (EU, 2016). Also, the

Global Competitiveness report 2015–16 states that government procurement of advanced technology products in Latvia takes 100th place in the total evaluation of 144 countries.

The MoE has started introducing innovation public procurement in Latvia. In application of the European Directive on public procurement, Latvia changed its Public Procurement Law in 2017 to increase the impact of public procurement on innovation development (EU, 2014). The new law envisages two new procurement procedures – **innovation partnership procedure** and **competition procedure with negotiations**. Innovation partnership procedure can be applied in the cases when it is necessary to create long-term innovation partnerships for the development and further procurement of new, innovative products, services or construction work. In turn, the competition procedure with negotiations could be applied only in those cases when it is impossible to obtain an offer that meets the customer's needs in open or closed competition.

Green Public Procurement (GPP) definition is developed, which provides wider possibilities for applying the GPP criterion in public procurement. In 2017, the Cabinet of Ministers regulations "Requirements for Green Procurement and their Application Procedure" came into force. These regulations were developed to facilitate green procurement, thus reducing the environmental impact of publicly procured goods, services and construction work during their life cycle, while facilitating the development of environmentally friendly goods and services markets and an increase of local economic competitiveness (MK, 2017b). It means that in future food delivery and food service procurement will be able to use the GPP criterion successfully, acquiring products that meet the National Food Quality Schemes requirements to raise the presence of higher quality local foods in green public procurement (Sections 3.2 and 4.1).

To reduce the attractiveness of a low price as selection criteria, the law sets the **economically most advantageous offer criteria** as the main offer assessment criteria. The latter is determined by the customer in view of its costs or price, or costs and quality criterion, or price only.

The new law also includes gradual transfer to a **fully electronic procurement procedure.** This will provide a decrease in the administrative burden on deliverers. From 1 January 2019, the reception of offers and applications will take place only electronically.

Although the impact of these changes will be noticeable only after some time, it is planned that the new regulation will simplify and speed up the process of procurement and will provide increased opportunities for customers as well as partially facilitate minimisation of the administrative burden while facilitating innovation and sustainability.

7.4. Creating knowledge markets

Intellectual property rights, knowledge networks, and knowledge markets are of growing importance in fostering innovation.

Disseminating research results

Scientific activity and innovation are furthered by scientists, scientific institutions, companies and residents through access to the existing results of scientific research, making them public and using them. Thus, it is essential to ensure science transfer between all the engaged parties. The optimum circulation of scientific knowledge, access to it and its delivery is a priority in Latvia (MoES, 2016a).

In Latvia, public accessibility of information is determined by the Information Publicity Law issued in 1998. It defines the cases of limited access to information and of its disclosure. It is considered to mark the beginning of facilitating information exchange between society and the state management institutions and its subjection to the existing bodies, including scientific institutions (Informācijas atklātības likums, 1998).

Availability of information on international research and its results is specifically regulated by the Law on Scientific Activity issued in 2005. According to the law, information on scientific research that is funded from the state or municipal budget is open and the institution responsible for performing the scientific research must ensure general availability of the research results (Zinātniskās darbības likums, 2005).

Latvia encourages open access to science, emphasising the transfer of science between the state funded research and the private sector while observing the intellectual property rights (MoES, 2016a). However a "total open-access science" policy is still under development and there is no regulation that determines which research publications and research data must be offered open access and archived in institutional open-access repositories. The proportion of open access scientific articles and data in Latvia is low and only 17% of scientific articles and data are provided in open-access. The main reason for this is insufficient funding, as publication in open-access resources is a paid service, especially in foreign open-access journals (MoES, 2016a).

Following the European Research Area Guidelines, Latvia aims to provide an appropriate infrastructural and regulatory environment that will facilitate the increase in open-access to scientific articles and data in Latvia. Its implementation is assured by the MoES's National Scientific Activity Information System (MK, 2017a). The system collects all information about scientific activities performed by scientific institutions and the people engaged in it (available at sciencelatvia.lv) (Zinātniskās darbības likums, 2005). The MoA has user rights in the system, and it supervises the agricultural sector scientific institutions which perform scientific research by providing information on the research findings. Private businesses are also entitled to both interrogate and contribute to the system (MK, 2017a). Since 2009, farmers have free access to current information in the sector and the results of projects on the homepages of the LLKC and the VLT (Valsts lauku tīkls, 2015).

Scientific institutions use various open-access publication options – open-access journals in Latvia and abroad and open-access repositories in Latvia. Currently, Latvia has seven open-access journals, two open-access repositories (LU's repository of e-resources and the academic repository of the Latvian National library "Academia") and one partially open-access repository (institutional repository of the Riga Technical University). Since 2009, Latvia has an open-access information point that was initiated through the LU's participation in the FP7 OpenAIRE project (MoES, 2016a).

There are limited incentives for scientists to publish specifically in open-access resources, because open-access publications and scientific data are not included in the assessment criteria of scientific institutions in Latvia when, for instance, a scientific database funding is allocated and scientific project applications are assessed (MoES, 2016a).

Access to scientific information in the agricultural and other sectors is provided by the Fundamental Library of the LLU, which is the only Latvian library in this sector and which from 1998 is also the depository library of the UN Food and Agriculture Organisation. The LLU Fundamental Library fund embraces topics in food production,

agriculture, forestry, fishery, agricultural economy, veterinary medicine, statistics, and other related sectors.

Several scientific institutions maintain gene banks to ensure the protection, preservation and sustainable use of genetic varieties of plants and animals, forests and aqua culture by the Latvian agriculture and food sectors.[3]

In 2006, the Latvian State Forest Research Institute "Silava" established the Genetic Resource Centre. The Centre co-ordinates activities in the area of preservation and study of Latvian genetic resources, including those for plants, forest trees and, partially, also for agricultural animals and fish. The Genetic Resource Centre is divided in three parts – the Latvian field crop gene bank, the central database and the molecular genetic analysis laboratory. The gene bank stores crop field seeds of Latvia origin – about 2 000 samples of plant genetic resources of Latvian origin from 72 plant varieties, including wild species related to cultivated crops. The central database contains information on plant genetic resources. Passport data of Latvian plant genetic resources for food and agriculture are maintained in the SESTO database (in collaboration with NordGen), and species descriptor data are stored in a local database. The central database maintains contacts with other international databases, for instance the EURISCO and other central crop databases (MoA, 2016a).

In addition to the Latvian State Forest Research Institute "Silava", other institutions responsible for the preservation of plant genetic resources in Latvia include the AREI, the DI, the LLU and the National Botanic Garden. Due to limited funding, these institutions only maintain plant genetic resource accessions, and there are minimum provisions for their description, assessment and potential utilisation. Molecular passport data is collected for the majority of species maintained in the gene bank, primarily utilising microsatellite (SSR) markers (MoA, 2016a).

The LLU's Scientific Laboratory of Molecular Biology and Microbiology operates a genetic bank for storing and studying agricultural animal breeds genetic resources biological material samples – altogether over 1 000 blood, DNA and hair samples, as well as sperm doses. The preservation and development of agricultural animal genetic resources in Latvia follows the breeding programmes developed by the agriculture animal breeding associations for each species. Owners of genetic resource animals can obtain annual national support, limited to a maximum of 550 animals of the same species. The number of animals involved in the genetic resource preservation programme is decreasing for the majority of species (MoA, 2016a). The LLU also maintains 60 local bee population colonies, including 5 breeding ancestral colonies, and 100 queen-bees (MoA, 2016a).

Protection of Intellectual Property

Intellectual property rights in Latvia are determined by several laws: a) the Law on Scientific Activity; b) the Patent Law; c) the Design Sample Law; d) the Plant Varieties Protection Law; e) the Law on Industrial Property Institutions and Procedures; f) the Law on Trademarks and Geographic Origins; and g) the Law on Breeding and Animal Production.

Intellectual property rights in relation to Latvian scientists in the sector of agriculture and food science are determined by the Law on Scientific Activity which defines precisely the legal subject when research is funded by the state. According to the law, a scientist has exclusive rights on intellectual property created as a result of the scientist's scientific

activity, unless the contract states otherwise. If a scientist has worked on a contractual basis, the scientist's rights on the property created as a result of scientific activities are determined by the contract (Zinātniskās darbības likums, 2005).

If as part of state-funded research one or several employees of the state scientific institutions have made inventions or plant varieties, and the employee(s) duties include invention, research, project creation, construction or preparation of technological developments, property rights on the invention or plant variety belong to the employing scientific institution under contractual relations. Property rights of inventors or breeders of plant varieties, who are not employed by a state scientific institution, are determined by the contract between the inventor or breeder and the state scientific institution at which the research was performed (Zinātniskās darbības likums, 2005).

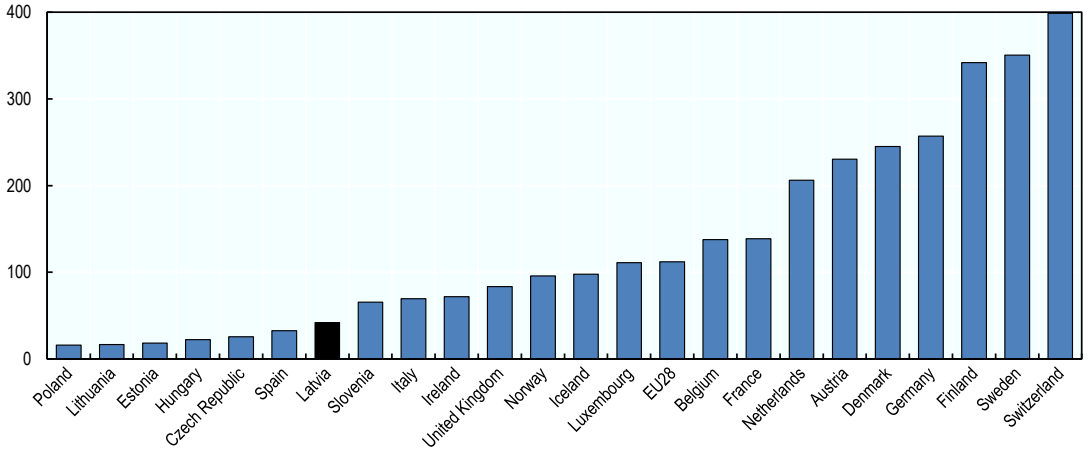
Scientific institutions follow the EC recommendation "On the management of intellectual property in knowledge transfer activities and Code of Practice for universities and other public research organisations". The majority of scientific institutions develop and perform knowledge transfer; as defined by the institution's existing or soon to be developed strategy (MoES, 2016a).

Patents

The Patent Office is an independent state institution attached to the Ministry of Justice. The Patent Office implements the legal protection of industrial property, especially invention, trademark, design sample and semi-conductor product topography (MK, 2017). Between 2007 and 2016, 1 480 patents were issued in Latvia based on national applications, and 35 patents were issued based on international applications. Based on an agreement between the Latvian and the European patent organisations, a number of European patents are related to Latvia and are confirmed every year. Between 2007 and 2016 of the 6 784 European patents confirmed, 264 were attributed on the territory of Latvia (Patentu valde, 2017a). In 2016, Latvian applicants submitted 25 applications to European patent institutions and 16 patents were allocated to Latvian applicants (Patentu valde, 2017b).

In 2013, Latvia had 67.17 patent applications per million of inhabitants, well below the average for the EU countries of 112 patents per one million inhabitants (Figure 7.8).

Figure 7.8. Patent applications to the EPO per million inhabitants, 2013



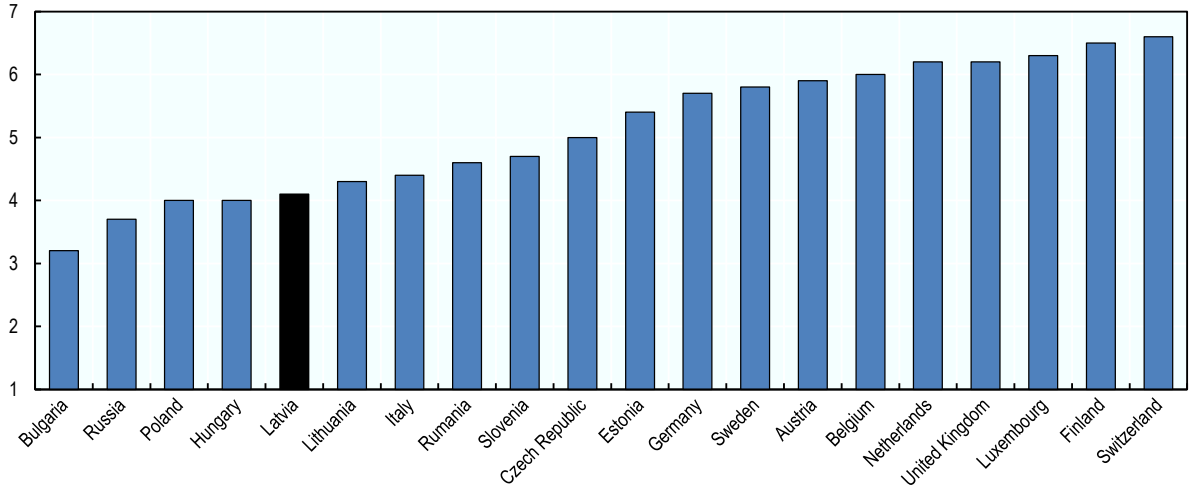
Source: Eurostat (2014), Regional Yearbook 2014: Research and innovation, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=pat_ep_ntot&lang=en.

StatLink https://doi.org/10.1787/888933914442

Latvia has introduced a system of intellectual property rights. Latvia scores 4.1 points in the WEF's Intellectual Property Protection Index for 2017 and takes the 68th position among 137 states, with no significant change in the recent past (Figure 7.9). Latvia's score is close to Brazil among others and well below Switzerland, which shows the highest Intellectual Property Protection Index in the world (WEF, 2017b).

Figure 7.9. Global Competitiveness Index: Intellectual property protection, 2017-18

Score from lowest (1) to highest (7) protection



Source: WEF (2017), The Global Competitiveness Report 2017-2018: Full data Edition, http://reports.weforum.org/global-competitiveness-index-2017-2018/.

StatLink https://doi.org/10.1787/888933914461

Plant breeding

Latvia preserves its significant plant breeds by collecting plant genetic resources. The activity is funded from the national support budget to agriculture. In 2016, EUR 39 000 was allocated to the activity of plant gene banks, central databases and molecular passporting laboratories, and EUR 62 thousand to the preservation of cultural plant genetic fund (MoA, 2016a).

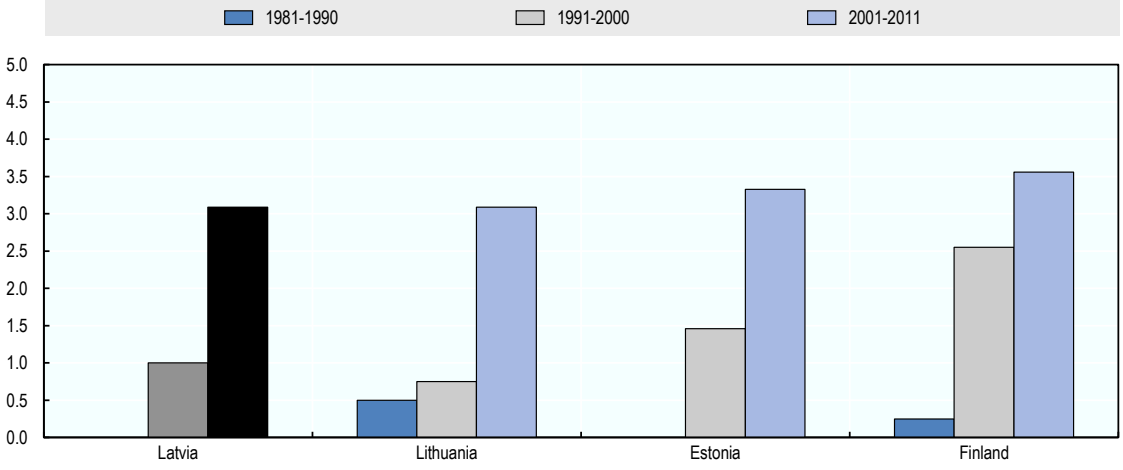
Plant varieties protection at the national level is regulated by the Plant Varieties Protection Law. Latvia is a member of the 1961 International Convention for the Protection of New Varieties of Plants (UPOV) and applies the Council Regulation (EC) No 2100/94 of 27 July 1994 on Community plant variety rights. On 31 May 2018, there were 191 varieties of protected plants in the state register on protected varieties of Latvia, among them 103 agriculture crops, 51 fruit trees and berry bushes, 36 decorative plants and 1 vegetable; overall 155 varieties, 81.2%, are bred in Latvia (VAAD, 2018).

The Latvian Catalogue of Plant Varieties lists plant varieties. The seeds of listed varieties may be certified and examined as standard seed, seed of conservation variety or seed of vegetable varieties developed for growing under particular conditions. The regulation on seed growing and marketing is applied to seed growing and marketing of each species. The regulations regarding the recognition of a conservation variety or vegetable variety developed for growing under particular conditions are also applied (Seed and Variety Circulation Law, 2000). On May 2018, there were 211 varieties listed in the Catalogue, 88 varieties among them are bred in Latvia, the remaining varieties originate in 12 other countries (VAAD, 2018).

Latvia's plant variety protection index is 3.08 points compared to a maximum score of 5.0. It is close to Lithuania's score and slightly below Estonia and Northern EU countries at 3.38 points (Figure 7.10).

Figure 7.10. Plant Variety Protection Index

Score from lowest (0) to highest (5) protection



Note: For Latvia and Estonia, 1981-90 data are not available.
Source: Campi, M. and Nuvolari, A. (2013), Intellectual property protection in plan varieties: A new worldwide index (1961-2011), LEM Working Paper Series 2013/09, No. 2013/09, www.econstor.eu/handle/10419/89567.

StatLink https://doi.org/10.1787/888933914480

Animal breeding

Agricultural animal breeding programmes and preservation of genetic resources are funded from the national budget support to agriculture and carried out by associations of animal breeders. These include two dairy cattle breeders' associations, two pig husbandry organisations, two meat cattle breeders' organisations, the sheep breeders' association and two horse breeding organisations (MoA, 2016a). Under the Preservation of Genetic Resources of Agricultural Animals, support was available for the applicants who owned a herd registered according to the regulation on the registration of agricultural animals, their herds and stalls, as well as on animal marking, and who worked with agricultural breeding animals of important local breeds, which are nationally or internationally acknowledged to be endangered species. Financial support was granted to herds represented by some of the following livestock breeds: the Latvian Brown (cattle), the Latvian Blue (cattle), the Latvian White (pigs), the Latvian Dark-headed (sheep), the Latvian horse breeds for riding and the Latvian domestic goat breed.

Food science

Innovations in food science and their property rights' protection is provided by the LLU and its scientific institutions, which perform research in food science and commercialisation of the results. It is expected that the activities of the Latvian Food Competence Centre together with support offered by the newly established Food Product Cluster will improve business co-operation with research and increase the commercialisation of scientific results (Section 7.3).

The MoA also promotes the Latvian food tradition heritage and requests the introduction of the names of Latvian products in the EU registers of protected products. These comprise products with Protected Designation of Origin (PDO), Protected Geographical Indication (PGI) and Traditional Speciality Guaranteed (TSG). There are currently six registered products (PDO "Latvijas lielie pelēkie zirņi'; PGI "Carnikavas nēģi" and PGI "Rucavas baltais sviests"; TSG "Sklandrausis"; TSG "Jāņu siers" and TSG "Salinātā rudzu rupjmaize").[4]

7.5. Co-operation between public and private actors

The Law on Scientific Activity states that scientific institutions have a duty to take the necessary steps to ensure that rights to an invention or plant breed are economically utilised (marketed) in a way which is most profitable for the State (Law on Scientific Activity, 2005).

Agriculture and food production sectors are defined as knowledge-intensive bioeconomy fields; therefore, co-operation between the agents involved and development of innovations are covered under the Latvia's Bioeconomy Strategy and its Rural Development Programme 2014-20 under the CAP.

Latvia's Bioeconomy Strategy stresses the importance of collaboration between scientific institutions and entrepreneurs in the bioeconomy sectors (including farmers) and emphasises the importance of research excellence in traditional bioeconomy fields (including agriculture and food production) and effective knowledge-transfer (MoA, 2017a). The establishment of a European-level centre of research excellence in bioeconomy is foreseen as part of the Bioeconomy Strategy. The strategy also puts special emphasis on research interdisciplinarity, additionality and multidisciplinarity (MoA, 2017a).

The Rural Development Programme 2014-20 (RDP) emphasises knowledge-transfer and innovations in agriculture as one priority means to promote innovations, co-operation and the knowledge base in rural areas. The RDP instruments are used to consolidate ties between agriculture, food production, forestry, and research and innovations to improve, among other things, environmental management and environment conditions. The RDP also aims to improve farm economic results by modernising and diversifying farm activities and enhancing their market involvement and orientation (MoA, 2013).

In line with these priorities, the programme provides for three rural development measures: a) Knowledge-transfer and information actions; b) Advisory services, farm management and farm relief services; and c) Co-operation. The funding for these measures amounts to 2.84% of the RDP's overall expenditure, funded by the EU and State budgets (MoA, 2013). The RDP also provides support for investments in the modernisation of farms and the introduction of technologies, thus indirectly promoting innovations in manufacturing and co-operation between the various parties involved.

Until 2016, co-operation between scientific research institutions and entrepreneurs in agriculture and food was shaped by business-based and entrepreneur-funded research. The Competence Centre for the Food Sector was established in 2016. Despite institutional changes that aim to improve and facilitate business access to research results through improved collaboration; in practice, insufficient co-operation between business and research sectors is still considered as one of the main challenges faced by the Latvian innovation system. This has been emphasised by the EU evaluations, Latvian experts and policy planners as one of the main issues with the development of the Latvian research sector (MoES, 2016a).

In 2014, the scientific community established the Bioeconomy Strategic Research Alliance; a unified innovation system in agricultural and food sectors that promotes excellence in the field of research and technology-transfer and carries out one of the Latvian smart specialisation goals regarding knowledge-intensive bioeconomy (MoES, 2016a).

Considering past experience, the use of EU structural funds to support agricultural innovation, excluding the primary sector, through Competence Centres, technology-transfer, the innovation voucher programme, the cluster programme, and support for the introduction of new products in manufacturing, should be evaluated. Their future use should be targeted based on results (MoES, 2016a).

The adoption of innovations

The Latvian farm sector has been adopting existing innovations more than generating them. The adoption of existing innovations requires a well-functioning knowledge-transmission chain from the sources of innovations to the farm. It also requires educated farm holders and qualified specialists. Latvia's pool of educated farm holders and qualified specialists must be widened as the relatively low level of educational attainment, and the lack of qualified specialists, hinder the introduction of innovation and the overall competitiveness of the sector. In 2016, 46% of farm managers had agricultural education (higher, vocational or basic), of which 31% had higher or secondary level agricultural education.

Several institutions offer agricultural knowledge-transfer and advice in Latvia. Some of them are also involved in policy-planning and monitoring the development of knowledge-transfer and consultations.

EU RDP funds are used to improve the knowledge base of farmers and there are lifelong learning opportunities in Latvian rural areas. Support to knowledge and information measures aims to raise the education attainment of both employees and managers of rural companies (especially small and medium) with positive outcomes with regards to the competitiveness of agriculture and food businesses and to the adoption of modern and effective implementation of company management system, technologies and equipment (MoA, 2013).

The LLU ensures consultations and knowledge-transfer by providing study and training programmes, organising courses and seminars. The LLU's Technology-Transfer Division promotes collaboration between scientists and entrepreneurs and provides consultations. The LLU's Life-Long Learning Centre offers professional development and qualification-upgrade courses for farmers and representatives of the food industry. In parallel to the LLU and its affiliates, several professional education institutions offer agricultural knowledge-transfer.

The LLKC and the VLT are among key institutions that offer farmers knowledge-transfer, on-farm support functions, and co-ordination and consultation.

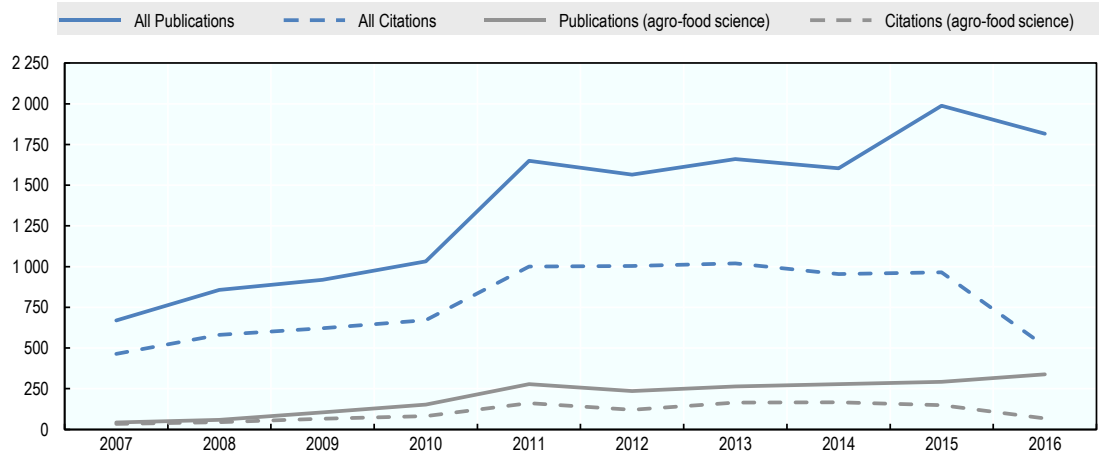
Latvia's capacity to connect to R&D networks also contributes to its capacity to adopt innovations generated abroad (Section 7.6).

R&D outcomes

Publications by the Latvian agriculture and food production scientists represent only a small part of Latvia's scientific publications (Figure 7.11). In 2016, the proportion of cited publications was 0.16% of publications worldwide but with a positive growing tendency, compared to only 0.03% in 2010.

From 2010 to 2014, Latvian joint publications with foreign partners in the SCOPUS data base (total number and divided by regions) was as follows: in total 2 317; Africa 51, Asia and the Pacific Region 317, Europe 2 046, Middle East 169, North America 371, South America 73 (MoES, 2016a).

Figure 7.11. Latvian R&D outcomes, 2007 to 2016



Source: SCImago (2017), SJR – SCImago Journal & Country Rank, www.scimagojr.com.

StatLink https://doi.org/10.1787/888933914499

7.6. International co-operation in agricultural R&D

One of Latvia's priorities is international co-operation through various activities to integrate in the European Research Area and develop co-operation both on the European and worldwide level. International co-operation is considered to be an opportunity for Latvian science, business development and competitiveness.

The MoA ensures representation of the agriculture and food sector at the European and global level. It is represented in several international organisations and networks: Food and Agriculture Organization (FAO), World Organisation for Animal Health (OIE), International Union for the Protection of New Varieties of Plants (UPOV), International Seed Testing Association (ISTA), European Federation of Animal Science (EAAP), Organisation for Economic Co-operation and Development (OECD), International Society for Horticultural Science (ISHS), International Plant Genetic Resources Institute (IPGRI), European Regional Focal Point for Animal Genetic Resources (ERFP) (MoA, 2017b). The MoA is also a member of the Standing Committee on Agricultural Research (SCAR); which enhances co-operation, co-ordination, and information exchange on agricultural research in Europe and secures the integration of Latvia's Bioeconomy Strategy in the overall European Research Area.

While co-ordinating the development of the Bioeconomy Strategy, the MoA held discussions with representatives from the field, discussing their role in the scope of bioeconomy and identifying possible investment in developing the strategy. Through discussions, the Ministry established co-operation with the Latvian office of the Nordic Council of Ministers which has supported several international bioeconomy events (seminars and conferences) in the field of forestry, agriculture and food science, attracting experts from EC institutions and Northern countries for the transfer of good practices (MoA, 2017b).

At the European level, Latvia participates in the European Commission Joint Programming Initiatives (JPI) established in 2008, to reach sufficient critical mass in order to carry out research projects in areas valued by the population, by joining resources of the EU Member States, harmonised implementation and synergy of state research programmes. Within the JPI, Latvia is represented by the MoE, and EU Member States develop a strategic research agenda, based on a joint view as to solving important population issues (MoES, 2016a).

Latvia is not a participant in the Joint Programming Initiative on Agriculture, Food Security and Climate Change, despite analysis carried out by the MoES which shows the competence of scientific institutions (FACCE-JPI)[5] (MoES, 2016a). Latvia is an observer in the EU food-related initiative "A Healthy Diet for a Healthy Life", and is a joint proposal partner in the EU Anti-Microbial Resistance initiative. Latvia fails to get completely involved due to limited funding for R&D, lack of information regarding JPI requirements as well as non-existent or limited research funding at the sectorial ministries (MoES, 2016a).

In 2016, the Cabinet of Ministers approved Latvia's participation in eight priorities of the European Research Area (ERA) and attributed the necessary funding for the participation. Involvement in the ESFRI research infrastructures will secure international co-operation of scientific institutions and integration in the European Research Area (ERA); furthermore, it will also enhance access to European-level research infrastructures, applying for support granted by various EU programmes, including within the ESFRI. Latvia can participate in the ERA activities with Latvia-based scientific infrastructure

sites which ensure effective implementation of scientific results in production by developing high technologies and securing the operation and development of unique research infrastructure sites (MoES, 2016a). The selected priority areas cover most RIS3 areas in Latvia; including the knowledge-intensive bioeconomy (MoES, 2016a).

The State Research Programme for 2014-2017 encouraged scientific development across all sectors, including scientific human resources. The State Research Programme "Agricultural resources for sustainable production of qualitative and healthy food in Latvia" conducts internationally competitive studies in agriculture and food science.

Latvia's RDP supports co-operation and participation in operational groups of the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI) (Box 6.3). The EIP-AGRI offers a framework to connect local multi-actor groups and strengthen links between research, innovations and practice via thematic networks on global challenges (SCAR, 2016). Stakeholders have shown great interest and since its start in 2016 project applications have exceeded available public funds.

International co-operation in agricultural research is carried out by Latvian scientific institutes through joint publications, projects and conferences. The LLU has an active role in the Nordic Association of Agricultural Scientists (NJF) as well as in the European Society for Agronomy (ESA), which is a scientific organisation. Furthermore, the LLU academic staff takes an active part in other international scientific associations: European Grassland Federation (EGF), International Society for Horticultural Science (ISHS), European Association of Agricultural Economists (EAAE), International Scientific Association ECOLOGICA, Nordic-Baltic Resistance Action Committee, KBBE-net – Knowledge Based Bioeconomy, International Humic Substances Society, European Weed Research Society (EWRS), International Soil Tillage Research Organization (ISTRO), British Society for Plant Pathology (BSPP), European Confederation of Soil Science Societies (ECSSS), International Union of Soil Sciences (IUSS). For more than ten years now the Institute of Horticulture has been a member of the European Fruit Research Institutes Network, engaging in fruit science and international sectorial co-operation and developing EU projects.

In Europe, there is the European Food Science Network and the European Federation of Food Science (EFFoST), which unites European food study and research universities/institutes. IFA (ISEKI Food Association) must also be mentioned; it is an independent non-profit organisation, established in 2005 by representatives of universities, scientific institutions, companies and associations with ties with the field of food; the organisation now covers the world. Several co-operation projects have been carried out with the aforementioned institutions at some point in time, including annual Baltic Conference on Food Science (FoodBalt) (MoES, 2015a).

7.7. Summary

- Latvia's agricultural innovation system is shaped by EU policies and funding, including the Europe 2020 Strategy, the CAP and the EIF.
- Innovation enabled economic growth is at the centre of government medium and long-term plans.
- The ZTAI sets general innovation policy objectives and investment trajectory with regards to innovation in the bioeconomy. It defines action lines necessary to

upgrade Latvian science, technology and innovation to a competitive level. It is supported by the Smart Specialisation Strategy and its implementation monitored.

- In a context where little private expenditure is invested in agro-food R&D numerous policy instruments and available public funds are all the more significant for agricultural innovation. These may suffer from a lack of co-ordination, of monitoring and of evaluation.
- The LLU and its scientific institutions carry out most agricultural-related research in Latvia. Their research infrastructure was assessed and modernised recently.
- Latvia has been adapting existing innovations to its own needs more than developing them.
- The adoption of existing innovations requires a well-functioning knowledge-transmission chain from the sources of innovations to the farm. It also requires educated farm holders and qualified specialists.
- Knowledge transfer activities in agriculture and food production, supported by EU funding, have become more widely available and should be further strengthened to facilitate better access to knowledge of the farming workforce. These activities should be continuously adapted to farmers' needs, monitored and evaluated. Higher levels of participation should contribute to wider innovation take-up.
- Implementation of new technologies and practices and foreign experience are an important part of innovation. However little information is available on farmer participation in such activities, they are not monitored or measured. Little is known on factors that drive the adoption of innovations more generally. Data gaps make it difficult to monitor progress and to adapt measures to needs.
- Co-operation between research and industry is increasing and must be strengthened in particular on joint projects directed towards marketing of research results.
- Latvia's capacity to connect to R&D networks strengthens its capacity to adopt innovations generated abroad. While Latvia is well connected to international organisations, lack of funding hampers the participation of research institutions in EU initiatives and in collaborative efforts. In turn this is an obstacle to the transmission and implementation of innovations generated elsewhere.

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[3] Information on genetic resources for plants in Latvia is available online at www.genres.lv.

[4] For more information on EU quality schemes: https://ec.europa.eu/agriculture/quality/schemes_en.

[5] https://www.faccejpi.com/About-Us/What-is-FACCE-JPI.

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Annex 7.A. Background table

Annex Table 7.A.1. Main ministries and measures of relevance to innovation in the agriculture and food sector in Latvia

MoA	MoF	MoEPRD	MoES	MoT	MoW	MoH
CAP Pillar 1 CAP Pillar 2 State aid Investment and Promotion	• Financial Sector Development Plan for 2017-19 • Corporate Income Tax • Personal Income Tax	• Environmental Policy Guidelines 2014-2020 • Green procurement Plan • Information Society Development Guidelines 2014–2020 • One-stop-shop for public services	• Vocational training • Scientific activities in universities and colleges • Private sector participation. • Foreign students. • Lifelong learning	• Transport networks connecting rural areas to jobs and markets	• Labour Market Policy • Social Insurance • Occupational Safety and Health at Work • Social inclusion	• Health services accessibility in rural areas

Source: Based on background report prepared by LLU.

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