

OECD Economic Surveys: Luxembourg 2025

April 2025

Volume 2025/9



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Please cite this publication as:

OECD (2025), *OECD Economic Surveys: Luxembourg 2025*, OECD Publishing, Paris, <https://doi.org/10.1787/803b3ea1-en>.

ISBN 978-92-64-91894-8 (print)
ISBN 978-92-64-84268-7 (PDF)
ISBN 978-92-64-84963-1 (HTML)

OECD Economic Surveys
ISSN 0376-6438 (print)
ISSN 1609-7513 (online)

OECD Economic Surveys: Luxembourg
ISSN 1995-3720 (print)
ISSN 1999-0782 (online)

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Foreword

This Economic Survey was prepared by Cyrille Schwellnus and Simone Romano, under the supervision of Sebastian Barnes. Research assistance was provided by Damien Azzopardi and editorial support by Jean-Rémi Bertrand and Laura Fortin.

This Survey is published under the responsibility of the Economic and Development Review Committee of the OECD. The Committee discussed the draft Survey on 28 January 2025. The cut-off date for data used in the Survey is 17th February 2025.

Information about this and previous Surveys and more information about how Surveys are prepared is available at <https://www.oecd.org/en/topics/economic-surveys.html>.

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Basic Statistics of Luxembourg, 2024

(Numbers in parentheses refer to the OECD average)

LAND, PEOPLE AND ELECTORAL CYCLE					
Population (million, 2023)	0.7		Population density per km² (2023)	258.9	(39.2)
Under 15 (% , 2023)	15.8	(16.9)	Life expectancy at birth (years, 2023, OECD: 2022)	83.4	(80.6)
Over 65 (% , 2023)	15.1	(18.2)	Men (2023, OECD: 2022)	81.7	(78.0)
International migrant stock (% of population)	51.2	(15.7)	Women (2023, OECD: 2022)	85.1	(83.2)
Latest 5-year average growth (%)	1.9	(0.4)	Latest general election	Oct-2023	
ECONOMY					
Gross domestic product (GDP)			Value added shares (% , 2023)		
In current prices (billion USD)	92.4		Agriculture, forestry and fishing	0.3	(2.7)
In current prices (billion EUR)	85.4		Industry including construction	11.5	(27.1)
Latest 5-year average real growth (%)	1.1	(1.7)	Services	88.3	(70.2)
	143.				
Per capita (thousand USD PPP, 2023) ¹	2	(59.0)			
GENERAL GOVERNMENT, Per cent of GDP					
Expenditure (OECD: 2023)	47.3	(42.4)	Gross financial debt (2023)	24.9	(110.5)
Revenue (OECD: 2023)	48.3	(37.8)	Net financial debt (2023)	-48.2	(67.0)
EXPENDITURE (OECD: 2023)					
Exchange rate (EUR per USD)	0.92		Main exports (% of total merchandise exports, 2023)		
PPP exchange rate (USA = 1)	0.87		Metals	19.8	
In per cent of GDP			Machinery and electronics	18.1	
	215.				
Exports of goods and services	8	(30.5)	Plastic or Rubber	15.3	
	184.				
Imports of goods and services	1	(30.1)	Main imports (% of total merchandise imports, 2023)		
Current account balance	13.9	(-0.6)	Transportation	16.8	
Net international investment position	36.4		Machinery and electronics	14.2	
			Fuels	12.5	
EXCHANGE RATE (EUR per USD)					
Employment rate (aged 15 and over, %)	58.3	(58.0)	Unemployment rate, Labour Force Survey (aged 15 and over, %)	6.4	(4.9)
Men	61.3	(65.4)	Youth (aged 15-24, %)	21.3	(11.1)
Women	55.3	(51.0)	Long-term unemployed (1 year and over, %, 2023)	1.7	(1.0)
Participation rate (aged 15 and over, %)	62.4	(61.0)	Tertiary educational attainment (aged 25-64, %, 2023)	51.3	(41.0)
	1	(1)			
Average hours worked per year (2023)	462	742)	Gross domestic expenditure on R&D (% of GDP, 2021)	1.0	(2.9)
ENVIRONMENT					
Total primary energy supply per capita (toe, 2023)	4.7	(3.7)	CO ₂ emissions from fuel combustion per capita (tonnes, 2023)	9.9	(7.6)
Renewables (% of total energy supply, 2023)	14.1	(12.5)	Water abstractions per capita (1 000 m³, 2023)	0.1	
Exposure to air pollution (more than 10 µg/m³ of PM 2.5, % of population, 2020)	0.0	(56.5)	Municipal waste per capita (tonnes, 2023)	0.7	(0.6)
SOCIETY					
Income inequality (Gini coefficient, 2022, OECD: latest available)	0.29		Education outcomes (PISA score, LUX: 2018, OECD: 2022)		
	6	(0.316)			
Relative poverty rate (% , 2022)	8.9	(11.7)	Reading	470	(476)
Median disposable household income (thousand USD PPP, 2022, OECD: 2021)	57.2	(30.0)	Mathematics	483	(472)
Public and private spending (% of GDP)			Science	477	(485)
Health care (2023)	5.8	(9.2)	Share of women in parliament (% , 2023)	33.3	(32.8)
Pensions (2021)	8.6	(9.9)	Net official development assistance (% of GNI, 2022)	1.0	(0.4)
Education (total spending, 2020)	3.4	(5.1)			

Note: The year is indicated in parenthesis if it deviates from the year in the main title of this table. Where the OECD aggregate is not provided in the source database, a simple OECD average of latest available data is calculated where data exist for at least 80% of member countries.

1. OECD aggregate refers to weighted average.

Source: Calculations based on data extracted from databases of the following organisations: OECD, International Energy Agency, International Labour Organisation, International Monetary Fund, United Nations, World Bank.

Executive summary

Key messages

- Maintaining high and sustainable growth in Luxembourg amid rising capacity constraints requires transitioning from rapid labour force expansion to growth based on skills and innovation, while securing the sustainability of the pension system and continuing to combat climate change.
- A comprehensive reform to curb pension expenditure and raise revenue is needed in the near term to secure the system for future generations and prevent disruptive changes at a later stage.
- Continuing to develop public transport and alternative mobility options, while bringing fuel prices more in line with neighbouring countries and making the tax regime less advantageous for cars with internal combustion engines, would help Luxembourg reach its climate targets.
- Boosting skills by upgrading training, refocusing public support for innovation and strengthening competition, especially in services, would help to reinvigorate stagnating productivity.

Transitioning to more sustainable growth based on skills and innovation

Maintaining high and sustainable growth in Luxembourg amid rising capacity constraints requires transitioning from rapid labour force growth to growth based on skills and innovation, while securing the sustainability of the pension system and continuing to combat climate change.

Despite several major shocks and the recent slowdown, Luxembourg has grown vigorously over recent decades. Living standards are among the highest in the OECD. The stable institutional framework, responsive regulation and a relatively favourable tax regime have attracted foreign investment and foreign workers, especially in finance and related business services.

Yet, the growth model based on rapid labour force expansion has reached its limits. Productivity has stagnated over the past 15 years, congestion has increased and housing has become less affordable for many residents. Policies fostering the transition to a more sustainable growth model based on skills and innovation need to be prioritised, while ensuring the sustainability of the pension system and addressing climate change.

Recovery is now underway way, but fiscal policy should remain prudent

Economic activity is set to gradually pick up as inflation remains low and financial conditions ease. As the recovery takes hold, fiscal policy should remain prudent to prepare for rising expenditure pressures, including on pensions, public investment related to the green and digital transitions, and defence.

Activity appears to have bottomed out, but growth has remained weak (Figure 1). Rising interest rates, driven by euro area monetary tightening since mid-2022, dampened measured activity in the financial sector and prompted a correction in the real estate market. While private and public consumption have stabilised and exports have rebounded, residential investment remains weak, reflecting the downturn in the construction sector.

Real GDP growth is expected to pick up gradually over 2025-26 (Table 1). Easing financial conditions and a gradual recovery of the construction sector will support growth. Headline consumer price inflation temporarily increased in early 2025 as energy price ceilings were scaled back, but will gradually return to around 2%.

Risks are broadly balanced. The decline in borrowing costs could have larger positive effects on activity, especially in the interest rate-sensitive finance and construction sectors. By contrast, weaker activity abroad due to escalating trade tensions, especially in key euro area trading partners, could delay the recovery in exports.

The financial system remains robust, but risks are rising. Investment funds have weathered redemptions during the monetary policy tightening cycle, and banks are well capitalised. But the ongoing downturn in the housing cycle has led to an increase in non-performing loans. Once the housing market recovers, macroprudential rules need to be tightened, including by reviewing loan-to-value ratios.

Table 1. Real GDP growth will gradually pick up

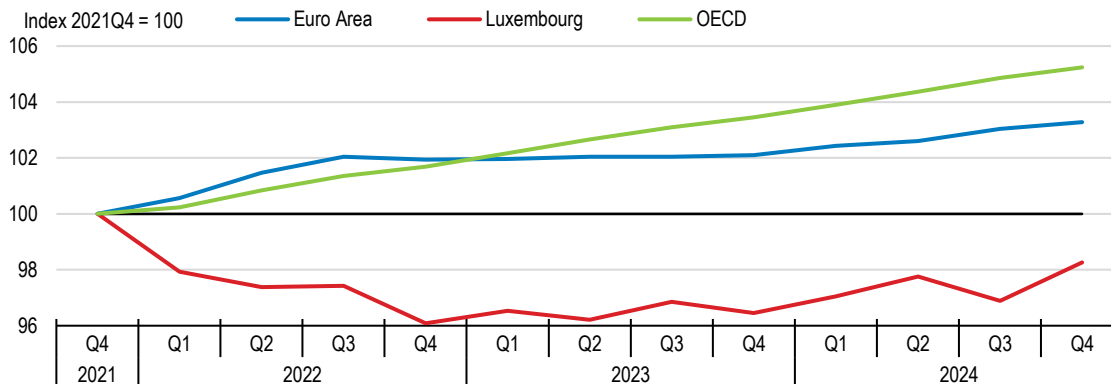
Annual growth rates, %, unless specified

	2023	2024	2025	2026
Real GDP	-0.7	1.0	2.1	2.3
Unemployment rate (% labour force)	5.2	5.7	5.9	5.8
Inflation (harmonised index of consumer prices)	2.9	2.3	2.1	1.9
Government budget balance (% of GDP)	-0.8	1.0	-0.0	-0.1
Public debt, Maastricht definition (% GDP)	24.9	22.9	22.9	23.5

Source: OECD, Economic Outlook No. 116.

Figure 1. Activity appears to have bottomed out

Gross domestic product, volume



Source: OECD Analytical database.

StatLink  <https://stat.link/9oaub7>

Fiscal policy should remain prudent. As a highly open economy with a large financial sector that accounts for about one-quarter of GDP, Luxembourg is highly exposed to global economic shocks. Moreover, spending pressures related to the green transition, ageing and defence are rising. In the short term, the priority should be to re-build fiscal buffers, including by fully phasing out energy policy support.

Adopting a national net spending rule would continue to ensure a medium-term anchor for fiscal policy. While long-term debt stabilisation will require a comprehensive pension reform, the rule should align the medium-term management of the public finances to the revised EU fiscal framework.

Reforms are needed to make the tax system more growth friendly. Gradually raising taxes on immovable property and VAT rates – which are relatively low – would provide space to raise tax revenue in a more efficient way. Moving from joint to individualised

personal income taxation of couples over time would help to reduce the high share of women who work part-time. The simplicity of the tax system would be enhanced and distortions reduced by reforming the net wealth tax on corporations.

Housing affordability remains low despite real house prices having fallen by about 20% over the past two years. The authorities have mainly focused on supporting existing and prospective homeowners, but a stronger emphasis on addressing structural supply shortages is needed. The mortgage interest deduction should be phased out and tax credits for house purchases should be targeted to low-income buyers. The planned adoption of a property surtax on unused land is a positive step, but the rate should be set sufficiently high to increase tax revenues and discourage land hoarding. Streamlining permitting for construction projects would help make building more responsive to demand.

Securing the pension system for future generations

A comprehensive reform of the pension system is needed in the near term, combining higher pension contributions, increased effective retirement ages, and some reductions in benefits to secure the system for future generations.

Luxembourg faces rapidly rising pension expenditure over the next decades (Figure 2), mainly from the retirement of the large cohorts of workers who entered the labour market from the late 1980s. The number of pensioners will more than triple over 2024-2070, requiring an increase in employment of 1.2 million workers to maintain a stable ratio of workers to pensioners. This would further strain infrastructure and housing, underlining that the pension system is

unsustainable under current rules, despite large pensions reserves accumulated over the past two decades.

Balancing the pension system in the long term requires a comprehensive reform. The horizon over which periodic reviews assess the balance of the system needs to be extended from 10 to 50 years. Setting a steady-state contribution rate that balances the system

over 50 years and phasing it in early would ease the burden on future generations by allowing larger working-age cohorts to contribute more, while the pension reserve fund would grow through financial returns.

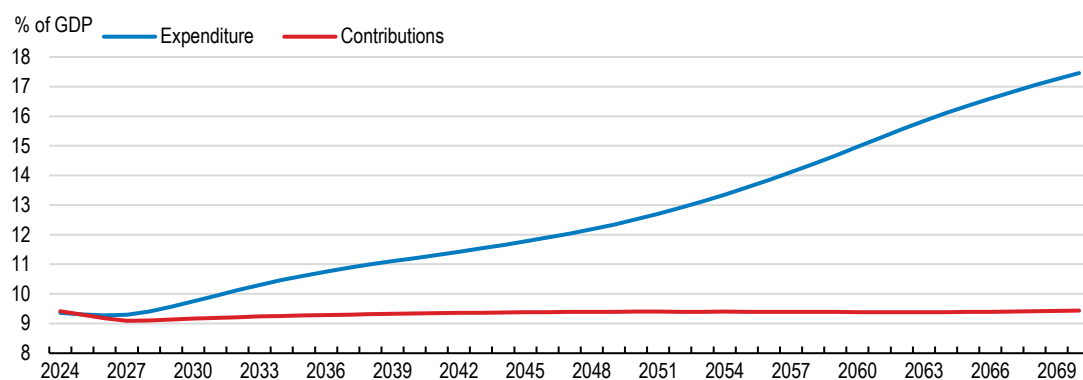
Raising contributions to a rate that can be maintained over the long term and raising the effective retirement age, which is the lowest in the OECD, would put the system on a sustainable footing. Eligibility for early retirement should be tightened by removing educational years from the calculation of contributory years, aligning benefits with actual work history. On top of helping to balance the pension system, this would also help to improve intra-generational fairness by mainly affecting highly-educated workers, while protecting lower-educated ones. At the same time, early and statutory retirement ages should be raised to match gains in life expectancy.

Pension benefits need to be brought more in line with other OECD countries. Currently, the relative income of older people is the highest in the OECD. Shortening the

transition to the lower replacement rates of the 2012 reform from 40 to 25 years would contribute to a slower depletion of assets in the pension reserve fund. Switching from nominal wage indexation of pensions in payment to inflation indexation – as is common in OECD countries – would ensure that current pensioners contribute to the reform effort.

If all policy levers are used and reforms are enacted in the next few years, the extent of required changes would be manageable. Legal retirement ages would increase by about 1½ years per decade; the replacement rate at retirement age for a worker with a full career would remain around 75%; and the joint pension contribution of employers and employees would increase from 16% to 18%. While these changes are significant, they appear manageable relative to the radical changes that would be required at a later stage if no reform is undertaken, such as large increases in pension contributions or sharp reductions in replacement rates from the late 2040s.

Figure 2. The pension system will go from broad balance to large deficit



Note: Baseline scenario for the European Commission Ageing Working Group.
Source: IGSS.

StatLink  <https://stat.link/drbgny>

Continuing to reduce emissions to attain climate targets

Timely and effective implementation of the measures contained in the national energy and climate plan (NECP) is key to reach climate goals. Reducing the reliance on cars and promoting the use of public transport and alternative sustainable commuting options would reduce emissions in the transport sector.

Luxembourg has made substantial progress in reducing emissions, but further efforts are needed. The authorities aim to reduce emissions in sectors not covered by the EU Emissions Trading System by 55% by 2030 and to reach net zero emissions by 2050. This will require ambitious policies in the transport and

residential sectors, which account for 80% of measured emissions.

There is scope to further strengthen public transport. Continuing to expand the public transport infrastructure and increasing the frequency and capacity of carriages would help to ease congestion and boost overall system capacity. Measures are also

needed to limit congestion during peak hours, including by better linking land planning and public transport development, as well as by introducing staggered or flexible school and working hours.

The reliance on combustion engine cars is high, supported by low taxes on cars and fuel. Setting a clear, forward-looking trajectory for the taxes on motor

fuels that goes well beyond 2027 and brings the final fuel price more in line with that of neighbouring countries would reduce fuel tourism and the use of private cars. Increasing the registration tax on new cars and making it dependent on emissions, while introducing road tolls and reserving road lanes for buses and carpooling, would encourage the transition to more sustainable commuting options.

Reviving productivity growth

Luxembourg needs to transition from a growth model based on rapid labour force growth to a model based on skills and innovation to revive stagnating productivity growth, sustainably raise living standards and ease pressures on infrastructure, housing and emissions.

Productivity is among the highest in the OECD, but has stagnated over the past 15 years (Figure 3). The stagnation has primarily been driven by dismal performance of multi-factor productivity, a common measure of technological progress. Spurring the development and adoption of new technologies requires boosting innovation, addressing skills shortages and strengthening competition.

Business innovation and technology adoption is weak. Business expenditure R&D is among the lowest in the OECD as a share of GDP and there is scope to increase innovation – including scientific publications, patent applications, as well as product and business innovations – which is well below leading countries.

Reforms to the system of public innovation support are needed. Establishing a coordination mechanism between the main actors providing public R&D support, shifting more from institution to project-oriented support and strengthening the role of public-private partnerships would crowd-in more business R&D. Streamlining the investment tax credit and making incremental digital and technological improvements eligible for support would favour technology adoption in smaller firms.

Luxembourg faces skills shortages, as demand for skills increasingly outpaces supply. Enhancing adult learning is key to equip the workforce with the skills that are currently in short supply. Quality standards for training

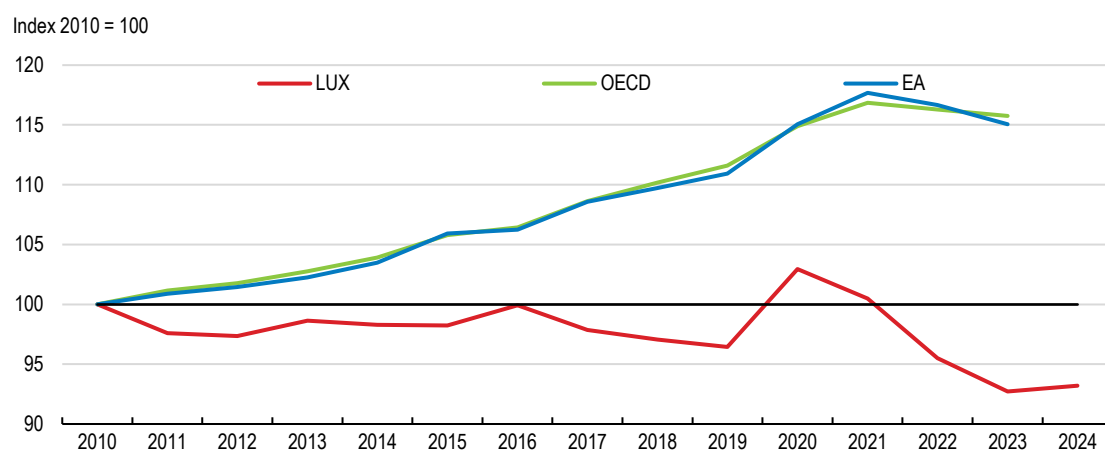
providers could be strengthened through the creation of a national accreditation agency, as well as the tightening of quality control on training providers. Enhancing the targeting of financial incentives for adult learning and more proactive guidance would increase the participation of low skilled and older workers. Fully digitalising visa and work permit processing would help to attract talent from abroad.

High barriers to competition hold back productivity growth, especially in services. Reviewing the requirement to be member of a professional association and to pass an examination on top of a formal education degree would reduce entry barriers and lower prices in professional services. The scope for incumbents and larger firms to shape regulation in their favour at the expense of smaller firms and new entrants needs to be curtailed. This could be achieved by requiring full disclosure of the identity of interest groups and public officials that were involved in lobbying activities and introducing sanctions for lobbyists who do not enrol in the dedicated public register.

The quality of regulation could be further improved by enhancing the regulatory process. Introducing ex-ante and ex-post evaluations of the impact of regulation on competition and requiring the use of plain language in drafting new laws and regulations would reduce the administrative and regulatory burden for businesses.

Figure 3. Labour productivity has stagnated over the past 15 years

Real value added per hour worked



Source: OECD Analytical Database.

StatLink  <https://stat.link/ak5op8>

Main findings	Key recommendations
Balancing support to the economy and fiscal prudence	
Fiscal policy has supported the economy through generous energy policy and housing policy measures.	Fully phase out energy policy supports and better target housing policy measures.
The share of immoveable property taxes and VAT in total revenues is low. The government envisages an update of the property register underlying the land tax.	Gradually raise VAT rates and taxes on immoveable property.
The property register used for the assessment of the land tax is outdated and the land tax is too low to discourage land hoarding. The government envisages a major reform.	Set the rate of the property surtax on unused land sufficiently high to increase tax revenues and discourage land hoarding.
The existing procedures for obtaining construction permits are relatively complex, involving multiple ministries.	Consolidate the permitting process into a single, streamlined entity and adopt the principle of “silence means consent”.
The gender wage gap is low and female labour market participation is high, but many women work part-time.	Gradually individualise the income tax system to reduce disincentives for women to work full time.
Securing the pension system for future generations	
The public pension system boasts low legal retirement ages and high benefits but, at current contribution rates, will become unsustainable in the long run despite large pension reserves.	Extend the horizon of the periodic pension reviews from 10 years to 50 years to ensure the long-term sustainability of the system.
The semi-automatic adjustment mechanisms of the 2012 pension reform will be insufficient to prevent large increases in pension contributions from the early 2040s.	Phase in a stable contribution rate by 2030 that balances the pension system over the horizon of the pension review, while protecting low-wage workers.
The effective retirement age is the lowest in the OECD, mainly reflecting generous eligibility criteria for early retirement. Legal retirement ages are not linked to life expectancy.	Exclude periods of education from the calculation of total insurance years. Raise early and statutory retirement ages to match gains in life expectancy.
High pension benefits will lead to a rapid drawdown of assets in the pension reserve fund over the next 15 years, despite the reduction of replacement rates foreseen by the 2012 pension reform.	Bring forward from 2052 to 2037 the phase-in of the replacement rates of the 2012 reform.
Accelerating the green transition	
Public transport has been made free of charge, but capacity and the network fall short of demand.	Continue to develop public transport infrastructure, expanding the network, increasing frequency, and raising the capacity of carriages. Better link land planning with public transport development.
Fuel prices are lower than in neighbouring countries, encouraging fuel tourism and the use of combustion engine cars.	Set a clear, forward-looking trajectory for taxes on motor fuels that goes well beyond 2027 and brings the final fuel price more in line with that of neighbouring countries.
The tax regime for cars is too advantageous, with the lowest value added tax rate on new cars in Europe and a low registration tax.	Increase the registration tax for new cars and the annual road vehicle tax, while strengthening the link with emissions.
Reviving productivity growth	
R&D support is provided by various institutions, with different application procedures and selection criteria, and the allocation of grants is institution based rather than project based.	Establish a coordination mechanism to streamline public R&D support, while making it more project-oriented and conditional on public-private partnerships.
Accredited training providers are numerous, and the quality and relevance of courses is not always of the highest standards.	Tighten quality control by creating a national accreditation agency that encompasses the relevant ministries and the social partners.
The uptake of the individual training leave is very low and unbalanced, being lower among low skilled and older workers.	Enhance the customisation and targeting of current training incentives and develop more proactive guidance.
Barriers to entry in professional services are high A reform to make entry requirements more flexible for civil engineers and architects is underway	Review the requirement to be member of a professional association and to pass a professional examination on top of a formal education degree.
Lobbying regulations do not guarantee full transparency and accountability.	Require full disclosure of the identity of lobbyists and public officials for each interaction.



1 Promoting a strong and sustainable recovery

Cyrille Schwellnus

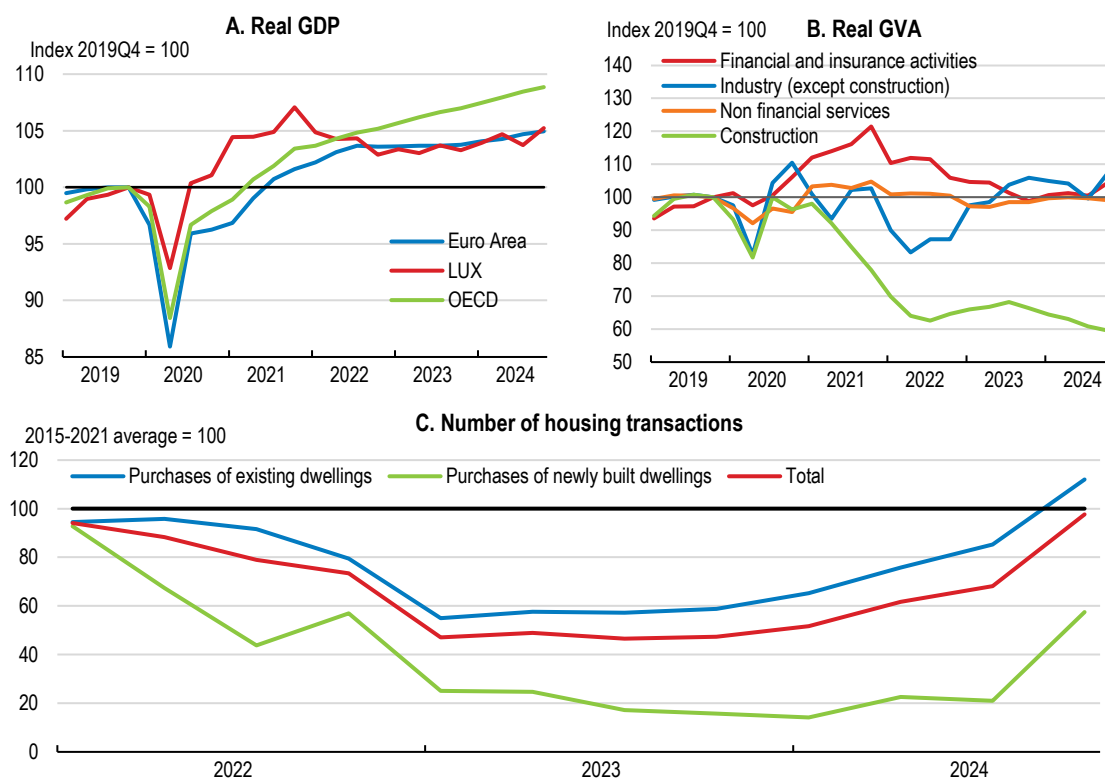
Luxembourg's economy weathered the energy crisis of 2022-23 and global monetary tightening, but the costs have been significant. Higher borrowing costs abruptly halted a decade-long housing boom, causing a 40% drop in construction activity. Rising interest rates also impacted activity in the financial sector, a major pillar of the economy. The recovery is now underway, as substantial fiscal supports and robust private consumption bolstered by strong wage growth sustain activity. Inflation has receded, although the rollback of energy price measures in early 2025 has led to a temporary uptick. The government budget balance was positive in 2024, but medium-term expenditure pressures from ageing, the green transition and defence are rising. A comprehensive pension reform is essential to secure the pension system for future generations, while maintaining low public debt. Raising taxes on immovable property and VAT would provide space to meet revenue needs and make the tax system more growth-friendly.

1.1. The recovery is underway

1.1.1. Activity is gradually recovering from the energy crisis

The energy crisis of 2022-23 and the ensuing tightening of global financial conditions weighed more heavily on Luxembourg's GDP growth than on that of the average euro area country. Having navigated the COVID-19 pandemic relatively unscathed, Luxembourg's economy began to shrink in early 2022. By the third quarter of 2024, real GDP stood roughly 1½ percentage points below its level at the end of 2021 (Figure 1.1, Panel A). The downturn was especially severe in the construction and financial sectors. Higher borrowing costs following euro area monetary policy tightening brought an abrupt halt to the housing market that had enjoyed a decade of rapid price growth. The number of transactions fell by about 50% between early 2022 and late 2023, before recovering in 2024 (Figure 1.1, Panel C). Construction activity fell by around 40% relative to pre-pandemic levels, with adverse effects on construction employment and the financial position of companies. Rising interest rates also hit the measured output of the financial sector, which constitutes around a quarter of Luxembourg's GDP, by curbing bank lending and driving net outflows from investment funds. While manufacturing has shown signs of recovery from its initial dip caused by high energy prices, growth in non-financial services, which are closely linked to financial services, has remained largely stagnant (Figure 1.1, Panel B).

Figure 1.1. Activity has contracted since early 2022 but is now gradually recovering

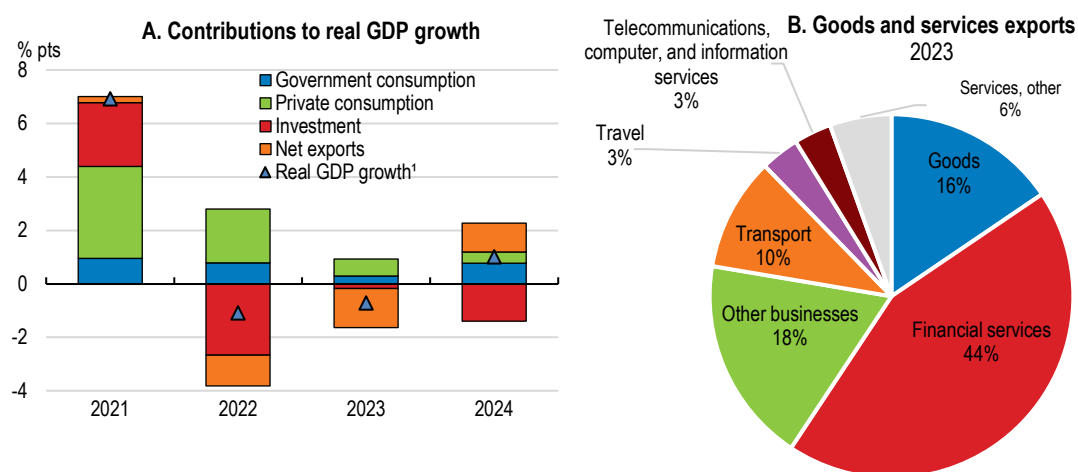


Source: OECD Analytical Database; Eurostat; and OECD calculations.

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The gradual recovery in 2024 has been driven by public consumption and the recovery of net exports (Figure 1.2, Panel A). Public consumption has been bolstered by energy policy support that includes price measures, such as subsidies on fuel, gas and electricity, as well as targeted income support, cumulatively amounting to about 4% of GDP since 2022. The recovery of net exports is explained by the modest pick-up in financial services, which account for about 45% of total exports, while investment remains exceptionally weak on the back of the downturn in the construction sector (Figure 1.2). Private consumption has been resilient, bolstered by strong growth in real disposable income on the back of generous energy policy support and the stabilisation of real wages due to the indexation of nominal wages to inflation. Despite robust household spending, the savings rate remained about five percentage points higher than its pre-pandemic average, suggesting that the drawdown of excess savings could support private consumption in the near term as exceptional fiscal support has been scaled back at the beginning of 2025.

Figure 1.2. The cyclical downturn was driven by the weakening of investment and exports



1. Annual growth rates.

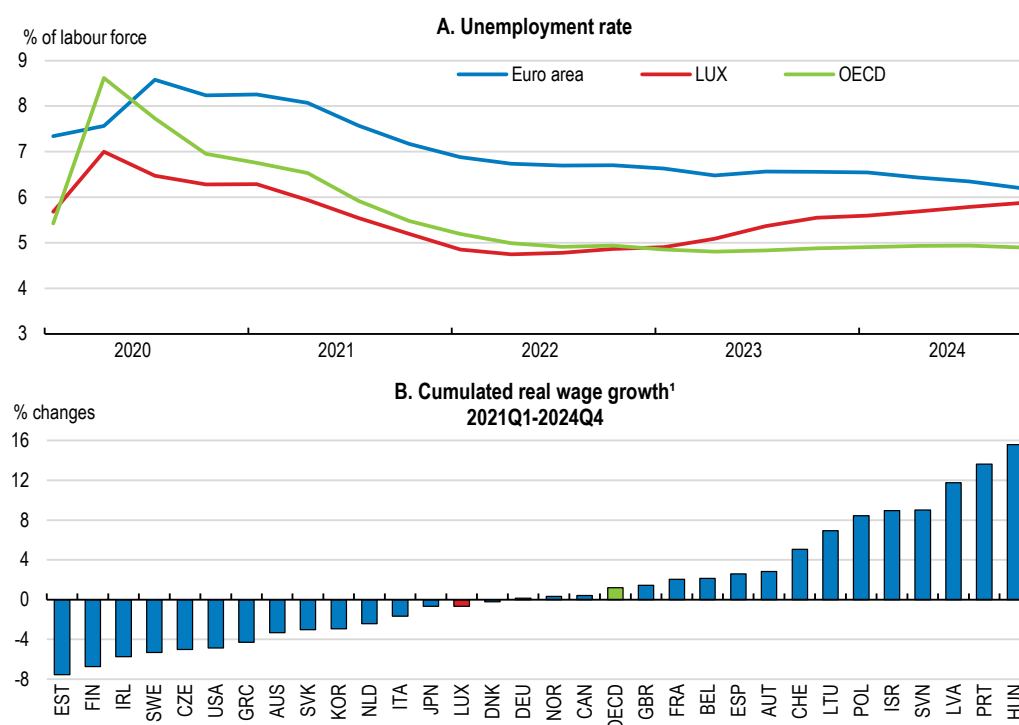
Source: OECD Analytical Database; Eurostat; and OECD calculations.

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1.1.2. The labour market has softened, but nominal wages have continued to grow robustly, driven by wage indexation

The slowdown in activity from early 2022, drove a gradual weakening of the labour market. Employment growth slowed and unemployment began to rise in mid-2023. Annual employment growth in the fourth quarter of 2024 was 1%, well below the pre-pandemic average of around 2½ per cent, driven in about equal measure by the weakening of resident and cross-border employment. In contrast to most other euro area countries, the unemployment rate started to rise from mid-2022, reaching 5.9% in the fourth quarter of 2024 (Figure 1.3, Panel A). Despite the softening of the labour market, businesses report persistent hiring challenges, reflecting shortages of skilled workers, especially in ICT, finance, and construction.

Figure 1.3. The unemployment rate has risen, but indexation has prevented real wages from falling



1. Real wages denote wage compensation per employee deflated by the consumer price index.

Source: Eurostat; and OECD Analytical Database.

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Despite the softening of the labour market, nominal wage growth has remained strong, reflecting the indexation of wages to inflation. Cumulated nominal wage growth since the end of 2020 has been around 14%, broadly in line with the cumulated growth in the consumer price index (Figure 1.3, Panel B). The wage indexation system has protected real household income by preventing real wages from falling during the inflationary shock triggered by the energy crisis. However, downward real wage rigidity may limit short-term macroeconomic adjustment to adverse economic shocks, which could partly be addressed by basing the indexation on core rather than headline inflation or better taking into account productivity developments in the wage indexation process (Box 1.1).

Box 1.1. Reforming the wage indexation system

Luxembourg's universal wage indexation system, which dates back to 1975, aims to safeguard workers' living standards by linking wage increases to inflation. When the 6-month moving average of the National Index of Consumer Prices (NICP) rises by 2½ percent above the level since the last indexation, all wages, salaries, pensions and social benefits are adjusted upward. In principle wage indexation is automatic, but in practice the system has been modulated during crises to allow for some degree of flexibility. For instance, indexations have been postponed, or the government has temporarily compensated businesses for higher labour costs (Fornino and Jarak, 2023).

Wage indexation supports social cohesion by preventing inflation from eroding purchasing power of workers and pensioners but also raises issues for short-term macroeconomic adjustment, especially for a small and highly-open economy like Luxembourg.

In the short term, automatic wage increases driven by inflation may raise labour costs compared to neighbouring countries, where the adjustment of nominal wages to high inflation may be more gradual. In the initial stages of the energy crisis, for instance, real wages in neighbouring countries fell, whereas they remained

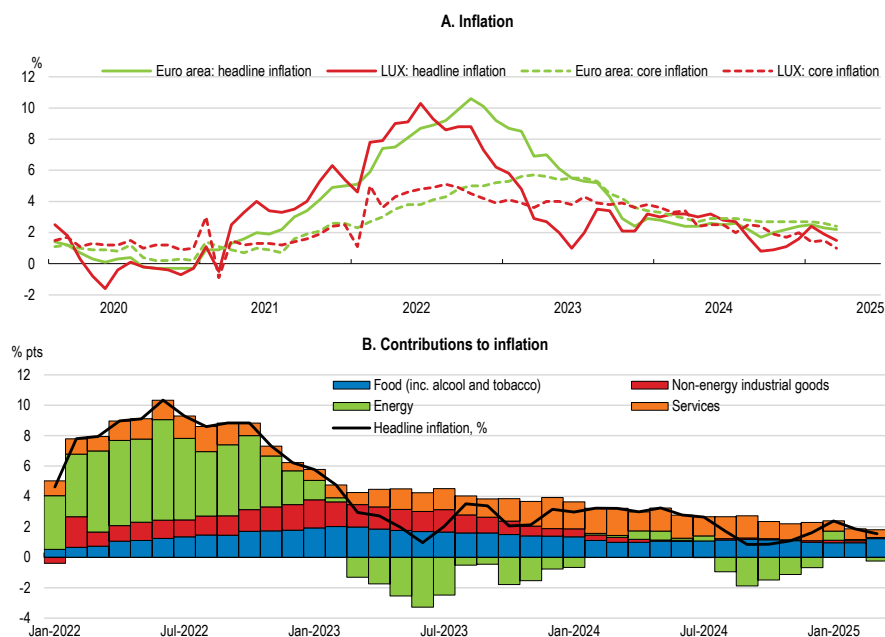
broadly constant in Luxembourg. In the medium term, adverse effects on competitiveness typically fade as real wages in neighbouring countries catch up, but in the meantime the government may need to provide compensation to businesses, as was done during the recent energy crisis. Moreover, wage indexation generates downward rigidity of real wages, which may lead to increases in unemployment rather than real wages in the wake of adverse economic shocks. This issue becomes particularly salient in the case of shocks that may require declines in real wages in specific industries to limit increases in unemployment. For instance, despite the collapse in construction activity, real wages in Luxembourg's construction sector did not adjust, driving the increase in the unemployment rate over the past two years.

Reforming Luxembourg's wage indexation system would require striking a balance between preserving social cohesion and promoting a higher degree of flexibility. One avenue for reform would be to base wage indexation on core inflation, which excludes volatile items like energy and food prices. This would prevent global commodity price shocks from automatically triggering wage increases, which would make the system more responsive to underlying economic conditions, rather than to short-term price fluctuations. In Belgium, for instance, automatic wage indexation is based on the so-called Health Index, which excludes alcohol, tobacco, and energy. Potential adverse distributional effects due to the high weight of these goods in low-income households' consumption baskets could be mitigated by direct social transfers. Another approach would explicitly take into account productivity developments to avoid adverse effects on competitiveness and employment. Moving towards sectoral wage bargaining, using core inflation as the starting point, would allow to better take into account sector-level productivity developments.

1.1.3. Inflation has eased, but competitiveness is deteriorating

As in other euro area economies, inflation has eased. By March 2025, headline inflation stood at 1.5%, down from a peak of around 10% in mid-2022 despite the partial unwinding of energy price support in January. This decline primarily reflects the unwinding of supply shocks, particularly energy, as well as continued energy price support. Core inflation declined to 1.5% in February on the back of weakening demand, down from around 5% in mid-2022, with pressures from services inflation having eased significantly over the past year (Figure 1.4, Panel B).

Figure 1.4. Inflation has eased

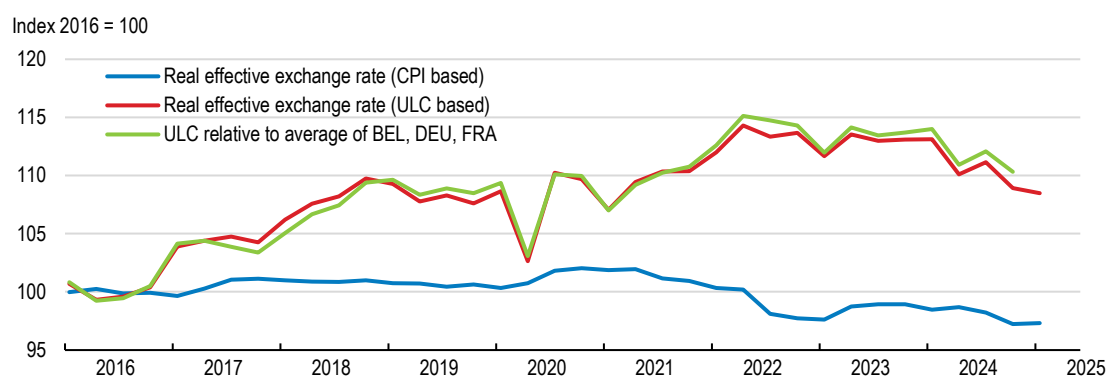


Source: Eurostat; and OECD Price database.

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The increase in unit labour costs of about 15% since the end of 2021 has not been reflected in the CPI-based real effective exchange rate (Figure 1.5), as headline consumer price inflation in Luxembourg has been comparable to the euro area average. This is partly explained by policy measures that sought to limit the impact of automatic wage indexations on businesses' costs by temporarily reducing social security contributions. The unit labour cost-based real effective exchange rate temporarily appreciated during the energy crisis but has since come down, as nominal wages in neighbouring countries caught up with productivity (Figure 1.5).

Figure 1.5. The unit labour cost-based real effective exchange rate has appreciated



Source: OECD Economic Outlook database; and OECD National accounts database.

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1.1.4. The economic recovery will continue

Real GDP is projected to grow by 2.1% in 2025 and 2.3% in 2026 (Table 1.1). Private consumption will remain strong as households' real disposable income will be boosted by another round of wage indexation and low inflation. Lower interest rates will help the financial and construction sectors to gradually recover. Core and headline inflation are projected to continue to decline, reaching around 2% by the end of 2026, although headline inflation ticked up slightly in January 2025 as energy price supports were scaled back.

The risks to the growth outlook are broadly balanced. On the upside, a quicker-than-anticipated recovery in the finance and construction sectors could bolster growth. By contrast, a slower growth in the euro-area in 2025 and 2026 due to escalating trade tensions might dampen the expansion by curbing export demand. Longer-term vulnerabilities that could lead to major changes in the outlook include a surge in global energy prices, heightened financial market volatility and a decline in the number of companies that channel pass-through financial investments through Luxembourg (the so-called SOPARFIs) and contribute about 2% of GDP in business taxes (Table 1.2). In the longer term, Luxembourg's economy is heavily dependent on its large financial sector, which is dominated by cross-border activities and international firms, for employment and tax revenues. While these activities are long-established in Luxembourg and there is a strong local eco-system around these activities, there is nevertheless a risk that activities could shift over time to other jurisdictions.

Table 1.1. The economic recovery is projected to continue

	2023	2024	2025	2026
Real GDP	-0.7	1.0	2.1	2.3
Unemployment rate (% labour force)	5.2	5.7	5.9	5.8
Inflation (harmonised index of consumer prices)	2.9	2.3	2.1	1.9
Government budget balance (% of GDP)	-0.8	1.0	-0.0	-0.1
Public debt, Maastricht definition (% GDP)	24.9	22.9	22.9	23.5

Table 1.2. Low probability events that could entail major changes to the outlook

Shock	Likely impact	Policy response options
Higher global energy prices due to the escalation of the war in the Middle East.	Higher interest rates in response to energy price inflation trigger a further downturn in the housing market.	Ensure appropriate capital buffers in the banking sector and limit household debt vulnerabilities, including by strengthening counter-cyclical macroprudential regulation.
Heightened financial market volatility due to an escalation of trade tensions.	Large redemptions from investment and money funds trigger asset price declines and liquidity shortages.	Continue to closely monitor liquidity and links between the fund industry and the banking sector.
Decline in the number of pass-through financial investment companies (so-called SOPARFIs).	Loss of tax revenue.	Closely monitor this sector, including the impact of the phase-in of the OECD/G20 global tax agreement.

Source: OECD.

Some progress has been made on enhancing macroeconomic resilience and better targeting fiscal support (

Table 1.3). Yet, there is scope for further reforms to secure the sustainability of public finances, make the tax system more growth friendly, and improve housing affordability, which are among the key priorities of the new government that took office in late 2023 (Box 1.2). Long-term growth could be boosted by 0.35 percentage points annually – raising the level of real GDP by 9% by 2050 – by reforming the pension system and undertaking structural reforms in the areas of skills, innovation, and competition (Table 1.4).

Box 1.2. The government's reform priorities

The 2023-2028 Luxembourg coalition agreement aims to strengthen the economy, foster social cohesion, and position the nation as a leader in digital and environmental innovation within the EU. The key themes are the following:

1. **Fiscal Policy:** The government commits to prudent fiscal policies while supporting public investment. The tax system will be reformed to alleviate the burden on low- and middle-income earners. A broad consultation process, involving the social partners and civil society, will be initiated to find consensus on reforms to secure the pension system's long-term viability.
2. **Housing and Infrastructure:** To address the housing crisis, Luxembourg will increase financial support to municipalities for affordable housing initiatives. Additional reforms in taxation aim to stimulate land use and increase housing availability. Urban planning initiatives include infrastructure upgrades and sustainable public transport networks.
3. **Modernisation of the State and Digitalisation:** A priority is placed on digital transformation to streamline administrative processes and improve citizen services, including by adopting the "once only" data-sharing principle to minimise redundant information requests from citizens.
4. **Environmental and Climate Action:** The new government pledges to uphold climate goals, investing in sustainable technologies and infrastructure, and continuing efforts to reduce greenhouse gas emissions.
5. **Education and Workforce Development:** Emphasis is placed on developing skills for the digital economy, improving access to early childhood education, and modernising public education to prepare for the future job market.
6. **Foreign Policy and Security:** Luxembourg is committed to increased defence spending aiming to modernise the military, with a focus on cybersecurity and collaboration with European partners.

Table 1.3. Past OECD recommendations on macroeconomic and financial policies

Recommendations in past Surveys	Actions taken since the previous Survey
Make income support to households more targeted to the most vulnerable and limited in time, whilst avoiding accelerating domestic demand pressures.	Fiscal support has been made more generous for vulnerable people, including low-income households, but some energy policy supports remain in place.
Reform the wage indexation system in consultation with social partners to take better account of the productivity, employment, and investment effects.	No action taken.
Expand and publish regular monitoring of all loan types by household characteristics to understand emerging pockets of vulnerability, and be prepared to implement additional macroprudential policies if necessary.	Real estate indicators have been improved to provide breakdowns by household characteristics on a semi-annual basis.
Put in place a more performance-oriented budgeting framework, incorporating spending reviews, to make spending more effective.	A study has been commissioned to the OECD to evaluate budgetary practices as well as streamlining performance monitoring approaches.
Link increases in the statutory retirement age to increases in life expectancy.	No action taken.
Phase out incentives for early retirement, while providing for more flexible working arrangements for older workers.	No action taken.

Table 1.4. Illustrative growth impacts of structural reforms recommended in this Survey

Impact on the level of real GDP by 2050, in %

Reform	Scenario	Impact
Reform the pension system	Raise the effective retirement age, shorten the transition to the 2012 reform and raise pension contributions	2.1
Raise workforce skills	Reduce the gap with the top-performer on the Pisa evaluation by one-third per decade. ¹	2.4
Raise total R&D expenditure	Increase total R&D expenditure to the OECD average over the next two decades.	2.0
Make product market regulation more competition-friendly	Reduce the gap to the OECD average by one-quarter per decade.	2.4
Total		8.9

1. Chapter 4 focuses on measures to promote adult skills rather than student skills, but adult skills are not modelled in the OECD Long-Term Model.
Source: OECD Long-Term Model.

1.2. The financial sector remains robust despite weaker measured activity

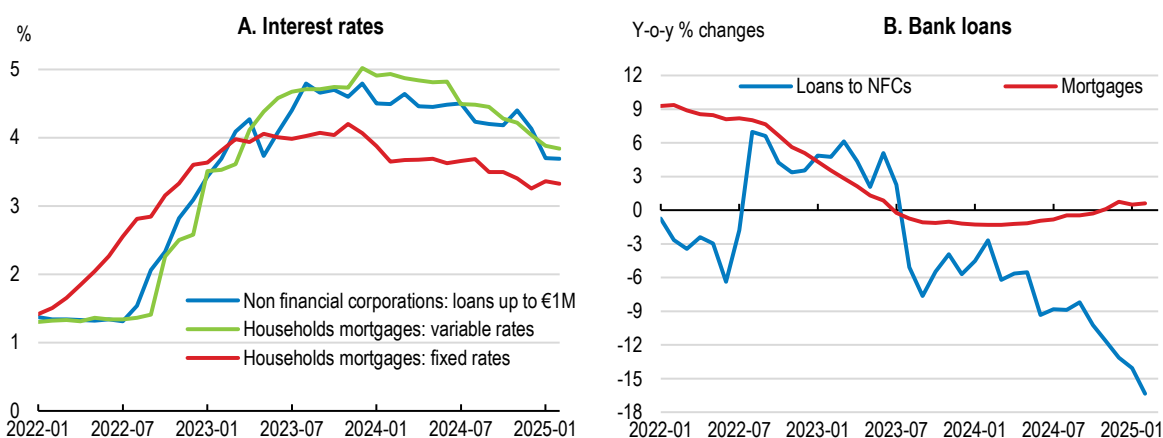
The financial sector is a key driver of Luxembourg's economy, accounting for about 25% of GDP and 10% of employment. In the national accounts, financial services output is measured as the sum of financial intermediation services indirectly measured (FISIM) and fees, for instance on account keeping, credit cards, brokerage, financial advice and asset management. FISIM is not directly observed and is estimated by imputing a reference interest rate on loans and deposits. Trading profits and other interest income, for instance on bonds and derivative products, are excluded from the national account measure of financial services output. Given the large size of Luxembourg's fund industry, financial services output in the national accounts only provides a partial measure of financial sector activity.

In terms of assets, the financial sector is dominated by the investment fund sector, with assets amounting to about 77 times GDP. Its initial growth in the late 1980s and early 1990s is explained by Luxembourg being the first country to adopt the EU Directive on Undertaking for Collective Investment in Transferable Securities (UCITS) in 1988, which allowed Luxembourg investment funds to market securities to investors from other EU member states by virtue of passporting rights. Over the past decades, the rapid development of a financial ecosystem supported by responsive regulation, stable institutions and the availability of specialised skills has driven sustained growth and diversification into non-UCITS funds (regulated and unregulated alternative investment funds). The large banking sector, with assets amounting to about 12 times GDP, is dominated by international banks, with domestically-owned banks accounting for about 8% of banking assets (around 100% of GDP). Only about one-fifth of banking assets are related

to commercial banking activities, whereas banking business models are dominated by private banking and fund management activities. The insurance sector specialises on the life insurance segment, with assets amounting to about 3 times GDP. Luxembourg is also host to a systemically-important international central securities depository (Clearstream Banking Luxembourg), as well as a large number of other financial intermediaries – mainly intragroup holdings (so-called SOPARFIs that are discussed in more detail below).

Euro area monetary policy tightening from mid-2022 was quickly passed on to bank lending rates for Luxembourg residents, driving downturns in the credit and housing cycles. Interest rates on loans to non-financial corporations and floating-rate mortgages have increased from about 1½ percent in mid-2022 to above 4% in October 2024 and credit standards have tightened. Consequently, loans to non-financial corporation and mortgages have declined and house purchases collapsed, with real house prices having fallen by about 20% from over the past two years.

Figure 1.6. Interest rates remain elevated and credit growth is weak



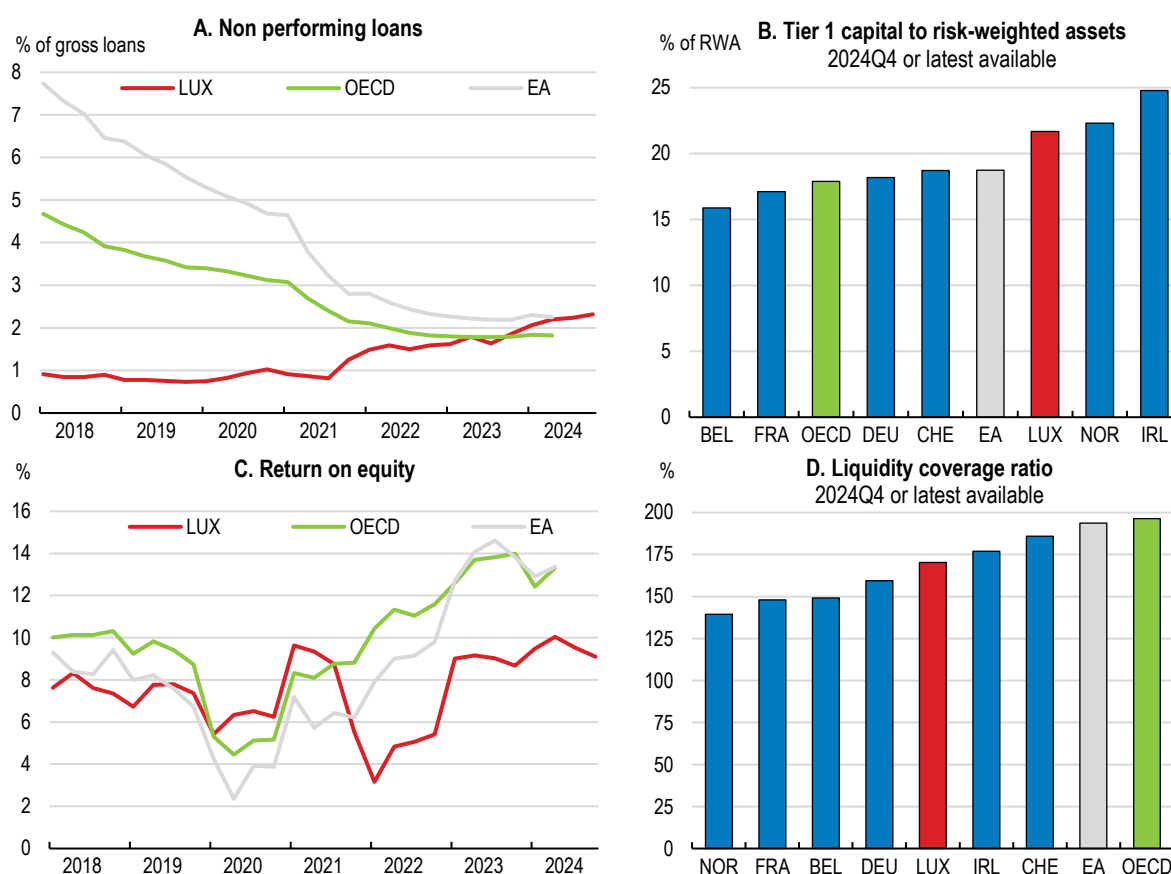
Note: Panel B: Annual growth rates

Source: Central Bank of Luxembourg.

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High interest rates and the downturn in the housing market are putting pressure on some borrowers, but banks' capital buffers remain comfortable. The ratio of non-performing loans increased from 1% in mid-2021 to 2.3% in the fourth quarter of 2024, according to internationally comparable data that cover domestic banks and subsidiaries of foreign banks (Figure 1.7, Panel A). Despite the housing market downturn, collateral values – houses for mortgage loans and land for commercial real estate companies – remain robust since a significant share of outstanding loans were contracted before the house-price peak. Moreover, wider net interest margins due to higher interest rates have allowed banks to increase profitability despite higher loan-loss provisions, lower commissions and valuation losses in the bond portfolio, with banks' capital buffers remaining well above the euro area average (Figure 1.2, Panels B and C). Banks' liquidity buffers are robust and there are regulatory limits to intra-group exposures, but subsidiaries of weak foreign parent banks could nonetheless be vulnerable to rapid deposit outflows due to large unexpected cash withdrawals by their parents.

Figure 1.7. Non-performing loans have risen, but the banking sector is well-capitalised



Source: International Monetary Fund (Financial Soundness Indicators).

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Strengthening macroprudential regulation over the long term, when cyclical conditions allow, would further enhance the stability of the banking system and protect borrowers. While owners with fixed-rate mortgages are protected from interest rate increases, some owners with variable-rate mortgages (around 30% of all mortgages) may face difficulties in servicing their debt. In 2022, the average owner was spending about 34% of disposable income on mortgage payments, well above the EU average (about 20%), with the majority of owners in the bottom quintile of the income distribution spending more than 40% (OECD, 2024e). In the medium term, once the housing market recovers, reviewing loan-to-value limits – which currently stand at 100% for first-time buyers – would reduce the risk of household defaults when economic activity weakens or interest rates rise. There is also a need for better coordination of macro-prudential policies with fiscal policy measures, especially those related to the housing sector. While fiscal demand-side support to the housing market may be justified in the short-term to stabilise the market, in the medium term help-to-buy policies, such as tax credits for house purchases (see below), the tax deductibility of mortgage interest payments and low recurrent taxes on property are likely to exacerbate structural supply shortages and the volatility of the house price cycle, which could make macroprudential measures less effective.

The investment fund sector has broadly maintained its global market share, even though it experienced losses in the exchange traded fund (ETF) segment. This is mainly due to rapid inflows into Irish ETFs, which benefit from a double tax treaty with the United States. Investment funds' cash deposits in the banking sector have declined, but banks' liquidity coverage ratio remains around the euro average and well above regulatory requirements (Figure 1.7, Panel D). The insurance sector has also experienced financial outflows, as policy holders shifted from fixed-rate products to higher-yielding assets and paid back variable interest rate policy loans (loans backed by an insurance policy as collateral).

Stress tests suggest that the financial system as a whole would be able to withstand severe adverse shocks, even though solvency and liquidity issues may arise in a small number of weaker institutions (IMF, 2024). The banking sector as a whole would be resilient in the adverse scenario thanks to strong average capital and liquidity buffers, but 6 weaker banks (out of 120 resident banks) would come under solvency or liquidity pressure. Recapitalisation by private means in the adverse scenario would be manageable, amounting to about 0.5-1% of GDP. Likewise, the investment fund and money market fund sectors as a whole would be able to withstand adverse shocks from falls in net asset values, higher interest rates and redemptions, but a small number of investment funds and money market funds show vulnerabilities in stress tests and warrant further monitoring. While risks in the fund sector are mainly borne by the investors, they may nonetheless spill over to the broader financial sector. The insurance sector is largely immune to adverse scenarios, thanks to the large share of unit-linked policies in the life insurance sector that transfers market risk to policyholders, and the low sensitivity of non-life insurers to market and credit risks.

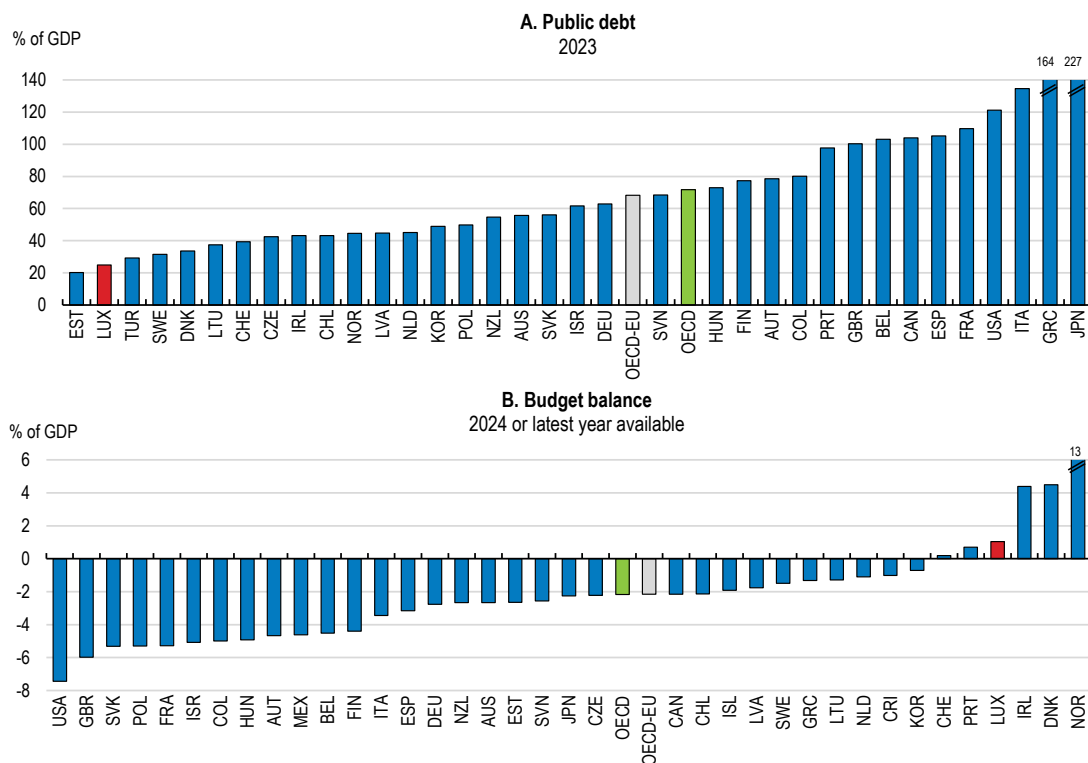
1.3. Fiscal management is sound, but expenditure pressures are rising

1.3.1. Fiscal policy has supported activity through the energy crisis

Luxembourg has a history of prudent budget management, with large budget surpluses before the 2020 global pandemic, gross public debt below 30% of GDP and net government financial assets of about 50% of GDP. Despite vigorous fiscal support during the pandemic and the energy crisis, the budget balance in 2024 was positive and well above the OECD average, and public debt is the second lowest in the OECD (Figure 1.8). The new government has re-iterated its support to prudent fiscal management in the coalition agreement, with the medium-term projections in the draft 2025 budget law foreseeing a budget deficit of 0.4% of GDP in 2028 and public debt of 26% of GDP (Ministry of Finance, 2024).

Figure 1.8. Luxembourg's public debt is low

2023



Note: Gross government debt (Maastricht criterion for European countries).

Source: OECD Analytical Database.

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The fiscal stance will be broadly neutral in 2025. Spending on energy policy support declined only marginally in 2024, as most energy policy support measures were extended, including targeted income support for low-income households and energy price measures. At the same time, employers' social security contribution rates were temporarily reduced to partially compensate them for higher labour costs related to the third indexation tranche of 2023; personal income tax brackets were adjusted up by 10% to partially account for past inflation; and the authorities introduced a housing market support package. The neutral fiscal stance in 2025 is driven by the planned scaling back of energy policy support that will be broadly offset by higher public investment.

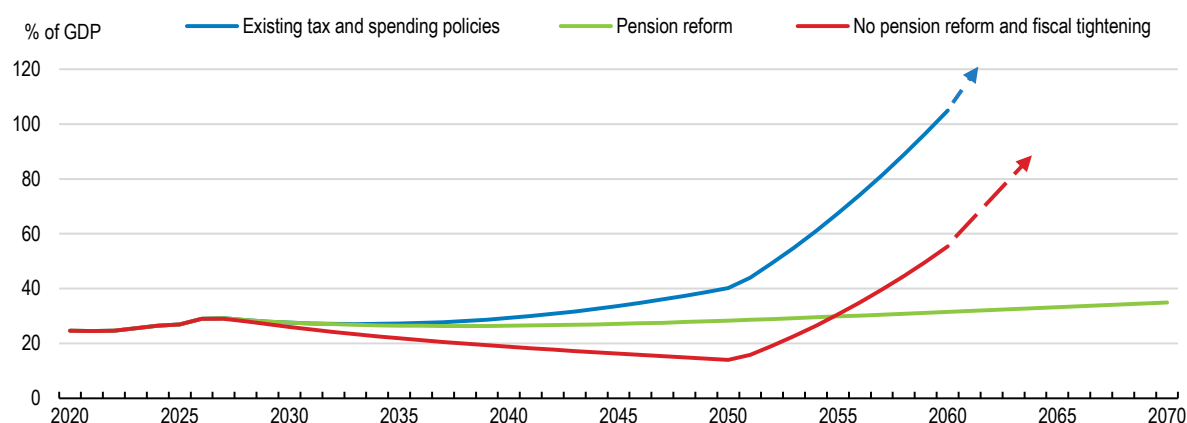
This broadly neutral stance in 2025 strikes a balance between the need to exit exceptional fiscal support related to the energy crisis and supporting a gradual recovery from the ongoing cyclical downturn. Given the projected easing of euro area monetary policy, the overall macroeconomic policy stance will remain mildly supportive. While this appears appropriate in 2025, energy price measures should be fully phased out and replaced by targeted income support for the lowest-income households. The pace of fiscal consolidation should be accelerated from 2026, as the recovery takes hold, to re-build fiscal buffers, including by better targeting help-to-buy policies in the housing sector to the lowest-income households.

1.3.2. Expenditure pressures are rising

Under unchanged tax and spending policies, gross public debt would be on a stable trajectory until the late 2040s but would rapidly increase from the early 2050s as ageing-related expenditure rises, given very large pension commitments (Figure 1.9). Pension expenditure is projected to increase by about 3% of GDP between 2024 and 2050, which under current pension rules would lead to the depletion of the pensions reserve fund (IGSS, 2024). The growth in pension expenditure is projected to accelerate after 2050, with the projected increase over 2050-70 amounting to about 5% of GDP, while assets in the pension reserve fund will have been depleted, so by the late 2040s public debt will be on a rapidly rising trajectory.

Figure 1.9. Reforming the pension system would maintain low public debt in the long term

Gross public debt, % of GDP



Note: The "Existing tax and spending policies" scenario assumes that the structural primary fiscal balance before accounting for gross ageing-related costs remains constant at 2026 levels. Gross ageing-related costs are defined as changes in expenditure on old-age pensions, health and long-term care. The "Pension reform" scenario assumes that the pension system remains balanced in the long term by adopting the pension reform in Chapter 2 and that the structural primary fiscal balance is maintained at the 2026 level, which requires offsetting non pension-related ageing costs by tax and spending measures. Initial financial surpluses in the "Pension reform" scenario are accumulated in the pension reserve fund rather than being used to pay down gross debt. The "No pension reform and fiscal tightening" scenario assumes gradual fiscal consolidation of 1% of GDP over 2027-30, with initial government budget surpluses used to pay down public debt.

Source: OECD calculations.

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The most effective way to address the challenge of large increases in ageing costs is to undertake a comprehensive reform of the pension system, as discussed in Chapter 2. Given large imbalances in projected cohort sizes and very high expenditure per pensioner, the most coherent reform path would be to balance pension-related revenue and spending in the long term, largely shielding other areas of fiscal policy from ageing-related expenditure pressures.

Balancing the pension system in the long term requires an ambitious reform package of higher pension contributions to allow for the accumulation of financial assets in the pension reserve fund over the 2030s and 2040s to finance projected expenditure increases over 2050-70; a gradual reduction in the level of pension benefits, which are currently among the highest in the OECD; as well as raising the effective retirement age, which is currently the lowest in the OECD, by requiring longer careers for people who spend long periods in education and fully indexing early and statutory retirement ages to life expectancy. A comprehensive and timely pension reform would be consistent with a broadly stable gross debt-to-GDP ratio, while building substantial reserves to meet future pension costs. (Figure 1.9).

If an ambitious pension reform is not undertaken, a tighter fiscal policy to reduce the debt-to-GDP ratio would help to prepare for the future, but would not address the underlying pressures in later years or avoid an unsustainable path for the debt ratio over the long term. For illustrative purposes, a fiscal tightening of around 1% of GDP without pension reform would put gross debt on a lower path in the near term, but would be insufficient to avoid a rapid increase in the debt ratio after 2060 (Figure 1.9). A very large fiscal consolidation in the short term, amounting to about 3% of GDP, would be needed now to reduce the debt ratio enough in the near term to avoid reaching very high levels in the longer term. The reason is that, unlike pension reform, fiscal tightening would not reduce the costs associated with ageing.

In addition to pensions, there are other medium-term challenges to fiscal policy from rising spending pressures and from uncertainties about tax revenues. Luxembourg's commitment to raise defence spending from 1.3% of Gross National Income to 2% by 2030 (an increase of about 0.5% of GDP over the period) will add to the ageing-related spending pressures over the medium term. At the same time, there are substantial net fiscal impacts of the climate transition: compared to 2024, these are estimated at around 2% of GDP annually by 2050 (Box 1.3), primarily due to lower revenues on motor fuels. Moreover, the medium-term stability of corporate income tax revenue cannot be taken for granted, including due to ongoing changes in global tax rules (Statec, 2021). A clear fiscal strategy is required over the medium term to manage this range of pressures, as well as to accommodate required changes in the pension system. This would be supported by identifying scope for growth-friendly adjustments to the tax system and areas where spending efficiency could be increased.

Box 1.3. Assessing the impact of climate transition on the public finances in Luxembourg

The energy transition and climate change mitigation and adaptation policies will have a material impact on Luxembourg's economy and on the public finances through changes in the growth path, tax revenues and government spending. While many countries are developing integrated models of the economy and climate, relatively few have undertaken detailed modelling of the impact on the public finances. In this area, Luxembourg's statistical institute STATEC has been a leader, developing consistent modelling of the climate, economy and public finances for Luxembourg in a transparent manner, sharing all underlying working assumptions and details of its projections.

This box is based on an experimental modelling framework named OECD-EDISON developed by the OECD's Governance Directorate for the assessment of the budgetary implications of the climate transition by independent fiscal institutions (IFIs). It draws on work undertaken by the UK Office for Budgetary Responsibility and the Irish Fiscal Advisory Council.

The framework uses estimates of climate transition policies and their impact on economic growth from existing modelling work and translates this into an assessment of the impact on public spending and tax revenues based on detailed bottom-up estimates across a wide range of policies. Estimates are made up to 2050, although uncertainty about climate, economic and policy developments increases over the horizon.

The application for Luxembourg is based on estimates of growth adjusted for the climate transition from the OECD's Long-Term Model (Guillemette and Château, 2023) and detailed estimates of revenue paths and energy demands from modelling by the Luxembourg statistical office STATEC.

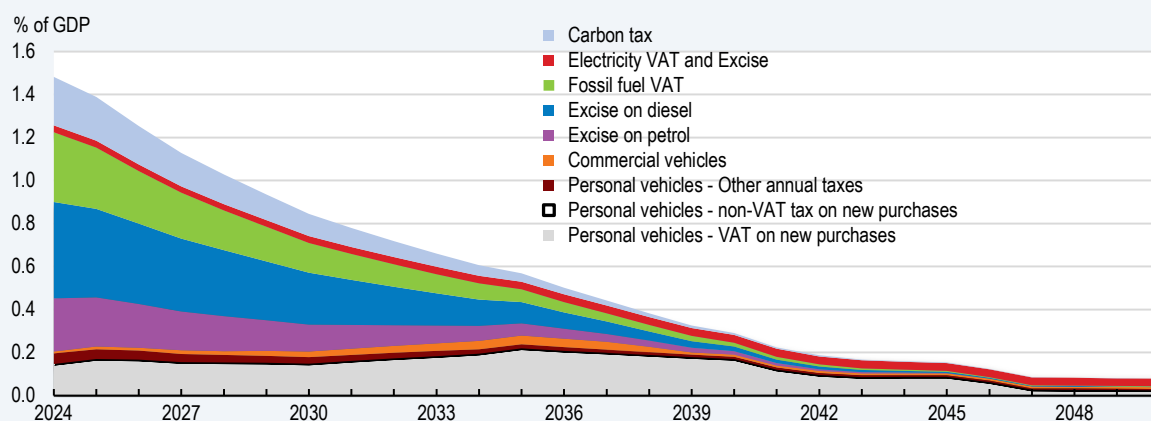
The climate transition slows growth modestly due to required policy action. Energy use is projected to remain broadly stable in line with past trends as energy-efficiency gains roughly offset growth of the economy and the population. There is a shift away from fossil fuels for transport and heating, while reliance on electricity expands at a fast rate.

Policies in model are based on the government's stated policies in the National Climate and Energy Plan, as updated in 2024, including programmed increases in the national carbon tax. STATEC estimates that if these 200+ policy measures were to be fully and timely implemented, Luxembourg would achieve its overall climate objectives by 2050, even though some sectoral targets, for example in the housing sector, will not be attained.

The modelled impact on the public finances is based on the current policy framework and does not allow for possible adjustments in spending or the development of new tax bases, for example charging motorists for the distance driven.

The framework shows the fiscal impact of the current approach to managing the climate transition. It does not show the potential costs of failure to tackle climate change more actively at the global level. There is significant uncertainty around the estimates and alternative scenarios are available within the OECD-EDISON framework.

On the revenue side, tax revenue will fall over time due to the shift from internal combustion engine vehicles to electric vehicles, which are less taxed per unit of energy (Figure 1.10). This shift is caused by policy measures, such as the planned increase in carbon price, and assumed structural technological changes. Over the coming decade, the decline in fiscal revenue will be only partially mitigated by increases in the national carbon tax. In the case of Luxembourg, these effects are magnified by the fact that these developments will reduce fuel tourism. In line with the gradual expansion and enhancement of public transport, the number of purchases of new cars is expected to decline towards the end of the forecast.

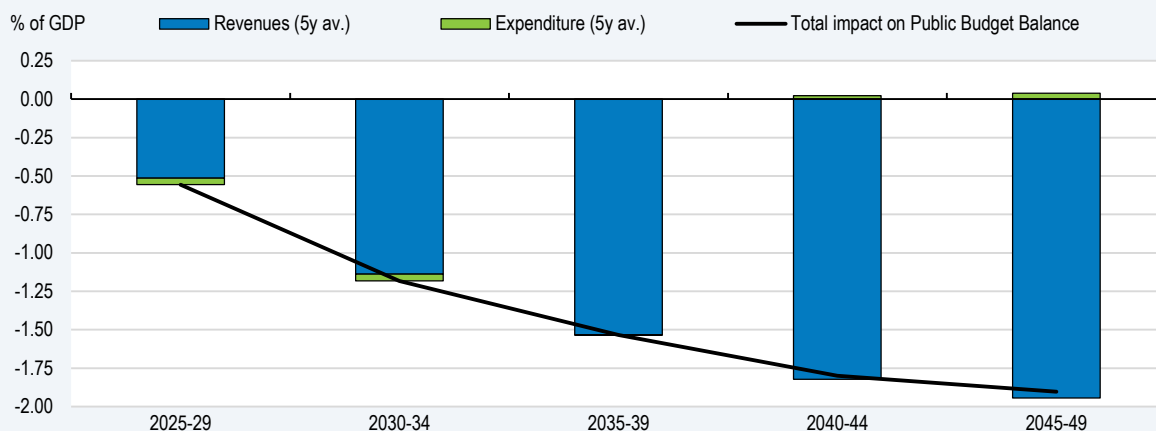
Figure 1.10. Projected future energy and fuel-related revenues

Source: OECD calculation based on OECD-EDISON.

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On the spending side, the main spending item is continued investment in public transport, with further spending on supports for upgrading of home heating and insulation and the transition in power and business sector subsidies. Infrastructure spending will support growth and reduce congestion, as well as helping to reduce emissions. Given that Luxembourg has already ramped up climate-related support, this will have little additional impact on the public finances in the years ahead. It is projected that this spending will gradually decline from 2030, as technology matures and low-emission solutions become more competitive, reducing the need for public subsidies, such as those for the purchase of new electric vehicles. There will be some increase in costs due to managing more frequent flooding episodes.

Taken together, these trends are projected to reduce the budget balance by around 2% of GDP by 2050 compared to the 2024 level, mainly driven by the fall of revenues (Figure 1.11).

Figure 1.11. Projected impact on the public budget balance relative to 2024

Source: OECD calculation based on OECD-EDISON.

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Note: This box has been prepared by Simone Romano.

While debt is currently low, a new national fiscal rule is needed following the 2024 EU governance reforms to replace the EU-mandated medium-term objective that was defined in terms of the structural budget balance (OECD, 2024f). Under the revised EU fiscal governance framework, Luxembourg will no longer be required to submit a medium-term objective to the EU institutions. Luxembourg should take the opportunity to reduce the reliance on the structural budget balance – which depends on uncertain estimates of the output gap – and transition to a net spending rule with adjustments for discretionary revenue measures, in line with the new EU governance framework. If the sustainability of the pension system is secured through a pension reform along the lines of Chapter 2, the net spending rule should aim for the stabilisation of gross debt, accounting for the rise in non-pension related ageing costs. Given that pension expenditure accounts for about 80% of the rise in projected ageing costs, while health and long-term care account for the remaining 20%, the rule would provide room to address expenditure pressures in other areas, including investment needs related to the green and digital transitions.

Introducing a national fiscal rule would be supported by an enhanced role for the fiscal council. The fiscal council's current mandate closely follows minimal EU requirements and includes the monitoring of compliance with the medium-term objective; the triggering of an automatic correction mechanism in case of non-compliance; as well as the evaluation of the government's macro-financial projections. A first reform avenue would be to broaden the council's mandate to conduct assessment of long-run debt dynamics and sustainability of the public finances. The Italian Parliamentary Budget Office (UPB), for instance, conducts debt sustainability analyses to assess the amount of fiscal consolidation needed to comply with the new European fiscal framework. Second, given that the existing medium-term objective will become obsolete under the new EU fiscal framework, validation and monitoring of the national fiscal rule will become a purely national process. A strong "comply-or-explain" procedure should be anchored in national legislation, with the government required to publish a detailed response to the council within a reasonable amount of time. In Spain, for instance, a strong "comply-or-explain" procedure forced the government to better explain budgetary risks in response to concerns raised by the fiscal council (AIRef), as well as triggering a debate on the social security's medium-term financial sustainability (Beetsma, 2023).

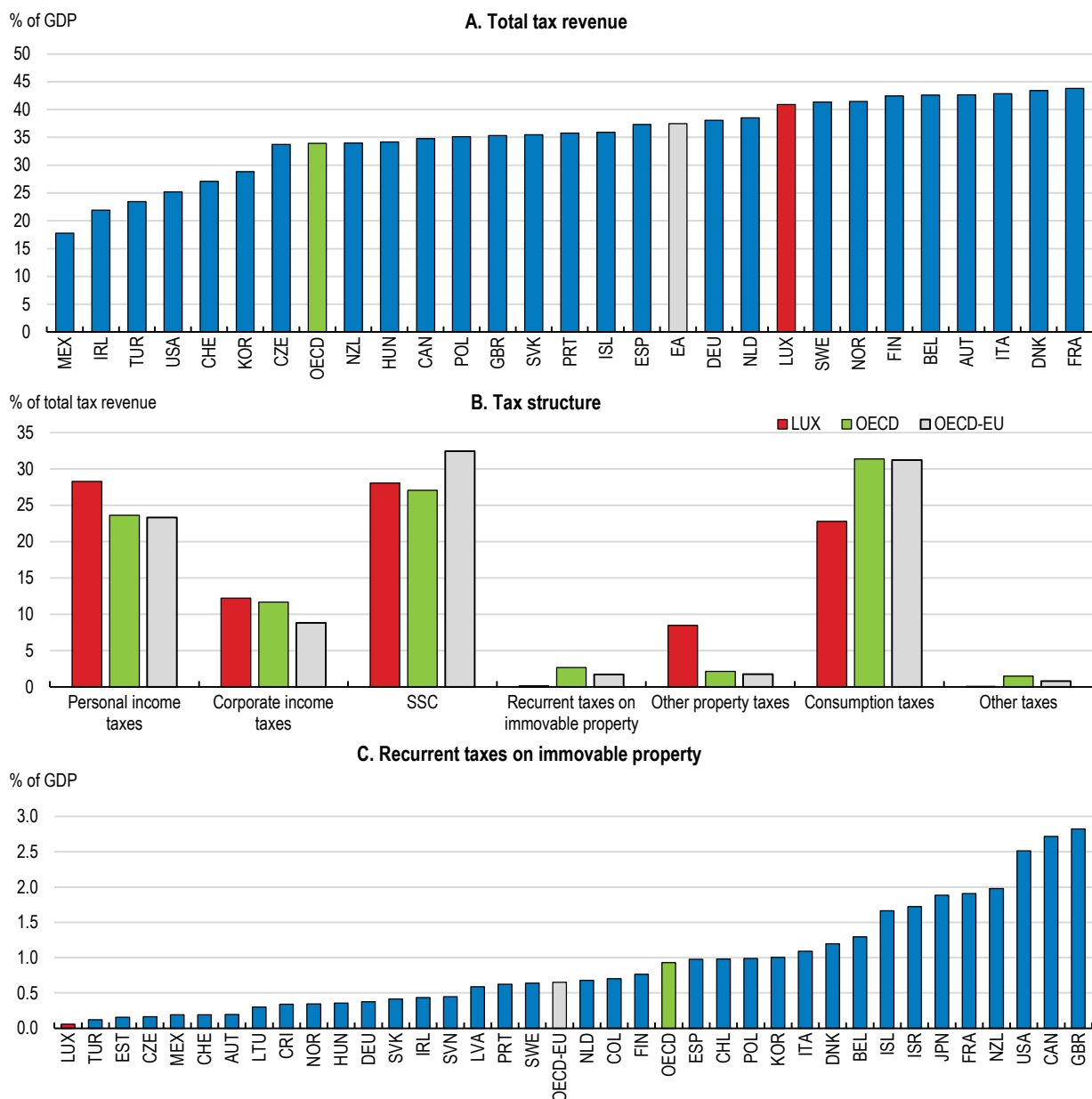
1.3.3. There is scope to make the tax system more growth friendly

Tax revenues have increased as a share of GDP since 2010, but they nonetheless remain around the euro area average (Figure 1.12, Panel A). The tax mix could be made more growth-friendly, by relying to a greater extent on taxes on immovable property and taxes on goods and services – which are relatively low in Luxembourg.

The taxation of immovable property takes the form of a municipal land tax ("impôt foncier") in Luxembourg. While the tax rate is set by the municipalities, typically ranging from 3-10%, property values are determined by the national-level property register dating to 1941. Revenues from the land tax are among the lowest in the OECD, with revenues amounting to about 0.1% of GDP as compared to an OECD average of 1% (Figure 1.12, Panel C). The reform of immovable property taxation foreseen by the authorities aims to update the property register and to introduce a surtax on unoccupied land and housing (see below). Despite the update of the property register, the authorities expect tax revenues from the land tax to remain broadly constant. The tax base will typically increase as the property register becomes more closely aligned with market values, but the increase in the tax base is likely to be offset by a slight general reduction in tax rates by municipalities. The rates of the surtax on unoccupied land will initially be low and only gradually increase over time. While broad revenue neutrality during the phase-in of the new property register and the surtax on unoccupied land is appropriate to ease the transition, there is scope to raise overall revenues from immovable property taxation in the medium term to bring it more in line with other OECD countries.

Figure 1.12. Overall taxes as a share of GDP are around the euro area average, but recurrent taxes on immovable property are the lowest in the OECD

2023



Note: "Other property taxes" in Panel B includes the net asset tax on corporations.

Source: OECD Revenue Statistics database.

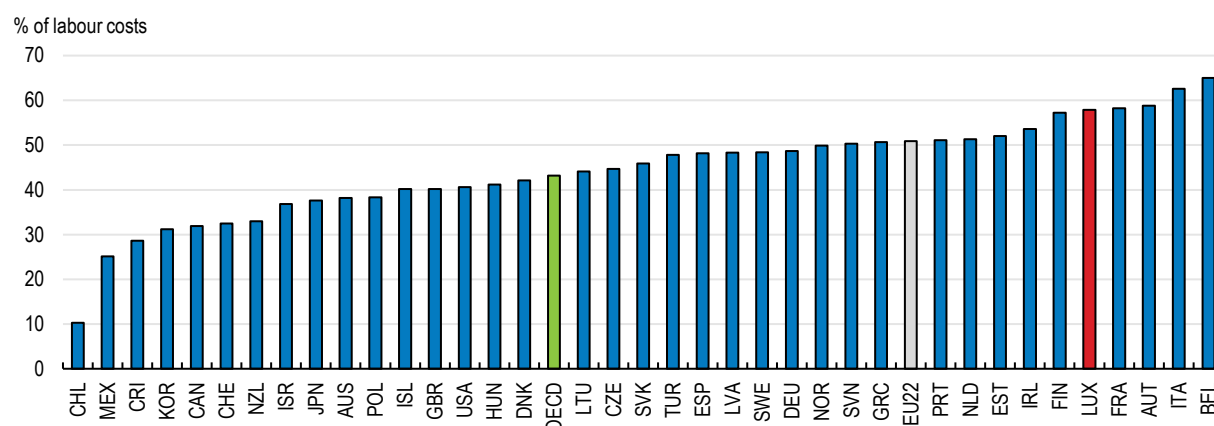
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Increasing reliance on indirect taxation and environmental taxes would further increase the efficiency of the tax system. Revenues from indirect taxes on goods and services are well below the EU and OECD averages (Figure 1.12, Panel B), which is explained by the relatively low standard VAT rate (17%) as the VAT revenue ratio is among the highest in the OECD (84%); the large size of the financial sector that is generally exempt from VAT, as in other countries; and low excise taxes, despite a carbon tax partially compensating for low excise taxes on fuels since 2021. Shifting the burden of taxation from income to indirect taxes, such as VAT, has generally been found to raise economic growth (Arnold et al., 2011). But the risk for a highly-open economy, such as Luxembourg, is that consumption may be shifted across the border. For instance, higher taxes on fuels may lead to a larger negative impact on fuel consumption than elsewhere, as domestic and foreign consumers can easily shift fuel consumption across the border. However, the sizable gap in the standard rate between Luxembourg (17%) and its neighbours (20% on average in Belgium, France and Germany) suggests that there is some room to raise rates without large negative effects on consumption. At a minimum, the authorities should ensure the carbon tax is increased according to schedule (Chapter 3). While the adverse distributional consequences of increasing VAT need to be carefully weighed against potential increases in revenues, distributional consequences could be mitigated by maintaining preferential rates for basic goods and services (Brys et al., 2016).

Higher revenues from land taxes and VAT could be used to finance the higher government contribution needed to put the pension system on a sustainable footing as part of the comprehensive pension reform set out in Chapter 2. If the current financing structure were maintained and additional financing needs of 1.2% of GDP were evenly split between the government, employers and employees, then additional transfers from general government revenues of around 0.4% of GDP would be required. Given that the marginal rate of income tax plus social security contributions is above the OECD average (Figure 1.13), the government could consider raising the reliance on taxes on immoveable property and consumption – which have smaller adverse effects on consumption – to partially compensate employers and employees for higher pension contributions.

Figure 1.13. Taxes on labour are high

Marginal rate of income tax plus employee contributions less cash benefits, single earner, no children (100% of average wage), 2023



Source: OECD (2024c)

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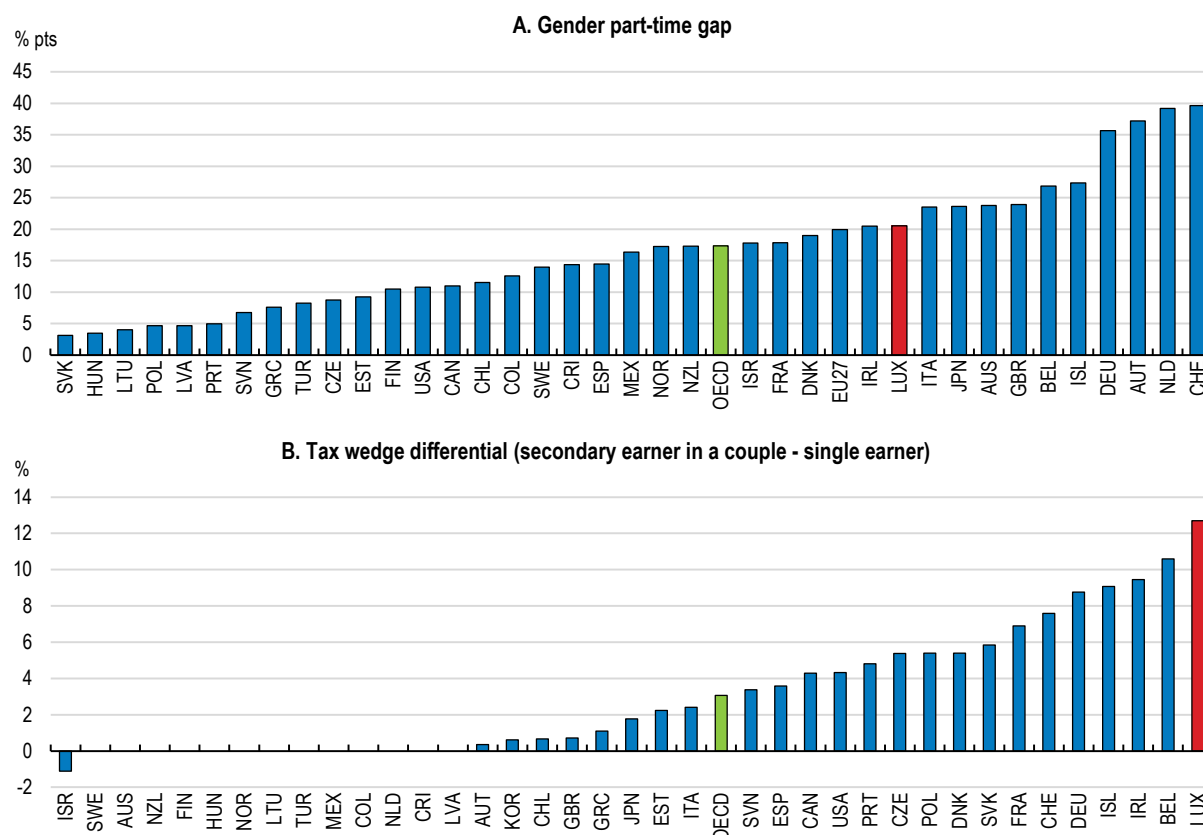
Reforming the net wealth tax on corporations would reduce distortions and promote growth. Corporations are subject to a tax of 0.5% on net assets up to threshold of EUR 500 million and a rate of 0.05% above that threshold. Corporate income taxes can be deducted from the net wealth tax to shield businesses that pay corporate taxes in Luxembourg, but companies are subject to a minimum net wealth tax. The net wealth tax on corporations is highly uncommon internationally and, to the extent that it cannot be offset by the corporate income tax, raises distortions to investment. Businesses that temporarily incur losses, for instance due to high investment expenditures or volatile sales, pay higher overall business taxes (corporate taxes plus net wealth tax) in the medium term than businesses with more stable income streams, which may discourage investment and risk taking. The net wealth tax also magnifies debt financing bias since equity financing increases a company's asset base without a corresponding increase in liabilities, whereas debt financing increases both assets and liabilities. But an outright suppression of the net wealth tax on corporations would lead to revenue losses of about 1.4% of GDP. Revenue could be preserved by maintaining the net wealth tax only for pass-through investment entities (the so-called SOPARFIs), while suppressing it for all other corporations, but this may be legally challenging since SOPARFIs are legally equivalent to other corporations. A legally viable reform may be to exempt corporations with sales below some threshold from the net wealth tax, with the threshold calibrated to ensure that most SOPARFIs continue to pay the minimum tax, while most small and medium-sized enterprises in the non-financial economy are exempted.

Tax incentives for investment in R&D and the digital and green transitions would be more effective in boosting investment than across-the-board corporate income tax cuts (Hanappi et al., 2023). The combined statutory corporate income tax rate – consisting of the national rate of 17%, a surcharge to finance the unemployment fund and the local business tax – stood at 24.9% in 2024. The 1 percentage point cut of the national rate from 17% to 16% in January 2025 brings the combined statutory CIT rate close to the OECD average of 23.9% (OECD, 2024b).

The envisaged introduction of mandatory individual taxation in 2026 is likely to have positive effects on growth by improving incentives for women to work full time. Overall, women in Luxembourg are well-integrated into the labour market with women's average hourly wages nearly on par with men's and female labour market participation, at just below 87%, among the highest in the OECD, supported by a range of favourable policies including free childcare during school terms. However, high female labour market participation in Luxembourg conceals a significant reliance on part-time work. Around 30% of women are employed part-time, a rate 20 percentage points higher than for men (Figure 1.14, Panel A). While this pattern may partially reflect individual preferences, it may also be explained by joint taxation of couples that disincentivises full-time work for secondary earners, who are often women, as many households still view men as the primary breadwinners. The current system of joint income taxation benefits couples with large income disparities by reducing their overall tax burden, as the higher earner leverages the lower tax rates and tax-free allowance of the lower earner. However, the system comes with a drawback, as the secondary earner faces taxation at the couple's marginal rate on any additional income, rather than enjoying lower rates and the basic tax-free allowance under individual taxation. As a result, the tax wedge of the secondary earner, often the woman, is relatively high in Luxembourg (Figure 1.14, Panel B).

Figure 1.14. Many women work part-time

2023



Note: The gender part-time gap in Panel A is defined difference in the prevalence of part-time work between women and men. The tax wedge differential in Panel B is defined as the difference in the tax wedge between a secondary earner at 67% of the average wage (the primary earner is assumed to earn 100% of the average wage and the couple is assumed to have no children) and a single earner at 67% of the average wage.

Source: OECD Labour force statistics; and [OECD Taxing Wages 2024](https://www.oecd.org/tax/taxing-wages/).

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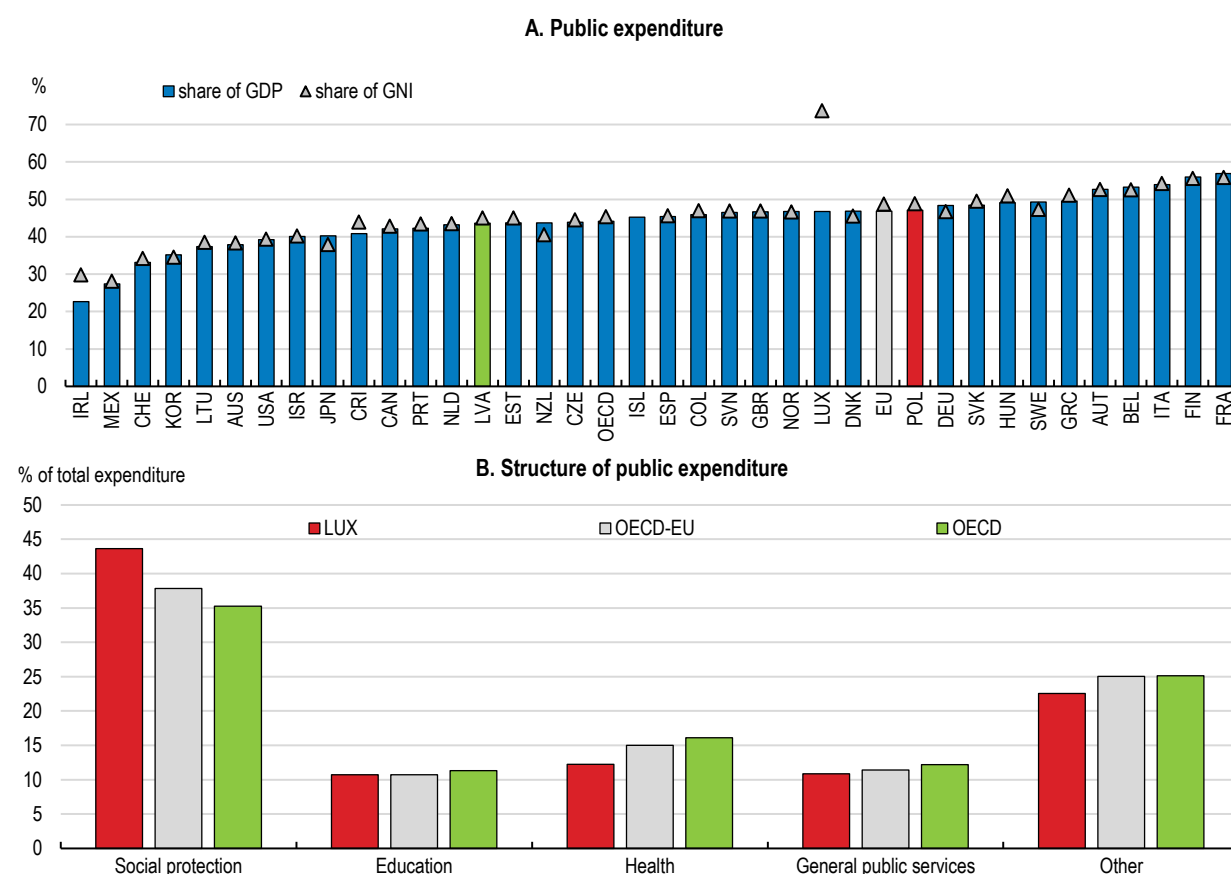
The government is considering a shift towards individualised income taxation by 2026. Since the 1970s, several countries, including Austria, Canada, Denmark, Finland, Ireland, the Netherlands, Sweden, and the United Kingdom, have shifted from joint to partial or full individual taxation. Evaluations of these reforms have consistently shown that individualising personal income tax increases female labor force participation (Selin, 2014; Doorley, 2018; Crossley and Jeon, 2007) and would reduce the burden on people living alone. However, the shift would raise taxes on couples with a single earner or with large differentials between the earnings of the primary and secondary earners, as – under the existing parameters of the tax system – the primary earner would no longer implicitly benefit from the tax-free allowance and the lower tax rates of the secondary earner. This could be particularly challenging for older couples who have set up their career choices based on the current tax system. To smooth the transition and ensure a balanced outcome, the introduction of individualised personal income taxation could initially allow for the full or partial transferability of the basic tax-free allowance for the non-working partner, which would then gradually be phased out. The United Kingdom, for example, introduced a tax allowance for married couples when it moved to individual taxation in 1990, which, for most couples, was phased out over a decade, with only couples with one partner born before 1935 continuing to be eligible. While the individualisation of personal income taxation would have positive effects on female labour supply and growth, it should be designed in a revenue neutral way rather than leading to higher revenues. Lower taxes on working couples should initially broadly offset higher taxes on couples with a single earner or with high income disparities.

1.3.4. The efficiency of public spending needs to be enhanced

Public spending as a share of GDP is around the EU average, though much higher as a share of GNI (Figure 1.15). The green and digital transitions will put upward pressure on public investment spending, which has amounted to about 4% of GDP over the past decade, as compared to an average of 3.1% in the EU. Social benefit spending is also relatively high and on a rising trajectory, as the large cohorts of workers who entered the labour market in the 1980s and 1990s retire, underlining the importance of reforming the pension system (Chapter 2). Meeting public investment needs while maintaining high-quality public services and adequate social protection, especially for low-income households, requires prioritising public spending and enhancing its efficiency.

Figure 1.15. Public spending is focused on social protection

2023 or latest year available



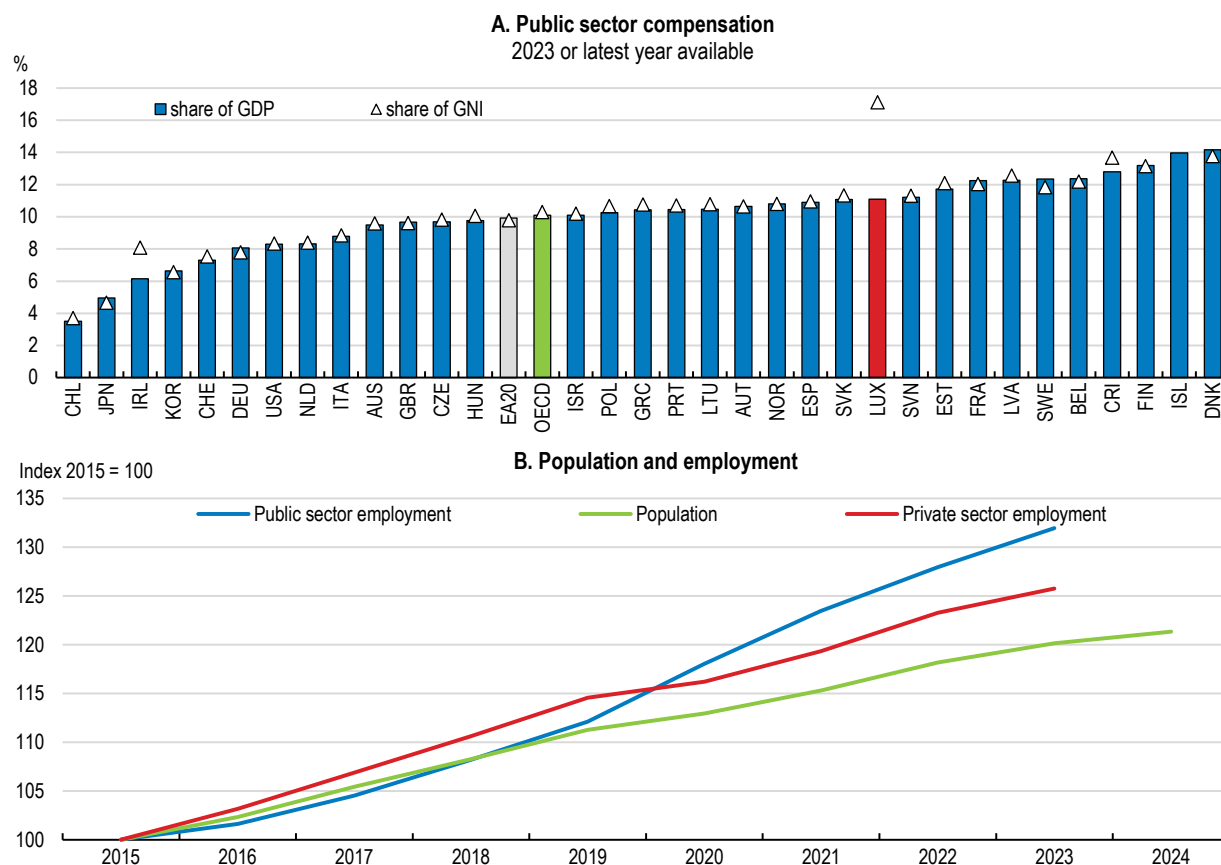
Source: OECD National accounts database.

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Compensation of public sector workers is around the OECD and EU averages as a share of GDP (Figure 1.16, Panel A), but a large proportion of GDP is produced by non-resident cross-border workers that may require fewer public services than resident workers, especially in the areas of education and local public services (Bouchet, 2024). Public sector compensation is higher than in any other OECD country when expressed as a share of gross national income, which excludes goods and services produced by cross-border workers. While scaling public sector compensation by gross national income likely results in an overadjustment relative to the conventional GDP-based measure, given that cross-border workers consume some public services, such as social security and transport, on balance public sector compensation appears relatively high by OECD standards. Moreover, recent public employment developments suggest scope to reduce public sector compensation without reducing the level and quality of public services. Between 2015 and 2023, cumulative public sector employment growth was around 32%, outpacing both

private employment growth (26½ per cent) and growth of the resident population (17%), suggesting weak public sector productivity growth (Figure 1.16, Panel B). Moreover, the wage differential between public sector workers and similarly-qualified private sector workers appears to be among the largest among advanced economies (Abdallah et al., 2023).

Figure 1.16. Public sector compensation as a share of GDP could be reduced by containing public employment growth



Source: OECD National accounts database; and OECD Analytical database.

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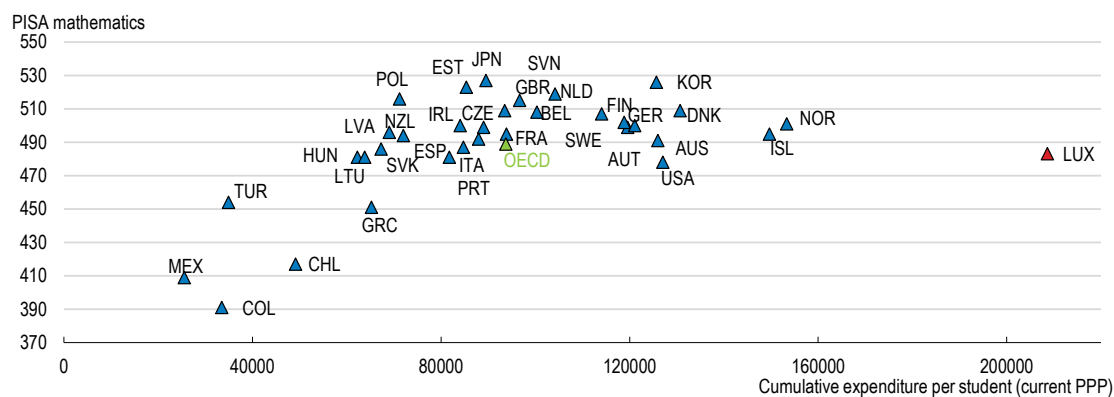
Upgrading human resources management would increase public sector efficiency and improve the attractiveness of public sector employment. Public sector remuneration is based primarily on seniority and grade-based advancement rather than performance pay. Public servants typically advance through predetermined salary steps based on years of service rather than performance. Promotion to higher-level career grades is possible after 6-12 years, depending on the grade, but usually requires passing promotion examinations, with a limited number of promotion slots available each year. The system is deliberately structured to reward long-term commitment to public service, with predictable career progression paths. However, this can also mean relatively slow advancement compared to the private sector, partly explaining why around 1400 public sector positions remain unfilled despite high entry-level salaries. Measures to strengthen performance incentives to increase efficiency and attract high-potential candidates to the public sector could include the introduction of fast track promotion paths for consistently high performers; linking a portion of annual salary increases to the achievement of objectives; and creating special project bonuses for exceptional contributions.

Further advancing digitalisation would enhance public sector efficiency, reducing the need for further employment expansion. Luxembourg performs well above the EU average in terms of providing digital public services to citizens and businesses (European Commission, 2022). A digital portal (Guichet.lu) acts as single point of contact for interactions of citizens and businesses with the public administration, including administrative procedures,

receiving public administration documents and booking appointments. The government intends to further strengthen the digitalisation of the public administration, focusing on the principles of “digital by default” (make the digitalisation of administrative procedures the default), “once only” (require data from citizens and businesses only once) and transparency (including the use of data received from citizens and businesses). The “once only” principle implies automatic data exchange between public administrations, requiring the development of IT tools that allow exchanging data while meeting privacy requirements. While some data exchange between public administrations is already in place, developing a comprehensive data exchange tool, such as the successful X-Road platform in Estonia, would allow for full implementation of the “once only” principle (OECD, 2019). Ongoing initiatives to promote experimentation with artificial intelligence (AI) in the public administration, such as “AI4Gov”, could be expanded. In the medium-term, the use of AI tools could significantly reduce the amount of working time spent on routine tasks, such as responding to frequently asked questions by citizens and businesses.

Education is another key priority area to enhance the efficiency of public spending. Completion of upper-secondary education is below the OECD average (OECD, 2023), and results from 2018 Pisa evaluation (Luxembourg did not take part in the 2022 evaluation) suggest that student performance is below the OECD average, despite spending per student being higher than in any other OECD country (Figure 1.17). Weak results are partly explained by the comparatively high share of first-generation and second-generation immigrant students, who often struggle to master Luxembourg’s three languages used in school. But targeted support to the weakest students and their families while reducing the use of grade repetition and allowing for selection into school tracks at a later age would improve results, as emphasised by previous Surveys (OECD, 2017a). Continuing to improve support for weak students requires the reallocation of teaching resources; the strengthening of lifelong teacher training to ensure that teaching methods remain up-to-date; and a tighter link between teachers’ participation in training, pay and career progression. By contrast, lowering student-to-teacher ratios is unlikely to be the best use of public resources. Student-to-teacher ratios in Luxembourg are among the lowest in the OECD (OECD, 2024d), with the international evidence suggesting that lower ratios do not systematically raise student outcomes on standardised tests, such as the Pisa evaluation (Jepsen, 2015). Measures to improve the quality of teaching should take precedence over further expanding the teacher workforce.

Figure 1.17. The efficiency of the education system needs to be enhanced



Note: Cumulative expenditure per student between 6 and 15 years old in 2019 and PISA mathematics score at age 15 in 2018.

Source: OECD Government at a Glance 2023.

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In the medium term, Luxembourg faces the challenge of curbing age-related spending and making spending on climate change mitigation more efficient. Comprehensive pension reform, including measures to raise the effective retirement age and contain the growth in benefits, is discussed in Chapter 2, while climate change policies are discussed in Chapter 3. Ageing-related spending could be further contained by reforms in the areas of healthcare and long-term care, which are projected to increase by approximately 2½ percent of GDP between 2024-70 (IGSS, 2024). Several approaches could help to manage these rising costs:

- The healthcare system could benefit from several efficiency-enhancing measures. Standardised care pathways for common conditions could reduce duplicate examinations and unnecessary hospital visits

(OECD, 2017). A national health information exchange platform could improve care coordination across providers. Digital health solutions, including teleconsultations, remote monitoring, and health apps, show promise in reducing in-person visit costs while increasing patient engagement.

- In long-term care, expanding home care services and community-based options could provide more flexible and cost-effective alternatives to institutional care (Colombo et al., 2011). Additional financing mechanisms might include means-tested co-payments and voluntary private insurance schemes with automatic enrolment features, drawing on experiences from other European countries.

The overall budgetary impact of the reforms recommended in this Survey amounts to fiscal consolidation of about 1.2% of GDP over the period 2027-30 (Box 1.4), essentially reflecting the need to put the pension system on a more sustainable footing with a range of other spending and tax measures that could be embodied within a medium-term fiscal strategy.

Box 1.4. Illustrative medium-term fiscal impact of reforms

Table 1.5 shows the illustrative medium-term fiscal impact of the recommendations in this Survey.

The comprehensive pension reform outlined in Chapter 2 would lower pension expenditure compared to the existing system through lower benefits and a higher effective retirement age, but these effects would be modest in the near term. Consequently, if the current financing structure of the pension system is maintained, pension contribution rates for the government, employers and employees would each need to increase by 1 percentage point. The higher government contribution could be financed by raising the standard VAT rate from 17% to 18% or by higher taxes on immovable property or reductions in spending in other areas.

Other measures aimed at making the tax system and public sector spending more efficient are broadly offsetting in terms of the overall fiscal balance. Measures to increase spending efficiency are difficult to quantify.

Table 1.5. Illustrative medium-term fiscal impact of reforms

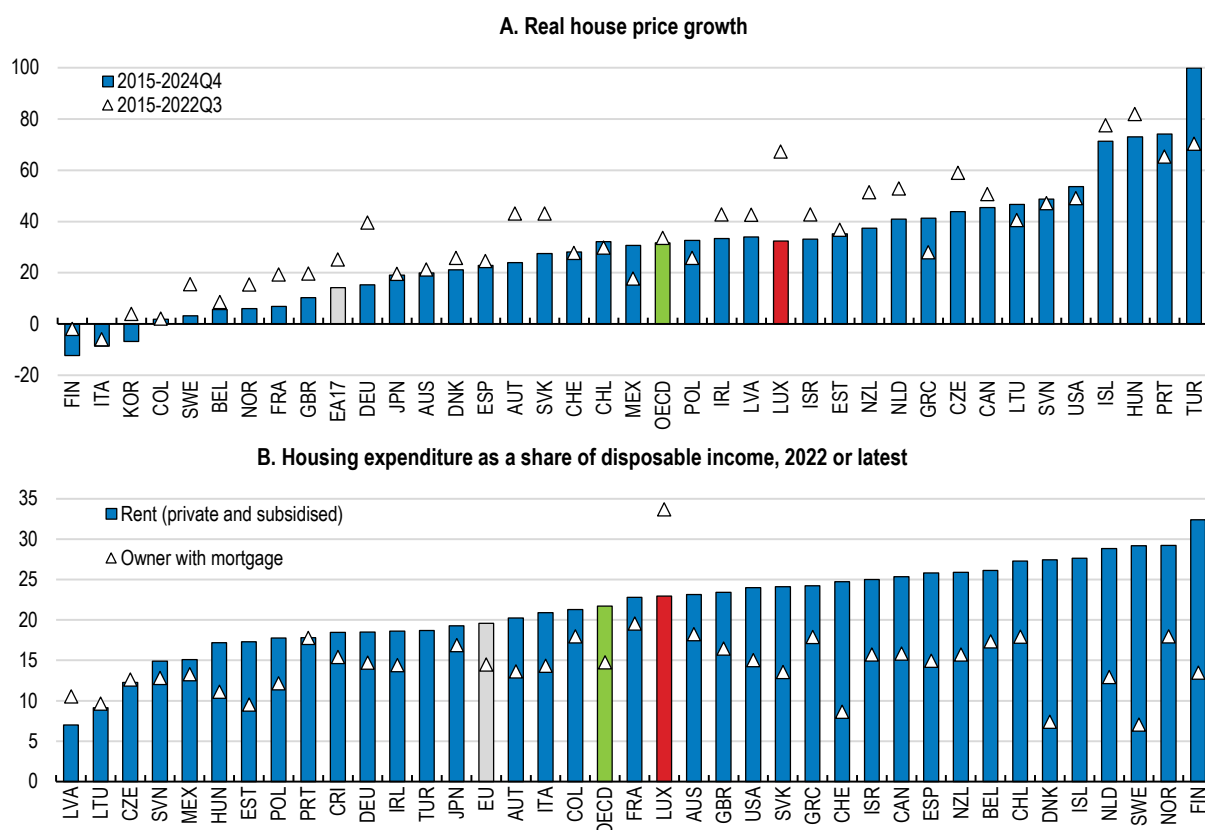
Recommendation	Scenario	Impact on fiscal balance (annual, % of GDP)
REVENUE MEASURES		
Pension reform measures		+1.2
Raise employer and employee contributions	Gradually raise employer and employee pension contribution rates from 8% to 9%.	+0.8
Raise indirect taxes	Raise the standard VAT rate from 17% to 18%	+0.4
Other revenue measures		-0.4
Raise revenues from immovable property taxes	Gradually raise the standard rate of the land tax and the surtax on unused land.	+0.4
Reform the net wealth tax on corporations	Exempt businesses with low sales from the net wealth tax	-0.4
Protect low-wage workers from higher pension contributions.	Exempt employer and employee contributions for low-wage workers or reduce personal income taxes for low-income households.	-0.4
<i>Total revenue measures</i>		+0.8
EXPENDITURE MEASURES		
Raise public investment	Expand and modernise public transport infrastructure	-0.2
Improve the efficiency of the public administration	Continue digitalising the public administration, and limit growth in public sector employment	+0.6
Total expenditure measures		+0.4
TOTAL		+1.2

Note: The estimates in the table are based on a variety of sources and OECD calculations. The total impact on the fiscal balance matches the increase in pension contributions required to balance the pension system in the long-term under the pension reform outlined in Chapter 2. Source: OECD.

1.4. Improving housing affordability

Real house prices have fallen by about 20% since their peak in the third quarter of 2022, with the cumulated increase in house prices since 2015 now around the OECD average (Figure 1.18, Panel A). But housing affordability remains low, especially for owners with a mortgage. Before the turnaround in the housing market in mid-2022, house price increases had been among the largest in the OECD, with real house prices having risen about 65% over 2015-22. As many buyers contracted large mortgages, housing affordability deteriorated, especially among owners, with the average owner spending about one-third of disposable income on mortgages (Figure 1.18, Panel B). In the bottom quintile of the income distribution, the majority of owners with a mortgage spend more than 40% of their income on housing (OECD, 2024e). Housing affordability has further declined over 2023-24, as declines in real house prices have been more than offset by the doubling of interest rates on new mortgages since early 2022. While owners who contracted fixed-rate mortgages before 2022 are protected from interest rate increases, owners with variable-rate mortgages (around 30% of all mortgages) and new buyers face almost twice the interest costs than before 2022 while real house prices have come down by only 20%.

Figure 1.18. House prices have come down since 2022, but affordability remains low



Note: Housing costs cover only those relating to mortgage costs (principal repayment and interest payments) and rental costs (for both private market and subsidised rental housing). Housing costs are considered as a share of household disposable income, which includes social transfers (such as housing allowances) and excludes taxes.

Source: OECD (2024), OECD Affordable Housing Database - indicator HC 1.2. Housing costs over income, <https://oe.cd/ahd>

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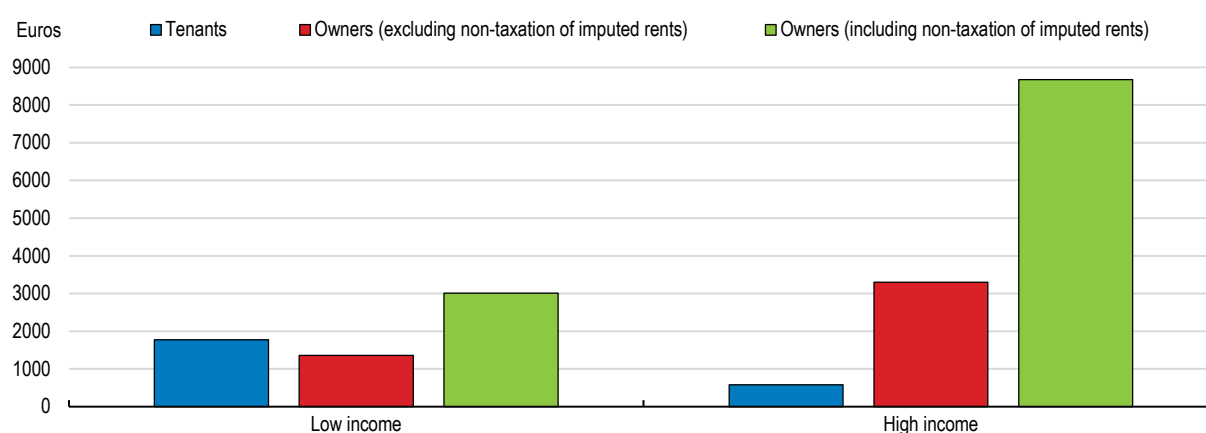
In early 2024, the authorities took a range of measures to stabilise the housing market and improve affordability in the short term. On the demand side, these measures include an increase in the tax credit for house purchases (the so-called “Bellëgen Akt” tax credit); the introduction of a new tax credit for investment in rental housing; increased public purchases of rental housing; an increase in interest deductibility for owner-occupiers; as well as an increase in rent subsidies for low-income households with children. The authorities have also supported the creation of a special purpose vehicle (“Prolog SA”) by five banks that will purchase properties under construction to mitigate

financial stress for developers. These measures are expected to stabilise the housing market by supporting housing demand in the short term. For instance, increased public purchases of rental housing will clear some of the supply overhang in the private housing market. The measures will directly improve affordability for households in the short term by reducing tax and interest expenditure for owners and rental expenditure net of subsidies for renters. Among the measures adopted in early 2024, only the planned increase in investment in construction of new affordable housing – which would cumulatively amount to about 1% of GDP over 2024-26 – would expand supply.

The key challenge for the authorities is to strike a balance between supporting housing demand in the short term, while strengthening supply in the medium term. Short-term demand-side support can help prevent further increases in bankruptcies of construction companies and a broader crisis in the construction sector, which would have adverse effects on supply in the medium term. However, exceptional demand-side support should be phased out as soon as the housing market starts to recover in order not to undermine the medium-term objective of making housing more affordable. Increased mortgage interest deductibility favours owners over renters, and mainly benefits high-income households because each euro deducted from taxable income provides a larger tax benefit when the marginal income tax rate is high. The overall financial gain from for an owner in the fifth quintile of the household income distribution is about three times the one for an owner in the bottom quintile (Figure 1.19). Given that owner-occupiers benefit from an implicit tax advantage due to the non-taxation of imputed rents – which can be viewed as a financial return paid by owners to themselves – there is no economic rationale to further favour owners over renters through housing policy support measures. Similarly, purchase subsidies (the so-called “prime d’acquisition”) and the “Bellëgen Akt” tax credit for house purchases drive up house prices, undermining affordability in the medium-term. Rent subsidies are among the most progressive housing market support measures in Luxembourg (Observatoire de l’Habitat, 2022), but they nonetheless risk driving up rents and ultimately house prices. Targeting owner support to the lowest-income households, while maintaining targeted rent support, would make the housing policy support system more neutral with respect to households’ decision to buy or rent, while making the system less regressive.

Figure 1.19. High-income owners are the largest beneficiaries of housing support measures

Average annual gain, 2018 household data, 2020 tax and benefit system



Note: Estimations based on household data from the 2018 EU-SILC Survey and the tax-and-benefit system of 2020. “Low income” denotes households in the first quintile of the household income distribution and “high income” households in the fifth quintile.

Source: Observatoire de l’Habitat.

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Reducing the scarcity of land available for development would help boost housing supply. While construction prices have grown broadly in line with economy-wide inflation since 2010, land prices have more than doubled, suggesting that scarcity of land available for development rather than increasing construction costs is a key driver of large increases in house prices over the period. Currently, the 1000 largest landowners – about 0.15% of Luxembourg’s population – own about 45% of all land owned by physical persons (Observatoire de l’Habitat, 2023). The 10 largest real estate companies own just below 50% of the land owned by all companies. These owners may hoard land to benefit from expected future price increases, given that prices have increased continuously over the past decades. Providing stronger incentives to make land available for construction would likely make housing more affordable for most people, while limiting the extent to which rents from strong economic growth are appropriated by a small number of landowners.

The authorities are planning a major overhaul of the property tax by updating the municipal property tax base and introducing a national-level property surtax on unused land. The current base of the municipal property tax has not been revised since 1941 and may not conform to the principle of horizontal equity, as similar plots of land may be subject to widely different taxation. The reform proposal foresees a formulaic approach to calculate land values, since the small number of market transactions in some areas of Luxembourg precludes the use of market prices. The formula would include a broad range of factors, including commuting time to the city of Luxembourg; amenities and services, such as schools and retail outlets; and national-level house prices to ensure a broadly stable ratio between taxes and house prices at the national level. An evaluation study conducted by the Luxembourg Institute of Socio-Economic Research suggests that, for areas where a sufficient number of market transactions is available to estimate market prices, there is a close link between the land values calculated through the formulaic approach and market prices (Bousch et al., 2022). While the update of the municipal property tax would lead to a significant redistribution across taxpayers, the average land value would remain broadly constant, implying that at current rates average tax revenues would remain broadly constant.

The introduction of a new national-level property surtax on unused land aims to discourage land hoarding. The authorities are in the process of establishing a national register of unused land, which allows assessing the extent of housing density relative to the density allowed by municipal urban plans. The rate would initially be set to 0 but increase with the time the land remains unoccupied, with the increase particularly steep for land with access to water and sanitation in areas designated as high priority for development. Tax revenues would depend on the extent to which land is made available for construction, with initial simulations suggesting that revenues would amount to around 270 million euros (around 0.3% of 2023 GDP) after 20 years. International experience suggests that surtaxes on vacant land can discourage land hoarding and promote a more efficient land use (Box 1.5). The authorities plan to eventually introduce a national-level tax on unused housing on top of the property tax on unused land, with the objective to bring all available housing to the property or rental markets. This will require a registry of unused housing, which is currently being established.

The planned reform of the property tax is a positive step to improve horizontal equity between taxpayers and raise housing supply, but the authorities should aim to raise property tax revenues. The update of the property tax base is crucial to ensure that the owners of land with high market values pay higher taxes than those owning low-value land. However, there is room to raise recurrent taxes on land and buildings – which are currently among the lowest in the OECD (see above). Shifting the burden of taxation from labour to immobile property would not only make the tax system more growth-friendly, it would also make the tax system more neutral in terms of households’ decisions to own or to rent their house. Currently, the average recurrent land tax of 100 euros per year is dwarfed by owner-occupiers’ implicit tax advantage originating in the non-taxation of imputed rents, which amounts to about 4400 euros per year on average and about 8500 euros for high-income households (Figure 1.19).

Box 1.5. International experience with surtaxes on vacant land

Differentiated taxes on occupied and vacant land are relatively uncommon internationally but are in use in a number of municipalities in the US states of Pennsylvania and Hawaii; the city of Seoul in Korea; and at the national levels in Finland and Ireland (OECD, 2022, Housing Taxation in OECD countries). In Pennsylvania, Hawaii and Finland, tax differentiation takes the form of split-rate taxes, with higher tax rates applying to land than buildings. In Seoul and Ireland, tax differentiation takes the form of surtaxes on vacant land, with the rate increasing over the period a plot remains vacant. In practice, both split-rate taxes and surtaxes on unused land amount to applying a higher average tax rate to vacant than to occupied land, which should make land hoarding based on expectations of future price increases less attractive relative to land development. Property owners have an incentive to construct new housing units on vacant or under-used land.

A number of studies suggest that split-rate taxes may raise housing supply and have positive distributional effects. Banzhaf and Lavery (2010) find that split-rate taxes in Pennsylvania raise housing supply by increasing density. Moreover, 85% of property owners experienced a decrease in property tax liabilities following the introduction of split-rate taxes (Hartzok, 1997), with the increases in liabilities concentrated on richer homeowners for whom land-to-building value ratios tend to be higher (Bowman and Bell, 2004). The impact of surtaxes on vacant land is likely to be similar, even though rigorous studies of the taxes in Seoul and Ireland are unavailable.

A key issue with differentiated taxes on occupied and vacant land is the interaction with other land-use policies. If the main barriers to increased housing supply are restrictive building codes and zoning laws, tax differentiation may be an ineffective policy tool. For instance, height restrictions for buildings or zoning restrictions may limit the number of housing units that can be built on a vacant plot of land. In this case, the elasticity of housing supply to changes in tax rates would be low, with most of the higher tax on vacant land resulting in higher prices rather than new housing units.

A key issue with the reform of the property tax will be to ensure that regulation of urban density is aligned to national-level housing objectives, with municipalities having little discretion over limiting density or designating areas as low priority for development. The effectiveness of the surtax on unused land in raising housing supply could be curtailed by limiting construction on newly mobilised land, including through restrictive density regulations. Local politicians may be more exposed to political pressure from local house owners than politicians at the national level, who may better take into account national-level housing needs (Glaeser and Gyourko, 2018). The current vetting of local urban plans through the central government should be vigorously enforced, and periodic updates of local urban plans should become mandatory to ensure that they remain in line with national-level housing needs.

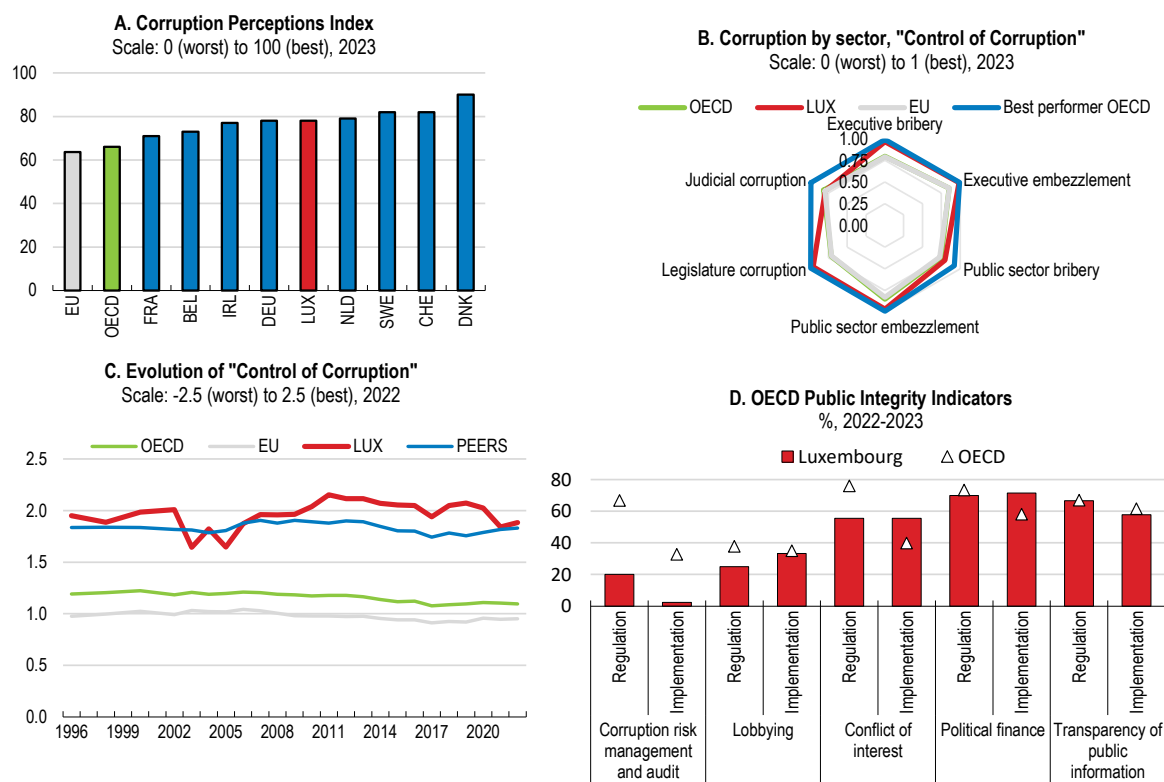
Other reforms that would increase housing supply include the establishment of a one-stop shop for construction permits and promoting large projects with a significant impact. The existing procedures for obtaining construction permits are relatively complex, involving multiple ministries, including the Ministry of the Interior, the Ministry of the Environment, and the Ministry of Housing. This complexity results in significant delays and increased costs for housing projects. To increase the supply of housing, it is crucial for the authorities to focus on reducing delays. Consolidating the permitting process into a single, streamlined entity where all necessary approvals can be obtained and adopting the principle of “silence means consent” would simplify the application procedure and reduce the time required to secure permits.

1.5. Continuing to strengthen the anti-corruption framework

Strong anti-corruption policies are essential for a thriving business environment. Corruption – when public office is exploited for personal gain – stifles business growth by discouraging investment and innovation (Jin, 2021). It hampers economic progress by funneling resources like capital and labor into politically-connected firms instead of those with high productivity, leading to an inefficient allocation of resources (Akcigit et al., 2023). Moreover, corruption undermines equal opportunities and erodes public trust in government. Corruption is perceived to be low in Luxembourg, though it is still slightly higher compared to some northern European countries (Figure 1.20,

Panel A). The Varieties of Democracy Project highlights that the main areas where Luxembourg could improve are in addressing public sector bribery and judicial corruption (Figure 1.20, Panel B).

Figure 1.20. There is scope to improve several areas of the anti-corruption framework



Note: PEERS is defined as the simple average of Belgium, Denmark, France, Germany, Ireland, Netherlands, Sweden and Switzerland. Panel B shows sector-based subcomponents of the "Control of Corruption" indicator by the Varieties of Democracy Project.

Source: Transparency International (Panel A); Varieties of Democracy Project (Panel B); World Bank (Panel C) and OECD Public Integrity Indicators (Panel D).

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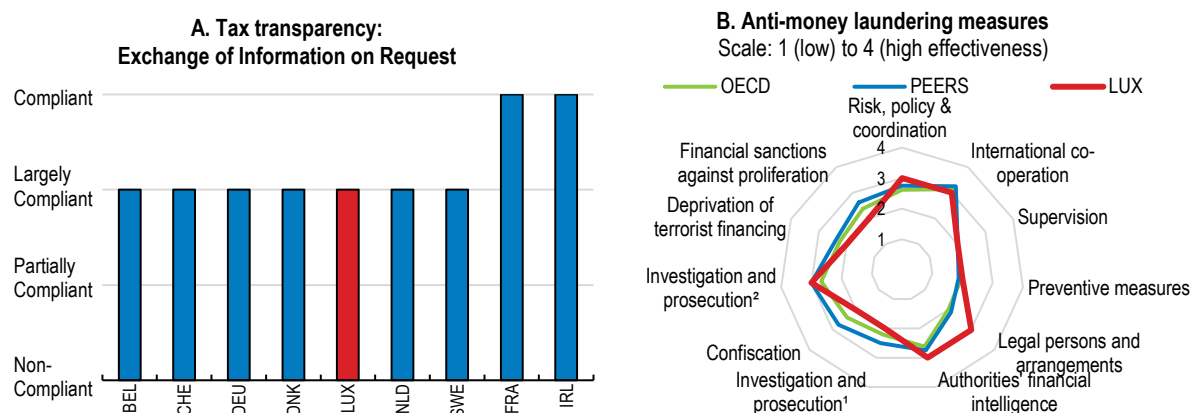
Luxembourg performs at or above the OECD average in several key areas of the OECD Public Integrity Indicators (OECD, 2024), including transparency in political finance and public information (Figure 1.20, Panel D). The country's regulatory framework on political finance prohibits political parties from receiving anonymous donations, as well as any financial support from state-owned enterprises, foreign governments, or foreign businesses. Political parties are required to report on their finances, with the Court of Auditors overseeing and publishing these financial reports for the past five years. The Court also tracks and reports on cases, investigations, and sanctions related to party financing. In the area of transparency of public information, the Commission for Access to Documents publishes data on information requests and conducts inspections to ensure public sector compliance. Luxembourg also proactively discloses important datasets, including updated versions of primary legislation, draft laws, and ministerial agendas.

However, there is scope for improvement in other areas. In corruption risk management and auditing, while the country has standards of conduct for ministers, parliament members, political appointees, civil servants, and internal auditors, it lacks a comprehensive regulatory framework for internal control and auditing. The Court of Auditors oversees internal audit activities across the public sector, but there is no central body responsible for developing and harmonising these systems. As a result, Luxembourg does not fully track which public organisations have internal audits, how many have been audited in the past five years, or how many audit recommendations have been implemented. In the area of lobbying, Luxembourg has regulations that define lobbying activities and impose cooling-off periods for former government members, but not for other parliament members or lobbyists. While

there is an online lobbying register, it does not reveal which pieces of legislation are being targeted by lobbyists, and there is no central government authority overseeing transparency in lobbying activities.

When it comes to tax transparency, Luxembourg aligns closely with its northern European peers, effectively curbing the potential for tax evasion (Figure 1.21, Panel A). The country also performs on par with other OECD nations in combating money laundering (Figure 1.21, Panel B). Luxembourg has a robust framework for anti-money laundering (AML) and counter-terrorist financing (CTF), underpinned by a solid grasp of its own vulnerabilities in these areas (FATF, 2023). The authorities efficiently utilise financial intelligence and collaborate well with international partners. The financial sector supervisor, the Commission de Surveillance du Secteur Financier (CSSF), has appropriately concentrated its efforts and resources on the banking and investment sectors.

Figure 1.21. Tax transparency and anti-money laundering measures are mostly effective



Note: Panel A summarises the overall assessment on the exchange of information in practice from peer reviews by the Global Forum on Transparency and Exchange of Information for Tax Purposes. Peer reviews assess member jurisdictions' ability to ensure the transparency of their legal entities and arrangements and to co-operate with other tax administrations in accordance with the internationally agreed standard. The figure shows first round results; a second round is ongoing. Panel B shows ratings from the FATF peer reviews of each member to assess levels of implementation of the FATF Recommendations. The ratings reflect the extent to which a country's measures are effective against 11 immediate outcomes. "Investigation and prosecution" refers to money laundering. "Investigation and prosecution" refers to terrorist financing.

Source: OECD Secretariat's own calculation based on the materials from the Global Forum on Transparency and Exchange of Information for Tax Purposes; and OECD, Financial Action Task Force (FATF).

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However, the authorities should direct more attention to other sectors at high risk of money laundering, such as real estate and non-financial professionals providing trust and company services. Given the country's exposure, enhancing the detection, investigation, and prosecution of complex money laundering cases is essential. Although some Luxembourg authorities understand the risks associated with terrorist financing, FATF (2023) suggests that the country needs to better articulate to both public and private stakeholders how its status as an international financial hub could be exploited for large-scale terrorist financing. A more risk-based approach to supervising the non-profit sector is recommended, including outreach to improve the sector's currently poor understanding of terrorist financing risk.

1.6. Macroeconomic policy developments and challenges: Recommendations

MAIN FINDINGS	RECOMMENDATIONS
Phase out fiscal support as activity recovers	
Fiscal policy has supported the economy through generous energy policy and housing policy measures.	Fully phase out energy policy supports and better target housing policy measures.
The financial sector is healthy and would be able to withstand severe adverse shocks, but risks related to the downturn in the housing cycle are rising.	In the medium term, review loan-to-value limits to reduce household debt vulnerabilities.
Rebuild fiscal buffers and make the tax system more growth-friendly	
The reform of the EU fiscal framework makes the EU's medium-term objective anchoring fiscal policy obsolete. The government plans to introduce a national fiscal rule.	Adopt a net expenditure rule that aims to stabilise gross public debt in the medium term. Extend the mandate of the fiscal council to include long-term debt projections.
The share of immoveable property taxes and VAT in total revenues is low and corporations pay a net wealth tax on top of the corporate tax. The government envisages an update of the property register underlying the land tax.	Gradually raise VAT rates and taxes on immoveable property. Exempt corporations below a minimum revenue threshold from the net wealth tax.
The gender wage gap is low and female labour market participation is high, but many women work part-time.	Gradually individualise the income tax system to reduce disincentives for women to work full time.
The public sector wage bill as a share of national income is high and public employment has grown faster than overall employment over the past years.	Continue the digitalisation of the of the public administration to improve efficiency. Prioritise targeted educational support for weaker students over across-the-board reductions in student-to-teacher ratios.
Improve housing affordability	
The housing market is in a deep cyclical downturn. The government has focused on demand-side measures to stabilise the market.	Phase out demand-side housing market support once the housing market starts to recover.
The current system of housing market support favours high-income households and owners over renters.	Phase out the mortgage interest deduction. Target the "Bellëgen Akt" tax credit for house purchases to low-income buyers.
The property register used for the assessment of the land tax is outdated and the land tax is too low to discourage land hoarding. The government envisages a major reform of the land tax.	Set the rate of the property surtax on unused land sufficiently high to increase tax revenues and discourage land hoarding. Ensure rigorous vetting of local urban plans by the central government to align density regulations to national housing needs.
The existing procedures for obtaining construction permits are relatively complex, involving multiple ministries.	Consolidate the permitting process into a single, streamlined entity and adopt the principle of "silence means consent".
Continue strengthening the anti-corruption framework	
The corruption risk management and auditing framework is fragmented. The Court of Auditors oversees internal audit activities, but there is no central body responsible for developing and harmonising the various frameworks across the public sector.	Create a central body to develop a harmonised corruption risk management and auditing framework.

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2 Securing the pension system for future generations

Cyrille Schwellnus

Luxembourg faces rising pension costs due to the retirement of large cohorts of workers, including cross-border workers, who entered the workforce from the late 1980s. By 2070, the number of pensioners is expected to more than triple, making the current system unsustainable, despite large financial reserves accumulated in recent decades. To secure the pension system for future generations while preserving competitiveness and promoting intergenerational fairness, a comprehensive reform of the pension system is needed, combining higher pension contributions, raising the effective retirement age as life expectancy increases and gradually reducing the generosity of benefits. Phasing-in over the coming years a stable contribution rate that balances the system over 50 years to match future commitments would ease the burden on future generations by allowing today's large working-age cohorts to contribute sufficiently, while financial returns would help the pension reserve fund to grow. Increasing the required years of contributions for those with longer periods in education and linking the legal retirement age to life expectancy would help the sustainability of the pension system and encourage people to work longer as Luxembourg has one of the lowest effective retirement ages in the OECD. Reducing the generosity of pension benefits by accelerating the transition to the benefit calculations of the 2012 pension reform and limiting pension indexation to the consumer price index rather than wages would further strengthen sustainability.

2.1. Introduction

Luxembourg faces rising pension expenditure over the next decades, mainly from the retirement of the large cohorts of workers – including cross-border workers – who entered the labour market from the late 1980s. The number of pensioners will more than triple over 2024-2070, with the ratio of workers to pensioners declining from about 2½ to 1 despite an expected increase of about 190 000 of the workforce (IGSS, 2024).

While there is uncertainty around such projections, it is very unlikely that the workforce could expand enough to maintain a stable support ratio of workers to pensioners: this would require an increase in employment of about 1.2 million workers over the period, which would strain infrastructure and housing. This underlines that the existing pension system is unsustainable in the long term, despite the gradual transition of the reforms agreed in 2012 and large pension reserves accumulated over the past two decades. Pension contribution rates would have to almost double between the early 2040s and 2070 to maintain the current pension system in balance. This would impose a much larger burden on people in the labour force at that point – those born after around 1990 – than older generations by reducing their net wages and would raise businesses' labour costs, undermining investment and employment. The foreseen demographic pressures call for the implementation of a comprehensive reform to put the pension system on a sustainable footing for the long term.

Section 2 describes the current state of the pension system in terms of characteristics, outcomes, and challenges. Section 3 outlines avenues for reform of the general pension scheme that covers private and self-employed workers, but that should equally apply to the special civil servant scheme. Given that disability and survivor pensions play a negligible role in projected increases in pension costs over the next decades (IGSS, 2024), the chapter mainly focuses on early and old-age pensions.

2.2. Luxembourg's public pension system faces major challenges

2.2.1. *Current pension rules favour early retirement*

Private sector old-age pensions in Luxembourg are based on a pay-as-you-go system, in which the current cohorts of workers finance the pensions of the current cohorts of pensioners. Mandatory pension contributions are evenly split between employers, workers, and the government, with each contributing 8% of the gross wage up to a cap of 5 times the minimum wage (Table 2.1). The statutory retirement age is 65, but early retirement from age 57 is possible for workers with careers of at least 40 years. Initial pension benefits at retirement – income replacement rates – are calculated as the sum of an earnings-related part; a part related to years of insurance; and an end-of-year allowance that is proportional to years of insurance. Benefits are indexed to real wage growth and inflation, ensuring that pension benefits grow at the same rate as workers' nominal wages. The old-age pension system of civil servants is governed by similar qualifying rules and benefits but has different financing rules. Voluntary occupational pension schemes have developed in large businesses but are less widespread than in other European countries.

Box 2.1. Luxembourg's pension system

The general pension scheme covers private sector workers and self-employed workers, while the special civil servant scheme covers civil servants and workers of the national railway company. Qualifying conditions, benefits and financing of the schemes are reported in Table 2.1.

Table 2.1. Key elements of the Luxembourg pension system

2024 values

	General scheme	Civil servant scheme
	Qualifying conditions	
Definition of insurance periods	Total insurance years = Mandatory years (employment and unemployment) + voluntary years (people temporarily out of the labour force who choose to remain insured or buy back insurance years) + complementary years (study and education of children below age 6)	
Statutory retirement age	65 (provided that mandatory years + voluntary years > 120 months)	
Early retirement age	60 (provided that total insurance years > 480 months)	
	57 (provided that mandatory insurance years > 480 months)	
	Benefits	
Part A: Proportional to earnings	1.775% of total lifetime earnings + 0.015% for every year that the sum of age and contribution years exceeds 95 (capped at 2.05%)	
Part B: Proportional to years of insurance	For a worker with 40 years of insurance, 24.85% of the reference value (broadly corresponding to the minimum wage). For each missing year the value is reduced by 1/40 th	
Part C: End-of year allowance¹	For a worker with 40 years of insurance, 2.5% of the reference value. For each missing year the value is reduced by 1/40 th	
Indexation	Double indexation to real wage growth and inflation	
Cap	5/6 of five times the reference value (broadly corresponding to the minimum wage)	None
	Financing	
System	Pay-as-you-go	Pay-as-you-go
Contributions	8% workers + 8% employers + 8% government	8% workers + government for the remainder of expenditure
Cap on contributions	At 5 times the minimum wage	None

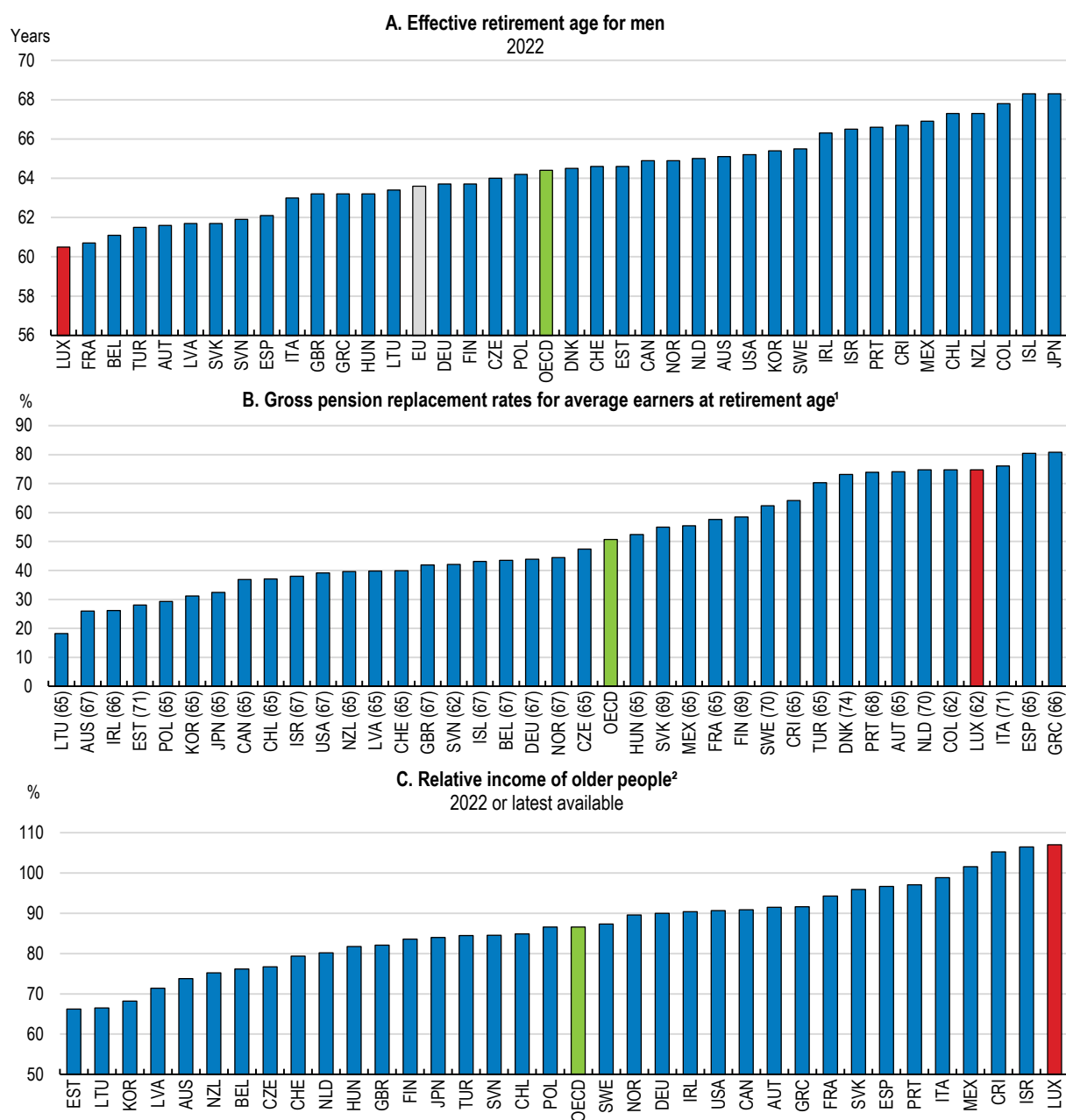
1. The end-of-year allowance will be eliminated if the total contribution rate exceeds 24%.

Source: OECD.

People with 20 years of insurance but whose benefits would be below 90% of a reference value, which is close to the minimum wage, receive a minimum pension, while people who do not qualify for a pension are covered by social assistance.

Due to the financial incentives for early retirement built into the pension system, the effective retirement age – 60 in 2022 – is the lowest in the OECD (Figure 2.1, Panel A). While workers with 40 years of social security contributions can retire at age 57, many high-qualified workers with shorter careers can retire at age 60, since non-contributory periods of study qualify as periods of social security insurance. For instance, a person with 4 years of university studies who started working at age 24 can retire at age 60 after 36 years of career. The relatively high replacement rates in the pension system also make it possible for people to retire without achieving the full entitlement and nevertheless enjoy a relatively high income by OECD standards. Financial incentives for longer careers that were introduced with the pension reform of 2012 (see below) – a “bonus” in the accrual rate for each year of social security contributions when the sum of age and contribution years is above 95 – appear to be insufficient to maintain older people in the labour market until the statutory retirement age of 65.

Pension benefits are among the most generous in the OECD, resulting in a very high relative income of older people. The future gross replacement rate for workers with average earnings and a full career from age 22 – the ratio of pension benefits to average wages over the working life – is around 75%, among the highest in the OECD (Figure 2.1, Panel B). While the replacement rates in Greece, Italy and Spain are higher, obtaining a full pension will require working until the age of 66 in Greece, 71 in Italy and 65 in Spain, as compared to 62 years in Luxembourg. Consequently, Luxembourg is among the few countries in the OECD, where the income of older people is higher than the average income of the total population (Figure 2.1. Panel C).

Figure 2.1. The effective retirement age is low and benefit levels are high

1. The future replacement rate is calculated for workers with average earnings and a full career from age 22.

2. Relative income of older people is defined as the average income of people above age 65 relative to the average income of the total population. Income of older people encompasses income from public transfers, employment, self-employment capital and public transfers. In Luxembourg, public transfers account for the overwhelming part of income of older people (83.1%).

Source: OECD Pensions at a Glance database; and OECD Income Distribution Database.

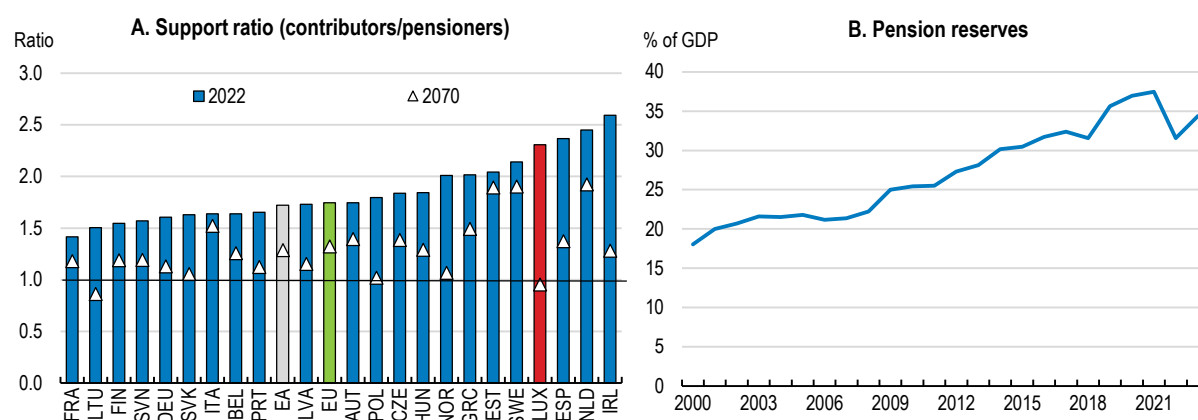
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2.2.2. The financing of the pension system will become increasingly challenging

Rapid employment growth over the past two decades and the associated growth in social security contributions have driven large financial surpluses of the pension system, despite the low effective retirement age and high benefit levels. Significant net immigration has helped to maintain a favourable old-age dependency ratio in the resident population, while the number of non-resident cross-border workers has more than doubled since the year 2000. This has resulted in a support ratio – the ratio of contributors to pensioners – well above the EU average and

a significant financial surplus over the past decades (Figure 2.2, Panel A), with total contributions consistently exceeding total benefit payments. The surpluses have been accumulated in a pension reserve fund that reached a balance of about 34% of GDP in 2023 (Figure 2.2, Panel B), with assets amounting to more than four times annual pension expenditure, well above the legal minimum of 1.5. About 90% of assets in the pension reserve fund consist of global equities and bonds, with the remainder consisting of real estate, infrastructure, and liquidities. Despite large valuation losses in 2022 due to the decline in global equity and debt markets, the fund achieved an average nominal net rate of return of 4.3% over the period 2013-22 (OECD, 2023).

Figure 2.2. The support ratio is currently favourable and pension reserves are high, but these trends will reverse



Note: Total pension reserves consist of the reserves of the National Pension Insurance Fund (CNAP, 1.4% of GDP) and the Pension Reserve Fund (FDC, 33% of GDP) in 2023.

Source: European Commission (2024) Ageing Report. Economic and Budgetary Projections for the EU Member States (2022-2070); and IGSS.

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The retirement of immigrant and cross-border workers, who drove rapid employment growth from the late 1980s, poses challenges for the sustainability of Luxembourg's pension system. The support ratio of social security contributors to pensioners is projected to decline from 2.3 in 2022 to just below 1 in 2070, one of the largest declines in the European Union. This implies that workers will have to support an increasingly large number of pensioners. The sharp decline in the projected support ratio is largely due to the retirement of the large cohorts of workers that entered the labour market from the late 1980s, who will begin to retire from the late 2020s. The gradual rise in life expectancy at retirement and the absence of any indexation of the statutory retirement age to life expectancy, which will lead to an increase in the average duration of retirement, play a more modest role. The projected decline in the projected support ratio is particularly pronounced between 2030 and 2050 before gradually tapering out between 2050 and 2070, as lower projected employment growth from the 2020s translates into smaller cohorts of pensioners (IGSS, 2024).

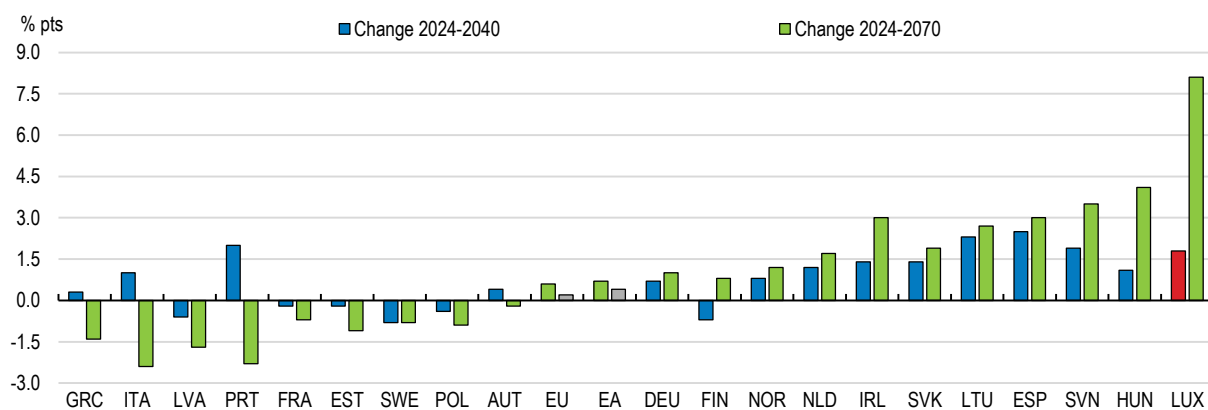
A pension reform in 2012 to improve the long-term sustainability of the pension system introduced: a number of semi-automatic adjustment mechanisms; reduced pension generosity; and strengthened financial incentives for older workers to remain in the labour force. A first adjustment of pension parameters will be triggered when the balance between contributions and current expenditure dips into deficit. The adjustment consists of a reduction in the extent of real wage indexation, with inflation indexation being fully maintained. A second adjustment is triggered when the periodic 10-year review of the pension system by the Social Security Institute (IGSS) – that was introduced by the 2012 reform – indicates that the balance of the pension reserve fund dips below 1½ times annual benefits over the next 10 years. When this happens, the contribution rate will be adjusted upwards to ensure that the balance of the pension reserve fund remains above the legal threshold. At the same time, the end-of-year allowance will be abolished. According to analysis in IGSS (2024), the first adjustment is likely to be triggered in 2028 and the second in 2041. The 2012 reform also reduced pension generosity by gradually reducing the income-related part, while raising the part related to years of contribution over the transition period 2012-52. The 2012 reform does not envisage any increase in the statutory and early retirement ages, but foresees a gradual increase in the bonus for long careers to strengthen incentives for older workers to remain in the labour force.

2.2.3. Past reforms will be insufficient to stem the rise in pension expenditure

Recent simulations in IGSS (2024) for the European Commission 2024 Ageing Report (European Commission, 2024) suggest that the 2012 reform is insufficient to prevent a significant rise in pension expenditure. At current policies and accounting for the 2012 reform, gross pension expenditure is projected to increase from 9.4% of GDP in 2024 to 11.2% in 2040 and 17.5% in 2070. The increase over 2024-40 is among the largest projected in the European Union, with the subsequent increase over 2040-70 larger than in any other European Union country (Figure 2.3). This mainly reflects the rapid decline in the projected support ratio, as the large cohorts of workers who entered the labour market from the late 1980s retire. These simulations rely on demographic projections by Eurostat that foresee an increase in employment of about 190 000 by 2070. According to the macroeconomic assumptions underlying the European Commission 2024 Ageing Report (European Commission, 2024), labour productivity growth is projected to gradually pick up to 1.5% in 2040 (Chapter 4). While there is some degree of uncertainty underlying these long-term simulations, they do not appear overly prudent, given constraints on labour force growth from congestion and housing and the stagnation of productivity over 2010-22. Alternative long-term simulations based on a range of scenarios recently developed by the national statistical institute (Statec) suggest that even in the most optimistic economic and demographic scenario, the support ratio would broadly halve between 2022 and 2070, declining from 2.4 to 1.1 (Everard, 2024).

Figure 2.3. There is a very large projected increase in gross pension expenditure

% of GDP



Note: The numbers in the figure refer to the baseline scenario in European Commission (2024).

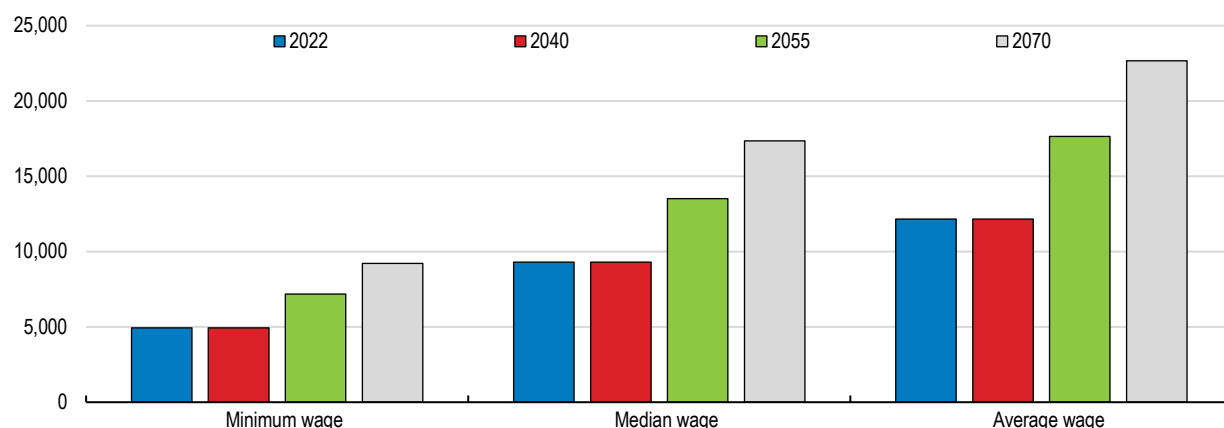
Source: European Commission (2024) Ageing Report. Economic and Budgetary Projections for the EU Member States (2022-2070).

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Given that the semi-automatic adjustment mechanisms and the reduction in pension generosity foreseen by the 2012 reform will be insufficient to stem the projected increase in expenditure, balancing the pension system under existing rules will require large increases in contribution rates. Significant increases in contribution rates would not occur before the first half of the 2040s, but balancing the system thereafter would require the joint pension contribution rate of workers and employers to increase from 16% to about 30% by the mid-2060s. In terms of today's wages, applying the required increase in contribution rates to current wage levels, the joint pension contribution for a typical worker would increase from about 9000 euros today to about 17 000 euros in 2070 (Figure 2.4). Contributions would remain constant until 2041 as the pension reserve is depleted but rapidly increase thereafter. While current workers would be protected from higher pension contributions, future cohorts of workers would bear the full brunt of the increases. Moreover, higher pension contributions on this scale would have adverse effects on businesses' competitiveness by raising their labour costs, reducing employment and further eroding the support ratio. Even though the increase in the government's contribution to the pension system from 8% to 15% would not have any direct impact on workers' earnings and businesses' price competitiveness, there would be indirect effects if the government chooses to finance higher pension expenditure through higher taxes or reductions in spending in other areas.

Figure 2.4. With current rules, balancing the system would require large increases in contributions

Annual joint employer-employee pension contribution required to balance the system under the rules of 2012 reform, based on 2022 earnings (euros)



Note: The calculations are based on the baseline scenario in European Commission (2024), assuming that projected increases in gross pension expenditure will have to be matched by proportional increases in pension contributions from 2041. For instance, projected gross pension expenditure is expected to increase by about 36% between 2022 and 2050 (from 9.2% to 12.5% of GDP), requiring a 36% increase in the joint worker and employer pension contribution rate from 16% to 22%. The nominal joint employer-employee contribution in euros is obtained by multiplying projected contribution rates by 2022 annual earnings.

Source: OECD calculations based on European Commission (2024) and Statec (2024).

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2.3. Comprehensive pension reform is required using a range of levers

A new comprehensive pension reform is needed to put the pension system on a sustainable footing and to ensure an equitable distribution of the costs of reform between current workers, pensioners and future workers, while protecting low-income workers and low-income pensioners, as well as maintaining businesses' competitiveness. Given the scale of the challenge, balancing these objectives will require a combination of reduced pension generosity, higher contributions and increases in the effective retirement age, while exempting low-income workers and low-income pensioners from some of these measures. The pace and the extent to which these pension parameters are adjusted will determine the balance of costs borne by current workers, pensioners and future workers.

2.3.1. Extending the horizon of pension reviews

The current governance of the pension system aims to balance its finances on a medium-term basis, but the 10-year horizon is too short given the long-term nature of demographic developments. In the current framework, financial balance has to be achieved over a 10-year horizon, allowing for withdrawals from the pension reserve fund if funding exceeds what is required over this period. Any upward adjustment of contribution rates is postponed until the beginning of the 10-year coverage period during which the pension reserve fund is projected to reach its legal minimum level of 1.5 times annual pension expenditure. While this framework has a longer-term horizon than many OECD pension systems that only require a balance between contributions and payments over a few years to smooth fluctuations in income, the horizon is inappropriate for Luxembourg given the rapid projected increase in pensions claims beyond the 10-year window, creating predictable pressures on the financing of the system.

Requiring the systems to balance over a 50-year horizon or longer would ensure sustainability despite unfavourable demographic developments. This would require the social partners to reach agreement on how contributions, benefits and retirement age will be adjusted. Periodic reviews of the pension system at short intervals, for instance every 5 years, as in the current setup, would ensure that pension parameters are set according to the most up-to-date demographic and economic projections. A pension scheme that balances the system over the long-term has

been successfully established in Canada (Box 2.2), which by default adjusts the contribution rates to balance the system.

Instead of sharply raising contributions from the early 2040s, when the pension reserve fund is projected to reach its legal limit, a steady-state contribution rate would be set that could be maintained over the 50-year horizon. Complementary reforms, such as a gradual increase in early and statutory retirement ages, and a shorter transition to reduced pension generosity than foreseen by the 2012 reform would allow to keep a low steady-state contribution rate. Setting a steady-state contribution rate would have the added benefit of accumulating larger assets in the pension reserve fund while the support ratio remains favourable. Financial returns on these assets could further limit the steady-state contribution rate.

Box 2.2. The Canada Pension Plan

The Canada Pension Plan (CPP) was created in 1966, when the support ratio of pension contributors and beneficiaries was favourable. Over time, declines in the support ratio due to demographic change that were not reflected in higher pension contribution rates drove a decline in the projected long-term balance in the CPP Fund. In 1995, the Chief Actuary report projected the CPP Fund to be depleted by 2015 (Little, 2008).

In response to the report, the Canadian government agreed to a major reform to ensure the CPP's long-term financial sustainability. Specifically, the contribution rate would be set on a steady-state basis aiming for financial balance over a period of 75 years without any recourse to further rate increases (Carroll and Barnes, 2023).

The financial balance of the CPP is assessed every three years by computing the minimum contribution rate required to finance pensions over the subsequent 75 years, accounting for demographic changes, economic conditions and investment performance of the CPP Fund (OECD, 2021).

If the calculated minimum contribution rate exceeds the current contribution rate, a political consultation between the federal and provincial finance ministers is triggered. If ministers cannot agree on an adjustment in contribution rates, benefit levels or eligibility criteria, a safety mechanism is activated, which foresees freezing the indexation of pension benefits and increasing the contribution rate by 50% of the difference between the calculated minimum contribution rate and the current contribution rate. The safety mechanism would remain in place until the subsequent three-year review of the pension system, thus preventing excessive funding pressures to build up when a political agreement cannot be reached.

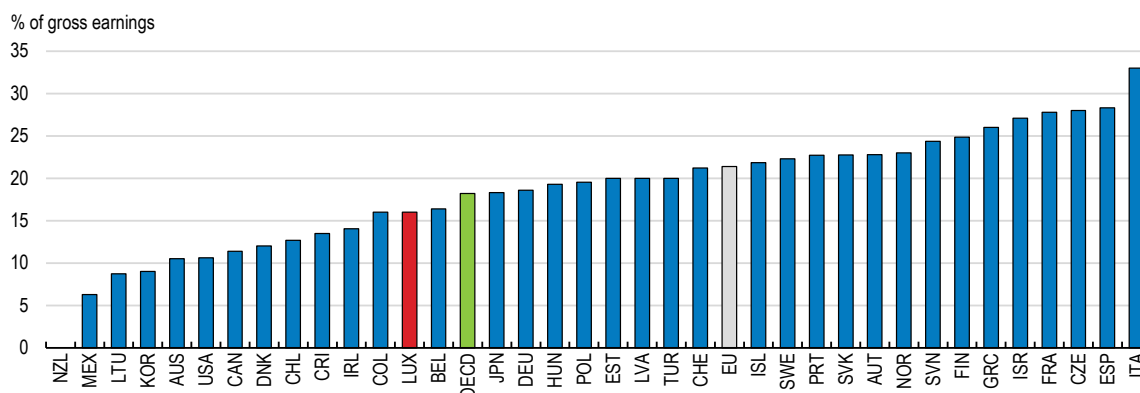
Steady-state contribution rates imply that the CPP accumulates assets while the support ratio remains relatively favourable while drawing them down as the support ratio declines. At the end of 2023, the CPP Fund had accumulated assets amounting to about 20% of GDP, with an average nominal 10-year return on assets of 9.2% (CPP, 2024).

2.3.2. Transitioning to a steady-state contribution rate

Pension contribution rates would need to be raised to achieve the long-term sustainability of the system as part of a wider package. Increases in pension contribution rates raise labour costs and reduce net wages, depending on whether businesses or workers bear the cost of the increases, which could reduce Luxembourg's attractiveness for both businesses and workers. However, the joint contribution rate of workers and employers of 16% is currently below the OECD average and those in neighbouring countries. Moreover, increases in contribution rates will be required in most neighbouring countries to maintain the financial balance of pension systems in the face of demographic change, suggesting that moderate increases in contribution rates would not necessarily harm Luxembourg's competitive position. Simulations by the German Council of Economic Advisors (2023), for instance, suggest that under current legislation contribution rates in Germany would have to rise by 2 percentage points by 2035 and 5 percentage points by 2080 to balance the German pension system.

Figure 2.5. The pension contribution rate is relatively low in international perspective

Mandatory pension contribution rates for old-age and survivors, 2022



Note: Sum of employer and employee pension contributions.

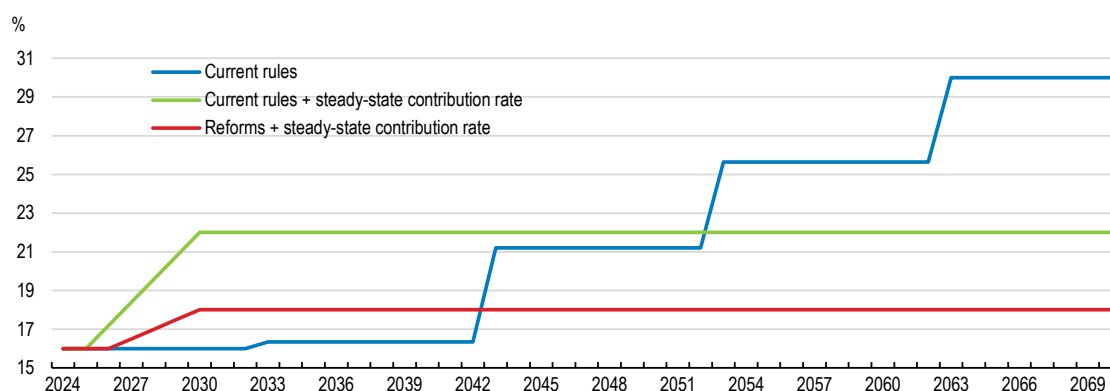
Source: OECD Taxing wages 2023.

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While there is room to moderately raise pension contribution rates, simulations conducted for this Economic Survey suggest that without any complementary reforms to raise the legal retirement age and to contain benefits, increases in contribution rates required to balance the system may have significant adverse effects on labour costs and net wages. Under current legislation the joint contribution rate of workers and employers would rise to 30% in 2070, 14 percentage points above the current rate (Figure 2.6). Moving to a system with a steady-state contribution rate would limit the increase, resulting in a steady-state contribution rate of 22% that would be gradually phased in by 2030. However, this would still imply an increase of 6 percentage points over the current rate over a short period, with likely significant adverse effects on labour costs and net wages. However, if growth in pension expenditure were reduced, including by increasing the effective retirement age and bringing forward the transition to the replacement rates of the 2012 pension reform from 2052 to 2037, the required steady-state contribution rate could be 18%, implying a much more limited increase of two percentage points.

Figure 2.6. Simulated pension contribution rates under various reform scenarios

Joint pension contribution rate of workers and employers



Note: The scenario "Current rules" is based on the rules of the 2012 pension reform, with real wage indexation being reduced to one-quarter in 2031 (as contributions fall below expenditure in 2028, triggering a semi-automatic adjustment) and the end-of-year allowance being abolished in 2033 (as the contribution rate is raised, triggering an automatic adjustment). The scenario "Current rules + steady-state contribution rate" assumes a gradual phase-in of a steady-state contribution rate over 2027-30 that would maintain pension reserves above 1.5 times annual expenditure over the entire period 2030-70. The scenario "Reforms + steady-state contribution rate" assumes that the transition to the replacement rates of the 2012 pension reform is brought forward from 2052 to 2037; the legal retirement age is indexed to life expectancy; periods of education are excluded from the calculation of length of careers; and pensions in payment are indexed to the consumer price index rather than nominal wages.

Source: IGSS on request of OECD.

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An important consideration when raising contribution rates will be to avoid adverse impacts on the take-home pay and employment prospects of low-wage workers. The higher rates required can be introduced gradually over a few years and the government should look at other opportunities to reduce the tax burden on labour (see Chapter 1). The increase could be achieved by exempting workers at or around the minimum wage from increases in contribution rates, or by reducing personal income taxes for low-income households. If employer and employee contributions were kept constant for low-income workers, the shortfall in contributions should be offset by a higher government transfer to the pension system that could be financed by higher general tax revenues.

2.3.3. Raising the effective retirement age

Raising the effective retirement age would contribute to the sustainability of the pension system and avoid even larger increases in contribution rates. The priority should be on tightening eligibility criteria for early retirement, which, apart from raising the legal minimum age, requires excluding non-contributory periods from the calculation of total insurance years. The fact that the effective retirement age at 60 is well below the statutory retirement age of 65 implies that only a small fraction of people continue to work until the statutory retirement age. Currently, people with 40 years of contributory and non-contributory periods can retire at age 60, allowing people who studied beyond the age of 20 and who can claim study periods as non-contributory periods to retire with lengths of careers well short of 40 years. For instance, a worker with an uninterrupted career who studied four years and started working at the age of 24 can currently retire at the age of 60 despite having contributed only 36 years. Eligibility for early retirement should be tightened by excluding periods of education in the calculation of length of careers. This reform would improve intra-generational equity, since the cost would mainly be borne by highly-educated workers, who typically have higher life expectancy at retirement than lower-educated workers who start their careers early. While some high-income workers may choose to stop working despite being ineligible for an early pension, fiscal savings would nonetheless be substantial, since early retirement for these workers would be financed by private savings rather than public expenditure.

Given that the effective retirement age in Luxembourg is among the lowest in the OECD, there is room to gradually raise early and statutory retirement ages. One policy option would be to link early and statutory retirement ages to life expectancy. This would improve the sustainability of the pension system, both by avoiding further increases in the length of retirement and by raising pension contributions to the extent that people work longer. Simulations by the European Commission (2024) suggest that the expenditure-containing effects of raising legal retirement ages would outweigh expenditure-increasing effects. According to these simulations, Luxembourg would be among the countries with the largest expenditure-containing effects, given that there is currently no link between the legal retirement age and life expectancy.

Early and statutory legal retirement ages should be indexed to life expectancy, which will increase by about 6 years for men and 5 years for women over 2024-70 (IGSS, 2024). A number of countries, including Finland, the Netherlands, Portugal and Sweden, have introduced a partial link between the legal retirement age and life expectancy to keep the proportions of length of careers and time spent in retirement roughly constant. Typically, this means increasing the legal retirement age by 8 months when life expectancy increases by one year, since the proportion of adult life spent in retirement is about one-third. However, reflecting Luxembourg's low effective retirement age, the average contributory period is currently the lowest in the European Union (European Commission, 2024) and the proportion of adult life spent in retirement around 43%, well above one-third (IGSS, 2024). To increase the very low retirement age, partial indexation of the legal retirement age to life expectancy could be preceded by a one-off set of increases in legal retirement ages to bring the proportion of adult life spent in retirement closer in line with other economies. This would put a larger burden of the costs of pension reform on current rather than future workers than indexation alone. Alternatively, if a political agreement on a one-off increase in legal retirement ages cannot be reached, the authorities should introduce full indexation of legal retirement ages to life expectancy, as is, for instance, the case in Denmark, Estonia, Greece and Italy. This would contain pension expenditure by about 2% of GDP by 2070, about one-sixth of the expenditure pressure arising from the decline in the support ratio (IGSS, 2024).

Shortening the transition period of the 2012 reform would further strengthen incentives for working longer. The 2012 reform foresees a gradual reduction in the income-proportional part of old-age pensions while increasing the part proportional to length of careers. The reform also increases the bonus for long careers, which means that when

the sum of age and length of career is beyond a minimum threshold, each year of contribution will receive a higher value in the calculation of the replacement rate. Cross-country studies suggest that financial incentives to work longer have a significant impact on peoples' choices to remain in the labour force (Boersch-Supan and Coile, 2023). Shortening the transition period of the 2052 reform, for instance by phasing it in by 2037, would strengthen incentives for workers to continue working rather than retiring early, limiting the decline in the support ratio over the next two decades.

Gradual increases in the legal retirement age and stronger financial incentives for continued work beyond the early retirement age should be complemented with measures to improve the employability of older workers and to encourage employers to hire and retain them. Better employment opportunities will ensure that older workers remain in quality jobs rather than becoming unemployed when the legal retirement age is raised. Improving the employability of older workers by preventing skill obsolescence and maintaining good health will require strengthening life-long learning; recognising skills acquired throughout working lives; and improving working conditions at all ages (OECD, 2019). There is also a need to provide training and upskilling programmes tailored to older workers, including to narrow the age gap in digital skills. Employers could be encouraged to hire and retain workers by addressing discrimination on the basis of age, including by enforcing legislation to prevent age discrimination, and ensuring that age is not a criterion in determining the level of employment protection. Good practices to manage an age-diverse workforce could be promoted, for instance by networking and mentorship programmes that facilitate opportunities for older workers to mentor younger employees, leveraging their experience and expertise while fostering intergenerational collaboration. Providing flexible schedules and more opportunities for remote work would allow adjusting work requirements to older workers' changing capacities.

2.3.4. Adjusting benefit levels

The sustainability of the pension system could be improved by adjusting benefit levels, reducing the need to raise contributions or the legal retirement age. Shortening the transition period to the new rules for calculation of pension benefits foreseen by the 2012 pension reform by 15 years (from 2052 to 2037) would postpone the date at which the pension reserve fund reaches its legal limit. The accelerated transition to the new pension parameters would not reduce expenditure pressure in the long term, but the slower drawdown of the assets in the pension reserve fund and the associated financial returns would nonetheless allow to limit the required increases in the steady-state pension contribution.

Given high levels of benefits relative to the income of workers, pensions in payment should be indexed to inflation rather than nominal wage growth. According to current rules, the indexing of pensions in payment to nominal wage growth will be suspended when pension contributions fall below expenditure, which is projected to be the case from around 2028. However, according to the 2012 pension reform, the authorities will be able to partially index pensions in payment to real wage growth on top of inflation. Most OECD countries currently index pensions in payment to inflation, without any adjustment for real wage growth (OECD, 2023). France and Italy, for instance, switched from nominal wage indexation to inflation indexation as early as the 1990s. These changes would reduce the overall value of pensions, particularly for those living for longer periods, but the effects would be mitigated by the high initial value of pensions.

Pensions spending could also be curtailed by reducing the cap on pension benefits, which would reduce expenditure without adverse social impacts. Currently, pension contributions are capped at five times the minimum wage, which is mirrored by a roughly equivalent cap on pension benefits (Table 2.1). Reducing maximum pensions while maintaining the cap on contributions at the current level would reduce net pension expenditure, while putting a larger burden of adjustment on the highest-income workers who are best able to absorb them and engage in private pension saving.

To help relieve long-term expenditure pressures, the authorities could consider also applying a sustainability factor in the indexation of pensions in payment drawing on the one introduced in Germany in 2004. The German indexation formula contains an element that reduces the indexation of pensions when the pensioners-to-contributors ratio – the inverse of the support ratio – increases (OECD, 2021). In practice, under the current formula, when the pensioners-to-contributors ratio increases by 1% – which roughly implies an increase of 1% in pension expenditure relative to contributions – the indexation is reduced by 0.25 percentage points. This means that about one-quarter of increased expenditure pressure from demographic changes is borne by current pensioners while

three-quarters are borne by current and future cohorts of workers. . Introducing a sustainability factor would have the advantage that reductions in benefits would only kick in once demographic changes become effective, reducing the reliance of current adjustments in pension calculation parameters on projections of future demographic developments. The extent of the reduction in the indexation of pensions in response to increases in the pensioners-to-contributors ratio would have to account for the overall financial sustainability of the pension system and inter-generational fairness. The burden borne by current pensioners would increase with the strength of the link between the pensioners-to-contributors ratio and reduced indexation, which may require protecting low pensions by setting a floor below which pensions cannot fall in real terms.

2.4. Ensuring the sustainability of the pension system: Recommendations

MAIN FINDINGS	RECOMMENDATIONS
The public pension system boasts low legal retirement ages and high benefits but, at current contribution rates, will become unsustainable in the long run despite large pension reserves.	Extend the horizon of the periodic pension reviews from 10 years to 50 years to ensure the long-term sustainability of the system.
The semi-automatic adjustment mechanisms of the 2012 pension reform will be insufficient to prevent large increases in pension contributions from the early 2040s.	Phase in a stable contribution rate by 2030 that balances the pension system over the horizon of the pension review, while protecting low-wage workers.
The effective retirement age is the lowest in the OECD, mainly reflecting generous eligibility criteria for early retirement. Legal retirement ages are not linked to life expectancy.	Exclude periods of education from the calculation of total insurance years. Raise early and statutory retirement ages to match gains in life expectancy.
High pension benefits will lead to a rapid drawdown of assets in the pension reserve fund over the next 15 years, despite the reduction of replacement rates foreseen by the 2012 pension reform.	Bring forward from 2052 to 2037 the phase-in of the replacement rates of the 2012 reform. Switch from nominal wage indexation of pensions in payment to inflation indexation.

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3 Managing the green transition

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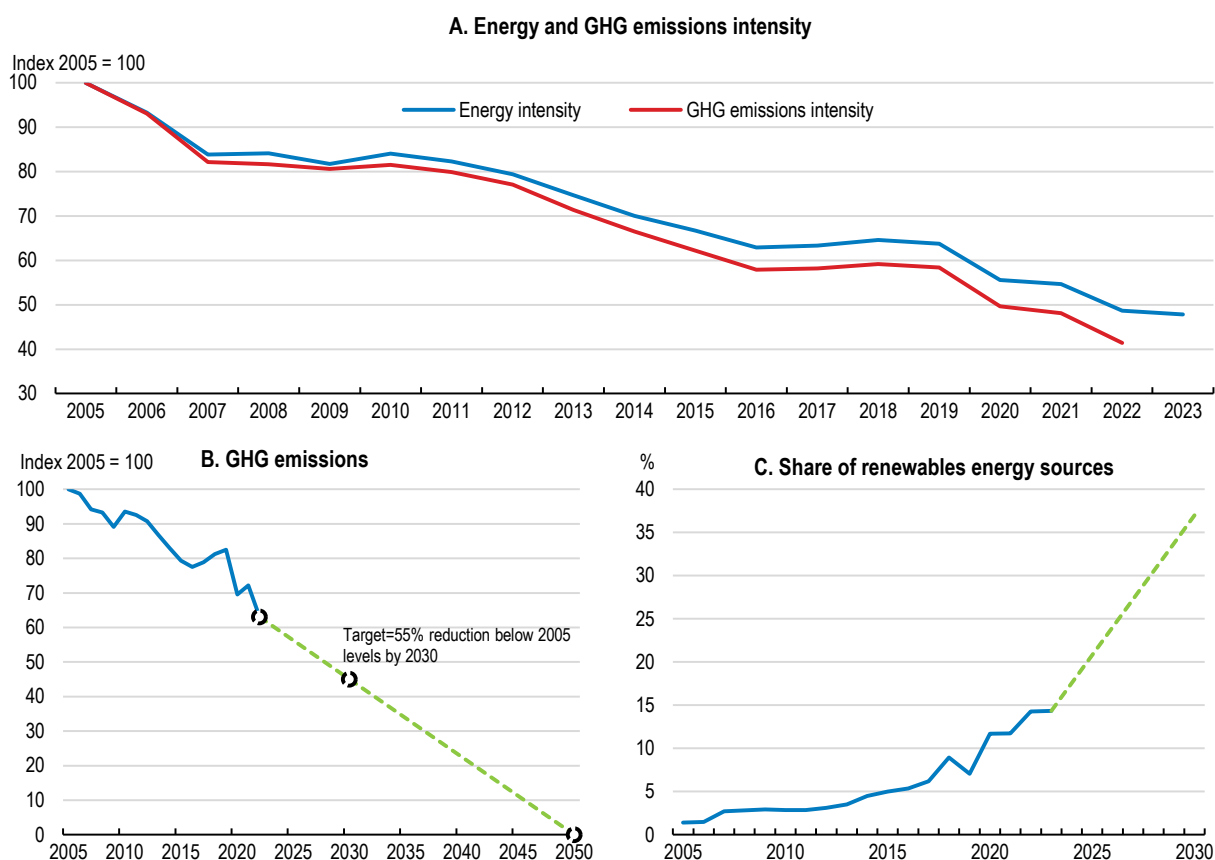
Luxembourg has made substantial progress in decoupling greenhouse gas emissions from economic activity. However, further efforts are needed to reduce emissions in sectors not covered by the EU Emissions Trading System by 55% by 2030 and to achieve net zero emissions by 2050. While policies need to continue to support the transition across a range of areas, the transport sector, which accounts for more than 60% of total emissions, is key. The use of public transport and alternative sustainable commuting options should continue to be promoted by increasing capacity, expanding the network and reserving road lanes for buses and carpooling. Setting a forward-looking trajectory for fuel taxes to bring prices more in line with those of neighbouring countries would reduce reliance on combustion engine cars and curb fuel tourism. Subsidies for the purchase of an electric vehicle should be phased out and made conditional on the sale or scrappage of a car with an internal combustion engine.

3.1. Luxembourg has reduced emissions, but further efforts are needed to meet climate targets

The climate law adopted on 15 December 2020 sets out Luxembourg's climate goals, with achieving zero net emission by 2050 as the long-term objective. The medium-term objective is to reduce greenhouse gas (GHG) emissions in sectors not covered by the European Union's Emissions Trading Scheme (EU ETS) by 55% by 2030 (relative to the 2005 level). Luxembourg's integrated national energy and climate plan (NECP) for the period 2021-2030 complements the climate law by adding two further intermediate objectives to be achieved by 2030: reaching a 37% share of renewable energy in gross final energy consumption and a significant reduction of final energy demand (42% compared to the EU PRIMES 2007 model baseline scenario).

Luxembourg has made significant progress towards the achievement of these objectives. First, the energy intensity of the economy (measured as total energy supply per unit of real GDP) has declined by around 52% over the past two decades (Figure 3.1, Panel A). Second, GHG emissions have decoupled from GDP growth, with the GHG intensity of GDP (measured as GHG emissions per unit of real GDP) declining by around 57% since 2005 (Figure 3.1, Panel A). Third, in 2022 total GHG emissions have been reduced by around 35% in comparison with 2005 levels (Figure 3.1, Panel B). Fourth, the share of energy produced by renewable sources in final energy consumption has grown significantly, from around 2% in 2005 to around 12% in 2023 (Figure 3.1, Panel C). Counting additional statistical transfers, the share rises to around 14% in 2023 Box 3.1.

Figure 3.1. Luxembourg has been making progress in reducing emissions



Notes: In Panel A, the energy intensity of the economy is originally measured as total energy supply over real GDP (originally TJ/thousand 2015 EUR); while GHG emissions per real GDP is originally expressed in tCO₂e/kEUR/yr. Panel B shows the total GHG emissions for Luxembourg, expressed in Mt CO₂e/yr. Panel C shows the total share of energy consumed that comes from modern renewables sources (solar, wind, hydropower, biofuels, excluding traditional uses of biomass).

Source: [OECD Green Growth database](#); and [Eurostat](#).

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Luxembourg has a number of unusual characteristics that affect how GHG emissions are accounted for. The Grand Duchy imports most of its electricity supply and this means that emissions due to the production of electricity that is consumed in Luxembourg are accounted for elsewhere, bringing the emissions from electricity production as low as 3% of total emissions (Box 3.1). At the same time, the emissions produced by the road fuels consumed in neighbouring countries by cross-border commuters, freight vehicles and fuel tourists that come to Luxembourg to fill their tanks are entirely accounted for in Luxembourg. These peculiarities distort the relative importance of different sectors in terms of GHG emissions. As a result, policy needs to be mindful both of measured progress against targets, but also contributing to real progress in reducing overall emissions, whether counted in Luxembourg or not.

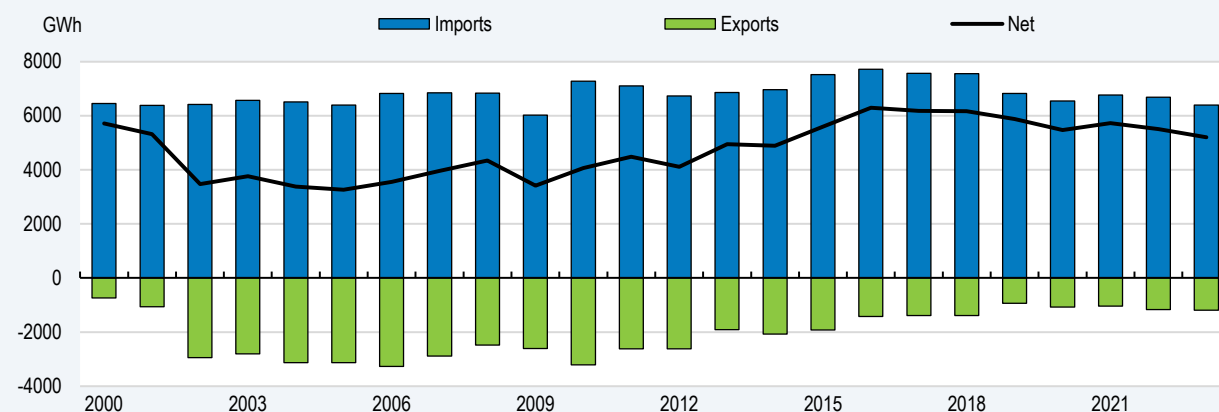
Luxembourg imports almost all its energy, including electricity from its neighbours. In 2022, imports of natural gas from Belgium replaced imports from Russia, with most energy imports now coming from European partners, limiting the risk that geopolitical tensions directly disrupt energy supply. Pursuing the decarbonisation of the transport sector will strengthen energy security by reducing the reliance on imported oil products. Enhancing the electricity transmission grid; allowing for an efficient and increasing integration of renewable energy generation into the power grid in cooperation with neighbouring countries and ensuring import capacity is expanded in line with increasing electricity demand are key to ensuring reliable energy supplies.

Box 3.1. Electricity supply in Luxembourg

Luxembourg has no large-scale electricity power plants within its borders and relies on imports from neighbouring countries. In 2022, net electricity imports (imports minus exports of electricity) reached 89.9% of the total electricity supply (Figure 3.2, Panel A). This means that the share of power generation in total energy-related CO₂ emissions from production is very low, around 3% compared to a typical share of around 40% (IEA, 2024), despite per capita electricity consumption being higher than the EU and OECD averages. Electricity imports mainly come from Germany (2546 GWh in 2023), Belgium (2211 GWh in 2023) and France (107 GWh in 2023).

Figure 3.2. Electricity generation

Net electricity imports



Source: Eurostat.

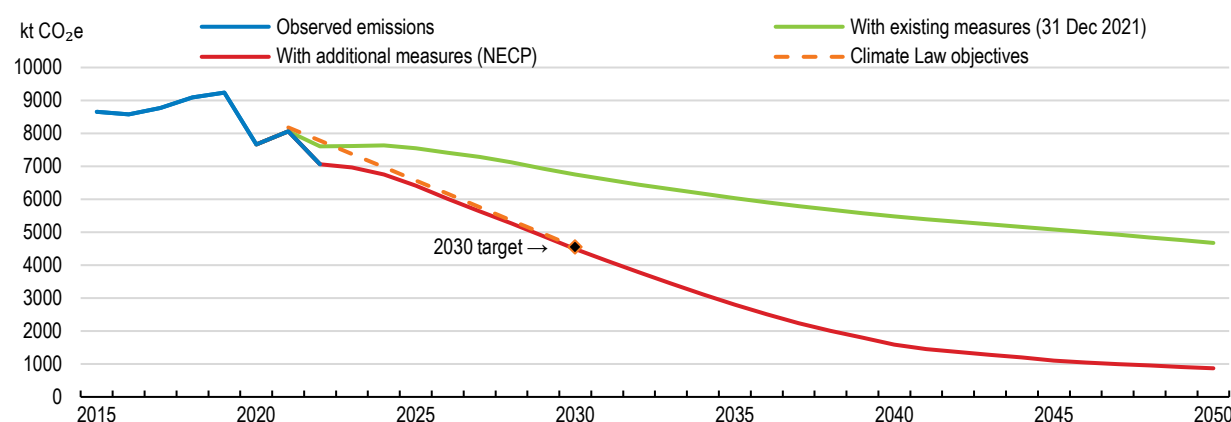
StatLink  <https://stat.link/ivy2fu>

The main sources of domestic electricity generation are photovoltaics, bioenergy and wind. The aim is to increase renewable sources to enhance Luxembourg's national contribution to the EU Member States' collective endeavour to achieve the EU-wide target of a 45% share of total energy production generated by renewables. To this end, given the limited amount of land in Luxembourg, it has undertaken the first-ever cross-border agreement to support renewable energy in the EU in the framework of the renewable energy financing mechanism (RENEWFM). Luxembourg will contribute EUR 27.5 million to Finland and it will receive 80% of the production generated by the project as a statistical transfer for a period of 15 years, which will count towards Luxembourg's targets for energy produced by renewables sources.

Despite the significant progress made so far, further efforts are needed to achieve Luxembourg's medium- and long-term objectives. The national energy and climate plan (NECP) contains around 200 measures, ranging from the full implementation of the national mobility plan 2035 to the simplification of the authorization procedures for new renewable-energy power plants or the improvements of electricity grids. If all these 200+ measures were to be fully and timely implemented, Luxembourg would achieve its overall climate objectives. However, first, failure to fully implement measures beyond those already legislated at the end of 2021 would risk the reductions of GHG emissions in sectors not covered by the EU ETS up to 2030 falling short of the 55% reduction target by around 20 percentage points, and also the objective of achieving net zero emissions by 2050 would not be attained (Figure 3.3). Second, even in the case the measures contained in the NECP were to be fully implemented and the overall objectives attained, some sectors would anyway fail to achieve their sectorial targets, as for example the residential sector (Box 3.2).

Figure 3.3. Full implementation of the National Energy and Climate Plan is needed to achieve 2030 and net zero objectives

Emissions reduction paths



Note: The scenario “With Existing Measures” (WEM) shapes the reduction path by taking into account only the policy measures adopted until the 31st of December 2021. The scenario “With Additional Measures” (WAM) models the emission reduction path under the hypothesis that all the measures contained in the NECP were to be fully and timely implemented. Before 2030, in line with the climate objective set in Luxembourg’s climate law, greenhouse gas (GHG) emissions do not include emissions from the European Union Emissions Trading Scheme (EU ETS) and emission from land use, land-use change and forestry (LULUCF), while after 2030 they are included in the total count of GHG emissions.

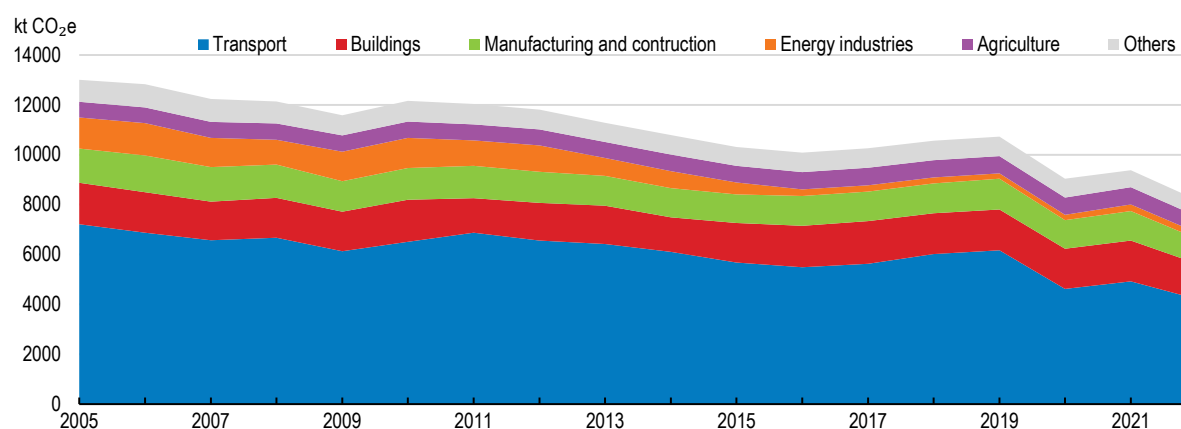
Source: [STATEC](https://statec.luxembourg).

StatLink  <https://stat.link/gl0x43>

Due also to its unusual characteristics, measured emissions in Luxembourg in recent years came mostly from three sectors: transport, residential and industry. Transport alone accounted for more than 60% of total emissions (Figure 3.4) and 51% of total measured energy demand. Industry accounted for around 12% of total emissions, which come primarily from burning fossil fuels to produce heat for industrial processes, such as making paper or steel. The plan laid out by the NECP to reduce emissions in the industry sector hinges on increasing energy efficiency of industrial processes and replacing fossil fuels with hydrogen and electricity.

Figure 3.4. Reducing emission from the transport sector is key to the green transition

CO₂e emissions by sector



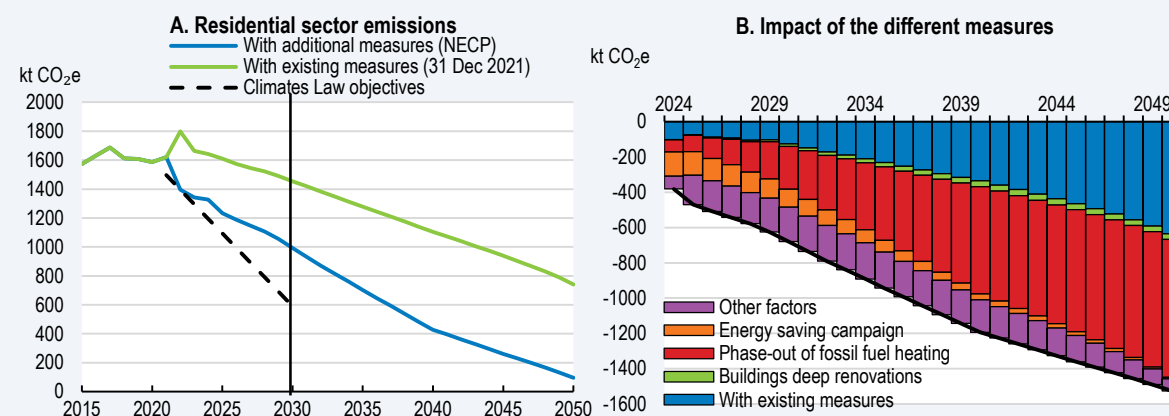
Source: Eurostat.

StatLink  <https://stat.link/9i2hk5>

In view of the key role in achieving Luxembourg's climate objectives, this chapter focuses on the transport sector, although challenges related to the housing sector also play an important role and are discussed in Box 3.2, while adaptation to climate change is discussed in the final section (Section 3.5). The chapter identifies three main avenues for policy action. Section 3.2 discusses how to further promote the use of public transport by increasing capacity, expanding the network and reducing congestion. Section 3.3 discusses policies to reduce the reliance on internal combustion engine (ICE) cars. This requires using carbon price instruments to raise fuel prices and bring them closer to neighbouring countries; disincentivising the use and purchase of polluting private cars and continuing to promote the electrification of the car fleet. Section 3.4 proposes ways to promote alternative sustainable means of transport, such as carpooling or cycling, by increasing their attractiveness, while further reducing that of privately-owned cars.

Box 3.2. Managing emissions from housing

Achieving the 2030 and 2050 climate targets in the housing sector, despite the expected continued growth of the population, will require additional efforts compared with measures contained in the NECP (Figure 3.5, Panel A). Phasing out of fossil fuel heating systems is the most important measure, while energy standards for new buildings, which since 2021 are among the highest in Europe with every new residential building required to be a Nearly Zero Energy Building (NZEB) (corresponding to AAA energy class), are going to increasingly contribute to reduce emissions as new buildings are constructed and the share of new buildings in the total building stock increases (Figure 3.5, Panel B). However, more than 50% of the current residential building stock in Luxembourg was built before 1970, implying that deep renovations of the existing building stock to improve energy efficiency still have a role to play.

Figure 3.5. Residential sector's trajectory towards climate objectives

Note: Panel A shows the CO₂ emissions of the residential sector in kt CO₂e, projecting their evolution according to 2 scenarios: With Existing Measures (WEM), takes into account all the policy measures implemented before the 31st of December 2021. With Additional Measures (WAM), plots the emissions in the case all the measures contained in the NECP were fully and timely implemented. Panel B disentangle the contribution of the different policy measures to the reduction as projected in the second scenario (WAM).

Source: [STATEC](https://statec.lu).

StatLink  <https://stat.link/4oem9r>

The authorities have put in place a structured plan (Klimabonus programme) of financial and non-financial incentives to encourage owners to undertake energy-saving renovations and phase out fossil fuel heating systems. Public incentives cover almost all kinds of interventions that can lead to an increase in energy efficiency, from the replacement of windows to insulation. The government also covers the cost of specialised consultants that visit the houses to help citizens assess the interventions with the highest potential and to guide them through the different existing financial incentives, together with a dedicated online simulator covering the different subsidy programmes. Financial incentives cover up to 50% of renovation costs for higher incomes, while the share could reach 100% for lower incomes.

However, the uptake of these subsidies and initiatives has been limited so far. One reason could be that owners are called to provide the financing upfront as the government's financial aid can take the form of tax breaks in the following years or a direct reimbursement, but only a few months after the renovation works have ended. This could discourage low- and mid-income owners, especially in a period of higher interest rates. While the government pledged to introduce in 2025 a "prefinancing option" that will help to partially finance the cost covered by the public subsidy, France's *Éco-prêt à taux zéro* (*éco-PTZ*) provides an example of an alternative and pragmatic policy option. The French system of incentives is quite similar in nature to that of Luxembourg, but thanks to the possibility of obtaining an interest-free loan, it features the possibility to avoid making upfront payments (France, 2024).

On top of financial incentives for energy efficiency-enhancing renovations, the authorities should consider stricter regulation on the replacement of heating installations in existing buildings to speed up the phase-out of fossil fuel-based heating systems. Replacement should be allowed exclusively with systems above a minimum threshold of renewable energy.

3.2. Transitioning from private to public transport

Encouraging greater use of public transport among residents and cross-border workers is key to reduce emissions in the transport sector and road congestion. Since March 2020, the government of Luxembourg has made public transport across the country, including both intra- and inter-urban buses, tram and trains (except first class), completely free of charge, for both residents and visitors alike. This measure goes in the right direction, but there is little evidence as yet that this measure has reduced the number of cars on the road, also considering that public transport was not expensive before in Luxembourg (EU Urban Mobility Observatory, 2022). To be more effective,

this measure needs to be coupled with others aimed at improving users' experience and make public transport a preferable alternative, as many passengers are discouraged by long waiting times, inadequate frequency and information, and overcrowded carriages, especially at peak times.

Expanding the public transport network and increasing its frequency and reliability is essential to attract commuters. The *Plan national de mobilité 2035*, introduced in 2022, foresees the expansion of the railway infrastructure through various projects, some of them still at an early stage of development, for a total investment of up to 1.7% of GDP between 2023 and 2027, maintaining roughly the same level of investment in public transport infrastructure as a share of GDP as between 2021 and 2024. The adaptation of the Luxembourg City main train station to better handle the new network is envisaged as well, together with the progressive introduction of 34 new railcars. The tram network in Luxembourg City will be extended as well, reaching strategic points like the airport, and longer tram trains will be introduced to reduce congestion of carriages, in conjunction with the needed supporting infrastructure. The infrastructure investments outlined in the *Plan national de la mobilité* should help to green the transport system, but it is important to ensure rigorous cost-benefit analysis is applied across the whole of public investment to ensure maximum effectiveness of public spending. Together with the expansion of the public transport network, integrating land-use and transport planning would allow to enhance the effectiveness of public transport by ensuring proximity of businesses and new, higher residential buildings to public transport network.

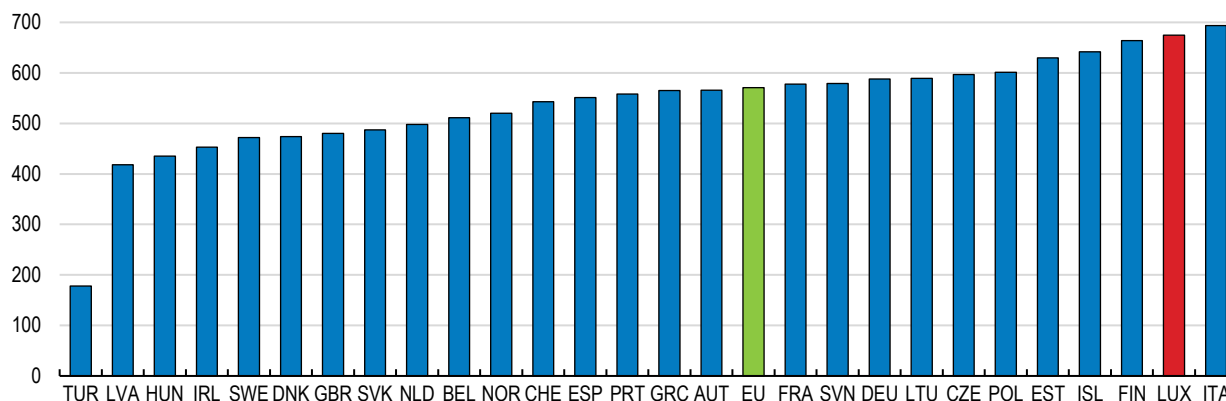
Increasing frequency and capacity of public transport should be coupled with complementary measures aimed at reducing congestion. This would allow to avoid inefficiency, with means of transport that are almost empty outside rush hours. Applying differentiated fares to better distribute travel demand over time and reduce congestion at peak times, as many cities in OECD countries have done, does not constitute a feasible or recommendable option, as Luxembourg has made all public transport free of charge since 2020, increasing its absolute and relative convenience. However, other solutions like staggered or flexible school and working hours, that have proved to be effective in reducing demand in peak times, might be applied (Eriksson et al., 2023). While imposing them to private businesses or schools might be cumbersome, applying them to public administrations and public schools would already have a concrete impact in Luxembourg, as the vast majority of pupils is enrolled in public schools and public administration accounts for more than one fifth of total employment.

3.3. Curbing the reliance on internal combustion engine cars

Car ownership in Luxembourg is very high (Figure 3.6) and car transport is the preferred way of commuting. While Luxembourg is the EU country with the highest share of passenger cars that are younger than 2 years, it is also one of the few EU countries in which the share of small petrol engines is lower than the share of the medium- and large-sized ones, with the average weight of newly registered cars that has increased by 15% in the last 20 years (Eurostat, 2024). Moreover, more than 80% of the cross-border workers rely on private cars to commute, contributing to making cars responsible for almost the 70% of the total energy consumption of the entire transport sector (Odyssee-Mure, 2022). Reducing the reliance on cars, especially internal combustion engine (ICE) vehicles, as well as switching towards public transport, alternative sustainable commuting options or more energy-efficient vehicles, is therefore key to reduce emissions in the transport sector.

Figure 3.6. Car ownership is high

2023



Note: The figure shows the number of passenger cars per 1000 inhabitants, where passenger car are road motor vehicles, other than a moped or a motorcycle, intended for the carriage of passengers and designed to seat no more than nine persons (including the driver).

Source: [Eurostat](https://ec.europa.eu/eurostat).

StatLink  <https://stat.link/3680ce>

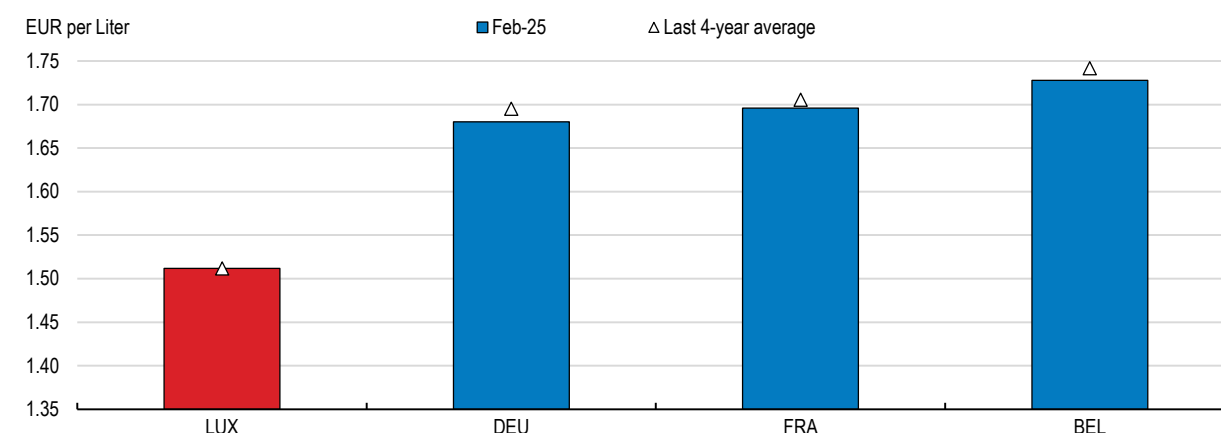
3.3.1. Bringing fuel prices closer to neighbouring countries through carbon price instruments

Fuel excise taxes are the main implicit form of carbon pricing used in Luxembourg, while emission permits through the EU ETS and national carbon taxes are the explicit carbon price tools. ETS and the national carbon tax together covered 88.9% of GHG emissions in 2021. The EU ETS applies to GHG emissions from companies and firms (large emitters) operating in electricity and heat generation, energy intensive industry sectors, aviation, and maritime transport. The unusual structure of GHG emissions in Luxembourg, where road transport (which is currently not included in the EU ETS) is the sector with the highest GHG emissions, makes the proportion of emissions covered by the EU ETS relatively low in Luxembourg, at 16.4% in 2019 against an average of 36.1% in the neighbouring countries. However, 75% of GHG emissions are covered by the national carbon tax, a share that is higher than in other EU-OECD countries.

When the national carbon tax was introduced in 2021, the carbon price was set at EUR 20 per tonne of CO₂, based on the average value of carbon pricing in neighbouring countries. An annual increase of EUR 5 per tonne of CO₂ was foreseen and applied, bringing the price of carbon to EUR 35 per tonne of CO₂ in 2024. The annual increase is set to be implemented each year until 2027, bringing the carbon price to EUR 50 per tonne of CO₂ in 2027. 2027 has been selected as the endpoint of the rising carbon tax trajectory because in 2027 the EU will introduce the new ETS2, which will expand the existing emission trading scheme to fuel combustion in buildings and road transport. However, EU legislation gives member states with a national carbon tax the option to decide whether they want to keep their domestic carbon tax instead of using the ETS2. Luxembourg has informed the European Commission that it might opt for a temporary derogation and join the ETS2 at a later date, continuing to apply its national carbon tax in the meantime. However, a final decision has not yet been taken.

Even though fuel prices for professional use have recently been close to (and sometimes above) those of Belgium and France, fuel prices for final consumers have historically been lower in Luxembourg than in neighbouring countries due to lower overall taxation (Figure 3.7). This has resulted in motor fuel sales per capita that have been much higher than in any other OECD countries, with most of the fuel (almost 75%) being sold to non-resident drivers filling their tanks in Luxembourg (OECD, 2020). The introduction of the ETS2, with the European Commission that will set the reference carbon price may result in an increase in final consumers' fuel prices in neighbouring countries and thus widen the price differential with Luxembourg.

Figure 3.7. Final gasoline price

Source: CEIC [data](#).StatLink <https://stat.link/6wc18h>

In view of this, and in line with policy recommendations of previous Economic Surveys (Table 3.1) and the commitments in the NECP, Luxembourg should establish a clear, forward-looking path for fuel taxes that goes well beyond 2027, aiming to bring final fuel prices more in line with those of neighbouring countries. This means that continued increases of EUR 5 per annum in the national carbon tax would constitute only a minimum, with the government standing ready to use the implicit and explicit carbon price instruments at its disposal to ensure that the price gap with neighbouring countries gradually closes, regardless of whether and when Luxembourg joins the ETS2.

Table 3.1. Past OECD recommendations on the transition to green growth

RECOMMENDATION	ACTION TAKEN
Improving resilience through the transition to green growth	
Introduce scenario and sensitivity analysis to estimate the long-term cost of the green transition, including the impact on different households and firms.	The National Climate and Energy Plan (PNEC) contains an estimation of the economic impacts of the different measures and the overall impact of the green transition has been recently assessed by STATEC. The cost of the green transition is also regularly estimated by the IGF in its annual draft budget and in its multi-annual financial programming.
Set a rising carbon tax trajectory over the medium and long term, while redistributing revenues to minimise the burden on the most vulnerable.	Since 2021, fossil fuels are subject to the CO ₂ tax, which amounts to EUR 35/tCO ₂ in 2024 that will increase annually by EUR 5/tCO ₂ to reach a level of EUR 45/tCO ₂ in 2026.
Introduce and gradually increase road use charges in conjunction with tighter parking policies. Use tax credits and municipal funding incentives to encourage higher urban density, with green homes built in accordance with the Master Programme for Spatial Planning.	The Raum+ instrument identifies priority areas for densification and ongoing coordination among sector policies
Strengthen regulations on fertiliser and pesticide use. Make national agricultural subsidies contingent on the adoption of sustainable farming practices that protect the environment	The National Action Plan for the Reduction of Plant Protection Products provides for several objectives for the reduction of the use of pesticides. The national focus on reducing emissions from livestock (NEC targets) led to the introduction of new measures supporting the reduction of livestock numbers and encouraging rapid manure incorporation.

Increasing carbon prices through both implicit and explicit tools would reduce distance traveled with internal combustion engine (ICE) vehicles, curb incentives for foreign residents to refuel in Luxembourg, and encourage the use of more energy efficient vehicles or alternative means of transport, reducing both measured and actual emissions, as the price elasticities of both residents and cross-border fuel tourists are estimated to be negative. The price elasticity of fuel sales for residents is estimated to be around -0.4 (STATEC, 2020). This means that increasing the price of motor fuels would effectively reduce consumption among residents, although substantially curbing the

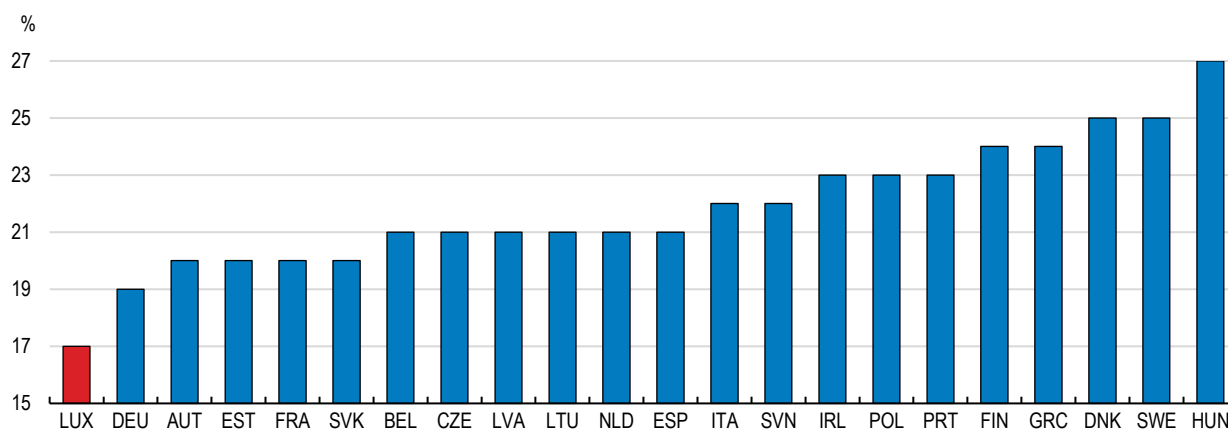
demand will also require complementary policy measures. Increasing carbon prices to bring fuel prices in Luxembourg closer to those of neighbouring countries would be even more effective to discourage fuel tourism, as the price elasticity for cross-border residents is estimated to be below -1 and become more negative in a non-linear way as the price differential with neighbouring countries diminishes (STATEC, 2020).

While a lower demand from cross-border commuters and fuel tourists would substantially decrease GHG emissions in the transport sector, it would have a negative impact on government revenues. The negative net impact is difficult to gauge as it depends on the dynamics of relative prices, but it is expected to be around EUR 60 million in 2026, above EUR 150 million in 2030, for a cumulated negative impact of around EUR 650 million (around 0.8% of GDP) up to 2030 (STATEC, 2023). However, Luxembourg's government revenues from fuel sales will in any case be negatively impacted by the gradual shift towards electric vehicles and so will need to be managed in any case.

3.3.2. Further disincentivising the purchase and use of polluting cars

Increases in fuel taxes should be complemented by measures that encourage a shift towards other commuting options or lower emission vehicles. The tax regime with regard to private cars should be made less favorable. Luxembourg's standard VAT rate of 17% applies to vehicles as well, making Luxembourg the EU country with the lowest VAT rate on the purchase of new vehicles (Figure 3.8). It has no additional tax on luxury vehicles, and registration tax is low and without any linkage to the type of vehicle purchased, making the fiscal burden difference between electric vehicles (EV) and internal combustion engine vehicles one of the lowest in Europe (Danielis, 2023). Moreover, while the formula to calculate the annual road vehicle tax takes into account the CO₂ emissions of the vehicles, the overall level of this tax is lower than in other EU countries.

Figure 3.8. VAT rates on new vehicles



Source: [ACEA - European Automobile Manufacturers' Association](#).

StatLink  <https://stat.link/3178g5>

Increasing the annual road vehicle tax and the registration tax, while strengthening the link with emissions, would help to weaken the strong car-oriented mobility culture and reduce emissions. Denmark provides a good example of a tax system that is engineered to discourage the purchase of new vehicles in a country that has a low but increasing car ownership. First, VAT rate in Denmark is 25%. Second, for each vehicle, the registration rate is progressive on its price, with a rate of 25% on the first DKK 70200 (around EUR 10000), then a rate of 85% is applied on the price up from DKK 70200 to 218100 (around EUR 30000), and finally the rate applied on the residual part of the price is 150%. Third, the CO₂ annual tax is not only calculated on the basis of the number of grammes of CO₂ emitted by the vehicle per kilometre, but it also foresees an additional surcharge for most polluting (diesel) vehicles.

Company cars also play a role, and the government has recently revised the company car benefit scheme. The monthly value of taxable benefit in kind to be recorded on the employer's payroll is determined by multiplying the purchase value of the new vehicle by a percentage rate. With the latest revision, to be applied on newly registered company vehicles from 1 January 2025 onwards, the rate scheme is simplified and depends on the type of engine and CO₂ emissions. A 1% rate is set for pure electric cars with an electric energy consumption of up to 18

kWh/100km and for hydrogen fuel cell vehicles, a rate of 1,2% for all other pure electric cars, while a 2% rate is set for ICE vehicles, including all hybrid and plug-in hybrid engines with a combustion engine.

While this is meant to encourage employees to opt for a company car with zero CO₂ emissions, the difference in rates is too small to be effective and further and bolder steps are needed. First, rates should be much higher for ICE vehicles to effectively disincentivise the choice of an ICE vehicle as company car. The UK provide a good example, with the rate for more polluting diesel vehicles reaching up to 37%, thus creating a differential in the amount of tax paid in comparison with electric vehicles that is more substantial. Second, the advantage-in-kind system should be shaped to favour alternative mobility options. Belgium's "Mobility budget" offers a concrete example of good practice: this allows employees to choose how to allocate the budget destined to their company car between different alternatives, with the options containing the reimbursement of the costs of public transport or alternative mobility (such as cycling) being the only one completely exempt from taxes and social security (Belgium, 2024).

Empirical evidence suggests that road pricing provides a further effective way to manage road congestion and disincentivise the use of private cars (ITF OECD, 2018). However, highways in Luxembourg are toll-free for private cars, as only heavy good vehicles and trucks are subject to a Euro vignette system. A positive price should be imposed for private vehicles using motorways in order to reduce congestion, with the revenues contributing to finance the building and maintenance of transport infrastructure. This might be coupled with the application of a congestion charge to enter Luxembourg City, as Stockholm has done since 2006 and the city of London since 2003. The evidence suggests that congestion charging schemes have helped in reducing traffic, air pollution and emissions, and, depending on their design, shifting the composition of the car fleet towards electric vehicles (Isaksen and Johanes, 2021). The effectiveness of such policies is found to be magnified if these are applied together with measures aimed at enhancing public transport, as Luxembourg has been doing (Givoni, 2011). Developing distance-based charging could help and also provide a future revenue stream.

Parking policies have played a role in cities such as Munich, Berlin, Hamburg, Vienna, and Zurich in discouraging the use of private cars (Fonds Kirchberg, 2019). Measures such as rising hourly parking charges and parking fines, limiting the number of parking spaces available and the allowable parking time would further contribute to the effort of shifting preferences of commuters from private cars towards public transport. These more restrictive parking policies should not apply to electric vehicles, meaning they should be able to continue to enjoy low parking fees and long parking time, to further incentivise consumers to opt for low-emission cars. As many workers in Luxembourg rely on their cars to commute to their offices, norms on office car parking have a role to play as well. Following the examples of Amsterdam and London, as the effectiveness of public transport gradually increases, norms setting a minimum parking spots requirement for offices based on their floor area should be scrapped, while norms establishing maximum parking spots should be amended to lower these ceilings (Fonds Kirchberg, 2019).

3.3.3. Fostering the electrification of the car fleet

Electrification of the private and corporate car fleet will contribute to reduce private transport emissions. With a share of electric vehicles in total new registrations that was almost 16% in 2022, Luxembourg is performing better than the EU average (11.7%), a trend confirmed in the first 10 months of 2023. However, despite the generous subsidy, cars fueled by petrol and diesel still represent almost 90% of the overall fleet, making the target of 49% of the total fleet represented by EV in 2030 very challenging to attain.

Luxembourg has active subsidies for the purchase of new pure electric (or fuelled by hydrogen fuel cell) vehicles that are bought before 30 June 2026 and brought into service in Luxembourg at the latest on 30 June 2027 (while the subsidy for plug-in hybrid electric vehicles has ended and has not been renewed). The amount of the subsidy for the purchase of a new pure electric vehicle is negatively linked to the consumption of the car and has been reduced from EUR 8000 to EUR 6000 (without exceeding 50% of the purchase price excluding VAT) for passenger cars with an electrical energy consumption not exceeding 160 Wh/km, while it is set at EUR 3000 for cars whose energy consumption is between 161 Wh/km and 180 Wh/km. Pure electric vehicles whose energy consumption is higher than 180 Wh/km are no longer eligible for a purchase incentive (previously set at EUR 3000). Exceptions are in place only for households with three or more children, allowing them to receive a subsidy for a less energy-efficient pure electric vehicle. The subsidy amounts to EUR 1000 for pure electric motorcycles.

EV subsidies should continue to be gradually phased out as the market matures, and efforts should be focused on areas with higher returns. Untargeted EV subsidies are costly and regressive, as most electric car buyers are richer than the average household. Moreover, EVs are becoming more competitive, although the purchase's price remains above equivalent internal combustion engine cars. During the phase-out, EV subsidies should be made conditional to the scrappage or the sale of a dated and polluting internal combustion engine vehicle. This would minimise the risk of using the subsidy to just add new EVs to the existing car fleet, changing only marginally the fleet's composition and failing to reduce the use of ICE vehicles. Scrappage schemes applied in many European countries in the aftermath of the great financial crisis, such as those applied in Germany, France or Italy in 2009, have proved effective at increasing the scrappage rate (with an estimated 82% increase in scrappage due to the scheme) and so at updating the car fleet, reducing environmental pressures from private transportation (Marin et Zoboli, 2020). These schemes provided a subsidy to buy new, less polluting vehicles (EURO 4 or EURO 5 standards, with CO₂ emissions lower than 140 g/km), but making them conditional to the scrappage of more polluting and old vehicles (EURO 0, 1 and 2 older than 10 years).

Reliable charging infrastructure is a key enabler for EV adoption. Luxembourg launched in 2017 the campaign to install a network of public charging points for electric cars and plug-in hybrids, called "Chargy". In 2021, the Grand Duchy started the deployment of the new generation of super-fast charging stations, called "Super Chargy". Moreover, the government has introduced a subsidy, still active in 2024, that covers 50% of the VAT-exclusive cost of the purchase and installation of private charging stations. In 2022, the government introduced a subsidy scheme, still active in 2024, for companies that install charging infrastructures. This scheme covers 50% of the VAT-exclusive cost for publicly accessible infrastructures, while the share lowers to 30% for private infrastructures that will be used exclusively by the company itself and its employees. The subsidy is provided through a tender based regime on the basis of a competitive process, but for small projects presented by SMEs a simple request is sufficient to be eligible. All these measures have allowed Luxembourg to have today one of the best developed and more capillary charging infrastructure structures in Europe. However, to be able to reach the NECP's target of 49% of the total fleet represented by EV in 2030, it will be pivotal to continue to develop this infrastructure and the electricity network, as foreseen in the network development plans of the grid operators, to make sure the electricity supply is adequate to cover the increase in demand.

3.4. Encouraging the use of alternative and more sustainable forms of private transport

Encouraging the use of alternative and more sustainable forms of private transport is a needed complementary strategy to reduce the level of GHG emissions in the transport sector. Cycling has been actively promoted by the government, in accordance with the 2035 National Mobility Plan, especially as a solution for short distance commuting. Applied and foreseen measures aim at improving infrastructures, from cycling paths network (and its security) to parking spaces and enhancing bike sharing services. Since 2020 the government has also provided financial aid for bicycles and pedal-assist cycles that covered 50% of the cost excluding VAT, up to a maximum of EUR 600. Starting from October 2024, this subsidy will be reserved for people who belong to a household in receipt of the cost-of-living allowance or the energy allowance at the time of purchase of the bicycle, unless the bike is a cargo-bike. For the latter, the subsidy has been extended until 30 June 2026, is available to anyone and has a maximum ceiling of EUR 1000. The uptake of cycling as commuting option has indeed increased since the pandemic, but it started from a very low level and a further acceleration is needed (European Commission, 2020).

Carpooling, by reducing the number of automobiles needed by travellers, contributes to reduce energy consumption, GHG emissions and road congestion (Shaheen et al., 2018), especially in a country like Luxembourg where, at peak times, no fewer than 250,000 car seats travelling towards the city centre are empty. In 2019, Luxembourg adopted a package of measures to encourage carpooling, starting at the frontier and developed in collaboration with neighbouring countries. The creation of a free carpooling platform called "CoPilote", aimed at facilitated carpooling in Luxembourg and the Greater Region, is contributing to this. The platform allows the government to automatically reimburse the travel costs for the platform's users during periods of train infrastructure maintenance works or when air pollution is peaking, and provides the possibility for companies to

connect their employees in private "communities" and further incentivise them to use carpooling by reserving office parking spaces for CoPilot users.

The effectiveness of these measures would be magnified if these were coupled with infrastructure developments aimed at incentivising carpooling use. Dedicated one lane of the highways only to public buses and carpooling might prove very effective in encouraging their uptake, above all on roads heavily affected by congestion as the main motorways in Luxembourg are. The impact might even be broader, increasing carpooling uptake not only on these highways. If tolls or a congestion charge were to be applied, carpooling vehicles should be exempted.

In 2022, Luxembourg launched a national strategy to promote car sharing. Car sharing can contribute to emissions reductions in the Grand Duchy in different ways. First, considering the high number of private cars per inhabitant, it might be used to replace a second or a third car, and empirical evidence suggests this change in ownership pattern is usually coupled with less kilometres driven (Nijland et Van Meerkeek, 2017). Second, car sharing fleets are usually composed by vehicles that are smaller, newer, and less polluting than those of private fleets (Namazu and Dowlatabadi, 2015). Third, making the rental price of the vehicle conditional on its size, as some operators already do, might further help to select the appropriate vehicle for the task at hand, reducing inefficiency.

3.5. Adapting to climate change

While striving to limit the increase of global temperatures, climate adaptation is important to protect people and infrastructure and reduce their vulnerability to the current or expected impacts of climate change. Luxembourg is not particularly prone to natural catastrophes, nonetheless it has been facing a considerable economic impact of weather and climate-related extreme events (European Environment Agency, 2023).

Luxembourg's main climate hazard are storms and floods. While average annual precipitation has decreased from the 1960s, seasonal precipitation patterns have changed, rising in winter, with more rain and less snow. The average annual air temperature has increased from 8.3 degrees Celsius (between 1961-1991) to 9.8 (between 1991-2020). The cumulated effect of these changes has, first, increased the risk of floods and flash floods, which in turn might affect infrastructures, like the electricity infrastructures, as the flood in July 2021 demonstrated. While flood insurance is an optional extension of general home insurance policies and it is not mandatory, penetration is anyway around 50% of households. Beyond further reducing the insurance gap, risk mitigation should be pursued as well, including by avoiding new constructions in flood-prone areas and continuing to pursue improvements in river management.

Heat waves are the second main climate hazard for Luxembourg, as they risk becoming more frequent, with the number of days with heat waves expected to increase from 7.6 to more than 30 per year in the near future. These changes are affecting agriculture and forestry, with forests covering almost 1/3 of Luxembourg territory.

Luxembourg in 2018 updated its National Strategy for Adapting to Climate Change, which was adopted in 2011. This Strategy builds on a comprehensive assessment of potential climate impacts across various sectors. It encompasses 13 sectors, ranging from ecosystems to infrastructure, from crisis management to the economy, and entails a detailed action plan to achieve sectoral objectives derived from the climate risk analysis. This plan includes both the review of existing measures and the implementation of new ones where necessary. Moreover, the strategy suggests output or monitoring indicators to track progress effectively, in the attempt to ensure a systematic and accountable approach to climate adaptation efforts in Luxembourg.

While this approach is in line with that of other OECD countries, risk assessment could be further strengthened by better taking into account inter-dependencies among sectors and better considering supply chain and trade aspects, as well as the impacts on tourism which remain marginally addressed. In view of this, the next adaptation strategy, currently under discussion, could be further anchored in a thorough climate risk assessment.

The forthcoming adaptation strategy could also benefit from a more structured assessment of progress made thus far, ensuring that Luxembourg's adaptation efforts remain effective and adapted to evolving climate challenges. While the previous strategy included monitoring indicators, it did not outline precise and robust mechanisms for tracking and evaluating progress. France provides an example of good practices on this, establishing a mid-term evaluation.

Table 3.2. Policy Recommendations to enhance the green transition

MAIN FINDINGS	RECOMMENDATIONS (key in bold)
Promote the use of public transport and sustainable mobility solutions	
Public transport has been made free of charge, but capacity and the network fall short of demand.	Continue to develop public transport infrastructure, expanding the network, increasing frequency, and raising the capacity of carriages. Better link land planning with public transport development. Consider introducing staggered or flexible school and working hours.
Alternative and sustainable forms of mobility, like carpooling and cycling, have grown but need to be further encouraged	Reserve one lane of motorways for public buses and carpooling. Continue to enhance the cycling path network and bike parking capacity.
Reducing emissions from cars	
Fuel prices are lower than in neighbouring countries, encouraging fuel tourism and the use of combustion engine cars.	Set a clear, forward-looking trajectory for taxes on motor fuels that goes well beyond 2027 and brings the final fuel price more in line with that of neighbouring countries.
The tax regime for cars is too advantageous, with the lowest value added tax rate on new cars in Europe and a low registration tax.	Increase the registration tax for new cars and the annual road vehicle tax, while strengthening the link with emissions.
The company car benefit scheme is too generous, and the rate applied to ICE vehicles does not discourage employees from choosing them as company car.	Substantially reduce tax benefits for ICE company cars, gradually linking them to CO2 emissions and re-orienting them to sustainable mobility options.
No tolls are applied on cars on Luxembourg's motorways and no congestion charge is envisaged to enter Luxembourg city.	Impose a toll on vehicles using motorways (excluding carpooling vehicles) and introduce a congestion charge to enter Luxembourg city.
Combustion engine vehicles still constitute almost 90% of the car fleet.	Make EV purchase subsidies conditional on the sale or the scrapping of a high-emission vehicle and gradually phase them out.

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4 Reviving productivity growth

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Luxembourg's real GDP growth over the past 15 years has largely been driven by the increase in the workforce, especially in finance and business services, while labour productivity has stagnated. To sustainably raise living standards and ease pressures on infrastructure, housing and greenhouse gas emissions, Luxembourg needs to transition to a more broad-based growth model based on innovation and productivity growth. This requires reforms to improve the system of public innovation support, boost workforce skills and strengthen competition. Consolidating coordination of innovation support, making support more mission-oriented and further fostering public-private partnerships would help raise business R&D expenditure from very low levels. Workforce skills would be boosted by strengthening quality standards for training providers and raising the attractiveness of Luxembourg for highly-qualified non-EU nationals. Reducing entry barriers, especially in the services sector, and strengthening disclosure requirements for lobbyists would help to ensure that innovative start-ups can compete with incumbent businesses on an even footing.

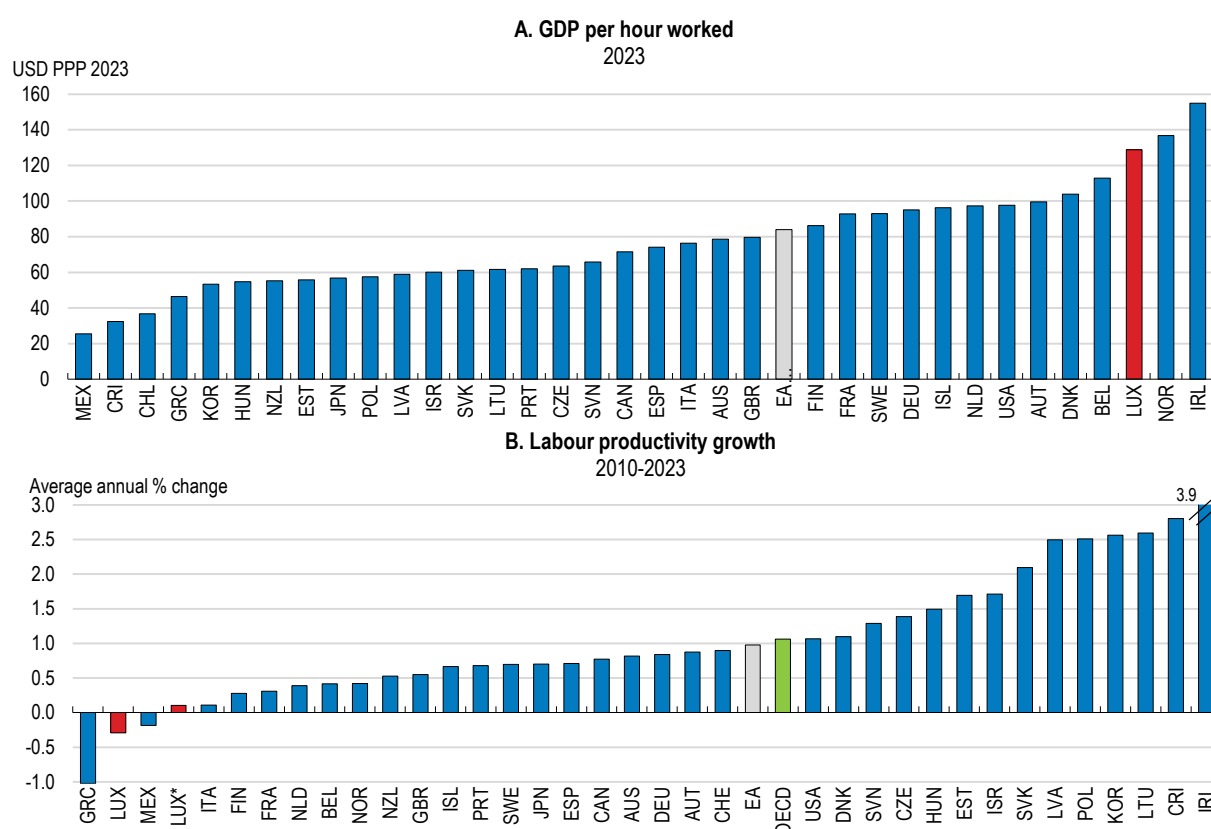
Over the past 15 years, Luxembourg's real GDP growth has been driven by finance and business services, drawing on cross-border workers and immigrants, but the country now faces the limits of this model. Labour productivity growth of the business sector, which is essential to sustainably raise living standards, has stagnated since 2010. The strategy of supporting growth mainly through a rapid increase in employment puts pressure on the housing market, creates strains on infrastructure and GHG emissions from road transport. At the same time, Luxembourg's financial sector – long a cornerstone of its economy – faces strong competition and its growth in terms of employment may be impacted by increased use of artificial intelligence and other trends, slowing both direct and indirect job creation.

This chapter discusses how Luxembourg could navigate these challenges and sustain its economic dynamism in the long term. Shifting to a more broad-based growth model rooted in innovation and productivity gains requires reforms in the areas of skills and innovation policies, as well as revising regulations that unduly reduce competition. Section 4.1 provides a brief overview of productivity developments over the past 15 years; section 4.2 analyses policies to strengthen innovation, especially in the business sector; section 4.3 discusses policies to address the issue of skills shortages through developing, attracting and retaining the skilled workforce needed to thrive amid rapid technological change; section 4.4 reviews avenues to reduce barriers to competition.

4.1. Productivity is high but has stagnated over the past 15 years

Measured labour productivity in Luxembourg is among the highest in the OECD (Figure 4.1, Panel A). A highly educated workforce; a favourable business environment in terms of regulation, taxes and infrastructure; the strategic location in the centre of Europe; as well as economic openness and political stability contributed to high productivity growth until the mid-1990s. However, labour productivity growth since 1995 has been among the lowest in the OECD (Figure 4.1, Panel B), suggesting that the pre-1990s growth model may no longer be able to deliver the rates of productivity growth experienced in the past. Accounting for issues with the measurement of labour productivity in the financial, real estate and non-profit sectors of the economy does not significantly change this assessment (Box 4.1).

Figure 4.1. Labour productivity is high, but growth has been sub-par



Note: The bars refer to total-economy labour productivity. Labour productivity growth in Panel B is measured as the growth rate of GDP per hour worked. In Panel B, LUX refers to total-economy labour productivity growth, while LUX* refers to Non agriculture business economy excluding real estate and financial services.

Source: OECD National accounts database.

StatLink  <https://stat.link/olvk4n>

Box 4.1. Issues with the measurement of labour productivity in Luxembourg

Total economy labour productivity is a standard internationally comparable measure of productivity based on the national accounts, but the unusual structure of Luxembourg's economy with an unusually high share of the financial sector makes it more difficult to interpret here. The OECD Productivity Database focusses on business sector productivity (excluding real estate), which reduces the reliance on imputed measures. However, financial sector value-added is also partly imputed. From a sectoral perspective, the key issues are the following:

- Financial sector:** In the system of national accounts, financial services output is measured as the sum of financial intermediation services indirectly measured (FISIM) and fees (for instance on account keeping, credit cards, brokerage, financial advice and asset management). While fees are directly observed, FISIM is estimated by first imputing a reference interest rate and then computing net interest income. The choice of the imputed reference rate can have a significant impact on FISIM. Moreover, estimating FISIM in volume terms – which is the relevant measure for productivity analysis – requires the estimation of prices that are not directly observed to deflate loans and deposits. Further issues include the exclusion of trading profits (for instance capital gains) and other interest (for instance on bonds and derivative products) from the measure of financial sector output in the national accounts.
- Real estate sector:** Apart from the revenue of real estate agencies, the output of the real estate sector in the system of national account includes rents of tenants and imputed rents of owner-occupiers,

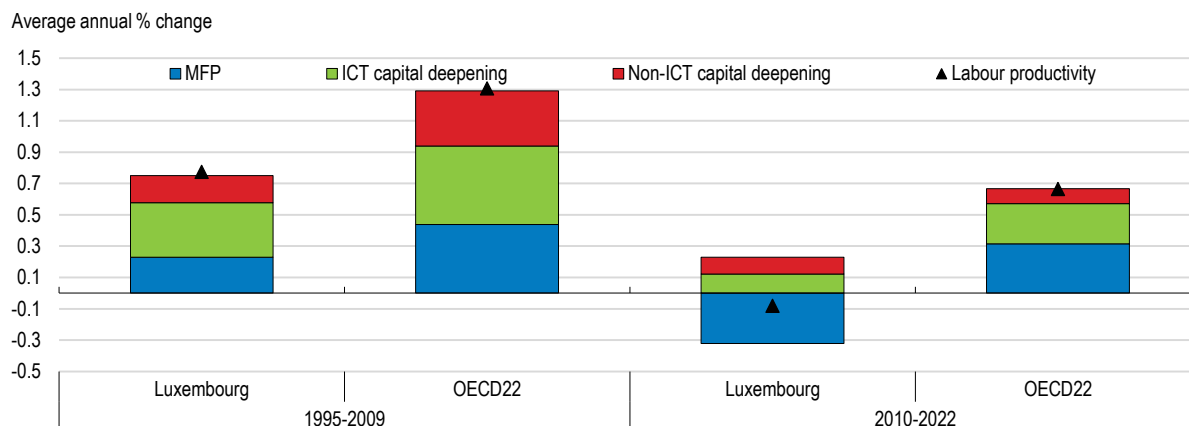
whereas the labour input of owners is excluded. This results in very high levels of labour productivity in the real estate sector, since the only input accounted for in value added calculations is the labour input of real estate agents. Fluctuations in rents or imputed rents, for instance due to changes in house prices, can lead to large fluctuations in labour.

- **Non-profit sector:** The output of the non-profit sector (mainly the public administration, education, health and activities of households as employers) is imputed based on the wage bill. This implies that, all else equal, increases in real wages are recorded as labour productivity gains.

Excluding these sectors from the calculation of labour productivity does not fundamentally change the result that productivity growth in Luxembourg has been among the lowest in the OECD over the past 15 years (Figure 4.1, Panel B). Given that differences in productivity growth between the total economy and the non-agricultural and non-financial business sector measures are small and a number of disaggregated productivity measures are available at the total economy level only – for instance regional disaggregations – the remainder of the chapter focuses on the total economy measure.

The slowdown in labour productivity growth has been driven by both declining multi-factor productivity and slowing capital deepening. The decline in multi-factor productivity – which encompasses skills and technological progress – has been particularly striking. While multi-factor productivity growth has slowed across a broad range of OECD countries over the past three decades, the growth rate in the average OECD country remained positive over 2010–22 (Figure 4.2). By contrast, in Luxembourg, multi-factor productivity growth has turned negative, declining by 0.3% annually on average between 2010 and 2022. Even though improvements in skills and technological progress become increasingly difficult to achieve when productivity is already high and economies are close to the technological frontier, declines in multi-factor productivity over several years are unusual. In fact, apart from Greece and Mexico, Luxembourg is the only OECD economy to report negative multifactor productivity growth over 2010–22. The slowdown in capital deepening has been somewhat less pronounced, but the contribution of capital deepening, especially ICT capital deepening, over 2010–22 is nonetheless lower than in other euro area economies.

Figure 4.2. Both multifactor productivity growth and capital deepening have slowed



Note: This refers the non-agricultural business economy excluding real estate and financial services.
Source: OECD Productivity Database.

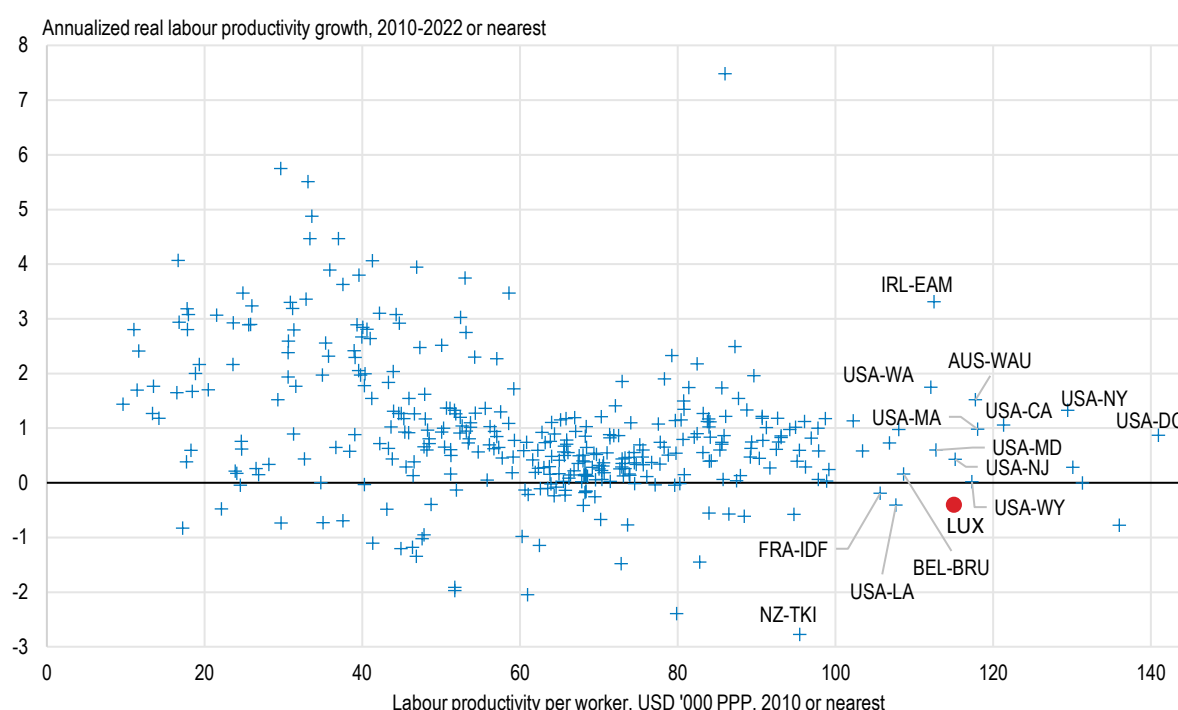
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While Luxembourg's high level of productivity makes any additional productivity gains more difficult to achieve, its productivity growth performance has been poorer than many similar high-income economies. Economies far below the technological frontier typically experience higher productivity growth than those at or close to the frontier (Ravikumar et al., 2024), as they can raise productivity by adopting technologies developed abroad, whereas economies close or at the technological frontier need to develop new technologies, requiring larger investments in research and development and a more highly-skilled workforce (Aghion et al., 2023).

Given Luxembourg's relatively small size, comparing its productivity growth performance to other regions with similar initial labour productivity appears to be more informative than comparing it to other countries. This comparison suggests that Luxembourg has underperformed other OECD regions with similar levels of initial labour productivity, which have in most cases experienced significantly higher labour productivity growth (Figure 4.3). This includes a number of high-income US states, such as California, Massachusetts and New York, that may benefit from larger economies of scale than Luxembourg due to their large size, and also a number of European regions, such as the Belgian capital region ("Brussels-Capital"), the French capital region ("Île-de-France") or the Irish Eastern and Midland regions. Despite being significantly larger than Luxembourg in terms of population and GDP being close to or at the technological frontier, these regions managed to reach productivity growth rates that are typical of regions at much lower levels of productivity and well above Luxembourg's.

Figure 4.3. Luxembourg's productivity growth is lower than in many other regions with high levels of initial productivity

GDP per worker, USD '000 PPP, NUTS2 regions



Note: selected regions labels are AUS-WAU Western Australia, BEL-BRU Brussels-Capital Region, FRA-IDF Île-de-France, IRL-EAM Eastern and Midland, NZ-TKI Taranaki, USA-DC District of Columbia, USA-NY New York, USA-CA California, USA-WY Wyoming, USA-NJ New Jersey, USA-MA Massachusetts, USA-WA Washington, USA-MD Maryland, USA-LA Louisiana.

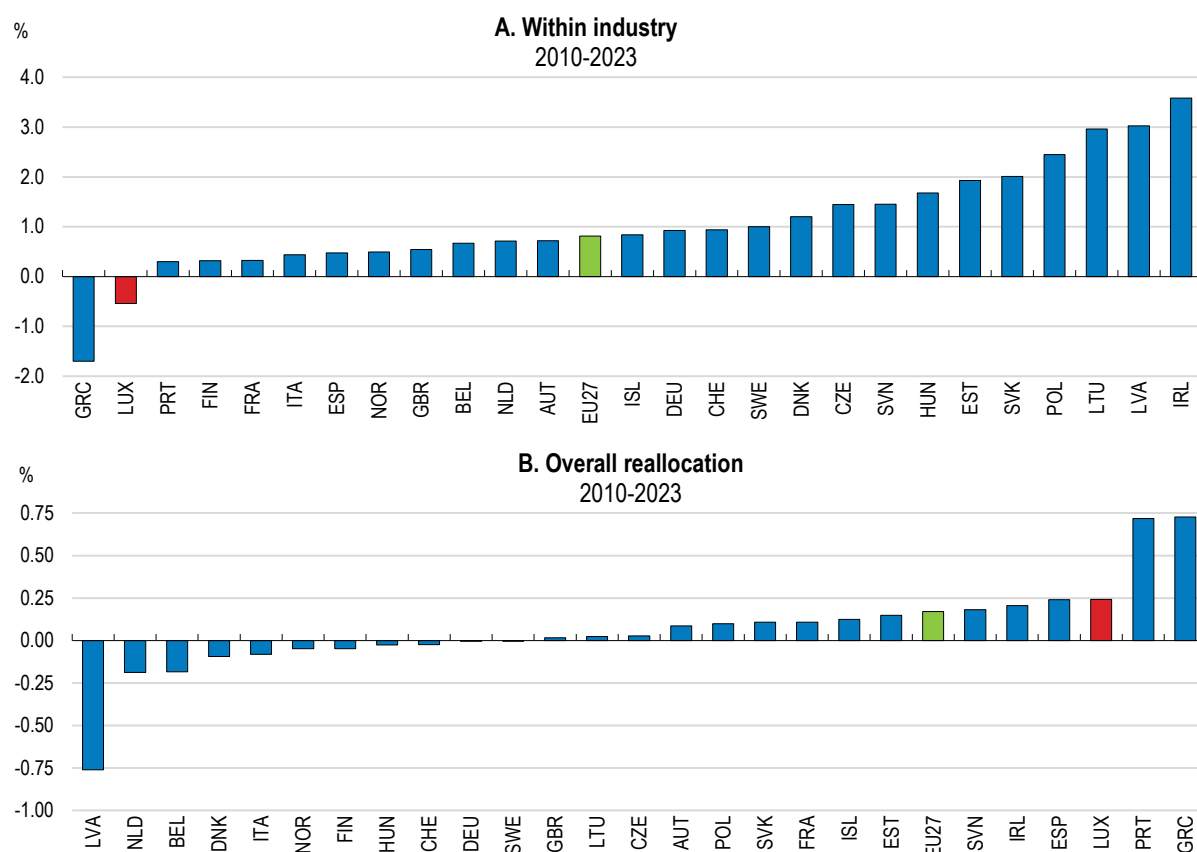
Source: OECD Regional Database.

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Low productivity growth mainly reflects low within-industry growth rather than changes in industry specialisation. For a high-income economy such as Luxembourg, increasing specialisation in services could act as a brake on productivity growth as labour is reallocated from high-productivity manufacturing to lower-productivity services, such as hotels and restaurants and the public sector, due to increasing demand as incomes rise and low potential for productivity growth in these sectors. However, the reallocation component of productivity growth in Luxembourg over 2010-2022 is similar to other OECD countries (Figure 4.4). Reallocation in Luxembourg is mainly explained by increasing employment shares of high-productivity ICT and professional services. By contrast, the average within-industry growth rate – broadly speaking, the average productivity growth rate of productivity across industries weighted by industry value added – has been well below the OECD average.

Figure 4.4. Within-industry average productivity growth has been low, while reallocation has had a small positive effect

Shift share decomposition, 2010-2023



Note: "Within industry" denotes contributions from productivity growth within industries, while "overall reallocation" denotes contributions from labour reallocation across industries with different productivity levels and growth rates. 2010-2022 for United Kingdom, Lithuania, Norway, Portugal, Sweden and EU27.

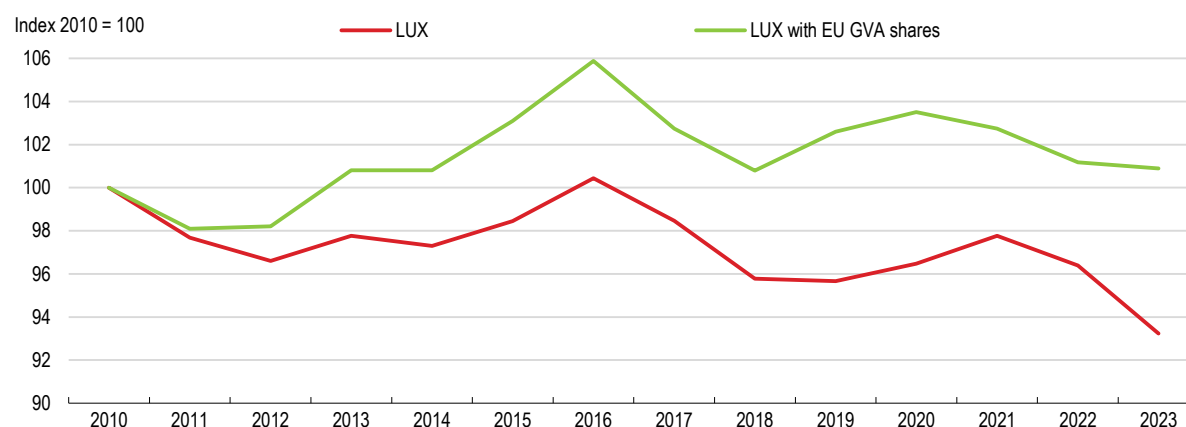
Source: OECD National Accounts database and desk calculations.

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To some extent, the negative within-industry contribution to overall labour productivity growth reflects the structure of Luxembourg's industry specialisation. All else equal, in countries that have relatively large activities with low productivity growth, such as construction or hotels and restaurants, the within-industry component of productivity growth tends to be lower than in countries specialised in industries with typically high productivity growth, such as manufacturing or ICT services. In Luxembourg, the share of manufacturing in total value added was around 5% on average over the period 2010-22 as compared to 17% on average in the rest of the European Union, partly accounting for the shortfall in productivity growth over the period. If Luxembourg had had the same pattern of industry specialisation as the average EU country, annual within-industry productivity growth over 2010-2022 would have been about 0.3 percentage points higher, resulting in a 4% higher level of productivity in 2022 (Figure 4.5). However, even at the same pattern of the average EU country, Luxembourg's within-industry productivity growth would have been among the lowest in the EU.

Figure 4.5. Low within industry productivity growth partially reflects specialisation

Within-industry contribution to labour productivity growth



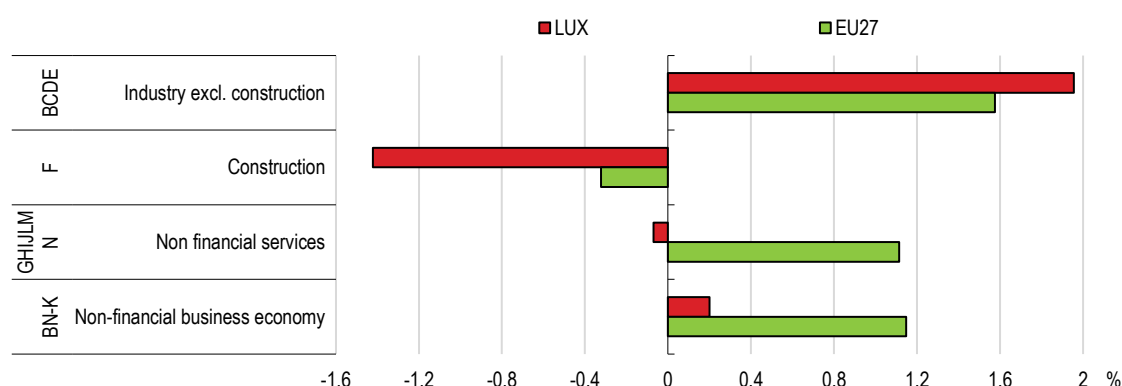
Source: OECD National Accounts database and desk calculations.

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Low within-industry productivity growth relative to the EU average over the period 2010-22 is mainly explained by low productivity growth in non-financial services and construction (Figure 4.6). Measured productivity growth has been particularly weak relative to EU peers in accommodation and food and in wholesale and retail trade, but also in information and communication services. By contrast, productivity growth in the manufacturing sector has been in line with EU peers, while in transportation and storage it has outperformed EU averages.

Figure 4.6 Most services sectors experienced lower productivity growth than the EU average

Labour productivity, annual growth rates, 2010-2023 average



Note: 2010-2022 for EU27, pending the 2023 release.

Source: OECD National Accounts database and desk calculations.

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4.2. Reducing the gap with top performing countries in innovation and technology adoption

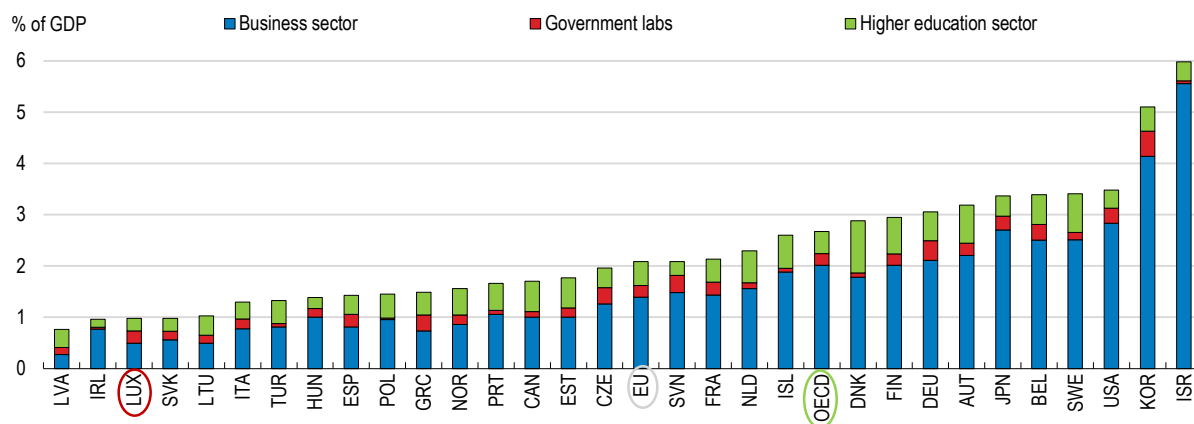
Innovation and technology adoption are key drivers of productivity growth. Innovation drives the development of new products, services and business models in technologically-leading businesses, which is especially important in high-income economies such as Luxembourg. The adoption of technologies and business models developed elsewhere helps lagging businesses catch up with the technological leaders and might gain even further importance with the spread of artificial intelligence (AI) (OECD et APO, 2022).

4.2.1. Innovation and technology adoption are weak

Luxembourg's gross domestic expenditure on R&D, which is a key input into innovation, is among the lowest in the OECD as a share of GDP (Figure 4.7). While public R&D expenditure is in line with other OECD countries, business R&D expenditure is only about one-quarter of that in top performing countries such as Sweden or Japan. To some extent, this is explained by Luxembourg's specialisation on financial services, which typically have a very low measured R&D intensity. The absence of tax credits for R&D may also play a role, as it weakens incentives to report R&D expenditure (STATEC, 2021). However, business R&D spending is substantially lower than in top-performing countries across a broad range of sectors, suggesting that low business R&D spending does not solely reflect the unusually large size of the financial sector.

Figure 4.7. Business R&D expenditure is low

Gross expenditures on R&D spending components, 2022



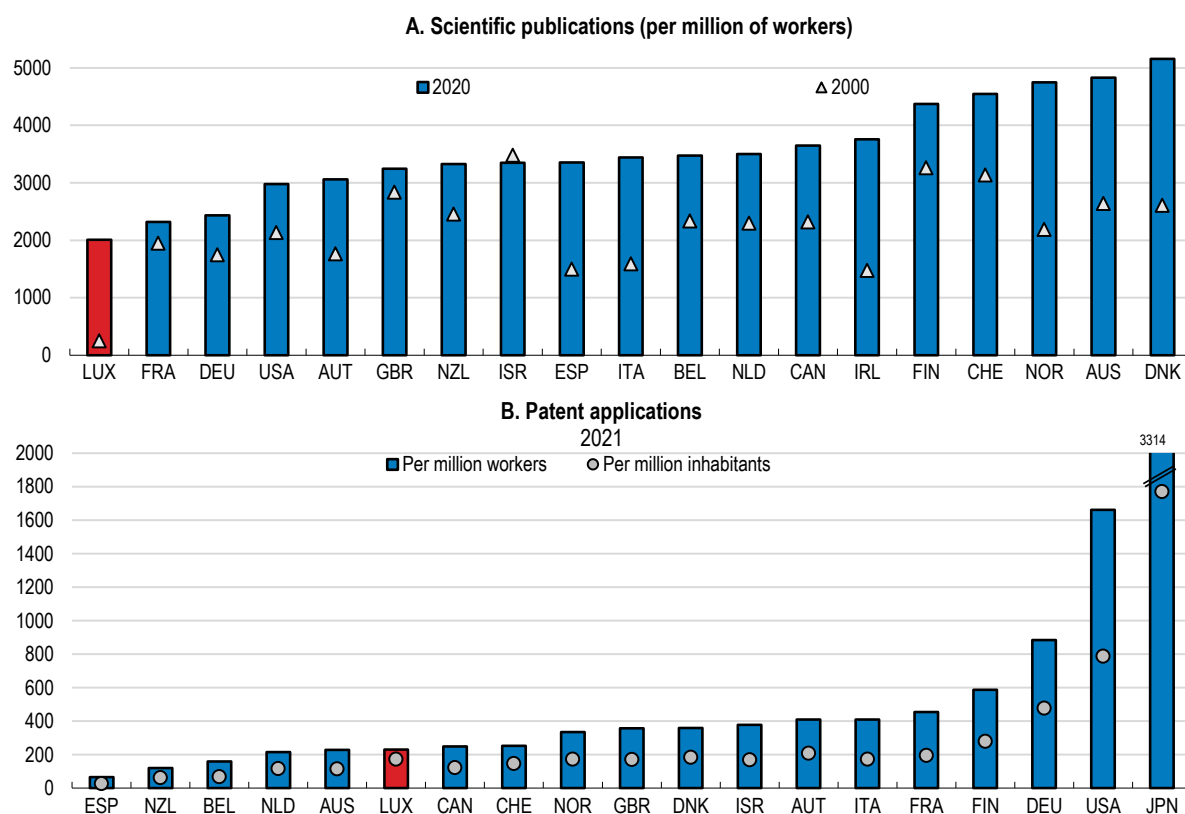
Source: [OECD Data Explorer • Main Science and Technology Indicators \(MSTI database\)](https://data.oecd.org/science-and-technology/main-science-and-technology-indicators-msti-database/)

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Investment in intangible assets other than R&D is relatively high in international comparison, with new financial products being the dominant type of intangible investment in Luxembourg, in line with the structure of the economy (Conseil National de la Productivité, 2023). While Luxembourg has also witnessed rapid growth in investment in organisational capital and branding, the gap with innovation-led economies remains substantial in some other intangible assets. Investment in ICT equipment is just above the EU average, and the gap with top performing countries is even more pronounced for investment in intellectual property.

Innovation outputs, such as patent applications, lag top-performing countries. Scientific publications have witnessed a significant increase since 2003, when the University of Luxembourg was created. However, they still remain well below the rate of the Nordic countries, the Netherlands and Switzerland (Figure 4.8). Both scientific publications and patent applications are more in line with top-performing countries if expressed as a share of population rather than as a share of total employment, but given that both resident workers and cross-border workers contribute to innovation, normalising scientific publications and patent applications by employment appears more appropriate.

Figure 4.8. Innovation outcomes can be enhanced



Note: Panel A shows the number of scientific and engineering articles published in scientific journals in the following fields: physics, biology, chemistry, mathematics, clinical medicine, biomedical research. The total number is divided by the workforce in millions. Panel B shows the total number of patent applications lodged by physical persons or legal entities resident in Luxembourg (legal entities resident in Luxembourg include cross-border workers who work for them) divided by workforce in millions.

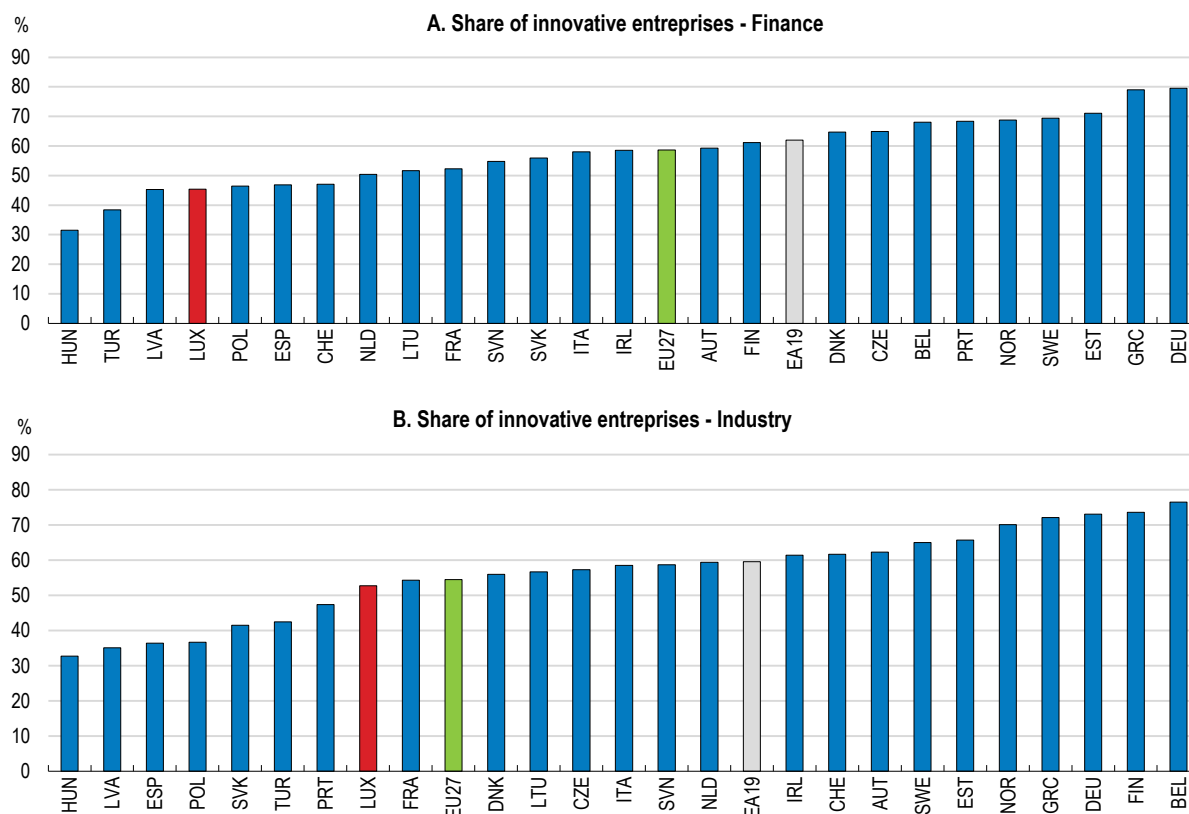
Source: World Bank.

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The share of enterprises that have internally developed product or business innovations is low across a broad range of sectors. Less than 50% of firms operating in the financial sector, which plays a key role in the Luxembourg's economy, have developed in-house innovations, while the share in top performing countries such as the Nordic countries and Germany is around 70% (Figure 4.9, Panel A). Luxembourg also performs worse than EA average in the industry sector (Figure 4.9, Panel B), with specific examples ranging from the manufacture of metal products, electrical equipment and computers to chemical products.

Figure 4.9. The share of innovative enterprises is low

2020



Note: Data in all four panels are expressed as percentage share of the total population of firms in that sector.

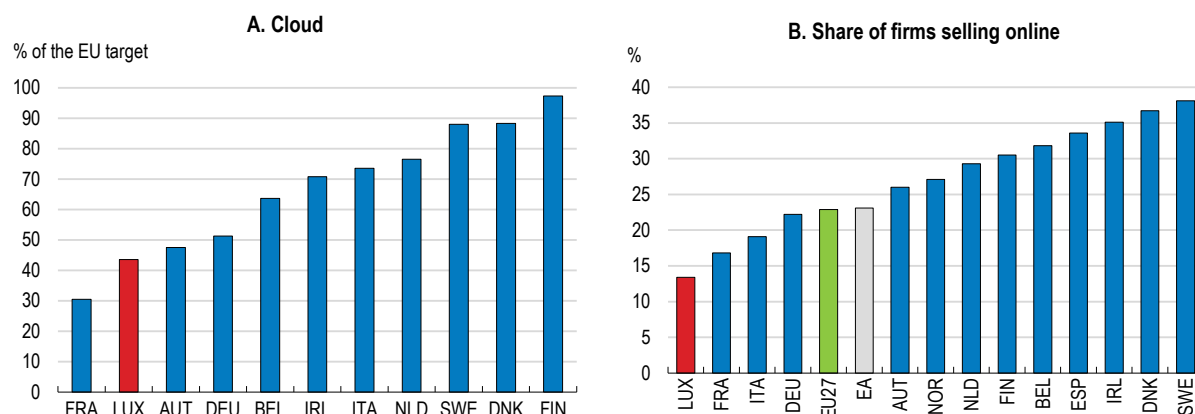
Source: [Eurostat Community innovation survey 2020](https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&code=sdg_8_4_2).

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Adoption of digital technologies is behind EU peers. The EU has set the goal for its “Digital decade” that 75% of all firms could use cloud computing and big data analysis by 2030. While Nordic countries and the Netherlands are already close to the achievement of the objective with regards to cloud computing, Luxembourg hardly reaches 50% of its completion (Figure 4.10, Panel A) and the scenario for the adoption of data analysis is similar. Beyond EU’s “Digital decade”, the lag with the top performing countries and the EU average is confirmed in the use of the internet of things, but also on more established technologies, with the share of firms selling their products online being one of the lowest in Europe (Figure 4.10, Panel B). In terms of the share of enterprises using AI the gap with top performing economies (such as Denmark and Finland) is narrower, but less than 20% of Luxembourg firms are using it, leaving space to better integrate this innovation in productive processes (European Commission, 2024).

Figure 4.10. Technology adoption lags behind

2023



Note: Panel A show the country performance in terms of the achievement of the EU's "Digital Decade" targets regarding the adoption of specific technologies, such as cloud in this case. Panel B show the share of enterprises with 10 or more employees selling online.

Source: [EU's Digital Decade 2024 Report](#) for Panel A, [Eurostat](#) for Panel B.

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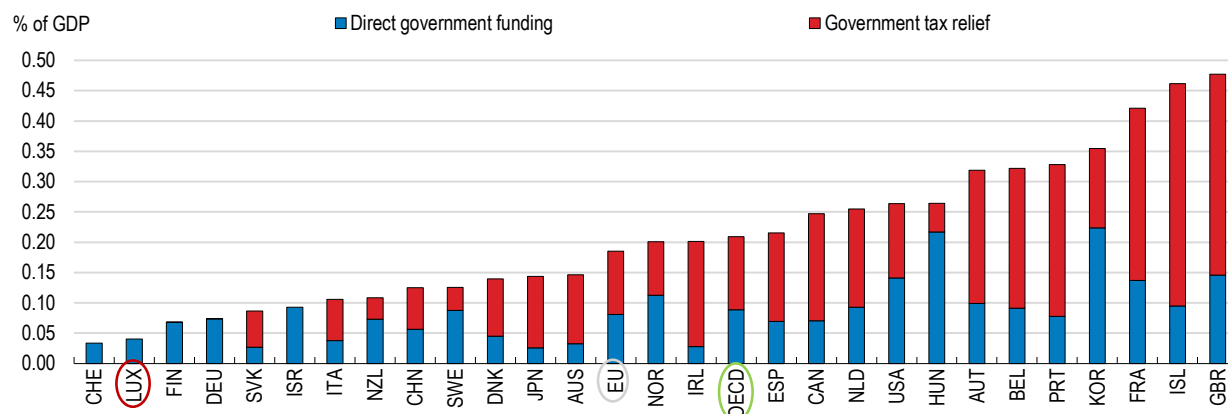
4.2.2. Enhance innovative outputs

Increasing the effectiveness of public support in crowding in business investment in R&D and innovation

Government financial support is important for sustaining innovation. Public support is aimed at crowding in business investment in R&D and can be direct, with government and public agencies directly funding research projects or institutions. Indirect support, such as tax allowances, exemptions and deductions, effectively subtract R&D investment from the tax base, while tax credits subtract it from tax liabilities. The vast majority of OECD member countries use both forms of support, while Luxembourg relies almost exclusively on direct funding, using only the Intellectual Property (IP) Box as R&D tax incentives (Figure 4.11).

Figure 4.11. Government support for R&D relies entirely on direct funding

Direct government funding and government tax support for business R&D, 2021



Source: [R&D tax incentives | OECD](#)

StatLink <https://stat.link/loac7w>

Direct forms of support to R&D and innovation in Luxembourg are provided by several different institutions. The Ministry of the Economy mainly supports businesses' innovation, offering co-funding for R&D projects, innovation aid for SMEs, and support for young innovative enterprises. The grants can cover up to 25-80% of project costs (Luxembourg, 2024f). The Luxembourg National Research Fund (FNR) is the main funder of public research activities, with funding commitments that can reach up to an overall ceiling of EUR 445 million over the years 2022-2025. The FNR invests public funds and private donations into research projects through grants and other forms of direct funding (FNR, 2024). The "Société Nationale de Crédit et d'Investissement", a Luxembourg public-sector banking institution that supports companies in their innovation projects, provides innovation loans at a lower-than-market and fixed interest rates (SNCI, 2024). It has also created, together with the European Investment Fund (EIF), the Luxembourg Future Fund 1, which is a EUR 150 million fund that aims to attract venture capital investment to foster the sustainable development of SMEs in Luxembourg's strategic sectors, such as fintech or cybersecurity (EIF, 2023).

Streamlining the public support for R&D and innovation and establishing a mechanism for coordination of the main actors involved in providing the support would help to improve its effectiveness and link to business. First, having a mechanism that coordinates the public support, for instance an innovation council, would allow to take advantage of synergies between different actors and projects, ensuring that both public and private research efforts are aligned with common national priorities. Second, it would allow to harmonise application procedures and selection criteria, which would increase the capacity to crowd in more business investment, as piecemeal approaches to R&D and innovation support discourage firms from applying, especially smaller enterprises because of the higher costs incurred in following the different procedures (OECD, 2000).

The UK's effort to better coordinate and streamline its research and innovation provides an example of good practice. In 2018 the UK launched UK Research and Innovation (UKRI), a non-departmental public body that brought together the seven Research Councils, Research England, which was responsible for providing funding to higher education institutions in England, and also the business-oriented innovation agency "Innovate UK". The idea was to enable a greater focus on cross-cutting issues and improve collaboration between the research base, enhancing the effectiveness of the different research efforts and their impacts. The first years of activity seem to confirm that the creation of UKRI has allowed to tackle cross-cutting problems more effectively than if the nine constituents would have continued to work individually in silos (UK, 2022).

Furthermore, public support could be made more mission-oriented by basing the allocation of fund more on projects rather than institutions, while keeping some continuity of research with a part of recurrent funding. Currently, the government allocates the major part of its R&D expenditure to research institutions, such as the University of Luxembourg, and only a minor part to specific projects, which limits support to private business-led R&D. In the mission-oriented approach, supported projects pursue objectives that are in line with broader and clearly defined national interests, and they typically involve different actors and span different fields. However, policy mission orientation presents some risks, as the selection of goals and the identification of niches of activity is difficult. Moreover, it is also important to clearly determine the timeframe for the support and to put in place an effective system of monitoring and evaluation with the aim to ensure the effectiveness of the support.

Public-private partnerships should be further encouraged by making them a requirement to access public support for public applicants. This would allow to both crowd in more business investment and reinforce collaboration. Furthermore, a part of public support should be made conditional on businesses matching public grants through private R&D and innovation investment. Similar recommendations were made by the 2022 OECD Economic Survey of Luxembourg, but no substantial policy action has been taken to address them so far (Table 4.1)(OECD, 2022d).

Table 4.1. Past OECD recommendations on enhancing productivity growth

RECOMMENDATION	ACTION TAKEN
Subsidise active on-the-job training schemes targeted to the over-45-year-olds.	No action taken.
Expand access to training to help early-school leavers enter the workforce, alongside school system reforms.	Compulsory schooling was extended from 16 to 18 years in 2023, with the measure coming into force in 2026.
Increase public spending on R&D to match private R&D funding and encourage greater investment by firms.	No action taken.
Increase funding to targeted projects by reducing the funds spent on administration.	No action taken.
Reduce administrative burdens on small firms, notably by streamlining procedures for starting a business	No action taken

Source: OECD Economic Survey of Luxembourg (OECD, 2022d)

A more tailored and straightforward approach to R&D and innovation supports could encourage small enterprises to invest more in innovation, technology adoption and overall productivity growth. Simplicity of the tools used to support innovation in SMEs is key for their success. Until recently the application process and supporting documents to be provided to apply for Luxembourg's financial aid for SME innovation were the same as those for larger enterprises, discouraging small firms (Luxembourg, 2024g). The recent simplification of the participation procedures of the "Fit4" programmes, however, goes in the right direction. The "Fit4" programmes offer to reimburse SMEs the cost of an assessment of needs in terms of innovation, digitalisation and sustainability by an external consultant and the possibility to apply for public co-funding of the investments suggested by the consultant.

Austria and Germany's innovation vouchers offer similar services to SMEs and their experience strongly confirms the key importance for this kind of tools of being simple and agile, involving low administrative burden (Interreg Europe, 2021). These innovation vouchers allocate funding to enterprises to buy innovation services from knowledge providers, or to recruit an in-house innovation resource or innovation manager, facilitating SMEs' access to external knowledge. Austria's evaluation of this tool showed that they have been effectively used by SMEs to address technological development and innovation in a broader sense: 25% of firms that used the voucher then conducted follow-up projects and many participating firms created lasting networks with research organisations, producing as a final result a significant change in innovation behaviour as well as increased R&D expenditures (European Commission, 2021).

Beyond increasing the effectiveness of the existing direct support, Luxembourg could consider introducing more forms of indirect support measures to increase overall business R&D investment (Box 4.2). Public support for business R&D usually requires a mix of direct instruments and market-based incentives, as no single mechanism is able to provide a full range of incentives (OECD, 2023g). While market-based mechanisms such as tax credits tend to increase business R&D at the margin and for innovative projects that are closer to the market, more direct forms of support tend to stimulate research that may not immediately result in new goods or service (OECD, 2020c) (Appelt et al. 2016). Empirical evidence suggests that both direct funding and market-based incentives are effective in stimulating private business R&D investment, with a gross incrementality ratio that is similar for both of them, being of around 1.4, meaning one extra unit of R&D tax support translates into 1.4 extra units of R&D (OECD, 2023g).

Box 4.2. Introducing indirect R&D support: the example of Iceland

Iceland provides a good practice to follow, as it has introduced tax incentives to boost business R&D in 2010 and these have proved to be effective (OECD, 2023d). Iceland's R&D tax incentive is a refundable volume-based scheme that allows companies to deduct part of the R&D related costs from the corporate income tax. Over the years, it has demonstrated to have a positive impact on total business R&D spending – especially for micro firms – but also on annual firm sales, employment, and average wages. The 2016 reform, which raised the ceiling on total eligible cost and represented a further cost for public finances, has also led to positive results, being effective in increasing R&D spending, especially among small and medium enterprises (OECD, 2023d).

Since the last reform, Iceland's tax credit rates are 35% for SMEs and 25% for large firms. The credit is refundable, meaning that if a company with an approved R&D project has insufficient taxable profits against which it could deduct the R&D costs, the deduction is converted into a refundable amount and paid out to the company in the following fiscal year. To qualify for the scheme, companies are required to spend a minimum of around EUR 7000 per year per R&D project and need to obtain a certification of validity by the Icelandic Centre for Research. The Centre assesses the R&D content of projects and makes sure that the business plan is well defined and that the staff have the training, education and experience in the area of the proposed project (OECD, 2023d).

Continue to favour the development of niche ecosystems conducive to innovation

The development of successful innovation ecosystems helps strengthen overall innovation. These are networks of firms, higher education and research institutions, government agencies and innovation support organisations, investors and researchers that contribute their expertise, human and financial resources to develop new technologies, products, processes or services that address shared specific goals (OECD, 2023f). Collaborations are often coordinated and funded by government agencies. Successful innovation ecosystems are characterised by cross-pollination of ideas across different fields and, as specialised industrial clusters, attract skilled labour force, specialised business support and venture capital and investors. The interactions and knowledge flows within the ecosystem accelerate the innovation process compared to organisations working in isolation, and the large externalities generated by innovation collaboration justify public support for innovation ecosystems. Luxembourg has already and successfully fostered innovation ecosystems in some specific niches (Box 4.3) and should continue to pursue this approach.

Box 4.3. Luxembourg's thriving niches

The cleantech cluster

The cleantech cluster aims at fostering innovation, business development and cross-sector cooperation in the field of clean technologies. The cluster supports its members in the generation of new processes, products and services with an ultimate goal of turning the concept of the circular economy into a reality in Luxembourg. Luxinnovation supports the cluster by offering tailored advice on national and European funding opportunities, easy access to key contacts and participation in matchmaking sessions (Luxinnovations, 2024b).

The healthtech cluster

Luxinnovation fosters the development of the healthtech cluster as well, which aims to support the development of sustainable and trusted services and products for the European healthcare market in fields such as digital health, medical devices and software, in vitro diagnostic and neurology. This is meant to favour positive spillovers to other areas where Luxembourg has considerable expertise such as telecommunication (for telemedicine and mobile health), cybersecurity, and artificial intelligence.

The support offered by Luxinnovation is similar in nature to that offered to the CleanTech cluster, but on top Luxembourg has recently launched the initiative “Dataspace 4 Health”, a platform that provides secure access to health data and respects the EU’s data privacy legislation and patients’ rights, as currently health data is often siloed, fragmented, and hence underutilised, limiting the potential for innovation and research. This initiative aims also at helping to build a connected ecosystem by establishing a secure and efficient layer for data sharing across institutions, fostering collaboration and advancements and leveraging AI to improve diagnosis, treatment and prevention of diseases, enhancing patient outcomes and quality of life, and advancing scientific knowledge and discovery (Luxinnovation, 2024a).

The space sector

The space industry in Luxembourg has witnessed a constant expansion and consolidation, bringing the sector to represent almost 4% of GDP (among the highest ratios in Europe), and counting over 1000 employees, seven research centres and over 60 specialist companies. The origins of this industrial specialisation go back to 1980s, with the creation of the European Society of Satellites (SES), one of the world leading satellite operators, that has given the advantage of the first mover to the Grand Duchy and has favoured its imposition as the main actor in aerospace for over 30 years.

The public sector has played an important role in supporting and nurturing this industrial niche since the beginning. It was a key initiator in the formation of SES in 1985 and has remained a major shareholder since then. The support of the government was key also to enable the company to become Europe's first private satellite operator with the launch of Astra 1A in 1988. In 2005, Luxembourg’s accession to the European Space Agency (ESA) opened the door for national players to access the space market in Europe. In 2017, the Luxembourgish government introduced a legal framework offering legal security to owners of resources from outer space, with a view to becoming a European hub for the use and exploitation of space resources. In 2018, Luxembourg created its own space agency - the Luxembourg Space Agency (LSA) - in order to remain at the cutting edge of the latest mining operation developments. In 2020, the European Space Resources Innovation Centre (ESRIC) has been established in Luxembourg as part of this initiative to create additional opportunities for European and international innovation.

The successful wide-ranging support also includes positive examples of cross-institution collaboration that might serve as examples of good practices to be replicated. Together with a group of private and public investors, the Luxembourg Government has invested in Orbital Ventures, an investment fund focused on providing equity funding for early-stage space companies with ground-breaking ideas and technologies engaged in space activities. Furthermore, as the space industry needs specialised skills and talent, a two-year Interdisciplinary space master program has been launched by the University of Luxembourg in the fall of 2019 and it has been developed in collaboration with the Luxembourg Space Agency (LSA).

4.2.3. Fostering technological adoption

Encouraging digital diffusion through investment tax credits

The increasing productivity differential observed in Luxembourg between frontier (80th percentile of most productive businesses) and laggard firms (20th percentile) has played a role in explaining slow productivity growth in the last 20 years (OECD, 2022d). Productivity dispersion per se does not have a negative impact if it is determined by fast-growing front-runners, but in Luxembourg widening dispersion is also due to laggard firm productivity performance being in protracted decline since the great financial crisis. Raising the productivity level of laggard firms by favouring a rapid and efficient innovation diffusion and technology adoption among all firms would help foster total-factor productivity growth.

Starting from 2024, Luxembourg has revised the investment tax credit. The aim is to better support Luxembourg companies in their digital and ecological/energetic transformation. The reform has increased the tax credit rate from 8% to 12% for generic investment, introducing a 18% tax credit for investments and operating expenses connected with digital and ecological transformation (Luxembourg, 2024c). Moreover, the minimum threshold for each investment has been scrapped. The tax credit can be carried forward for 10 years.

The introduction of this new tax credit scheme goes in the right direction, but its design could be streamlined. Companies that want to apply need prior approval from the Ministry of Economy, to be obtained through the eligibility attestation submission form that contains several wide-ranging questions aimed at gathering an extensive and in-depth description of the project. Moreover, companies are required to apply for the annual compliance certificate for each fiscal year during which investments have been carried out and granting of a tax credit is requested, presenting supporting documents detailing investments and operational expenses effectively incurred during the period. While conditionality in the concession of tax credits and surveillance of compliance is important to increase the effectiveness of public financial support, an excessively cumbersome procedure might end up discouraging application, especially for smaller firms.

Denmark's tax credit scheme to promote investment in R&D (Skatte kreditordningen) offers a practical example of lighter administrative requirements. The application does not need prior approval and is filed online to the tax authorities together with the annual tax return for the same year. While this reduces compliance costs, it may increase uncertainty for firms as the reimbursement is received only after undertaking the investment. Spain's system of innovation incentives might provide a solution to this issue. Similarly to Denmark, applications can be filed online together with the corporate tax declaration procedure, but in Spain firms may apply for pre-validation of the application, which are binding for tax authorities at the moment of actual application (and more than 80% of firms do so). A different solution to ease the complexity of application and compliance procedures and encourage smaller firms to apply is provided by Canada, where different sorts of application assistance is available (first-time advisory service, pre-claim project review, assign a contact person that assists in the process) (European Commission, 2014).

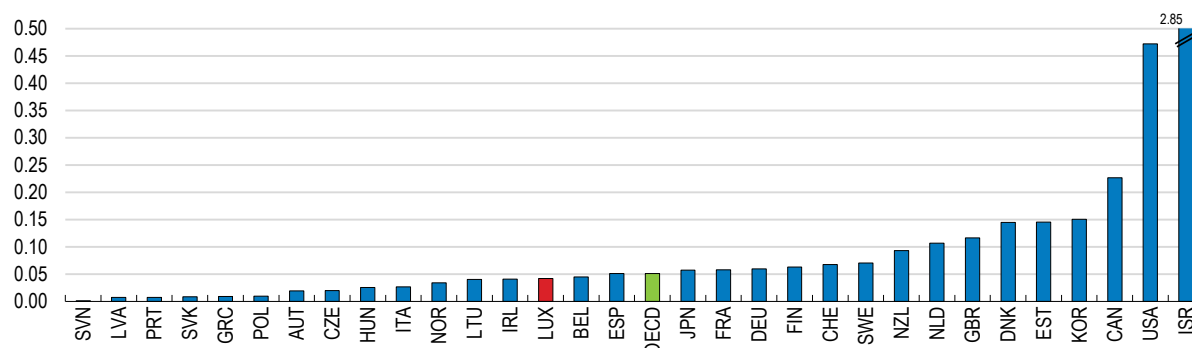
The investment tax credit scheme might also benefit from adding further incentives addressed specifically at SMEs, which usually lag behind in their technology adoption and constitute the bulk of laggard firms (OECD, 2020b). Australia's "Small business technology investment boost" might provide an example. The program has allowed small businesses (less than AUD 50 million of aggregated annual turnover) to benefit from an additional 20% tax deduction (on top of the normal investment deduction rate) in 2022-2023 to support their digital operations and digitalise their operations, encompassing various aspects of digitalisation, from basic hardware and software to more advanced e-commerce and cybersecurity solutions (Australian Taxation Office, 2023).

Expand financing options to spur innovation and technology adoption

Access to finance is key to developing innovative products or business models, adopt innovative technologies or invest in intangible capital. The vast majority of Luxembourg firms – 82% over the period 2017-21 – rely on bank financing for their investment projects (Chambre des metiers, 2024). However, bank financing has limitations for small innovative firms and starts-ups at early stages of development that might face challenges because of their limited collateral and track record. Empirical evidence shows that companies financed by private venture capital investors tend to have a greater increase in innovation output (Amess et al., 2016) and that venture capital has a positive causal impact on firms' growth (Paglia and Harjoto, 2014). However, venture capital investment as a share of GDP in Luxembourg remains relatively low compared to other OECD countries (Figure 4.12).

Figure 4.12. Venture capital investment is lower than in the best performers

2023 or latest year available

Source: [OECD Data Explorer](https://data.oecd.org/).StatLink  <https://stat.link/pfd7av>

Governments can have an active role in encouraging venture capital investment and the participation of individuals in the capital of enterprises (business angels). On the supply side, fiscal provisions can encourage this kind of investment. Such incentives are already present in Luxembourg, but they are weaker than in other OECD countries when it comes to individual investors. The ceiling for the tax deduction for individual investment in enterprises is currently set at EUR 5,000 and there is no further incentive to invest in newly created companies. The low ceiling for the deduction does not spur bigger investment, while the lack of further incentives to invest in start-ups does not balance the lower capacity of newly created companies to remunerate investors in the first years.

Luxembourg should remodel its fiscal incentive schemes for private investment in enterprises and start-ups to be more in line with other OECD and European countries. For example, among the tax relief tools available to individuals in the UK who invest in certain companies, the “Enterprise investment scheme” allows to claim a tax relief of 30% on the total amount investment, of up to GBP 1 million. The ceiling is raised to GBP 2 million if at least one million of that is invested in knowledge-intensive companies (UK, 2023). Belgium’s “Tax shelter pour startups” set the amount of deduction at 30% - 45% of the amount invested, with a EUR 100 000 investment ceiling (OECD, 2024b). On the demand side, enhancing financial literacy among managers, especially those of smaller firms, and changing the attitude towards the fear of losing control to the advantage of external subjects tend to improve firms’ capital structure.

4.3. Addressing skills shortages

The existence of a labour force that is endowed with the right set of skills is instrumental to technology adoption, innovation and, ultimately, overall productivity growth. However, Luxembourg faces widespread skills shortages, as demand for certain skills increasingly outpaces supply (OECD, 2023b). Skills shortages harm productivity growth by preventing the most productive and innovative businesses from expanding. Moreover, the lack of specific skills in the job market may prevent a broad range of businesses from adopting productivity-enhancing technologies and business models, for instance if shortages of IT technicians prevent businesses from adopting digital technologies.

Luxembourg can continue to tackle the issue of skills shortages by further strengthening its capacity of attracting and retaining foreign talents with relevant skills; but this approach has some limits and needs to be coupled with other policy measures. Upskilling and reskilling of the workforce is key, as well as university reforms to better align tertiary education with labour market needs.

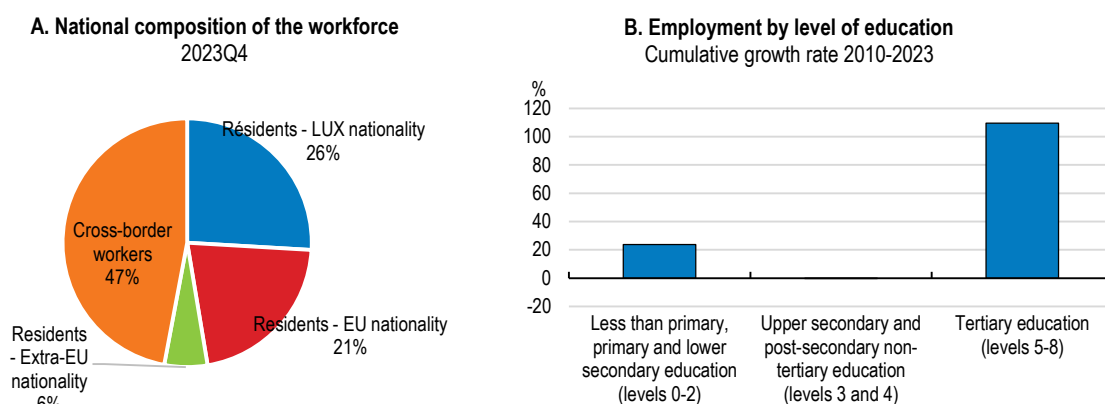
4.3.1. Employment has become more polarised

As the economy has expanded, employment in Luxembourg has almost doubled over the past 25 years, reaching more than 515,000 workers at the beginning of 2024 (ADEM, 2024b). The workforce has been increasing mainly due to more cross-border workers: while approximately one-quarter of the workforce consists of residents with

Luxembourg nationality and another quarter are immigrants (residents with non-Luxembourg nationality), about one half are cross-border workers. 50% of cross-border workers come from France, with the other 50% being evenly split between Belgium and Germany (Figure 4.13, Panel A).

Changing labour demands over the past two decades have led the labour market to become increasingly polarised. This partially reflects the rapid expansion of high value-added services – such as finance, information technology (IT), education, and scientific and technical activities – and robust growth in lower-skilled services – such as construction, and hotels and restaurants (STATEC, 2020). Consequently, employment has increased significantly at the top end of the skills distribution, with a cumulative growth rate for professionals with a tertiary education that has exceeded 100% over the period 2010-2023 (Figure 4.13, Panel B). Over the same period, employment has increased also for low-skilled workers, as the cumulative growth rate for professionals with less than primary or with lower secondary education has exceeded 20%. By contrast, employment for secondary graduates has contracted.

Figure 4.13. Employment has become more polarised

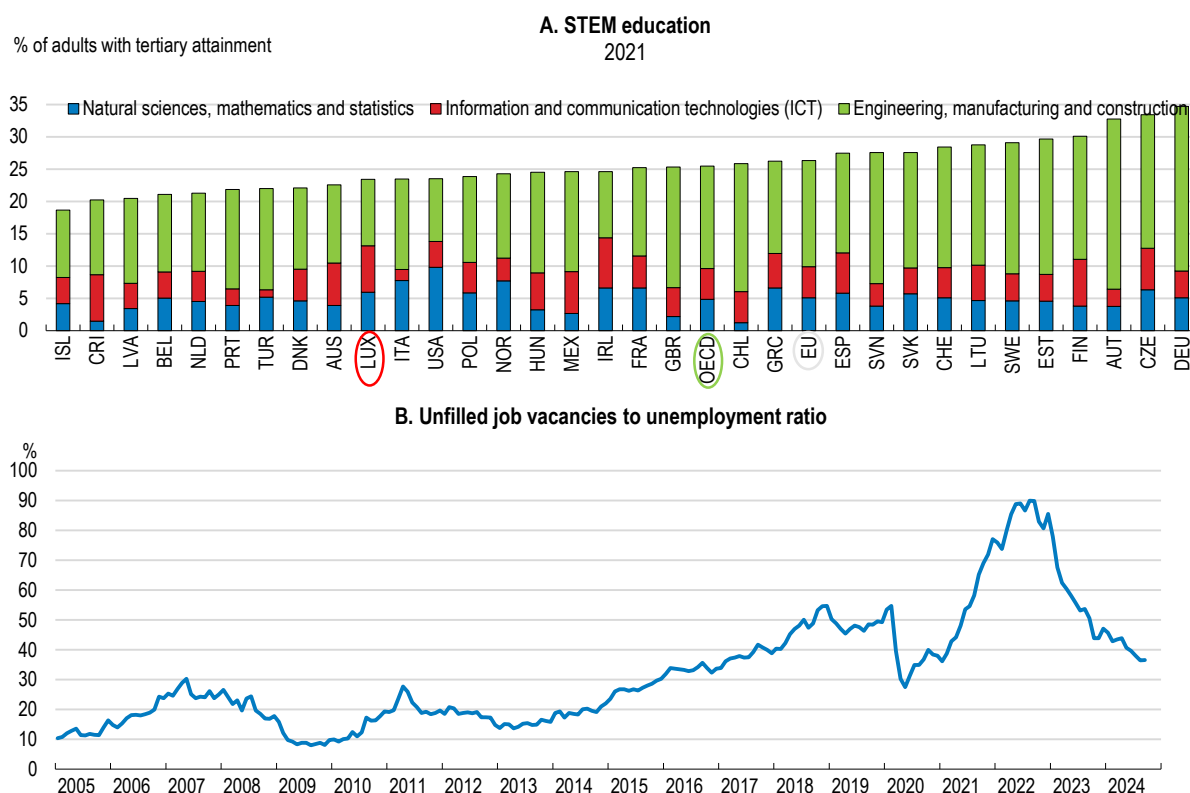


Source: [LUSTAT](#) (Panel A) and [STATEC](#), Eurostat.

StatLink  <https://stat.link/9r25uw>

Luxembourg's resident population has one of the highest shares of tertiary graduates, with about 50% of residents having a tertiary degree, above the OECD average of 40%. This is the case despite weaknesses in the education system, as demonstrated for example by the highest increase among EU member countries of young people neither in employment nor in education or training (NEET) over the last 10 years, or the below average results obtained when the country took part in the OECD PISA assessment (Eurostat, 2024b).

However, even though the share of tertiary graduates is high, Luxembourg faces a mismatch between the field-of-study and the labour market, with tertiary degrees often obtained in fields that are not those in high demand by employers. For example, while shortages are particularly severe in IT and scientific and technical professions (ADEM, 2024a), the share of 25–64-year-olds with tertiary education who studied in the field of science, technology, engineering and mathematics (STEM) is lower than the OECD average (Figure 4.14, Panel A), and the gap is even larger for female tertiary graduates in these fields (OECD, 2023a). This contributes to the rise in the number of unfilled job vacancies, which has been trending up over the past 15 years. While it has come down from its peak in 2022, it still is on a higher level than the pre-pandemic average despite above-average unemployment, posing challenges for total factor productivity growth (Figure 4.14, Panel B).

Figure 4.14. Unfilled job vacancies have been on the rise

Note: The graph in Panel B plots the % ratio between the number of unfilled job vacancies and the number of unemployed people registered at the public employment agency. For each monthly observation the graph shows the moving average over the previous year. Data for unfilled job vacancies refer to the number of vacancies notified to the Labour Administration Offices and remaining unfilled at the end of the month. Firms are required by law to declare vacancies at Labour Administration Offices.

Source: [Education at a Glance 2022](#) (Panel A) and [OECD Data Explorer • Infra-annual registered unemployment and job vacancies](#) (Panel B).

StatLink  <https://stat.link/rj02gt>

The public employment agency (ADEM) periodically publishes a list indicating the jobs that are in high demand, but for which very few candidates (or none) are available among the jobseekers registered at the employment agency (ADEM, 2024a). The relevant occupations include finance, IT, engineering, health and personal care, construction, social action and corporate support services. While most of the professions that are currently in short supply require advanced education degrees, such as industrial IT analyst programmer, neuropsychologist or industrial materials engineer, others require specialised skills but not necessarily advanced education degrees, for instance specialised construction jobs or specialised IT technicians (Table 4.2).

Table 4.2. Occupations in very high demand

Level of qualification	Field	Occupation
High	Finance	Financial Analysis and Engineering; Credit and Banking Risk Analysis
	Information Technology (IT)	IT Research and Development; Information Systems (IS) Advisory and Project Management
	Engineering	Management and Production Engineering; Management and Engineering – industrial design and studies, research and development; Management and production Engineering
	Business Services	Legal Defence and Advice; Audit Financial and Accounting Control; Management Audit
	Care/Education	Psychology; Early Childhood Education; General Nursing Care
Middle/Low	Finance	Bank Customer Management
	Information Technology (IT)	Information Systems Technical Support
	Engineering	Installation and Maintenance of Industrial and Operating Equipment
	Business Services	Bookkeeping
	Care/Education	Patient Hygiene and Comfort Care Services
	Construction	Roofing Installation and Restoration

Note: The list contains almost all occupations listed in the original ADEM list but does not contain the specific job titles.

Source: [ADEM](#)

4.3.2. Attracting and retaining foreign talents with skills in high demand

The attraction and retention of foreign talent has represented a key and effective way to meet labour and skill demand in Luxembourg. Over the past decades Luxembourg has performed well in attracting foreign professionals, with cross-border employment having grown by 360% since 1994, as compared to 80% for resident employment. However, maintaining the high pace of growth, particularly in the sectors characterised by the most severe shortages, is becoming increasingly challenging. Population ageing will shrink the pool of workers in neighbouring countries available for work in Luxembourg for years to come. Moreover, skilled labour shortages in areas such IT and STEM are a common feature throughout the OECD, pushing up salaries and reducing the relative attractiveness of Luxembourg. Finally, rapid population growth and the surge in cross-border work are putting upward pressure on house prices and straining transport infrastructure.

Attracting foreign talent through preferential tax schemes

Luxembourg has recently reformed its preferential impatriés scheme for foreign workers, with new provisions becoming effective from January 2025. This reform aligns Luxembourg's regime to a number of OECD countries that have introduced preferential tax schemes to attract foreign talent, including, among others, Belgium, France, Denmark, Finland, Italy, the Netherlands, Portugal, Spain, Sweden, and Switzerland. While the evidence suggests that these schemes are effective in attracting skilled workers (Kleven et al., 2020), it is key to design them to avoid beggar thy-neighbours and regressive outcomes.

Luxembourg new impatriés scheme closely resembles those in Denmark and the Netherlands (Table 4.3). Duration of the preferential schemes are similar, being 8 years in Luxembourg, 7 in Denmark and 5 in the Netherlands. The preferential treatment in Denmark is given on the tax rate, substituting a flat income tax rate of 30% for the regular progressive income tax with a top marginal tax rate of 56%, while in Luxembourg and the Netherlands the schemes grant eligible employees a tax exemption of up to 50% of gross annual income for the former and 30% for the latter. In all the three schemes, eligibility conditions dictate a minimum threshold for gross annual salary, even though these limits in Netherlands are somewhat more flexible, having no salary requirement for scientists of qualifying universities or recognised institutions and a lower minimum threshold for workers under the age of 30.

Table 4.3. Preferential tax schemes in Luxembourg, Denmark and the Netherlands

	LUX - 2020 scheme	LUX - Entlastungs-Pak Reform	DNK	NLD
Remuneration	Tax exemption for 50% of the impatriation bonus	Tax exemption for 50% of total gross annual remuneration	Flat income tax rate of 32.8% instead of the progressive income tax (top marginal tax rate 56%).	Tax exemption for up to 30% of total gross income (to become 27% from 2027 on)
Limitations	Up to a limit of 30% of the fixed annual remuneration (excluding bonuses and benefits in cash/kind)	Up to a limit of €400,000 (excluding benefits in cash and in kind)	It is possible to use the scheme only once in a lifetime, but the 7 years can be split into periods	30% exemption can be applied over a maximum of maximum €233000, including taxed expense reimbursements and employer pension contribution
Duration	8 years	8 years	7 years	5 years
Eligibility conditions	> Not having been a tax resident in Luxembourg or having lived less than 150km away from the Luxembourg border in the past 5 years. > Earning a gross annual salary of at least EUR 75,000. > No more than 30% of the company's employees may benefit from the regime. > Having in-depth specialisation	> Not having been a tax resident in Luxembourg or having lived less than 150km away from the Luxembourg border in the past 5 years. > Earning a gross annual salary of at least EUR 75,000. > No more than 30% of the company's employees may benefit from the regime. > Having in-depth specialisation	> Having an annual remuneration higher than the ninety-ninth percentile of the earnings distribution or being a researcher. > Not having been subject to full or limited tax liability in Denmark within the past 10 years prior to using the scheme.	> Possessing expertise that is scarce in the Dutch labour market. > Being recruited from abroad by a firm withholding payroll taxes in NLD. > Earning a gross annual salary of at least EUR 50000 (exemptions: younger than 30s, PhD researchers and specialising doctors). > Not applicable to Dutch nationals

Source: [Government of Luxembourg](#), [Government of Denmark](#), [Government of the Netherlands](#)

The 2024 reform of the preferential tax scheme allows Luxembourg to compete with other OECD countries in the attraction of foreign talent as it aligns the fiscal incentives to those of other countries. However, it will be important to monitor the application of the new schemes to check its fiscal impact, its degree of regressivity and so the overall impact on government revenues and the economy. Both in Denmark and the Netherlands preferential tax rates for high-skilled immigrants are close to being revenue maximising, with revenue losses from lower rates broadly offset by gains from larger tax bases (Kleven et al., 2020) (Timm and Giuliadori and Muller, 2022)).

Reducing commuting costs for cross-border workers

Road congestion represents a key deterrent for French, Belgian and German talents who live close to the border with Luxembourg and might want to work there without moving to the Grand Duchy. Cross-border workers in Luxembourg spend almost 10 hours per week commuting, with an average duration of a single journey to work being around 58 minutes, despite the relative short distances. As discussed in Chapter 3, decreasing the reliance on private cars for commuting is key to reduce traffic congestion and emissions. To this end, Luxembourg has made public transport free of charge for anyone. However, to be more effective this measure needs to be coupled with the continued expansion of the public transport network, the introduction of highway lanes dedicated to public buses and carpooling vehicles, and the reduction of public transport congestion through the adoption of staggered working and schooling times.

Promoting remote work would be a further effective approach to reduce traffic congestion, improving the quality of daily life and thus increasing the attractiveness of working in Luxembourg. Moreover, hybrid schedules, in which individuals spend a mix of days at home and at work each week, is found to improve overall job satisfaction and reduced quit rates by one-third, without damaging performance (Bloom et al., 2024). However, the bilateral double taxation agreements with neighbouring countries set the tolerance threshold for remote work from abroad at 34 working days per year. If the threshold is exceeded, the salary is not taxed in Luxembourg but in the country of

residence (Luxembourg, 2024a). This limits the use of remote working from home as an effective solution for cross-border workers.

As a response, some big firms have opened satellite offices in small centres close to the borders with Germany, Belgium and France, in an attempt to offer more flexibility to their cross-border employees and reduce commuting time without breaching the 34 days threshold. While this solution might be effective in increasing the attractiveness of Luxembourg for cross-border workers, its scope is limited, as small- and medium-size firms might face logistic and financial constraints in applying it regardless of their sector of activity, and for in-person services and manufacturing workers teleworking is not a viable solution.

Enhancing family integration

Beyond the issues with housing and road congestion that affect the quality of daily life in the Grand Duchy, a better integration into society and the labour market of professionals and their families is key to attract and retain foreign talent, as less than half of foreign workers who started working and living in Luxembourg in 2015 were still residents in the Grand Duchy in 2020. Comprehensive programmes offering systematic support to foreign workers' spouses are not available in Luxembourg and the employment rate of foreign spouses is 16 percentage points lower than the employment rate of the principal migrant (OECD, 2023b). This negatively affects the probability of immigrant talents to come and remain in Luxembourg and constitutes an untapped source of talent.

Since 2023, non-EU accompanying spouses have immediate access to the job market as soon as they arrive, while before they had to apply for the salaried worker residence permit. This is an important change, but to be more effective it should be coupled with a more systematic support aimed at providing information on work opportunities and daily life in Luxembourg, adding to the already existing initiative of the public employment agency ADEM to hold information events. Finland and Estonia provide examples of good practices by including regular workshops and networking events, where spouses can learn about important information on how to settle in the country, its working culture and the availability of public childcare (OECD, 2023b). The programmes also encompass individual work-related counselling and mentoring by peers, including on how to design CVs and cover letters in accordance with the country's national standards.

Attracting non-EU nationals by easing visa procedures

Increasing the attractiveness of Luxembourg for non-EU nationals is key to meet specific skill demands. Accessibility in terms of migration policies and admission procedures plays an important role in determining countries' attractiveness. Non-EU nationals need to go through a structured procedure to come to Luxembourg to carry out a salaried activity for more than three months, after having signed an employment contract with an employer in Luxembourg. The procedure, which involves applications to be sent only on paper, can require from 1 to up to 4 months to issue a temporary authorisation. The waiting time for a long-stay visa that allows to remain in Luxembourg and the Schengen area for more than 90 days (type-D visa) might be even longer, while the median statutory limit in many OECD countries for the same kind of procedures is around 90 days (OECD, 2023b). These features might reduce the attractiveness of Luxembourg for non-EU nationals and create difficulties for employers posting vacancies abroad. Fully digitalising the different steps of visa and work permit processing should simplify and speed up the process, reducing barriers for foreign talent who want to apply to a job in Luxembourg (Box 4.4).

Migration policies have been made more responsive to labour market needs by easing immigration procedures for workers whose skills are scarce and in high demand. In June 2024, Luxembourg transposed in national legislation the new EU directive on the Blue Card. The last update of the directive in 2021 makes some admission conditions more flexible for highly qualified workers. The minimum duration of the work contract is now 6 months (previously 12 months), and the annual salary must be at least equivalent to the average salary (58,968 euros), while before it needed to be 1.2 or 1.5 times the average salary. The directive also imposes a limit of 90 days from the submission of the application to receive a final decision and simplifies the request of family reunification permits for the same duration of the Blue Card permission.

The procedure to recruit a non-EU national has been improved for professionals who do not meet the EU Blue Card criteria. For all vacancies covered by the official list of occupations in high demand, a work permit will be automatically delivered by the employment agency ADEM within 5 working days from the employer's request,

waiving the requirement to perform an assessment by ADEM of whether that particular position could be filled by a jobseeker in the national labour market (OECD, 2023b).

Box 4.4. Digitalisation of visa procedures: good practices from Australia and Canada

Empirical evidence shows the positive impact of digitalisation on reducing the length of the admission process, with artificial intelligence (AI) tools likely to reduce it even further (EMN-OECD, 2022).

Australia provides an example of good practices in digitalising its visa application system, as it reached a share of more than 93% of visa applications filed online by the end of 2021. The continuous development and improvement of the system over time, improving automated correspondence and assistance services, and the priority given to online applications, which were made mandatory for certain types of visas (work and holidays) in 2019, contributed to this result (OECD, 2023b).

Canada is a good example of introducing AI technologies to increase the effectiveness of the scrutiny process. The introduction of advanced data analytics to identify routine applications for streamlined processing has allowed to better use available human resources, and ultimately speed up the overall process (Canada IRCC, 2024).

Migration policies could also be strengthened to attract non-EU entrepreneurs, as this might favour the attraction of investment, talent and capacity for innovation (Ditsche et al., 2023) (Peroni et al., 2016). Luxembourg has programmes to encourage start-ups and entrepreneurship, also in collaboration with neighbouring countries. However, it does not have any specific legislative framework aimed at attracting start-up founders and innovative entrepreneurs from third countries (EMN, 2019). Portugal, which introduced a start-up visa in 2018 to attract high-potential immigrant entrepreneurs, provides an example of good practices (OECD, 2023c). In the Portuguese system, the applicants need to present an innovative business project and open a startup in collaboration with a Portuguese business incubator. Up to five partners may be included in the application, but the main applicant must be a non-EU citizen or resident. Applications can be filed completely online and IAPMEI, the specialised Portuguese agency for competitiveness and innovation in the scope of the Ministry of Economy, will review them and provide a final response by maximum 30 working days from the submission (IAPMEI, 2018).

Attracting and retaining young non-EU talents

Attracting international students and facilitating their transition into Luxembourg's labour market is an important way to respond to skills shortages and also to attract and retain young foreign talents. The international appeal of the University of Luxembourg has increased over the years since its foundation in 2003, also thanks to a structured inter-institutional strategy that encompassed merit-based scholarships to international students and a national branding campaign aimed at raising the international awareness about Luxembourg's assets. This has brought international students to represent more than 60% of the total students. However, while measures aimed at attracting talented students are providing good results, there are measures to be taken to maximise the possibilities to retain international talented students as professionals in Luxembourg, since less than 50% of international master and PhD graduates in the period 2014-2019 had a first registered employment in Luxembourg (OECD, 2022a). The support provided to students in establishing connections with Luxembourg's labour market during their studies should be enhanced. To this end, the authorised number of hours for working alongside studies might be increased beyond the present limit of 15 per week, and targeted career guidance services might be further developed.

Former international students from non-EU countries should be supported to remain in Luxembourg to look for a job following the completion of their studies. To this end, a job-search visa has been introduced. Non-EU students who have completed their diploma, bachelor's, master's, or PhD program and hold a residence permit for students in Luxembourg, or students who have a student residence permit valid in a first Member State and who are in Luxembourg on an educational mobility scheme, can apply for the purposes of finding a job or setting up a business. Following France's example, the validity period of the job-search visas has been extended to 12 months. However, many other OECD countries, such as Canada, Australia and Germany, allow for a longer duration, from 18 months up to three years.

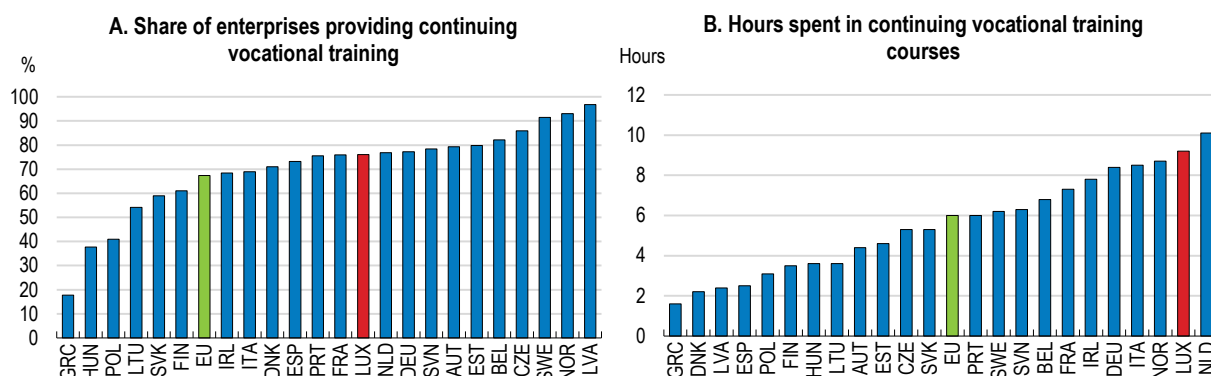
While the introduction of this visa represents an important and positive measure, some actions need to be taken to improve its effectiveness, as applications have been low so far. First, awareness among students needs to be raised. Second, even though recent cases indicate that the processing period has been shortened from the previous average of 90 days to around 4 weeks, streamlining the application process and reducing permanently the processing time would make it easier for graduates to transition smoothly without gaps in their legal status. New Zealand, with its average processing time for a post study work visa of around 6 weeks and 80% of demands processed within 3 weeks, provides an example of good practices (New Zealand, 2024) and its share of 50% of international students who extended their stay is one of the highest in the OECD (OECD, 2022b). Third, the eligibility might be expanded to include students who have completed short-term or vocational programs, as this could attract individuals with lower levels of education but with skills that are in high demand in Luxembourg. Australia's temporary graduate visa allows for this. Finally, the creation of a dedicated and simplified procedure for candidates who have already received a formal offer of employment from a Luxembourg employers could be envisaged.

4.3.3. Ensuring workers have good and relevant skills

Upskilling and reskilling the workforce can be powerful tools to confront skills shortages and raise human capital to the benefit of total factor productivity growth. Luxembourg firms are highly involved in workforce training, with the share of Luxembourg firms providing continuing vocational training courses in line with the shares in neighbouring countries and higher than the EU average (Figure 4.15, Panel A). The same applies to the number of hours spent in continuing vocational training by firms' employees (Figure 4.15, Panel B) and to the participation in formal and non-formal education and training by adult aged 25-64 (Eurostat, 2024). The existence in Luxembourg of various supporting measures to encourage the participation in learning activities, available to both employees and employers, is a positive step. However, there is ample space to enhance the effectiveness of these measures and improve the quality and the relevance of training activities.

Figure 4.15. Continuing vocational training is similar to or above neighbouring countries

2020



Source: Eurostat (Panel A) and Eurostat (Panel B).

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Strengthening support schemes for adult learning

The individual training leave (*congé individuel de formation*) is a key scheme in Luxembourg to encourage self-employed workers and individuals employed in the private sector to engage in training activities. Each worker has a total of 80 days of training leave during the entire career, with a ceiling of 20 days per two years. When workers take their days of training leave, the employer continues to pay their salary, but the government reimburses the employer for the wage costs as well as the employer's share of social security contributions. For self-employed workers, the government pays the individual a salary equivalent to their average daily earnings for every day of training leave. While employers can ask for training leave to be postponed guaranteeing the functioning of their company, they cannot oppose it. However, only about 1% of the total workforce in Luxembourg makes use of

training leave each year and the take-up is concentrated among young, male, high-skilled employees in the finance and insurance sector, who engage in training courses in finance and accounting (OECD, 2023). This limits the scheme's effectiveness, as it is used primarily by people who need it least, while low-qualified and older workers, those working in smaller businesses and self-employed workers, who would need it most, are rarely using it (OECD, 2019b).

The need to reform the individual training leave scheme to broaden its impact has been recognised in the 2023-2028 coalition agreement. Enhancing the customisation and targeting of current financial incentives to better support vulnerable groups would allow to increase the effectiveness of the support programmes. For example, additional financial incentives, such as training vouchers, might be provided to cover upfront costs and/or expenses related to training participation. These additional incentives might be targeted to employees with low qualifications and to develop highly demanded skills that are in short supply. More flexibility could also be allowed as to when the 80 days of training leave can be accessed over a career, especially for young low-qualified workers, as taking more training earlier in the career might improve their labour market prospects.

Training offers should be tailored to both workers' and employers' needs. Modularising training programmes, as done for example with the Skillsbridges and the Diplom+ programmes (Box 4.5), could foster a wider participation and can be particularly important for employees in micro and small enterprises, as it would allow to reduce the impact of training leave on their working time and so on the functioning of the firm. By contrast, courses could be made more intensive for the long-term unemployed and individuals in need of deep and fast reskilling to be fit for a new job (OECD, 2023).

Box 4.5. The Skillsbridges and Diplom+ programmes

The Skillsbridges programme, which started in September 2024, provides short-term courses designed to help adults to develop targeted skills that can be immediately applied in practice, with courses covering areas such as artificial intelligence, data analysis, cloud computing, as well as renewable energies and sustainability. The content of the training programmes is selected through labour market analyses and the curricula are regularly updated to ensure that these educational programmes are always up to date with employer needs and new trends in the labour market.

The Diplom+ programme, introduced in 2020, is addressed to secondary graduates holding a general and technical secondary education diploma or technician's diploma and who are either not sure of their choice of studies or willing to enter the labour market. The programme offers a common core with soft skills (e.g. employability, public speaking), transversal technical skills (e.g. project management), and green skills, as well as optional digital courses and practical training in crafts.

Both programmes are based on a modular architecture, which increases accessibility, participation, and flexibility, with the possibility to attend these courses while working, looking for a job or enrolling in higher education.

Guidance is a key part of encouraging people to improve their skills as across OECD countries the lack of adequate information on skills and learning outcomes has a concrete negative impact on participation to continuing vocational training courses, especially among low-skilled workers (OECD, 2020). Luxembourg established in 2012 the *Maison de l'Orientation* to offer a coherent and centralised service of lifelong skill development guidance to all individuals, delivered through a national "one-stop-shop". This includes support to identify people's capabilities, skills and interests, as well as to inform their professional and training activities, so that individuals become more resourceful in their own career management (CEDEFOP, 2020a). The establishment of the *Maison de l'Orientation* represents an important step, but there is space to enhance its effectiveness. The approach should be more proactive in engaging low-skilled adults, as they usually make less use of these structures. To this end, skills-development advice might be combined and preceded by awareness raising activities on the payoffs and advantages of reskilling and upskilling for workers. Employers' and employees' representatives might be taken onboard to design a coordinated strategy to better reach the targeted groups.

Improve the quality and relevance of adult learning offers

Training quality is important for the outcomes of investment in training and the attractiveness of training for individuals. Currently in Luxembourg's adult learning system, the Ministry of Education provides accreditation and certification to providers. However, the accreditation process and the selection criteria need to be made more rigorous to improve quality. Currently many employers in Luxembourg are concerned that the training provided to their employees is of low value in terms of addressing their employees' skills needs (OECD, 2023). Almost 90% of workers declare that a better quality of training would encourage higher participation (CEDEFOP, 2020b).

Setting up a certification agency encompassing relevant ministries, as well as employer and employee representatives could be a first step. Its aim should be to reevaluate from scratch the training providers and increase the quality standards required to grant them the certification as accredited training centres. The certification should be periodically renewed, in order to assure quality standards over time. Introducing a national certification procedure to become an adult teacher and a regular professional development requirement for these teachers would help to ensure and maintain high quality and effective teaching standards. Furthermore, a regular and systematic review process of curricula should be introduced to ensure labour market relevance. Switzerland's "eduQua" provides an example of good practices to be followed (Box 4.6).

Box 4.6. Raising the quality standards of adult education in Switzerland

In 2000 the Swiss Federation for Adult Learning (SVEB) – an umbrella non-governmental organisation representing both public and private institutions, associations, and personnel managers – introduced the quality label "eduQua" to ensure that providers of adult learning meet minimum standards.

In over 20 years since its introduction, eduQua has proved to be very successful in signalling quality of training provision. First, the certification process for the training centres to receive the quality label involves documentation but also on-site visits and yearly intermediate audits, allowing for a more accurate and thorough check of the quality of the formation offered in each centre. Second, the eduQua label certifies the whole institution, and not its individual courses, meaning the quality standards need to be high on each aspect, from curricula to structures and teachers. Third, the certification lasts three years, after which the provider must undergo a renewal, allowing for a continuous verification of quality. Fourth, among the required quality standards, there is also the minimum qualifications for teachers and further training to be followed by teachers themselves. Fifth, the certification process also takes into account the quality of training outcomes, measuring it through feedback from students and labour market performance of past participants. While the whole eduQua system is aimed at ensuring that centres provide high quality formation, this last requirement is aimed at specifically addressing a concern that many employers in Luxembourg have, pointing to reward centres that not only provide high-quality formation, but also teach labour market-relevant skills, allowing for a positive impact on both employees and employers.

Source: (OECD, 2021)

Since its creation, the University of Luxembourg has increased and refined its formal and informal adult learning offer. It provides both bachelor and master programmes for adults that can be pursued on a part-time basis, and a variety of shorter certificate programmes. The University of Luxembourg actively supports the alignment of the higher education offer to labour market needs, as the recent creation of the University of Luxembourg Competence Centre (ULCC) demonstrates. The centre, created jointly with the government, conducts regular studies analysing the skill needs in the labour market and also provides training courses (open online courses) to a variety of sectors. While this is a positive step, the uptake of adult learning courses should be increased. One key difficulty for professionals is the obligation to sign up for a whole bachelor or master programme, as modules are not transferable across programmes. Not providing the possibility to sign up for individual modules can hamper wider participation, as it might constitute a significant obstacle in terms of time and finances needed, ultimately making the adult learning offer less accessible.

To increase participation, module structure and size should be standardised across the whole university and the university should have an interoperable module structure across all the programmes destined to adult learning. This means that modular programmes should be structured to divide the formal education programmes into

smaller, self-contained units, with each one of them having its own curriculum and learning objectives. When the module is completed, this grants certified credits or partial qualifications. These credits or partial qualifications can then be tracked in a personal learning portfolio and combined into a full qualification over time, allowing for more flexibility and potentially lowering barriers to participation, contributing also to reducing the drop-out rate (OECD, 2023).

Encouraging a wider uptake of STEM disciplines

The share of residents who studied STEM disciplines at university is below the OECD and EU averages, while shortages in this field are particularly severe. Moreover, as in other OECD countries, the share of participation and graduation of female students in Luxembourg in these fields is significantly lower than that of male students. Recently, some policy initiatives have been taken to address these issues. “Gender4Stem” is an initiative aimed at combating stereotypes and sparking greater interest in STEM disciplines among girls through the creation of an online platform where educational and awareness-raising materials are available for use by secondary-level teachers. Luxembourg has also joined the network of European Space Education Resource Offices (ESERO), which provides learning material and inspiration for teachers wishing to bring space into the classroom. The Code Club is also active in Luxembourg, a non-profit organisation that involves volunteers, teachers and external professionals who imparts the basics of programming to students of primary and lower secondary school in weekly one-hour programming sessions.

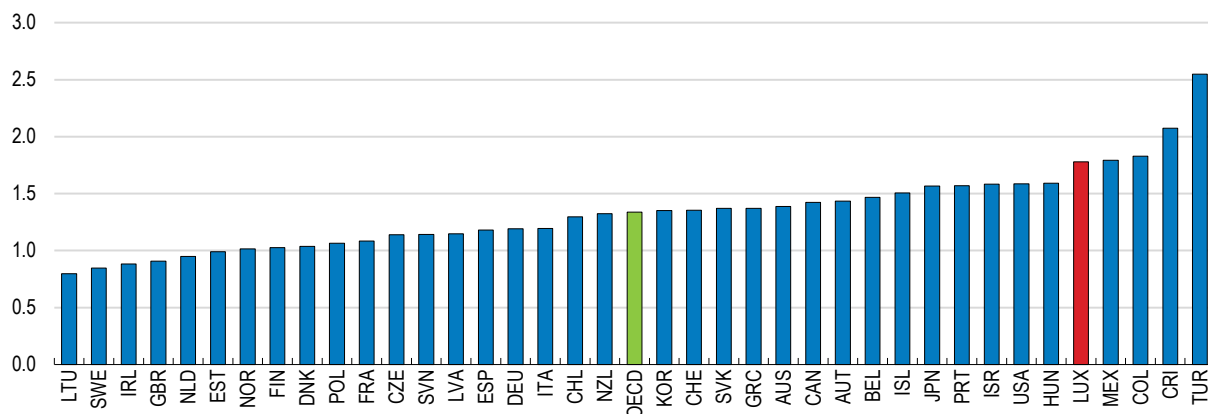
However, a more structured approach is needed, as many students who perform well in science at the high-school level do not consistently pursue scientific degrees afterwards at university level (Mysore, 2018). Together with sparking interest and combating stereotypes, a comprehensive career guidance service should be implemented to increase the uptake of STEM disciplines at the tertiary level. Finland provides an example of good practices, as it integrates career guidance into the education system from an early age, with the Strategy for lifelong guidance ensuring that guidance services are aligned with national education and employment goals (Cedefop, 2021). Finland has one of the highest proportions of bachelor's, master's and doctoral or equivalent graduates in the field of STEM among OECD countries (OECD, 2024). Moreover, schools helping students to understand the relevance and advantages of pursuing STEM-related subjects for their professional future have brought many students to pursue mathematics-related studies exactly because of the usefulness for their career (Kaleva et al., 2019).

4.4. Strengthening competition

Competition is a key engine of productivity growth, driving improvements both within firms and across the broader economy. Economies with more competition-friendly regulations consistently outperform those with more restrictive market environments, achieving higher rates of productivity growth (OECD, 2015). The OECD Product Market Regulation (PMR) indicator suggests high barriers to competition and market contestability (Figure 4.16), with Luxembourg performing poorly with respect to other OECD countries mainly because of barriers to competition in professional services, poor lobbying rules and improvable regulatory processes.

Figure 4.16. Barriers to competition are high

OECD Product Market Regulation indicator, index scale 0-6 from most to least competition friendly regulation, 2023



Source: OECD 2023 PMR database [Product market regulation | OECD](https://www.oecd.org/product-market-regulation/)

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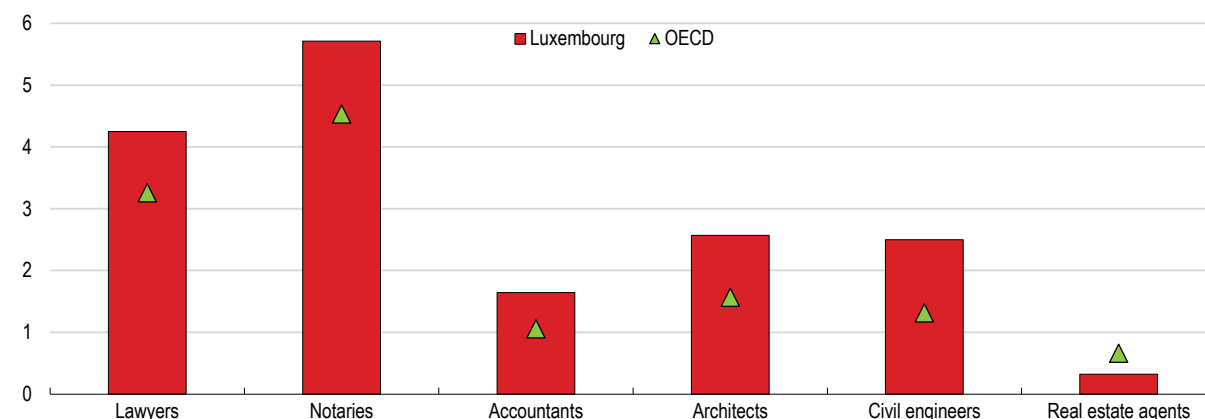
4.4.1. Reducing barriers to competition in services

Barriers to competition in professional services are high compared to other OECD countries (Figure 4.17). Professional services are instrumental to many other business activities, especially in the financial sector. They represent around 8.5% of non-financial employment, a share that is much higher than the EU and euro area averages. In many cases there is only one pathway to access the profession after the relevant university degree, which also requires passing a professional examination, and there is the obligation to be member of the relevant professional association to be allowed to practice the profession. Furthermore, in some cases, such as for notaries, competitive behaviour is hindered by the existence of binding maximum/minimum tariffs and the prohibition of any form of advertising and marketing.

Reducing or making these entry requirements more flexible, while preserving quality especially in the specific case of Luxembourg where the majority of these professionals have studied abroad, would allow to increase competition, encourage productivity enhancing practices and lower prices, to the benefit of all the enterprises that use them in their business. Norway provides a practical example of setting less stringent requirements for architects, that can become even more relevant for Luxembourg as the University of Luxembourg continues to develop and structure further its educational offer. While 5 years of education (3 years bachelor + 2 years master's) provided at three architect schools in Norway are required to practice the profession and sign projects, there is no mandatory exam to access the profession, nor is membership of one of the relevant professional associations legally required (ACE, 2024). A reform making entry requirements more flexible for civil engineers and architects is underway.

Figure 4.17. Barriers to competition in professional services are high, particularly for notaries

PMR indicator for professional services, index scale 0 to 6 from most to least competition-friendly regulation, 2023



Source: OECD 2023 PMR database [Product market regulation | OECD](https://stat.link/jzwd0p)

StatLink  <https://stat.link/jzwd0p>

In the retail sector, the requirement of specific authorisations for opening clothing, food and beverage retail outlets increases the administrative burden and discourages the entrance of new businesses. The permission of doing sales promotions only during some specific periods of the year limits entrepreneurial freedom and price competition. Geographical restrictions on where a pharmacy can be located, on the number of pharmacies that can be located in a given geographic area and the obligation that the opening and closing hours of pharmacies are determined by professional associations (OECD, 2024d). Luxembourg should reduce these regulatory barriers in the retail sector to encourage competition. For example, Ireland revoked in 2002 the establishment rules for the opening of new pharmacies. The Netherlands in 1998 prohibited establishment restrictions practiced by the pharmacy association. Norway abolished in 2001 the statutory establishment and ownership criteria for community pharmacies and horizontal and vertical integration were allowed, together with the permission of selling a restricted number of over-the-counter medicines outside pharmacies in 2003 (Vogler et al., 2012).

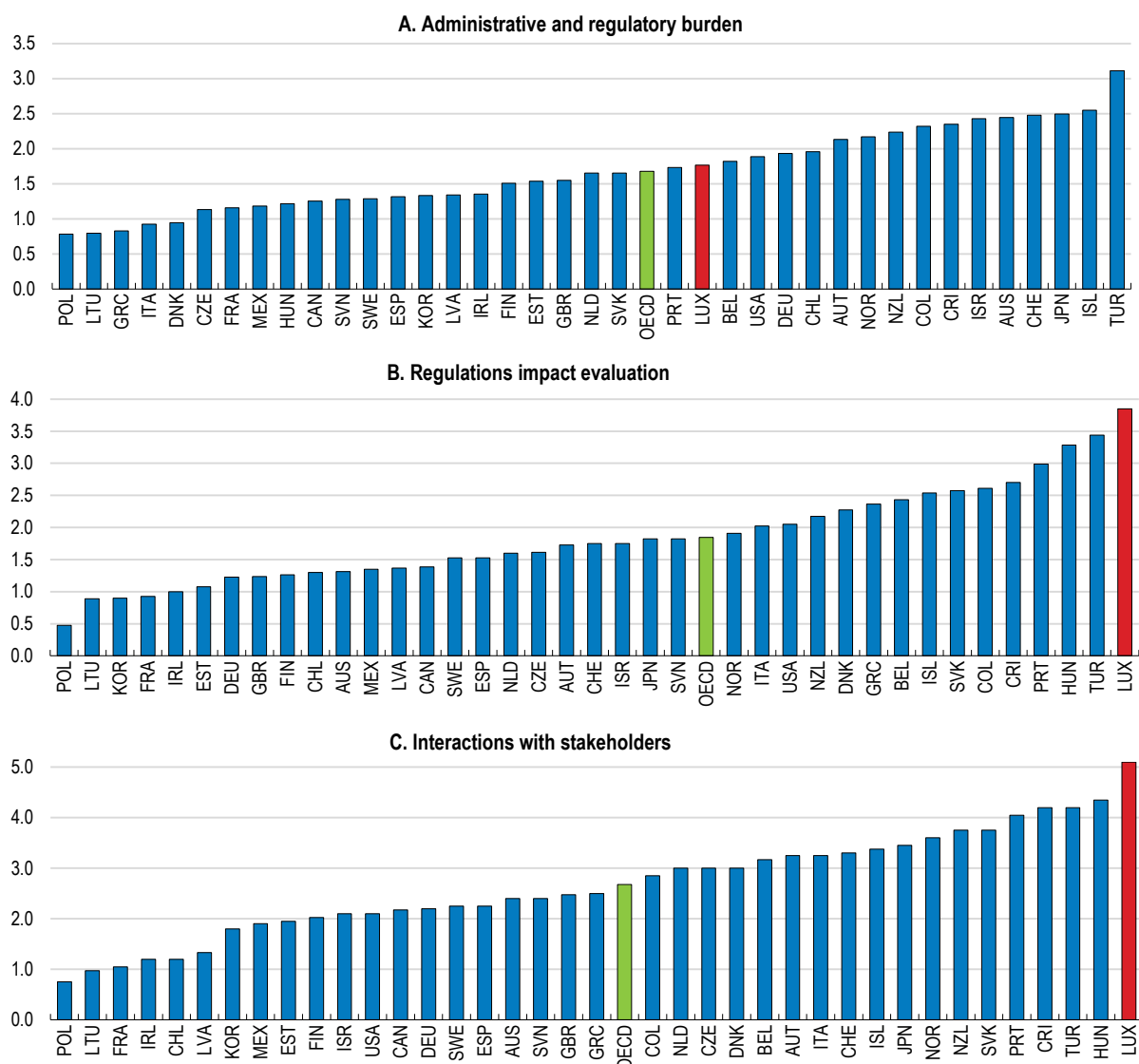
4.4.2. Lowering the administrative and regulatory burden

Complex laws and regulation that are associated with high compliance costs, cumbersome and unclear licensing procedures that require time-consuming paperwork and approvals are examples of how administrative and regulatory burden can concretely make it more difficult and costly for new competitors to enter a market, reducing overall competition. Moreover, these administrative and regulatory burdens often have a disproportionate impact on smaller entering firms, which often are the main drivers of innovation but that may lack the resources and experience to deal efficiently with complex regulatory environments (OECD, 2019).

Luxembourg has room to increase the quality of its regulatory process and reduce its administrative burden to the benefit of competition (Figure 4.18, Panel A). A regulatory process that fosters market dynamism needs to take into account the impact of new laws on competition and has to produce laws and regulations that are simple to understand and do not hinder entrepreneurial activity. However, in Luxembourg, the assessment of the impact of new laws and regulations on competition and the ability of businesses to innovate is not required (Figure 4.18, Panel B). Also, when such assessment is performed, there are not transparent, shared and clear guidelines on how to do so (OECD, 2024d).

Figure 4.18. There are administrative and regulatory obstacles and impact evaluation of regulations is weak

2023



Note: The scale of the indicator in each panel goes from 0 (more competitive) to 6 (less competitive)

Source: [Product market regulation | OECD](#)

StatLink  <https://stat.link/74cmo8>

A sound assessment of the impact and the effectiveness of new rules and laws through both ex-ante and ex-post evaluation is important to ensure that regulation is fit for purpose. To be effective, this assessment needs to be systematic and follow clear and well-established procedures. Flanders and Wallonia provide examples of good practices on public policy assessment. Flanders runs an evaluation unit within its Economy, Science and Innovation Department, which aims to initiate, supervise and monitor public policy evaluations through a transparent evaluation framework. In Wallonia, the *Institut wallon de l'évaluation, de la prospective et de la statistique* (IWEPS) leads its policy evaluations through a well-established process and each evaluation is described in detail and is published on the IWEPS website (OECD, 2024).

Quality regulation needs to be easy to understand, but in Luxembourg there is no legal requirement for the government to use 'plain language' in the drafting of new primary laws and subordinate regulations. The United States established through the 2010 Plain Writing Act and three different executive orders that regulations should be written in plain and clear language, be simple and easy to understand, with the final goal of minimising the potential for uncertainty and litigation arising from such uncertainty (USA, 2024).

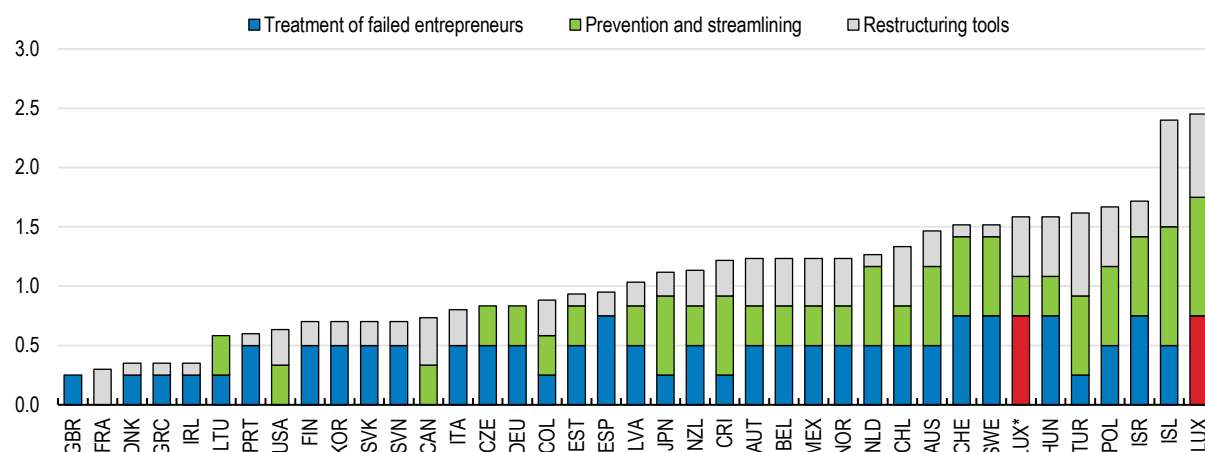
Luxembourg performs well below the OECD average when it comes to regulating lobbying activities, as the rules in place do not fully guarantee the transparency and accountability of these interactions (Figure 4.18, Panel C). The regulatory framework defines lobbying activities and establishes cooling off periods, but only for former members of government, not for other members of Parliament and lobbyists. The only disclosure requirement for lobbyists is to register in a public registry, but there are no sanctions for non-compliance and the register does not disclose the targeted legislation. Finally, members of the highest body of the judiciary and top-tier civil servants are not legally required to officially declare their interest to detect possible conflicts of interest (OECD, 2024c). This regulatory void may play a role in hampering competition, as it can benefit incumbents and larger firms, enabling them to shape rules in their favour at the expense of smaller businesses and new entrants.

Introducing the obligation to make publicly available the identity of the interest groups and public officials that were consulted in each interaction, together with the subject of their meeting, would be a substantial step to guarantee a level-playing field for both new entrants and incumbents. To this end the dedicated public register for lobbyists that was introduced in 2023 should be strengthened by imposing fair, objective, proportionate and dissuasive sanctions in case of non-compliance through disciplinary, administrative, civil and/or criminal processes (OECD, 2024c). France provides an example of good practice. In 2016 the Sapin II Act established that the High Authority for Transparency in Public Life may impose sanctions up to EUR 15000 and one-year imprisonment when legal requirements imposed to lobbyists are not met (European Parliament, 2018). Ireland provides a further example of good practices when it comes to regulate lobby activities, as it imposed disclosure obligations on policymakers and lobbyists to ensure transparency in their interactions, but it also imposed on public officials involved in the regulatory process both conflict of interest rules and a cooling-off period when leaving office (OECD, 2024).

4.4.3. Reducing barriers to firm exit

Effective insolvency frameworks are important to reduce barriers to exit markets and thus promote competition, efficiency and productivity growth in different ways. First, they help ensure that non-viable companies exit the market in a timely manner, allowing viable ones to restructure. This reduces the share of productive factors sunk in zombie firms and spurs the reallocation of capital and workers to more productive firms. Second, they promote entrepreneurship by offering a second chance to failed entrepreneurs. Not punishing entrepreneurs for their failure can promote risk taking, experimentation and thus innovation (OECD, 2022).

In 2023, Luxembourg deeply reformed its insolvency framework in line with implementation of the EU Directive 2019/1023 on preventive restructuring frameworks (Box 4.7). The recent reform has allowed Luxembourg to improve its performance in terms of the OECD insolvency indicator, which in 2022 placed the insolvency regime among the worst performing in all the three main subcomponents: treatment of failed entrepreneurs; prevention and streamlining; and restructuring tools (Figure 4.19). The reform has positively impacted all the three pillars as it has addressed many of the problems of the old system. It has introduced an early warning mechanism; repealed outdated and ineffective procedures such as controlled management and introduced new and more agile mechanisms to prevent distressed companies from systematically resorting to bankruptcy. However, more can be done to narrow the gap with the most favorable regimes even further. An example is the treatment of failed entrepreneurs. The new insolvency law has introduced a debt discharge mechanism for good-faith debtors. While this is positive step, further reducing the time to obtain debt discharge from the present 18 months would incentivise entrepreneurship and experimentation even further.

Figure 4.19. A major reform has improved the insolvency framework

Note: The scores for the three main sub-categories are scaled from zero to one, with lower scores indicating more favourable framework. LUX* refers to the new insolvency regime, after 2023 reform. LUX refers to the old regime.

Source: [OECD \(2022\), "Enhancing insolvency frameworks to support economic renewal"](#).

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Box 4.7. The 2023 reform of the insolvency framework

The law of 7 August 2023 on business preservation and modernisation of the bankruptcy regime entered into force on November 1, 2023, bringing many novelties with respect to the old insolvency framework.

- While the previous framework was focused only on commercial entities, the scope of application of the new regime has been broadened, including special limited partnerships, non-trading companies and artisans. Financial firms, pension and investment funds and insurance companies are still excluded.
- The preventive arm has been enhanced. Before there was no formal early warning system, while the new framework grants the possibility for the Ministry of Economy to access certain information, including payment defaults, in order to identify companies facing financial difficulties and invite them to discuss how business continuity can be ensured. To improve the detection of companies on financial distress, a special evaluation committee for businesses in difficulties (*Cellule d'évaluation des entreprises en difficultés*) has been created with members designated by the Minister of the Economy amongst the personnel of some of the main state administrations.
- The new regime introduces the figure of the conciliator, who can be appointed at the request of the distressed company to assist the debtor with the reorganisation of all or part of its business.
- The reform introduced two new proceedings as alternatives to insolvency: reorganisation by settlement agreement and the judicial reorganisation procedure. The reorganisation by settlement agreement is a voluntary out-of-court proceeding where debtor companies can propose amicable agreements to creditors for reorganising their assets or activities, with or without the assistance of a conciliator, and these agreements, once approved by the court, become enforceable and remain confidential. The judicial reorganisation can be carried out either by amicable agreement, by adopting a plan or through a court-ordered transfer.
- Some provisions of the bankruptcy procedures have been amended. Now the bankruptcy procedure can also be initiated by the public prosecutor; fraudulent bankruptcy has been decriminalised as it will now constitute an offence and no longer a crime, with the aim of easing prosecution, and offences of both simple bankruptcy and fraudulent bankruptcy have been extended to also apply to the company's managers.

The 2023 reform is a major positive step as it aims to foster company reorganisation over liquidation, promoting business continuity. Efficient implementation of the new framework is key to see tangible progress and to be sure this reform simplifies the processes related to companies' insolvency without risking doing the opposite through heightened uncertainty, longer procedures and administrative complexity. Doing so poses some challenges. First, the new regime provides debtors and creditors with additional options, but this implies that it imposes additional duties and obligations on court officers and other relevant bodies involved in insolvency procedures. Second, the reform also introduces new profiles such as company conciliator and the judicial agent. Third, the introduction of new procedures and professional figures requires a substantial dissemination effort to make sure all stakeholders are aware of the various options to make adequate choices when facing financial distress situations.

In view of this, a viable option to be sure courts are equipped with the right expertise to handle the new procedures and tools to deal with insolvency matters would be to create specialised insolvency courts, equipped with specialised judges and administrative staff, as the US did when it established specialised Federal Bankruptcy Courts (US Courts, 2024). France in 2015 created specialised commercial courts to handle complex insolvency proceedings. As normal commercial courts dealing with simpler insolvency procedures in France, these courts are composed by lay, non-professional judges, who are usually peer-elected former or current company managers or entrepreneurs, as they possess the right expertise to deal with these technical matters (France - Ministère de la Justice, 2024).

Table 4.4. Policy Recommendations to raise productivity growth

MAIN FINDINGS	RECOMMENDATIONS (key in bold)
Enhancing innovation and technology adoption	
R&D support is provided by various institutions, with different application procedures and selection criteria, and the allocation of grants is institution based rather than project based.	Establish a coordination mechanism to streamline public R&D support, while making it more project-oriented and conditional on public-private partnerships.
Technology adoption lags behind top-performing countries.	Streamline the investment tax credit and make incremental digital and technological improvements eligible.
Firms rely massively on bank financing. Alternative sources of financing, such as venture capital, remain underdeveloped.	Encourage venture capital supply from individuals through targeted fiscal incentives and enhance financial literacy among managers to increase demand.
Easing skills shortages	
Lengthy visa procedures complicate the hiring of non-EU nationals.	Fully digitalise the different steps of visa and work permit processing and introduce an ad-hoc visa to attract high-potential immigrant entrepreneurs.
The uptake of the individual training leave is very low and unbalanced, being lower among low skilled and older workers.	Enhance the customisation and targeting of current training incentives and develop more proactive guidance.
Accredited training providers are numerous, and the quality and relevance of courses is not always of the highest standards.	Tighten quality control by creating a national accreditation agency that encompasses the relevant ministries and the social partners.
Luxembourg has lower than EU and OECD shares of residents who study STEM disciplines at university.	Develop a comprehensive career guidance service, integrated into the education system from an early age, showcasing the advantages of choosing STEM-related subjects at university for career's prospects.
In recent years, less than 50% of international master and PhD graduates had a first registered employment in Luxembourg	Extend the limit on authorised number of hours for working alongside studies and streamline the application process for a job-search visa, reducing the processing time.
Strengthening competition and market dynamism	
Barriers to entry in professional services are high A reform to make entry requirements more flexible for civil engineers and architects is underway.	Review the requirement to be member of a professional association and to pass a professional examination on top of a formal education degree.
There is no requirement to assess the impact of new laws and regulations on competition nor to use plain language in writing norms.	Introduce ex-ante and ex-post evaluation of the impact of regulation on competition. Introduce the requirement to use plain language in drafting new law and regulation.
Lobbying regulations do not guarantee full transparency and accountability.	Require full disclosure of the identity of lobbyists and public officials for each interaction.
The insolvency framework has been reformed, but a gap with top performing countries remains.	Support the new insolvency framework by creating specialised insolvency courts and further reduce the time to discharge debt for good-faith debtors

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April 2025

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As Luxembourg increasingly faces capacity constraints, transitioning from labor force expansion to a growth model centred on skills and innovation is essential. Workforce upskilling, targeted innovation support, and stronger competition in the services sector would revitalise stagnating productivity. Securing the sustainability of the pension system requires a comprehensive reform in the near term to manage expenditures and boost revenues. Continuing the development of public transport and alternative mobility options, coupled with adjustments to fuel pricing and taxation of internal combustion engine vehicles, will help to meet climate targets.

SPECIAL FEATURES: SECURING THE PENSION SYSTEM FOR FUTURE GENERATIONS, MANAGING THE GREEN TRANSITION AND REVIVING PRODUCTIVITY GROWTH



PRINT ISBN 978-92-64-91894-8
PDF ISBN 978-92-64-84268-7

