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PARLIAMENT, THE EUROPEAN COUNCIL, THE COUNCIL, THE EUROPEAN
CENTRAL BANK AND THE EUROGROUP**

**2019 European Semester: Assessment of progress on structural reforms, prevention and
correction of macroeconomic imbalances, and results of in-depth reviews under
Regulation (EU) No 1176/2011**

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EXECUTIVE SUMMARY

While recent economic trends in Luxembourg pointed to a moderate economic expansion, prospects are now clouded by a deteriorated external environment, to which the economy is highly sensitive. Although the economy is forecast to continue growing, this could signal a need for Luxembourg to step up efforts to address key structural issues potentially hindering a more sustainable economic growth. At the current juncture, public finances remain sound and strong job creation is feeding into low unemployment. The country could bolster its economy and improve the conditions for sustainable growth by ensuring that labour supply and skills levels match labour market needs. This, in turn, would help to better address the long-term health of public finances. The resilience of the economy would also be strengthened by further diversification efforts through engaging the domestic business and investment community in the current technological and digital transformation. Private and public investment is needed to foster innovation, improve housing and transport infrastructure, and stimulate inclusive skills development. ⁽¹⁾

After slowing to 1.5 % in 2017, GDP growth picked up again and is estimated to have reached 3.0 % in 2018. Growth has been supported by a sizeable expansion in exports of (mainly financial) services, Luxembourg's main economic driver, which had been exceptionally weak in 2017. Private consumption growth also strengthened in 2018, building on an improvement in the labour market and higher disposable incomes as a result of taxation reforms and a new wage indexation from August 2018.

Growth is projected to decelerate to 2.5 % in 2019. The slowdown in world trade, and euro area GDP growth, has contributed to higher volatility in financial markets. A broad set of indicators suggesting that these trends may continue in 2019 has weakened growth prospects for financial

services and the economy as a whole. Therefore, external trade is expected to weaken markedly. This should drive down GDP growth despite supportive domestic demand, which is forecast to provide the main contribution to growth in 2019.

Business investment is set to remain subdued, reflecting lower expectations of economic growth and greater uncertainty. Business investment is projected to remain below 11 % of GDP, one of the lowest rates in the EU, while residential investment is also set to remain low in contrast with the high demand for housing. Productivity remains among the highest in the EU but it has declined since 2014, as GDP has grown more slowly than employment. While the recent downward revisions of past GDP growth seem to reflect exceptional events and methodological changes, they cast additional doubts on the reliability of statistics in general and productivity figures in particular.

Luxembourg's public finances remain sound. The general government balance is estimated to have posted a surplus of around 1.3% of GDP in 2018 and it is forecast to remain in surplus in 2019. General government debt is expected to continue to fall in 2019, from around 21 % of GDP in 2018 (well below the 60 % threshold). However, significant budgetary challenges could remain in the long term, with population ageing and growing benefit ratios driving up spending on pensions and healthcare.

Focussing investments ⁽²⁾ on fostering digitisation and innovation, improving housing supply and sustainable transport infrastructure, and stimulating skills development would improve economic resilience, and strengthen the long-term potential growth of Luxembourg. Public investment remains high and focussed on knowledge-intensive sectors, including a strong Information and Communication Technology sector. However, this has not spilled over, nor helped to stimulate private investment in innovation and digitisation, which remains low and appears insufficient to support the transition to a data-driven economy, and to improve significantly the low levels of economic digital integration and sluggish productivity growth. While firms

⁽¹⁾ This report assesses Luxembourg's economy in light of the European Commission's Annual Growth Survey published on 21 November 2018. In the survey, the Commission calls on EU Member States to implement reforms to make the European economy more productive, resilient and inclusive. In so doing, Member States should focus their efforts on the three elements of the virtuous triangle of economic policy — delivering high-quality investment, focusing reforms efforts on productivity growth, inclusiveness and institutional quality and ensuring macroeconomic stability and sound public finance.

⁽²⁾ Both private and public investment.

increasingly perceive the shortage of qualified workforce as an obstacle to investment, heavy traffic congestion and insufficient housing supply may also be negatively affecting the country's attractiveness (see Section 3.2), which calls for significant investments in construction and sustainable transport infrastructure (see Section 3.4). Effective investments in education and training are needed to make the most of people's potential and thus improve inclusion and employability, and foster technological and digital transformations to improve productivity and long-term growth potential (see Section 3.3). Annex D identifies key priorities for support by the European Regional Development Fund and the European Social Fund Plus for the 2021-2027 period in Luxembourg, building on the analysis of investment needs and challenges outlined in this report.

Overall, Luxembourg has made limited progress in addressing the 2018 country-specific recommendations.

There has been limited progress in the following areas:

- Increasing employment among older people, by enhancing their employment opportunities and employability, and further limiting early retirement.
- Further reducing regulatory restrictions in the business services sector. Such restrictions remain above the EU average in most regulated professions.

Regarding Luxembourg's progress towards its national targets under the Europe 2020 strategy, the employment rate target of 73 % is still out of reach despite substantial job creation. Luxembourg almost complies with the municipal waste recycling target of 50 % and is broadly on track to reach the targets for energy efficiency. On the other hand, it is at risk of failing to meet the targets for reducing the risk of poverty or social exclusion, early school leaving, post-secondary educational attainment, research and development intensity and reducing greenhouse gas emissions.

- **Luxembourg performs overall well on most indicators of the Social Scoreboard**

supporting the European Pillar of Social Rights. The labour market is performing very well, and social indicators on inequality, poverty and exclusion, remain close to or above the EU average, despite some signs of weakening. Significant skills shortages have emerged recently in certain sectors and school pupils' opportunities are still strongly influenced by their socio-economic status.

Other key structural issues analysed in this report, which point to particular challenges for Luxembourg's economy, are the following:

- **Despite recent reforms, pension-related and long-term care costs are still expected to increase markedly in the long term.** Recent projections of long-term trends in pensions and long term care expenditure point to risks to the sustainability of public finances. In its 2018 report, the government's pensions working group discussed various ways to improve long-term pension sustainability – the contribution rate could be increased gradually, the pensionable age could be raised to take account of longer life expectancy, and phased retirement could be encouraged. The report suggests a multi-pronged strategy of calibrated reforms to guarantee the long-term sustainability of the system while minimising the impacts on both the economy and pensioners.
- **Projected increases in expenditure threaten the long-term sustainability of the healthcare system.** The 2018 reform of long-term care insurance is expected to ensure financial viability until 2030. The government finances 40 % of long-term care expenditure. The reform will gradually increase workers' contributions to the healthcare system from 1.4 % of the wage base to 1.7 %, keeping costs in line with the proportion of dependent people.
- **Luxembourg's total tax burden as a share of GDP is close to the EU average.** Luxembourg's corporate income tax revenues are above the EU average while revenues from taxes on consumption, recurrent property and environmentally oriented taxes are all below the EU average as a share of GDP. The recent coalition agreement has announced a number

of tax reforms in support of the country's environmental commitments.

- **Luxembourg's tax rules appear to be used by multinationals engaged in aggressive tax planning structures, but some steps are being taken to limit such practices.** Some elements that may facilitate tax planning include the absence of withholding taxes on interests and royalties as well as possible exemption on dividends. However, Luxembourg has taken steps to amend aspects of its tax system to curb aggressive tax planning, in particular by implementing European and internationally agreed initiatives.
- **As one of the world's largest financial centres, Luxembourg is deeply integrated in the international financial industry's global value chain.** The financial sector is the main engine of the country's economy, accounting for 25 % of GDP, 11 % of employment and 21% of fiscal revenues. Luxembourg's banks display solid capital ratios. Despite a weakening in 2017 and 2018, their profitability remains comfortable and reflects a diversified revenue mix. Banks need to deposit large sums at the Central Bank to comply with liquidity ratios. Recent stress tests have found that banks would be able to withstand real-estate price shocks and high default rates. Potential risks stemming from the interconnectedness between banks and funds appear limited.
- **Despite being wealthy at the aggregate level, households have high levels of debt compared to their incomes.** Rising household indebtedness stems in particular from increasing property prices, as mortgage loans account for around 80 % of household debt. Increasing debt means that some lower income households may struggle to make ends meet, particularly if interest rates go up or if there is an economic downturn.
- **House prices continued to rise in 2017 and the first half of 2018, but not as much as in previous years. Rising rents and property prices could affect competitiveness and social inclusion.** The strong housing demand remains driven by population growth, favourable financing conditions and a large cross-border workforce. Housing supply and investment appear insufficient, constrained by insufficient land availability and low housing density, largely due to a lack of incentives for landowners to build new housing. The supply of social housing also appears insufficient and points to a need for significant investment to alleviate rising tensions in the housing market.
- **Luxembourg plans to take measures to stimulate housing supply.** These include changes to urban planning laws to increase building areas and develop affordable and social housing. Other measures involving land purchase, new tax incentives and technical assistance for municipalities should increase the amount of land available for building. Planned incentives are expected to encourage owners to sell or rent out properties that are currently vacant. Public authorities may also be given stronger powers for the compulsory purchase or exchange of land to unblock development projects.
- **Unemployment is low and the current favourable economic environment results in strong jobs creation.** However, certain groups are still less likely to find work. People aged over 50, people with disability and workers with reduced working capacity make up a large share of the long-term unemployed. Many employment measures aim to help the most vulnerable jobseekers (in particular those aged 45-50 or more) back into work.
- **Nevertheless, the employment rate among older workers has stagnated since 2010 and remains among the lowest in the EU (39.8% in 2017).** Limited progress has been made on reducing early retirement and targeted policies have so far failed to encourage significantly more older people to work or look for a job. Age management strategies, which should also help to keep older workers in employment, have not been a legislative priority so far.
- **Although social benefits play a pivotal role in lifting people out of poverty, their impact has weakened further and inequality got worse in 2016.** The minimum income arrangements are being reformed to tackle social exclusion (in particular for households

with children), encourage people to look for work or training and remove disincentives to work. The *Revenu d'inclusion sociale* scheme replaced the previous scheme in January 2019. Its success will depend largely on whether beneficiaries can find successful pathways back to work.

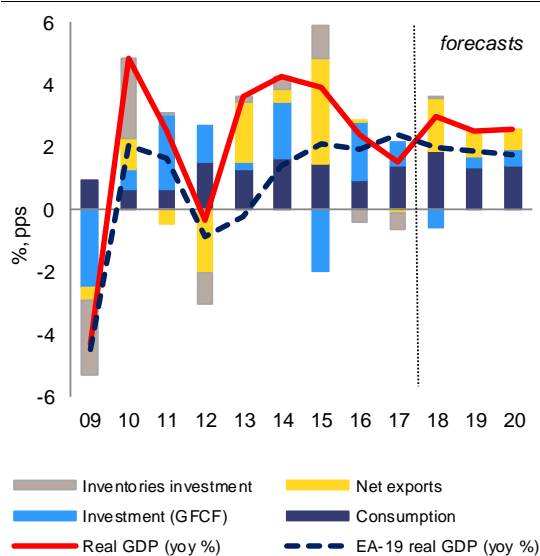
- **Luxembourg is among the best performers in the EU in terms of tertiary education attainment, but the basic skills of 15-year-olds are below the EU average.** Performance is strongly influenced by students' linguistic background and socio-economic status. Several measures have been taken to close the performance gaps among pupils of different backgrounds.
 - **To become more employable, people need skills and training that are more in line with employers' needs.** The public employment service has stepped up its cooperation with employers to ensure that their needs are met. Investing in skills development, including training courses for jobseekers (in particular those aged 30-45), in response to requests from employers, remains a priority.
 - **Overall productivity has remained high, even in the difficult 2007-2010 period, but no significant gains have been recorded since 2014.** Luxembourg's productivity gains were obtained from its involvement in global (largely financial) markets. However, cost competitiveness indicators are worsening, partly reflecting the sluggish productivity growth. The cost of labour, per unit of output, grew by 5.2 % in 2017, after very limited increases in previous years (around 1%, on average, between 2013 and 2016). This was due to a further decline in labour productivity coupled with a wage indexation, triggered (from January 2017) by a sharp rise in inflation. However, these trends eased in 2018.
 - **Luxembourg's export market shares for goods and services exports recorded a net loss of 4.5 % in 2017.** Luxembourg is highly dependent on the contribution of foreign trade to economic activity, domestic employment and public finances. Intermediate inputs account for 70 % of the country's trade,
- suggesting a high level of market integration, in particular for financial activities.
- **Luxembourg has kept up its efforts to strengthen knowledge-intensive sectors and pursue its economic diversification strategy.** Stronger private investment in research, technological innovation and digitisation can be key drivers of productivity growth and of the transition to a data-driven economy. The weak connection between the public science base and businesses calls for action to promote knowledge transfer to firms. The lack of a national research and innovation strategy and stagnant public support for business research and development investments, are among other challenges that prevent Luxembourg from exploiting the full potential of its innovation eco-system.
 - **Ambitious climate and energy policies can provide Luxembourg with opportunities for growth and jobs** through increased productivity, diversification of exports and business creation. Additional measures, as envisaged in the new coalition agreement, could contribute to bridge the gap to reach Luxembourg's 2020 and 2030 decarbonisation targets.
 - **Regulatory barriers remain in the business services sector, and some bottlenecks weigh on the business environment.** Regulatory restrictions in business services remain above the EU average for several economically important professions. Measures have been taken to ease restrictions in the retail sector.
 - **Luxembourg's location at the crossroads of one of the EU's most economically dynamic regions gives rise to significant mobility issues.** Traffic congestion, low air quality or long commuting times affect many cross-border workers. The projected increase in population and the number of commuters will require significant investments in infrastructure, including, education and health services.

1. ECONOMIC SITUATION AND OUTLOOK

GDP growth

After slowing to 1.5 % in 2017, GDP growth picked up again and is estimated to have reached 3.0 % in 2018. Growth has been supported by a sizeable expansion in exports of services (mainly financial), Luxembourg's main economic driver, which had been exceptionally weak in 2017 (Graph 1.1). However, historical figures need to be taken with caution given the frequent and substantial revisions to Luxembourg's national accounts data ⁽³⁾. Private consumption growth also strengthened in 2018, on the back of an improvement in the labour market and higher disposable incomes as a result of taxation reforms and new wage indexation from August.

Graph 1.1: Breakdown of real GDP growth



Source: European Commission

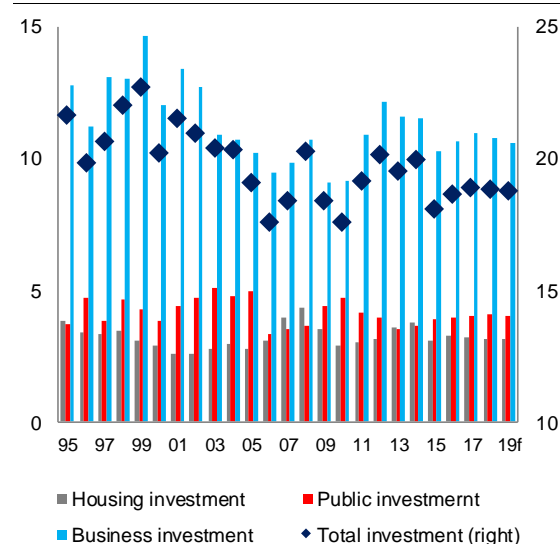
According to the Commission's winter forecast, growth is projected to decelerate to 2.5 % in 2019. The slowdown in world trade, and euro area GDP growth, has contributed to higher volatility in financial markets. A broad set of indicators suggesting that these trends may continue in 2019

⁽³⁾ In October 2016, GDP growth for 2015 was revised down to 3.5 % from the June estimate of 4.8 %. In March 2017 GDP growth for the same year was revised up to 4.0 %. In March 2018, GDP growth for 2015 and 2016 were revised down to 2.9 % and 3.1 % from 4.0 % and 4.2 %, respectively. In October 2018, the estimate for 2016 was further revised down to 2.4 % from 3.1 % and growth for 2017 was also lowered to 1.5 % from its first estimate of 2.3 %.

has weakened growth prospects for financial services and the economy as a whole. Therefore, external trade is expected to weaken markedly. This, in turn, should drive down GDP growth, despite supportive domestic demand, which is forecast to be the main growth driver in 2019.

The recovery of net exports of goods and services in 2018, reflects somewhat a normalisation, after an exceptionally weak outcome in the previous year. Nevertheless, growth is projected to drop subsequently as the external environment becomes less supportive. Exports rebounded in 2018, after stagnating over 2016 and 2017. These developments mainly reflect a recovered dynamism in the financial sector after a period of reduced activity, including the exceptional exit of a few large companies, which ceased activities in the place. Although these developments did not change significantly the weight of the financial sector in the economy, they entailed a reduction in the balance of externally oriented operators. Increased uncertainty and less support expected from the external environment are projected to moderate the external sector contribution to GDP growth.

Graph 1.2: Composition of investment spending (% GDP)



Source: European Commission

The deceleration projected for business investment reflects lower expectations about economic growth amidst increased external uncertainty (Graph 1.2). Some cyclical effect is

also expected, as growth will slow down and should stay close to potential. The business investment-to-GDP ratio is projected to remain below 11 %, which is one of the lowest in the EU.

Investment in construction has been buoyant thanks to public infrastructure projects and non-residential buildings. However, residential construction remains low. The housing investment-to-GDP ratio of around 3.2% should remain stable despite the high demand for housing. While supply constraints remain entrenched, price pressures are expected to build up further (see section 3.2.3). As the government investment cycle gets started, following the general elections in 2018, public investment might slowdown in 2019. Nevertheless, the public investment-to-GDP ratio is expected to remain stable at around 4.0 % of GDP, which is among the highest in the EU.

Potential growth

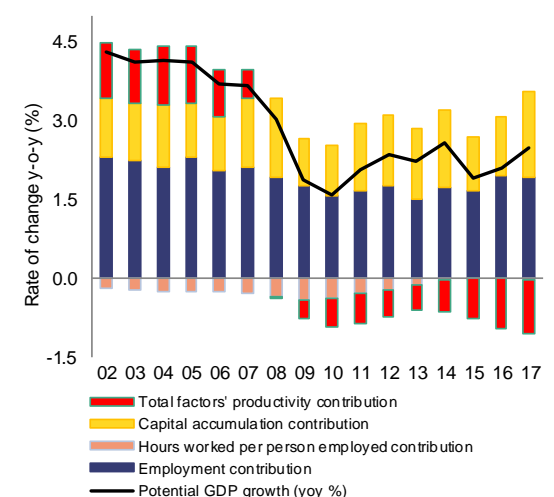
Potential growth has halved compared to pre-crisis records, due to total factor productivity slowdown slowdown. Annual estimates of potential GDP growth were revised down by 0.4 pps on average, between 2010 and 2017, albeit significantly more in 2016 and 2017. Potential GDP growth averaged 2.1 % in the period 2010-2017, compared with 4.1% in 2001-2007. A larger decline in total factor productivity underlays the new estimates of potential growth (Graph 1.3). Revised data also suggest that the decline in productivity since the global crisis has been larger (see Country Report, 2018) and its pace accelerated in the four years to 2014. Large productivity losses in 2015, 2016 and 2017 deserve special attention, as they were concurrent with exports stagnation and GDP slowdown, amid an allegedly supportive economic environment.

Lower growth coupled with high job intensity resulted in a degradation of labour productivity. This might point initially to a situation of labour hoarding ⁽⁴⁾. However, statistics on firms' results show that profitability was maintained overall and, in particular, in the banking sector. Notwithstanding the likelihood of some labour hoarding behaviour by firms, as

⁽⁴⁾ Labour hoarding refers to the practice in which a company does not lay off employees when it otherwise would (as during an economic slowdown).

skilled labour shortages are being reported in some sectors, it seems to exist also some inconsistency between the revised national accounts and the results of the business and labour surveys. Indeed, the frequent revisions of national accounts-data are witness of the uncertainty surrounding national accounts statistics, which need to be taken with caution, including the fall in productivity growth. Overall, Luxembourg continued showing among the highest levels in labour productivity, real GDP per head and trade openness in the EU.

Graph 1.3: Breakdown of potential GDP growth

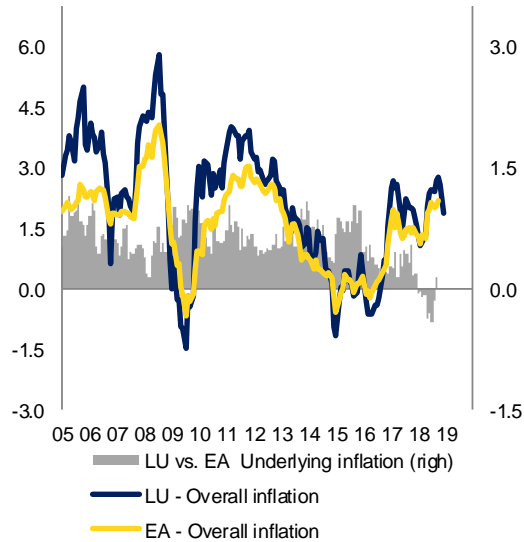


Source: European Commission

Inflation

The Harmonised Index of Consumer Prices inflation fell marginally to 2.0 % in 2018 from 2.1% in 2017, slightly above the euro area, where the average was 1.8 % (Graph 1.4). Inflation was sustained mainly by mainly oil price movements. Oil prices are assumed to ease significantly in 2019, which should drive down headline inflation to 1.6%, although this effect will gradually dissipate in 2020. At the same time, domestic price pressures, including from past wage increases, are set to reassert their influence and headline inflation should increase from 1.6% in 2019 to 1.8% in 2020.

Graph 1.4: Consumer inflation



Source: European Commission

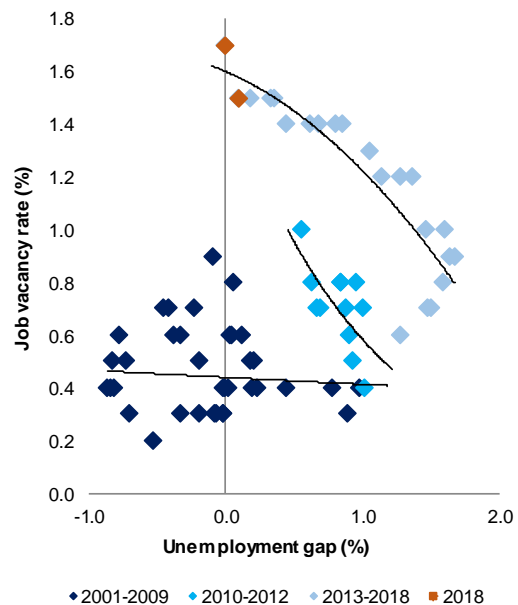
Labour market

Luxembourg labour market is growing at a robust pace. Employment growth accelerated markedly over the first half of 2018, to near 4 % (y-o-y) in July, when it started decelerating. On average it increased by 3.7% in 2018, after 3.4 % in 2017. This growth momentum appears to have moderated, with employment growth stabilising progressively. The unemployment rate continues to fall, also helped recently by a deceleration in active population, which is largely driven by inflows of new residents, especially from border countries. Resident employment (used for computing the unemployment rate) is rising markedly, helping to curb the unemployment rate. Unemployment fell to 5.3% in 2018, from 5.6 % in 2017. This downward trend is forecast to slowdown progressively, stabilising towards 2019. Youth unemployment decreased from 19.1% in 2016 to 15.2% in 2017 and reached 12.3% in the last quarter of 2018 while the rate of young people not in employment, education or training is very low.

Notwithstanding the recent labour market reforms and the good performance in terms of job creation, additional efforts are needed to improve inclusion of certain population groups in the labour market. In particular, the

employment rate of older workers remains substantially below the EU average. Part time underemployment has increased but remains at relatively low levels compared with other Member States. In time, labour market shortages have become more apparent in some industries and evidence points also to lower matching capacity. Estimates of the Beveridge curve hint at two outward shifts and higher steepness of the curve over 2010-2012 and 2013-2018 and a deterioration of matching mechanisms (Graph 1.5). Such evidence indicates the possibility of shortages arising at higher levels of unemployment under intense recruitment needs ⁽⁵⁾.

Graph 1.5: Beveridge curve



Source: European Commission

Despite the expected closure of the unemployment gap ⁽⁶⁾, there remain some important ‘pockets’ of untapped capacity. The most significant ones stem from low participation of older people, immigrants and women (in particular non-EU-born women), as well as among

⁽⁵⁾ Drumetz, F. and R. Lecat (2018). ‘Is the French labour market under pressure?’. Banque de France, Eco Notepad, June

⁽⁶⁾ The unemployment gap is computed as the difference between the actual unemployment rate and the corresponding estimate of the non-accelerating wage rate of unemployment.

those with lower skill levels. The observed outward shift of the Beveridge curve since 2010 is consistent with evidence of labour shortages (as reported in business surveys) arising at comparatively higher levels of unemployment due to lower matching capacity (e.g. skills mismatch). Such shortages are also compatible with the prevalence of lower employment rates than before the crisis among those with lower skills, which together with lower matching efficiency, amplifies frictions in job-to-job transitions between different sectors. Demographic policies would need to concur with education and training policies, taking a holistic approach to consider both the challenges and possibilities of changes in demography as well as in the digital economy, in order to sustain social cohesion and public finances, as population ageing remains a challenge in the long term.

Social developments

Poverty and social exclusion risks are increasing but they are still among the lowest in the EU. Income inequality remained stable in 2017 at the level just below the EU average but the overall risk of poverty or social exclusion (AROPE) situated at 21.5% in 2017, below the EU average (22.5%), but it is trending upward. In 2017, in-work poverty was the second highest in the EU. The number of persons affected by the risk of poverty or social exclusion amounted to roughly 126,000 in 2017 while Luxembourg's Europe 2020 target corresponds to around half of them, a maximum of 66,000 persons at risk.

Social transfers play a pivotal role in lifting people out of poverty. Yet their impact has weakened further, against the rise in market income inequality⁽⁷⁾. Furthermore, the link between socioeconomic status and educational outcomes remains particularly strong in Luxembourg, pointing to high educational inequality.

⁽⁷⁾ Market-driven inequality is defined as an increase in income inequality that results from the labour market, before taxation or income transfers. Market-driven inequality, as measured by the spreads in average hourly earnings by skill group (US\$ PPP at constant prices), is the highest among developed economies (according to the OECD Job Quality Database).

Competitiveness

Cost competitiveness conditions appear to have become less favourable in Luxembourg. Unit labour costs picked up in 2017 to 5.2%, after a very contained increase in previous years (around 1 % on average between 2013 and 2016). Wage increases, prompted by a sharp acceleration of inflation through the wage indexation mechanism, which together with additional productivity losses, explain this increase. However, a visible deceleration in unit labour costs growth has taken place over 2018.

Exports market shares of goods and services recorded a net loss of 4.5% in 2017. However, figures might be not fully consistent, partly due to methodological changes in the series. Gains in Luxembourg's exports market shares of goods and services have trended down steadily since 2014, before recording a net loss of 4.5% in 2017. These developments have become visible with the latest statistical revision, which also points to a reduced activity in the external sector, where the bulk of the revision was concentrated. However, as mentioned above, some consistency issues are apparent in the national accounts-data. To some extent it owes to methodological changes⁽⁸⁾, which had a significant impact on exports reported under the National Accounts of Luxembourg⁽⁹⁾. This might also help explaining the apparent inconsistency in productivity, employment and profit developments in Luxembourg.

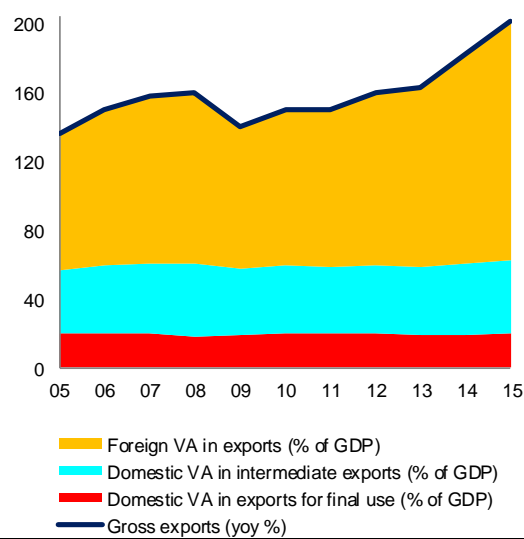
Intermediate inputs account for 70% of the country's trade, suggesting a high level of market integration, largely related to financial activities. OECD *Trade in Value-Added* indicators (TiVA) suggest that around 70% of operating costs are determined by intermediate inputs (140 % of GDP) (Graph 1.6), of which more than 60% are imported. On this regard, the country is deeply integrated in global value chains, as it features the highest global value chains participation across OECD countries. Recent studies show that global value chains participation is most significant in the

⁽⁸⁾ Notably aiming at correcting for double accounting effects, to improve the measure of activity in the external sector.

⁽⁹⁾ This is mainly due to the particularly high share of intermediate goods and services that are imported and exported (including re-imports and re-exports with or without transformation) before they reach the final consumer. See e.g.: *Whats New? Differences between the 2018 and 2016 editions of TiVA indicators* (OECD 2018).

financial sector⁽¹⁰⁾, starting at an early stage and since constantly evolving towards specialisation, diversification and expansion. Trade related to financial intermediate services, such as the ones provided by the funds management agencies, depositary banks or a varied range of professionals abroad, is much higher than the value added generated in the country.

Graph 1.6: Breakdown of value added content in exports (% of GDP)



Source: European Commission calculations, OECD-TIVA database (December 2018).

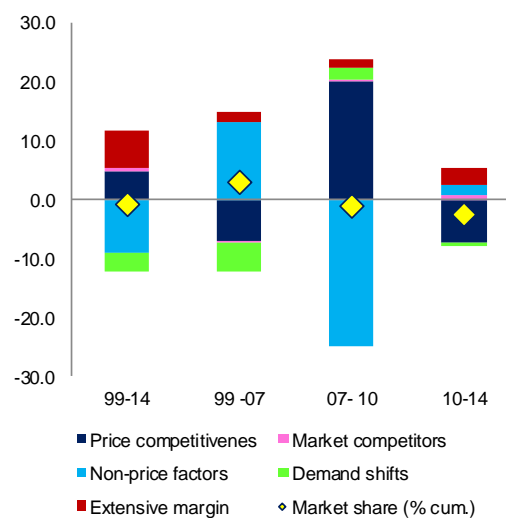
Luxembourg shows high dependence to foreign trade, as it contributes strongly to economic activity and domestic employment. Luxembourg shows one of the highest levels of market integration among OECD countries, with trade related activities also attracting a high share of employment. Recently, market deepening has increased further, helping Luxembourg to keep the high TFP levels accumulated in the past from access to external markets. However, the latter seem less closely related to innovation investment and might be less supportive for future growth. Moreover, effective access to international markets varies across sectors and firms, leading to productivity gaps that cumulate over time.

Overall productivity has been kept at a high level in Luxembourg, even in the period 2007-2010. Productivity growth was barely changed

⁽¹⁰⁾ See, e.g.: What place does Luxembourg hold in global value chains? Working paper n° 120, BCL, 2018.

over the period 1999-2014. As suggested in Graph 1.7, at high levels of market integration, production becomes the main adjustment variable, easing the pressure on profit margins⁽¹¹⁾. However, high market integration also implies higher exposure to external shocks, whereas barriers to trade have a cumulative impact on costs thus on productivity. In this vein, the recent apparent slowdown in aggregate productivity warrants a close monitoring. Specifically, comparing relative performance across sectors and relative contributions to market integration, productivity and economic growth, may help identifying potential productivity gaps and investment needs in Luxembourg (see section 3).

Graph 1.7: Market share decomposition: contribution of export shares' drivers to exports market share growth (% cumulated)



Source: European Commission. Data from CompNet (October 2016).

External position

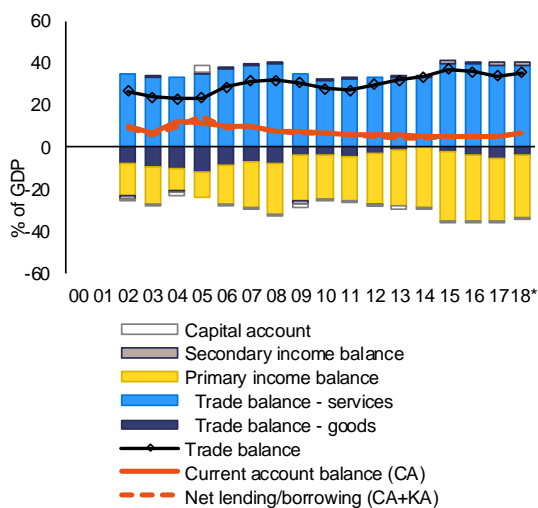
The current account balance recorded a surplus of 4.9 % of GDP in 2017 from 5.1 % in 2016. The current account balance continued on a slow decreasing trend in 2017, which turned up in 2018, to around 5.5% of GDP. This is explained by the

⁽¹¹⁾ Offshoring a large number of activities allows setting output as the adjustment variable between mark-ups and production costs, as the large shares of imports of intermediate inputs embedded in production costs play as a buffer, offsetting revenue losses.

increase in the secondary income surplus (Graph 1.8). The current account balance is driven by the surplus of the balance of services, which corresponds mostly to financial services related to the funds industry. Concomitantly, the primary income deficit reflects mainly the returns on investment in the funds industry.

Moreover, Luxembourg is a net creditor to the rest of the world. Its net assets, measured by net international investment position, have risen to around EUR 26.4 billion (47.0 % of GDP). The net position encloses large international investment assets. At the end of 2018, gross external assets and liabilities reached EUR 10.5 trillion (around 200 times the country's GDP). Net investment flows to the fund industry have stagnated since the first half of 2018, after increasing markedly in 2017, which might be due to increased uncertainty, with valuations signalling higher volatility in financial markets.

Graph 1.8: **Decomposition of external position (current and capital accounts) - Luxembourg**



Note: * indicates estimate based on quarterly data.

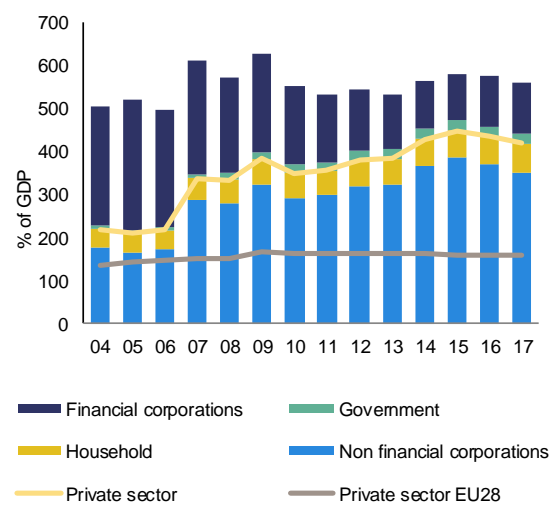
Source: European Commission

Private debt

Private debt remains at high level, in particular for non-financial companies, although most of it is intragroup lending. Private sector debt stood at 323% of GDP in 2017. This is mostly due to a high non-financial corporate debt (257 % of GDP in 2017), most of which is linked to cross-border

intercompany debt due to the large presence of multinational companies. In addition, a significant active deleveraging took place in 2016 and 2017, which might be partly linked to a few large companies ending operations in Luxembourg (Graph 1.9).

Graph 1.9: **Decomposition of Debt by Sector (non-consolidated) - Luxembourg**



Source: European Commission

Despite a favourable aggregate wealth position, households' indebtedness remains high compared to income. Household indebtedness has rapidly increased over the last 10 years. While household debt has risen from 39 % of GDP in 2000 to 67 % in 2017, the ratio of debt-to-assets is still very low (36 %). Yet, household debt is estimated at 178 % of income in 2017, among the highest in the EU. Household indebtedness reflects real estate inflation, as around 80% of it stems from mortgage loans. House prices have continued rising in 2017 and in the first half of 2018, although more moderately than in previous years. (see section 3.2.3). At the same time, rising indebtedness generates some concerns as to the solvency risks related to households with lower income, notably in case of rising interest rates or economic downturn (see section 3.2.2).

Public finance

Luxembourg's public finances remain sound. The general government balance is estimated to

have posted a surplus of around 1.8% of GDP in 2018 and it is forecast to remain in surplus in 2019. General government debt is expected to continue to fall in 2019, from around 21 % of GDP in 2018 (well below the 60 % threshold). However, significant budgetary challenges are likely to remain in the long term, with population ageing growing and growing benefit ratios driving up spending on pensions and healthcare.

Table 1.1: Key economic and financial indicators - Luxembourg

	2004-07	2008-12	2013-15	2016	2017	forecast		
						2018	2019	2020
Real GDP (y-o-y)	5.1	0.2	4.0	2.4	1.5	3.0	2.5	2.6
Potential growth (y-o-y)	3.9	2.2	2.2	2.1	2.5	2.6	2.7	2.8
Private consumption (y-o-y)	1.5	1.6	3.1	1.7	3.0	.	.	.
Public consumption (y-o-y)	3.0	2.1	2.8	2.5	3.1	.	.	.
Gross fixed capital formation (y-o-y)	5.1	4.1	0.0	10.4	4.0	.	.	.
Exports of goods and services (y-o-y)	9.3	1.9	8.8	3.8	-1.9	.	.	.
Imports of goods and services (y-o-y)	9.1	3.1	9.4	4.5	-2.2	.	.	.
Contribution to GDP growth:								
Domestic demand (y-o-y)	2.0	1.6	1.5	2.8	2.2	.	.	.
Inventories (y-o-y)	0.2	-0.2	0.6	-0.4	-0.5	.	.	.
Net exports (y-o-y)	2.9	-1.2	1.9	0.0	-0.1	.	.	.
Contribution to potential GDP growth:								
Total Labour (hours) (y-o-y)	1.9	1.4	1.6	2.0	1.9	1.9	1.9	1.9
Capital accumulation (y-o-y)	1.1	1.2	1.3	1.1	1.6	1.6	1.5	1.5
Total factor productivity (y-o-y)	0.9	-0.4	-0.6	-1.0	-1.0	-0.9	-0.7	-0.5
Output gap	0.9	-3.0	-1.7	0.4	-0.5	0.0	0.3	0.2
Unemployment rate	4.6	4.9	6.1	6.3	5.6	5.3	5.2	5.2
GDP deflator (y-o-y)	3.9	3.2	1.3	0.9	2.2	2.0	1.8	1.7
Harmonised index of consumer prices (HICP, y-o-y)	3.2	2.7	0.8	0.0	2.1	2.0	1.6	1.8
Nominal compensation per employee (y-o-y)	4.0	2.0	2.5	0.9	3.3	2.2	2.6	2.3
Labour productivity (real, person employed, y-o-y)	1.7	-2.3	1.6	-0.6	-1.8	.	.	.
Unit labour costs (ULC, whole economy, y-o-y)	2.3	4.4	0.9	1.5	5.2	2.7	2.8	2.4
Real unit labour costs (y-o-y)	-1.5	1.1	-0.5	0.6	3.0	0.7	0.9	0.7
Real effective exchange rate (ULC, y-o-y)	1.2	2.1	0.0	1.3	5.0	1.8	0.8	0.5
Real effective exchange rate (HICP, y-o-y)	1.0	0.1	-0.2	0.8	1.1	1.5	-0.5	-0.2
Savings rate of households (net saving as percentage of net disposable income)	10.8	13.3	14.6	13.7	20.7	.	.	.
Private credit flow, consolidated (% of GDP)	40.9	5.3	26.8	23.6	-15.0	.	.	.
Private sector debt, consolidated (% of GDP)	220.3	301.4	331.1	344.8	316.4	.	.	.
of which household debt, consolidated (% of GDP)	46.7	57.7	61.0	63.7	66.0	.	.	.
of which non-financial corporate debt, consolidated (% of GDP)	173.6	243.7	270.2	281.0	250.4	.	.	.
Gross non-performing debt (% of total debt instruments and total loans and advances) (2)	.	.	.	0.7	0.6	.	.	.
Corporations, net lending (+) or net borrowing (-) (% of GDP)	2.1	-4.0	-4.3	-2.8	-1.7	-4.1	-3.9	-3.6
Corporations, gross operating surplus (% of GDP)	28.2	28.1	28.8	29.0	27.2	26.9	26.3	25.9
Households, net lending (+) or net borrowing (-) (% of GDP)	2.6	3.5	3.3	3.2	4.3	5.8	5.5	5.3
Deflated house price index (y-o-y)	8.1	1.3	5.5	11.4	3.9	.	.	.
Residential investment (% of GDP)	3.2	3.4	3.5	3.3	3.2	.	.	.
Current account balance (% of GDP), balance of payments	10.6	6.6	5.2	5.1	4.9	4.8	4.3	3.8
Trade balance (% of GDP), balance of payments	26.4	29.3	33.9	35.5	33.6	.	.	.
Terms of trade of goods and services (y-o-y)	0.1	0.8	-0.2	0.9	-0.5	0.1	-0.1	0.0
Capital account balance (% of GDP)	0.0	-0.7	-1.0	-0.4	-0.4	.	.	.
Net international investment position (% of GDP)	10.2	9.4	44.6	46.9	47.0	.	.	.
NIIP excluding non-defaultable instruments (% of GDP) (1)	-2167.1	-1783.8	-3276.2	-3775.9	-3947.3	.	.	.
IIP liabilities excluding non-defaultable instruments (% of GDP) (1)	7892.3	7805.1	9669.6	10844.6	10980.7	.	.	.
Export performance vs. advanced countries (% change over 5 years)	28.9	14.4	22.6	22.7	14.5	.	.	.
Export market share, goods and services (y-o-y)	.	.	9.2	0.7	-4.5	.	.	.
Net FDI flows (% of GDP)	39.3	-31.5	-16.9	-37.8	-45.7	.	.	.
General government balance (% of GDP)	1.2	0.6	1.2	1.6	1.4	1.3	1.2	0.9
Structural budget balance (% of GDP)	.	.	2.0	1.4	1.6	1.3	1.1	0.8
General government gross debt (% of GDP)	7.6	18.2	22.9	20.7	23.0	21.4	20.8	20.6
Tax-to-GDP ratio (%) (3)	38.0	39.0	39.1	39.4	40.3	40.8	41.1	41.5
Tax rate for a single person earning the average wage (%)	26.3	27.2	30.1	31.0
Tax rate for a single person earning 50% of the average wage (%)	15.7	15.9	17.5	18.2

(1) NIIP excluding direct investment and portfolio equity shares.

(2) domestic banking groups and stand-alone banks, EU and non-EU foreign-controlled subsidiaries and EU and non-EU foreign-controlled branches.

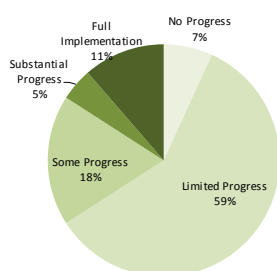
(3) The tax-to-GDP indicator includes imputed social contributions and hence differs from the tax-to-GDP indicator used in the section on taxation.

Source: Eurostat and ECB as of 31-1-2019, where available; European Commission for forecast figures (Winter forecast 2019 for real GDP and HICP, Autumn forecast 2018 otherwise)

2. PROGRESS WITH COUNTRY-SPECIFIC RECOMMENDATIONS

Since the start of the European Semester in 2011 ⁽¹²⁾, 34 % of all country-specific recommendations addressed to Luxembourg have recorded at least 'some progress'. Looking at the multi-annual assessment of the implementation of the country-specific recommendations (CSRs) since these were first adopted, 34 % of all the country-specific recommendations addressed to Luxembourg have recorded at least 'some progress'. 66 % of these country-specific recommendations recorded 'limited' or 'no progress' (Graph 2.1). Substantial progress and full implementation have been achieved in several areas of the fiscal policy, for instance preserving a sound fiscal position and strengthening fiscal governance.

Graph 2.1: Overall multiannual implementation of 2011-2018 CSRs to date



Level of implementation today of 2011-2018 CSRs

* The overall assessment of the country-specific recommendations related to fiscal policy excludes compliance with the Stability and Growth Pact

** 2011 annual assessment: Different CSR assessment categories

** The multiannual CSR assessment looks at the implementation until 2019 Country Report since the CSRs were first adopted.

*** The multiannual CSR assessment looks at the implementation until 2019 Country Report since the CSRs were first adopted.

Source: European Commission

Over the past years, Luxembourg has significantly strengthened its budgetary framework. In 2014, Luxembourg transposed in national legislation the requirements of the 2011

Council Directive on budgetary frameworks and the fiscal compact. In 2017, the authorities further adjusted the domestic regulation to bring it into full compliance with the 2011 Council Directive on budgetary frameworks. Since then, Luxembourg, which is under the preventive arm, has remained committed and compliant with the provisions of the Stability and Growth Pact. The implementation of the savings measures identified by the 2014 spending review is largely on track. The national authorities have implemented 80% of the measures identified in the review, most of them spending cuts integrated in the domestic budgetary planning. After overachieving savings target in 2015 (the first year of the multi-year budgetary strategy), the targeted savings for the 2016-2018 period were revised downwards by 25-35 %, partly linked to the reconsideration of a number of reform steps in vocational education and social transfers.

Several measures have been adopted to address the long-term sustainability of public pensions, though their impact has been limited. A pension reform was adopted in 2012, but its impact on pension expenditure has been limited. A law aiming at keeping workers with disabilities longer in the labour market entered into effect at the beginning of 2016. Additionally, the 2017 tax reform introduced some incentives for increasing working time. A reform of the long-term care public insurance was enacted at the beginning of 2018, which keeps the evolution of long-term care costs in line with that of the share of dependent people in the total population. Meanwhile, the expenditure projections reveal a heightened requirement for long-term care spending in the future. Additionally, the 'pré-retraite de solidarité', a special scheme allowing people to retire from the age of 57, was abrogated in 2018 but its impact might not be significant, as some restrictions on other kinds of early retirement were loosened. The employment rate of older workers has stagnated since 2010 and remains among the lowest in the EU (39.8% in 2017). More fundamental reforms have not been considered yet or are pending approval, such as the so-called 'Age Pact', which includes a whole package of measures to keep senior workers longer in employment. Finally, no measures have been taken on the recommendation for aligning the statutory retirement age to changes in life expectancy.

⁽¹²⁾ For the assessment of other reforms implemented in the past, see in particular section 3.

Some progress has been made on enhancing participation in the labour market, but challenges remain. The main efforts have focussed on reducing youth unemployment, where progress has been substantial. Regarding upskilling, has been recently addressed: the vocational education and training system had identified several fields for improvement. The law on vocational education and training, amended in 2016 and in application since 2016/2017, aims at improving the qualitative skill sets and study success rates of students. The employment of older workers remains among the lowest in the EU, particularly for the low-skilled, who are also particularly affected by long-term unemployment. In 2017 45.84% of the inactive were low-skilled (ISCED 0-2) while only 12.02% of the inactive were high-skilled (ISCED 5-8).

Luxembourg has made some progress in addressing bottlenecks that hamper housing investment. Numerous measures have been adopted or are planned, especially on the supply side, trying to increase the market offer. Recently, the Parliament endorsed a law empowering the "*Fonds de Logement*", a land management agency, to support the supply of housing. Measures are also envisaged to increase the land available for real estate development, through land purchase, new tax incentives and technical assistance to municipalities. New incentives are envisaged to bring to the market properties that are currently vacant. Public authorities may also obtain stronger powers to expropriate or exchange land to unblock development projects. Nevertheless, supply remains limited and the challenge ahead for the Luxembourg authorities continues to be sizeable. House prices have continued rising in 2017 and in the first half of 2018, although more moderately than in previous years.

Luxembourg has made limited progress in reforming the wage-setting system. After a modulation of the automatic wage adjustment to inflation in the period 2013-2014, no further measures have been adopted. A study was published about the impact of the wage indexation on the evolution of labour cost. Based on the study conclusion the current government announced its intention to consider reviewing the existing wage setting mechanism only in the case of a surge in inflation pressures.

Luxembourg has made some progress on strengthening its strategy to diversify the economy. Public investment remains high and other measures to foster innovation remain activated. Yet, private investment, especially on innovative technologies and digitisation, remains low compared with the euro area average.

Luxembourg has made limited progress⁽¹³⁾ in addressing the 2018 country-specific recommendations. In addition to limited progress on employment of older workers as outlined above, Progress has been limited in removing regulatory restrictions in the business services sector. Several measures have been taken, although some regulatory restrictions remain above EU weighted average in several regulated professions (according to available indicators). Luxembourg engaged in further reforming the profession of architects (a new draft law is envisaged in the first half of 2019). With the law of 18 July 2018, Luxembourg removed the requirement for professional qualifications to obtain a standard business license.

⁽¹³⁾ Information on the level of progress and actions taken to address the policy advice in each respective subpart of a CSR is presented in the Overview Table in the Annex. This overall assessment does not include an assessment of compliance with the Stability and Growth Pact.

Table 2.1: Summary Table on 2018 country-specific recommendations assessment

Luxembourg	Overall assessment of progress with 2018 CSRs: Limited Limited progress
<p>CSR 1: <i>Increase the employment rate of older people by enhancing their employment opportunities and employability while further limiting early retirement, with a view to also improving the long-term sustainability of the pension system.</i></p> <p><i>Increase the employment rate of older people by enhancing their employment opportunities and employability</i></p> <p><i>while further limiting early retirement,</i></p> <p><i>with a view to also improving the long-term sustainability of the pension system.</i></p>	<p>Limited Progress</p> <ul style="list-style-type: none"> • Limited Progress: The employment rate of older workers has stagnated since 2010 and remains the second lowest in the EU (39.8% in 2017). Some labour demand oriented policies have been implemented so far, which are having positive results on other population groups, but have failed to improve substantially older workers' participation in the labour market. • Limited Progress: The average effective retirement age stood at 60.2 in 2016, well below the statutory age of 65. 59.2% were early old-age pensions (average effective age: 59.8). Additionally, the 'pre-retraite de solidarité', a special scheme allowing people to retire from the age of 57, was abrogated in 2018 but its impact on the average effective retirement age and on expenditure is still difficult to assess due to an easing of restrictions on other kinds of early retirement schemes. No further measures intending to provide incentives for senior workers to stay longer at work have been announced so far. • Limited Progress: No evolution since 2017. The 2016 reform of the professional reclassification scheme for persons with working disabilities is expected to reduce the share of disability pensions and the 'pré-retraite de solidarité', a special scheme allowing people to retire from the age of 57, was abrogated in 2018 but its impact on the average effective retirement age and on expenditure is still difficult to assess due to an easing of restrictions on other kinds of early retirement schemes. No further measures intending to provide incentives for senior workers to stay longer at work have been announced so far. In 2018, the working group on pensions mandated by the Government concluded that the pension system appears to be not sustainable, amid high uncertainty levels, in the long term projections at unchanged policies.
<p>CSR 2: <i>Further reduce regulatory restrictions in the business services sector.</i></p>	<p>Limited Progress</p> <p>Regulatory restrictions remain above EU weighted average in several regulated professions (according to available indicators). Luxembourg engaged in further reforming the profession of architects (a new draft law is envisaged in the first half of 2019). With the law of 18 July 2018, Luxembourg removed the requirement for professional qualifications to obtain a standard business license.</p>

Source: European Commission

Box 2.1: EU funds and programmes contribute to addressing structural challenges and to fostering growth and competitiveness in Luxembourg

Financial allocation from the European Structural and Investment Funds (ESIF), aimed to support Luxembourg in facing development challenges, amounts to up to EUR 140 million in the current Multiannual Financial Framework, equivalent to around 1% of all public investment per year on average. As of the end of 2018, 56 % of the total has already been allocated to specific projects. In addition, EUR 66.1 million was allocated to specific projects on strategic transport networks through a dedicated EU funding instrument, the Connecting Europe Facility. Furthermore, numerous Luxembourg research institutions, innovative firms and individual researchers benefited from other EU funding instruments, notably Horizon 2020 which provided EUR 87.57 million.

EU funding has helped to address certain policy challenges identified in the 2018 CSRs. Given Luxembourg's relatively modest ESIF allocation, the programmes concentrate on addressing specific aspects of the issues identified in recent years in the context of the European Semester. Increasing R&D investment is of crucial importance for creating greater economic diversification and increasing the number of Small and Medium size Enterprises involved in research. Support is provided to the sustainable professional integration of jobseekers, inactive persons and young people (including through the implementation of the Youth Guarantee), active inclusion, and skills development through better access to lifelong learning. Helping to answer the need to provide incentives to older workers to work longer, the European Social Fund supports measures to mentor job seekers and workers aged 45+.

The Commission can provide tailor-made technical support upon a Member State's request via the Structural Reform Support Programme to help Member States implement growth-sustaining reforms to address challenges identified in the European Semester process or other national reforms. In Luxembourg, for example, work has started on providing technical support to help the authorities develop a comparative and benchmarking study on the General Law of Customs and Excise with a focus on some parts of the law, which should be aligned with good European and international practices to make them more efficient and operational.

EU funding contributes to mobilisation of private investment. In Luxembourg, total financing under European Fund for Strategic Investment (EFSI) amounts to EUR 123 million and is set to trigger EUR 623 million in additional private and public investments. Luxembourg ranks 18th as to the overall volume of approved operations as a share of GDP. Under the Infrastructure and Investment window the 7 projects ⁽¹⁾ approved were financed by the European Investment Bank with EFSI backing, for a total of approximately EUR 30 million set to trigger EUR 343 million in total investment. Under the small and medium-sized enterprises component, the 6 approved agreements with intermediary banks or funds financed by the European Investment Fund with EFSI backing reached EUR 93 million in total financing, set to trigger approximately EUR 280 million in investments with some 977 small and medium-sized enterprises and mid-cap companies expected to benefit from improved access to finance. An example of EFSI-backed project in the country is “Flen Pharma”, a small and medium-sized enterprise which develops medical devices to care for wounds. Thanks to EFSI financing, the company has been able to expand its Research and Development department and hire extra highly-skilled staff.

<https://cohesiondata.ec.europa.eu/countries/LU>

⁽¹⁾ All multi-country projects.

3. REFORM PRIORITIES

3.1. PUBLIC FINANCES AND TAXATION

3.1.1. LONG TERM SUSTAINABILITY

Fiscal sustainability risks remain low on the short to medium term. The debt sustainability analysis, as well as the S0 ⁽¹⁴⁾ and the S1 ⁽¹⁵⁾ indicators, in the Fiscal Sustainability Report 2018 (European Commission, 2019) point to low risks, due to the low public debt (21.6 % of GDP at end 2018) and the favourable initial budgetary position.

Risk indicators related to Luxembourg's long-term fiscal sustainability remain high. Luxembourg is projected to face a rise in ageing-related costs up until 2070. This is highlighted by a high S2 long-term fiscal sustainability gap indicator ⁽¹⁶⁾, at 8.1 percentage points of GDP. It is entirely driven by the expected increase in age-related expenditure, in particular pensions (5.8 pps of GDP) and health care and long-term care expenditure (2.8 pps of GDP).

3.1.2. PENSION, HEALTHCARE AND LONG-TERM CARE

The pension system is expected to remain in a favourable position in the short to medium term ⁽¹⁷⁾. Luxembourg's population is ageing at a

⁽¹⁴⁾ The S0 indicator aims at an early detection of fiscal stress stemming from risks within a one-year horizon, making use of the signalling power of its components.

⁽¹⁵⁾ The S1 indicator measures the required fiscal adjustment needed between 2021 and 2025 to bring the public debt ratio down to 60% of GDP by 2033.

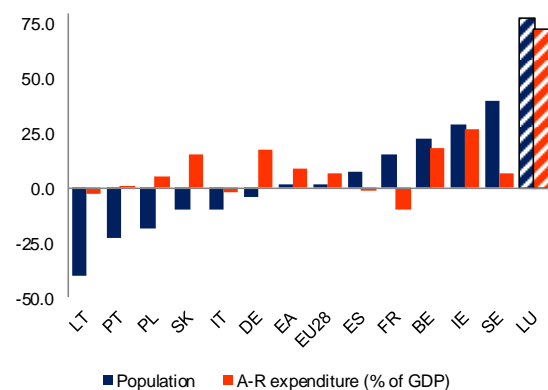
⁽¹⁶⁾ The S2 indicator shows the adjustment to the current structural primary balance required to fulfil the infinite horizon inter-temporal budget constraint, including paying for any additional expenditure arising from an ageing population.

⁽¹⁷⁾ Pension expenditure projections are computed by each Member state with an agreed methodology and peer review. However, national budgetary projections are all based on a common set of population and labour market projections and a common methodology, computed by Eurostat and the AWG for each Member state and the main aggregates. None of these variables includes cross-border workers. These are added in the commonly agreed methodology proposed for Luxembourg by the Commission for the computation of their pension expenditure projections. At the initial projection period the current share of cross-border workers is taken (which is currently around 41.1% of domestic employment) and the

slower rate than neighbouring countries due to the continuous inflow of foreign workers (both immigrants and cross-border commuters), which increases pension contributions while only modestly raising the average workforce age (see country report, 2017). In 2017, the pension system recorded a surplus of EUR 1.0 billion, pushing its accumulated reserves to EUR 19 billion.

Concerns are set to arise on the long term. The overall population and resident labour force are projected to increase to 1 million and 0.4 million respectively by 2070 (Graph 3.1.1), which should push up age-related expenditure (European Commission, 2019). According to the government-appointed pension working group, the operational balance of the general pension scheme for the private sector is projected to become gradually negative and eventually reach -7.6% of GDP by 2070. Accumulated reserves are expected to ensure the viability of the system until 2041 (Rapport du groupe de travail pensions, 2018).

Graph 3.1.1: Age-related expenditure (as % of GDP) and population projections in selected Member States (2016-2070 % change)



Source: Eurostat, European Commission

Despite recent reforms, pension-related costs are still expected to increase markedly. The contribution rate is currently 24 % of the wage mass, with employers, employees and the state each contributing one third. Following the 2012 reform, the rate has been fixed so that

assumption is made that the share remains unchanged over the projection period.

contributions cover pension payments over a period of 10 years. However, based on the latest simulations, the contribution rate needs to increase to 37 % to prevent the reserve of the general pension scheme to fall below the legal threshold of 1.5 times annual pension expenditure by 2070 (Ministère de la sécurité sociale, 2018). The 2012 reform also introduced changes to the benefits calculation method, incentivising longer working careers. Nevertheless, the gross average replacement rate is projected to remain well above the euro area average, (Table 3.1.1). In 2017, Luxembourg recorded the highest benefit and replacement ratios in the EU.

In its 2018 report, the government-appointed pension working group discusses possible solutions to improve long-term sustainability.

According to the report, the contribution rate could be gradually increased, while the formula for computing pension benefits could be further adjusted. In parallel, the eligible age to pension could be increased to take into account longer life expectancy, while gradual retirement could be encouraged. The report suggests a multi-pronged strategy of calibrated reforms to guarantee the long-term sustainability of the system while minimising the impact on the economy. The conclusions of the report are expected to guide future evolutions of the pension system legislation. The next evaluation of the general pension scheme is expected to be issued in 2022.

Table 3.1.1: **Gross average replacement rate (% of average wage at retirement)**

	2016	2070	Change
LU	72.9	63.0	-9.9
BE	40.2	37.1	-3.1
DE	37.8	33.2	-4.6
FR	45.4	35.6	-9.9
EA	48.9	38.5	-10.4

Source: 2018 Ageing report

Pre-retirement schemes which contribute to early exit from the labour market age are being reconsidered.

In 2017, the average effective retirement age stood at 61.5⁽¹⁸⁾, below the statutory age of 65. Only 24.9 % of new personal pensions (average effective age: 60.0) were

granted to those aged 65 or older (Graph 3.1.2), 57.5 % were early old-age pensions (average effective age: 59.9) and 17.6 % were invalidity pensions (average effective age: 53.0) (Ministère de la sécurité sociale, 2018). However, the 2016 reform of the professional reclassification scheme for persons with working disabilities could reduce the share of disability pensions. Additionally, the 'pré-retraite de solidarité', one of the pre-retirement schemes allowing people to retire from the age of 57, was abrogated in 2018.

Projected increases in health care expenditure threaten the long-term sustainability of the system.

Luxembourg's per capita spending on health care has consistently been the highest in the EU since 2012. Total and public per capita expenditure accounted respectively for 141% and 146% of the EU average in 2015. Total expenditure on health accounted for 6.1% of GDP in 2015, below the EU average (10.2%). According to the Ageing Report 2018, public health expenditure in Luxembourg is going to increase by 1.2 pps (Ageing Working Group Reference Scenario) or even by 1.7 pps (Ageing Working Group Risk Scenario) by 2070, which is going to add to age-related spending due to pensions and long-term care. In 2016, public health spending (in per capita Purchasing power standard) was above the EU average for all but one spending function⁽¹⁹⁾, while cost-sharing across services remains limited.

There appears to be some scope to increase the efficiency of the hospital system.

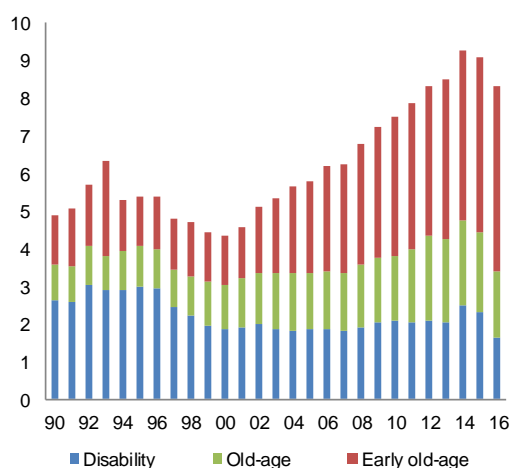
Hospital bed occupancy rate is low, inpatient discharge rates are below the EU average and decreased over the last ten years, while the average length of stay is above the EU average. This may partly be a consequence of a financing system based on global hospital budgets, which does not directly incentivise savings. Activity-based reimbursement, by contrast, can lead to a more efficient use of resources. Public pharmaceuticals spending is below EU average as a share of GDP but above average in per capita Purchasing power standard terms, while out-of-pocket payments are the lowest in the EU.

⁽¹⁸⁾ All personal pensions (old-age, early old-age and invalidity pensions) have been considered to compute the effective retirement age.

⁽¹⁹⁾ Inpatient curative care, expenditure on day-cases, outpatient care, ancillary services, medical goods, prevention and administrative spending

The expenditure projections reveal a heightened requirement for long-term care spending in the future. As far as demographic drivers are concerned, the "Ageing Working Group reference scenario" forecasts public expenditure on long-term care as share of GDP to grow from 1.3 to 4.1, increasing by 2.8 pps. According to this scenario, the projected increase for Luxembourg over the period 2016-2070, 219%, is considerably higher than the EU average of 73%. The "Ageing Working Group risk scenario", which captures additional cost drivers to demographic and health-status related factors, projects an increase of even bigger magnitude (5.2 pps) bringing public spending on long-term care from 1.3% to 6.5% of GDP by 2070, an increase of 405%, again well above the EU average of 170%.

Graph 3.1.2: Number of new pensions, by type (thousands)



Source: European Commission

The long-term care insurance system reform is expected to ensure the system's financial viability until 2030. The government finances 40 % of long-term care expenditure (excluding additional contributions). The long-term care insurance system should remain financially stable until 2030 if the contribution rate is gradually raised from 1.4% to 1.7%, according to an analysis carried out by the General Inspectorate of Social Security.

Meanwhile recent measures and the projected evolution of long-term care use patterns increase pressure on the budget. A new collective agreement with an important revalorisation of the career of nurses was

negotiated in 2017. Due to this change, the hourly fees paid by long-term care insurance will increase in 2018, raising the budget by an estimated 5% on a permanent basis. In combination the long-term care reform, long-term care spending is expected to increase to 8.2% of expenditures in 2018. In addition, Luxembourg is characterised by a relatively costly provision of institutional care. Although there are more beneficiaries of home care setting, the number of persons in residential care has been increasing rapidly and is projected to accelerate and push long-term care spending up⁽²⁰⁾.

3.1.3. FISCAL FRAMEWORK

The mandate of the National Council of Public Finances, Luxembourg's independent fiscal body, was broadened in 2017 to include the ex-post evaluation of macroeconomic and budgetary forecasts⁽²¹⁾. The first such analysis by the Council was published in June 2018⁽²²⁾ and was based on 10 to 20 years-worth of forecast data (1996-2016). The analysis covered projections for real growth, employment and unemployment, inflation and nominal general government balance. In its analysis, the Council identified a pessimistic bias in the projections for the budget balance and employment, leading to upward revisions in the years following their first publication. On an institutional note, the mandate of the members of the Council came to its end in November 2018 and the new composition is currently awaiting approval by Parliament.

The authorities provided their answer to the public finances evaluation formulated by the National Council of Public Finances. In line with the Memorandum of Understanding concluded in October 2017, the Ministry of Finance provided a public response to the recommendations of the Council's report of June 2018 on the evaluation of

⁽²⁰⁾ Pacolet, J. and F. De Wispelaere (2018), ESPN Thematic Report on challenges in long-term care – Luxembourg. Brussels: European Commission - Directorate-General for Employment, Social Affairs and Inclusion

⁽²¹⁾ On December 15 2017, the budget law for 2018 amended the law of 12 July 2014 on the coordination and governance of public finances

⁽²²⁾ Evaluation de la fiabilité des prévisions macroéconomiques et budgétaires (https://cnfp.public.lu/dam-assets/documents/actualites/2018/fiabilit%C3%A9_juin2018/8/2b-evaluation-fiabilite-juin2018.pdf)

public finances. The public position was in apparent disagreement with the main Council's recommendation on the appropriateness of running budgetary surpluses beyond the Stability and Growth Pact benchmarks, in seek the long-term sustainability of public finances, and it refused the recommendations on the macroeconomic scenario underlying the budgetary projections, as it lays under the responsibility of the STATEC, which is an independent body.

3.1.4. SPENDING REVIEW

The implementation of the savings measures identified by the 2014 spending review is largely on track. The national authorities have implemented 80% of the measures identified in the review, most of them spending cuts integrated in the domestic budgetary planning. After overachieving savings target in 2015 (the first year of the multi-year budgetary strategy), the targeted savings for the 2016-2018 period were revised downwards by 25-35 %, partly linked to the reconsideration of a number of reform steps in vocational education and social transfers.

3.1.5. TAXATION

With a total tax burden close to the EU average, Luxembourg's corporate income tax revenues are above the EU average while growth and environment supportive taxation remain moderate. The overall tax burden amounted to 38.9 % of GDP in 2017, close to the EU average of 39 % of GDP. Slightly less than half of the revenues come from labour taxation (17.3% of GDP vs 19.4 % in the EU in 2017) and the tax wedge on labour⁽²³⁾ for average and low-income earners was below the EU average in 2017. The high level of corporate income taxation revenues and large contribution from the financial services sector reflect Luxembourg's international position as a global financial hub. Revenues from consumption taxes, recurrent taxes on immovable property and environmental taxes were all below the EU average in 2017 (both in terms of GDP,

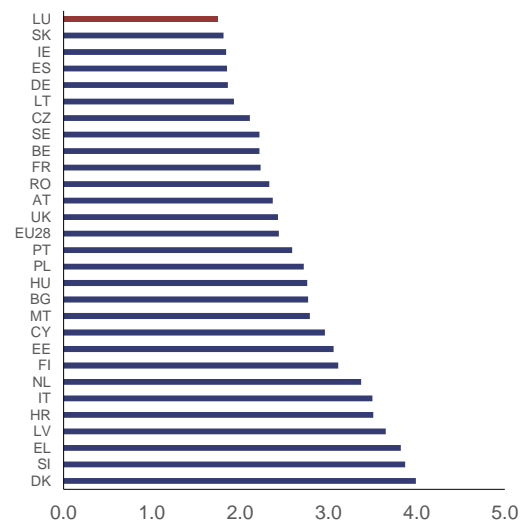
⁽²³⁾ The tax wedge on labour is defined as the sum of personal income taxes and employee and employer social security contributions net of family allowances, expressed as a percentage of total labour costs (the sum of the gross wage and social security contributions paid by the employer).

and as a share of total taxation), while environmental taxes have gradually decreased over the last ten years (while they remained stable on average for the EU).

Luxembourg's revenue from environmentally related taxes remains the lowest in the EU.

Environmental taxes accounted for 1.8% of GDP in 2016, well below the EU average of 2.44% see Graph 3.1.3). This is due to the low revenues from both transport taxes and taxes on pollution and resources. Moreover, environmental taxes are not indexed, which could lead to a gradual reduction in revenues over time (in % of GDP). Finally, Luxembourg applies a reduced Value Added Tax rate of 8% on natural gas and electricity, 14 % on heating fuel oil and 17% on other fossil fuels, which has adverse effects on energy consumption and is not necessarily the most targeted and cost-efficient support for well-off population groups.

Graph 3.1.3: Environmental tax revenues as a share of GDP (2016)



Source: Eurostat, European Commission

Transport fuel tax rates are among the lowest in the EU, which provides a disincentive for reducing fuel consumption. While revenues from transport fuel taxes are well above the EU average (1.6% vs 1.3% of GDP in the EU on average), tax rates on transport fuels are low compared to EU averages. They are also considerably lower than in neighbouring countries, inducing cross-border fuel purchasing which enables the country to raise sizeable tax revenues despite very low rates. This

contributes to traffic congestion (see also in Section 3.4.3), with highly negative ecological and health impact. Moreover, the level of tax on diesel is also low compared to unleaded petrol, despite diesel having higher carbon content, while some tax exemptions remain in place in the country for the use of fossil fuels in agriculture, horticulture, or for heating purposes⁽²⁴⁾. Nonetheless, the use of alternative fuels in new passenger cars sold in Luxembourg has increased over the past few years. The share of new passenger cars using alternative fuels (mostly electric vehicles) was three times higher in 2016 than in 2012⁽²⁵⁾.

On environmentally related taxes, the recent coalition agreement envisages a number of new measures. Revenues generated by an increase of the energy taxation would help decrease the fiscal contribution of natural persons. The taxation of fuels and mazut would be adapted, starting from 2019, to comply with the objectives under the Paris Agreement. The current tax incentives for electric vehicles would be replaced by targeted subsidies, and tax incentives for zero-emission or low-emission vehicles would be reinforced.

Despite a particularly effective Value Added Tax (VAT) collection, the economic efficiency of Luxembourg's VAT system is limited by a number of reduced rates and exemption⁽²⁶⁾. The administration of VAT collection is particularly effective as Luxembourg consistently displays one of the lowest VAT compliance gap in the EU (0.83% in 2016 vs 12.3% in the EU). Nevertheless, the standard VAT rate of 17% applied in Luxembourg is the lowest in the EU. A super-reduced (3%), a reduced (8%), as well as a parking rate (14%) also exist. Along with numerous non-compulsory exemptions, these lead to a large actionable policy gap (33% in 2016).

The more efficient, recurrent property taxes are low and based on outdated property values. Revenues from recurrent property taxes were among the lowest in the EU in 2017. This is

⁽²⁴⁾ OECD, [Inventory of Support Measures for Fossil Fuels](#), 2018.

⁽²⁵⁾ European Commission, [Transport in the European Union Current Trends and Issues](#), 2018, pp.27-28.

⁽²⁶⁾ Tax efficiency minimises the cost of complying with the tax code by reducing its administrative burden and by minimising any distortions in the economy caused by the tax.

mainly due to the tax base, which stems from a scale that dates back to 1941 and is not aligned with current market values. Not updating the tax base regularly gives support to rising property prices, particularly for housing (see also section 3.2.3). Moreover, the tax rate on real estate transactions is high, which may affect transaction decisions, while generating rather volatile revenues. A shift away from transaction taxes towards recurrent property taxes would maintain a constant level of revenue while reducing the distortions caused by transaction taxes. Moreover, the Luxembourg tax system tends to favour owner-occupied housing, as it is one of the few countries still providing mortgage interest deductibility. Home ownership is further favoured by the absence of imputed rent taxation, which was abolished in 2017.

In 2016, Luxembourg adopted significant reforms of its corporate income tax. The reform of corporate income tax sought to boost competitiveness by gradually lowering the statutory rate to 18% in 2018. Including the surcharges, this represents a 26.01 % corporate income tax rate in 2018, above the EU average. The tax burden effectively paid by companies is however impacted, not only by the tax rate but also by the definition of the tax base and possible tax incentives. Among others, the reform provided for amendments to the tax credits for investments. The rate applicable to corporations with a taxable income below EUR 25 000 has been reduced from 20 % to 15 %. The recent coalition agreement envisages lowering the statutory rate to 17% in 2019, while the threshold for corporations to benefit from the low corporate income tax rate of 15 % will be increased from EUR 25 000 to EUR 175 000.

High capital flows, coupled with the absence of withholding taxes on interests and royalties and possible exemption on dividends, may be an indication that Luxembourg's tax rules are used by companies that engage in aggressive tax planning. Inward and outward foreign direct investments are among the highest in the EU, with a majority linked to special purpose entities⁽²⁷⁾.

⁽²⁷⁾ A special purpose entity is a legal entity that has little or no employment, operations or physical presence in the jurisdiction where it is located. It is related to another corporation, often as its subsidiary, and is typically located in another jurisdiction (see European Commission, 2018).

The level of capital flows (dividends, interest, but also royalties) are also among the highest in the EU, and at a high level compared to the size of the economy⁽²⁸⁾. Luxembourg is a small open economy, with a large financial sector, which partly explains those financial flows and foreign direct investment stocks. These flows can also be explained by the large presence of foreign-controlled companies in Luxembourg which undertake intra-group financing or treasury operations⁽²⁹⁾. The absence of withholding taxes on outbound interest and royalty payments, and the possible exemption from withholding tax on dividends with treaty partners⁽³⁰⁾, may lead to those payments escaping tax altogether if they are not subject to tax in the recipient jurisdiction either.

Luxembourg is acting to curb aggressive tax planning through the implementation of European and internationally agreed initiatives.

The law to transpose the Anti-Tax Avoidance Directive (ATAD 1) was adopted by the Parliament in December 2018. It strengthens existing anti-abuse rules (in particular the exit taxation)⁽³¹⁾ and general anti-abuse rules) and introduces new anti-abuse rules, in particular controlled-foreign companies rules⁽³²⁾, interest limitation rules and rules to tackle hybrid mismatches.⁽³³⁾ In addition, Luxembourg also

introduced in the same bill, changes to its tax laws aiming at making the recognition of a permanent establishment abroad more stringent⁽³⁴⁾ and avoiding some abuses linked to the use of convertible loans⁽³⁵⁾. Regarding outbound payments, as per a recent circular (“circulaire”)⁽³⁶⁾, transactions with related companies located in non-cooperative tax jurisdictions listed by the EU will have to be reported and will be subject to greater scrutiny. These measures apply from transactions made in 2018 and it is therefore too early to assess their effects. In order to translate into its double tax treaties the outcome of the G20/OECD Base Erosion and Profit Shifting project, Luxembourg’s Parliament adopted a bill to ratify the Multilateral Convention to Implement Tax Treaty Related Measures to Prevent Base Erosion and Profit Shifting (‘Multilateral Instrument’). Luxembourg has chosen to apply the Multilateral Instrument to all its treaty partners but has put reservations on numerous articles not forming part of the minimum standard. This means that these anti-abuse rules will not necessarily apply in a constant manner as their impacts will rather rely on whether Luxembourg’s treaty partners have also signed the Multilateral Instrument and with which reservations. Luxembourg will rely on bilateral negotiations to amend Treaty provisions in line with the Base Erosion and Profit Shifting results. This negotiation process may take time to be completed. The actual review by Luxembourg of its double tax treaties therefore deserves to be analysed. Moreover, anti-abuse clauses regarding the exemption of withholding taxes have also been introduced in a number of tax treaties. No information is available yet on whether these clauses have been applied and with which results.

⁽²⁸⁾ See European Commission, 2018.

⁽²⁹⁾ IMF (2018), Article IV Consultation

⁽³⁰⁾ There may be an exemption from withholding tax on dividends paid to a company resident in a country that has a bilateral tax treaty with Luxembourg and is fully subject to an income tax comparable to the Luxembourg corporate income tax (Article 147 of the income taxation law –Loi concernant l’Impôt sur le Revenu). In practice, an income tax is considered comparable if it applies to a similar tax base, with a statutory rate which is at least half of Luxembourg’s corporate income tax rate. To be applicable, the parent company is required to have at least 10 % participation or a participation with an acquisition cost of at least EUR 1.2 million for an uninterrupted period of at least 12 months. In addition, Luxembourg implemented the anti-abuse clause provided for in the revised parent-subsidiary directive. Furthermore, specific anti-abuse clauses have been included in some bilateral tax treaties.

⁽³¹⁾ Exit tax rules will be applicable from 2020.

⁽³²⁾ Regarding the controlled-foreign companies rules, Luxembourg chose the “transactional” approach, whereby non-distributed income of controlled-foreign companies arising from non-genuine arrangements which have been put in place for the essential purpose of obtaining a tax advantage would be targeted.

⁽³³⁾ This provision would cover intra-EU hybrid instruments and hybrid entity mismatches envisaged in ATAD 1, but

not the hybrid mismatches measures of ATAD 2, which are due to enter into force from 2020 onwards.

⁽³⁴⁾ Luxembourg would require a taxpayer to prove that the other state is also recognizing a permanent establishment before granting an exemption based on the applicable double tax treaty.

⁽³⁵⁾ This provision would forbid the tax-free exchange or conversion of a convertible loan for participations or equity.

⁽³⁶⁾ Circulaire du 7 mai 2018 relative aux mesures défensives en relation avec la liste de l’Union européenne des pays et territoires non coopératifs à des fins fiscales.

3.2. FINANCIAL SECTOR

3.2.1. FINANCIAL SECTOR

Luxembourg is among the largest financial centres in the world, a platform for fund administration, private banking services and foreign currency operations. The country hosts numerous banks and insurers, with most banks (132 out of 136) belonging to a foreign group. Half of them are custodian banks working with the fund industry. The other half, typically smaller institutions, are mostly specialised in wealth management. Seven entities are classic domestically-focused retail banks⁽³⁷⁾. After the USA, Luxembourg is the second-biggest fund administration centre worldwide.

The financial sector is Luxembourg's main economic engine. The sector accounts for 25 % of GDP, 11 % of employment and 21% of fiscal revenues (Cour des Comptes, 2018). Within the financial sector, banks record the main contribution to GDP while the balance of payments largely reflects the activity of the funds industry. Luxembourg's funds account for 26.8% of money under management in Europe, reaching EUR 4,065 billion in December 2018, 71 times the GDP of the country. Although the number of bank employees has remained broadly stable at around 26,000 since 2010, employment has grown in the financial auxiliary services⁽³⁸⁾ (*professionnels du secteur financier*). Despite competitive salaries, the financial sector also encounters problems in recruiting and retaining talent due to structural mobility problems and expensive real estate market.

Luxembourg's financial sector is deeply integrated in a financial global value chain. Luxembourg's participation in global value chains in financial activities started at an early stage. Specialisation policies implemented in the past were instrumental in the sector's early

development, as well as in allowing Luxembourg to capture large benefits from the financial industry's global value chains (for instance in terms of technology or price transfers). Global value chains might have played an important role in Luxembourg's evolution as a global financial hub, with a favourable environment for multinationals and financial firms' offshoring activities. This is also suggested by the high content of imported intermediate inputs in external demand, as well as the high inward Foreign Direct Investment stocks (360.9 % of GDP, excluding Special Purpose Entities⁽³⁹⁾), the highest in the EU). However, long global value chains also imply a higher exposure to external shocks, including global value chains disruptions, which could add to the volatility in destination markets, mainly financial.

Luxembourg's banks display solid capital ratios. Luxembourg's capital conservation buffer was front-loaded and is at 2.5%. Additionally, 7 banks must respect an O-SSI buffer⁽⁴⁰⁾ of 0.5% of risk-weighted assets and one bank a buffer of 1%. The countercyclical capital buffer was introduced in 2016 and has been fixed at 0.25% for the first quarter of 2019, applicable from 1 January 2020 onwards. The profitability of banks remains comfortable, despite a weakening in 2017 and 2018. Net profits have shrunk recently, dragged down by lower non-recurrent income due to extraordinary operations and increasing volatility in financial markets. These developments are also reflected in the profitability indicators (see Return on Equity and Return on Assets in Table 3.2.1). Over the past years the share of commission and fee income over total income has increased markedly (from 43% in 2010 to 58% in 2017), reflecting higher income diversification in a context of historically low interest rates.

⁽³⁷⁾ The distinction between domestically and externally oriented credit institutions has especial relevance in Luxembourg. The five domestic banks operating in the Place are traditional deposit taking institutions and the domestic loan providers in Luxembourg. In this sense, they actively contribute to economic growth and they are deeply rooted in its society. On a different note, they are relevant for the macroeconomic monitoring, due to its close relationship with the domestic sector. By contrast the other institutions have no direct connection with the domestic economy of Luxembourg.

⁽³⁸⁾ Professionnels du secteur financier are also supervised by the Commission de surveillance du secteur financier.

⁽³⁹⁾ Special Purpose Entities (SPEs) are entities whose role is to facilitate the internal financing of a multinational enterprise but that have little or no physical presence in an economy. Excluding such entities provides a better measure of FDI having an impact on the economy.

⁽⁴⁰⁾ The O-SII (other systemically important institution) buffer is calculated depending on banks size, interconnectedness, complexity, cross-border activity and its importance in the relevant financial system infrastructure. It can reach a maximum of 2%. National supervisors must follow EBA guidelines in its calculation. Buffers in Luxembourg will increase to 0.5% in 2019 when the phasing-in period is over.

Table 3.2.1: **Financial soundness indicators, all banks in Luxembourg**

(%)	2011	2012	2013	2014	2015	2016	2017	2018Q2
Non-performing loans	-	-	-	1.4	1.1	0.8	0.7	0.7
Coverage ratio	-	-	-	30.8	38.5	37.7	38.5	33.3
Loan to deposit ratio*	65.8	60.9	54.9	52.2	51.8	54.1	52.5	na
Tier 1 ratio	15.3	18.6	21.3	18.5	20.2	23.6	21.9	21.9
Capital adequacy ratio	17.8	21.9	24.4	19.6	20.9	24.3	22.6	22.5
Return on equity**	2.7	7.0	6.4	7.2	7.2	7.5	6.3	5.5
Return on assets**	0.2	0.5	0.5	0.5	0.6	0.6	0.5	0.5

*ECB aggregated balance sheet: loans excl to gov and MFI / deposits excl from gov and MFI

**For comparability only annual values are presented

Source: ECB

Operational costs have also increased, as financial institutions adapt to the changing technological and regulatory environment and try to attract skilled workers despite mobility issues and high house prices.

Recent stress tests highlight banks' capacity to withstand real estate price shocks and high default rates. Solvency ratios remained well above the regulatory thresholds and showed high resilience, both quantitatively and qualitatively. With a CET1 ratio at 21.2 %, Luxembourg banking system has sufficient own funds to absorb shocks. Regular stress tests ⁽⁴¹⁾ run by the *Commission de surveillance du secteur financier* highlighted that the 5 domestically-oriented banks, which hold 90% of mortgage loans, could withstand dramatic increases in mortgage defaults combined with sizeable real estate price corrections without significantly falling below regulatory capital minimum requirements (European Commission, 2018). Losses would mainly stem from relatively recent vintages of high loan-to-value mortgages for which banks need to set aside extra capital. This is notably due to the steep rise in housing prices over the past years. The supervisor has floored mortgage risk weights at 15% for banks applying the internal risk based approach, although this is in place as a recommendation (European Systemic Risk Board, 2018). For banks applying the standard approach, a higher risk weight applies to the part of a mortgage exceeding 80% of the value of the collateral. A draft law introducing stricter borrower-based measures awaits parliamentary approval.

⁽⁴¹⁾ Sensitivity analysis on default rates augmenting in incremental steps by 2.5%-points up to a 25%- increase and price corrections in incremental steps by 5%-points up to a 50% price fall.

Banks need to deposit large sums at the Central Bank to comply with liquidity ratios ⁽⁴²⁾. Most banks in Luxembourg do not take deposits and cannot rely on them to fulfil liquidity ratios. In addition, Luxembourg government bonds, another major component to fulfil those ratios, are in short supply. Hence, in order to fulfil either ratio most banks have to resort to depositing with the Central Bank. Indeed, banks' significantly increased their deposits at the Central Bank in recent years, from EUR 16 billion at end 2014 to EUR 131 billion at the end of the third quarter of 2018, reflecting the phasing in period for compliance with the new international liquidity requirements.

Most funds in Luxembourg invest only in equity and/or bonds, benefiting from a network of specialised service providers. Luxembourg's funds are mostly "*plain vanilla*" funds (Table 3.2.2), i.e. they only invest in equity, bonds or a combination of both. Fund of funds, money market and real estate funds are smaller in size. Private equity and venture capital funds keep increasing their share of money under management. Most *plain vanilla* funds choose to domicile their fund in Luxembourg due to the eco-system surrounding the funds industry. This includes roughly 8,000 audit professionals, many legal specialists and IT providers, as well as around 70 custodian banks.

⁽⁴²⁾ Net Stable Funding Ratio and Liquidity Coverage Ratio. Both ratios demand from banks to hold enough sufficiently liquid assets to survive a 30 day stress period: The NSFR divides available stable funding (assets the banks currently holds are weighted according to their projected value in a liquidity stress scenario) through required stable funding. The LCR has 3 subcategories with decreasing levels of quality: level 1, level 2A and level 2B assets. Level 1 assets are not discounted when calculating the LCR, while level 2A and level 2B assets have a 15% and 50% discount, respectively. Level 1 includes sovereign bonds and central banks' deposits.

That environment shortens considerably the time it takes to set up a fund.

Custodian banks manage investment funds' treasury operations. Investment funds rely on custodian banks to provide treasury management and overdraft facilities. Investment funds held EUR 124 billion of deposits in Luxembourg's banks, or 17% of total bank liabilities, in December 2017 (Banque Centrale du Luxembourg, 2018). By contrast, funds accounted for only 1% of banks' assets, mostly short term loans for cash flow management. Given notably their size and interconnectedness with the domestic financial sector, some custodian banks are considered as other systematically important institutions by the banking supervisor and must therefore comply with additional capital buffers.

Table 3.2.2: **Distribution of investment funds per specialisation (% market share)**

Equity	30.6
Fixed income	28.5
Mixed (Equity-Fixed income)	22.5
Money market funds	7.2
Funds of funds	5.9
Real estate	1.6
Private equity and venture capital	2.1
Others	1.6

Source: European Commission

The potential risks stemming from the interconnectedness between banks and investment funds appear limited. Concerns have been raised regarding the potential risks for domestic banks and the real economy in a scenario of severe liquidity crisis in the funds industry (IMF FSAP, 2017, European Commission, 2018, Banque Centrale du Luxembourg, 2017). Such risks appear limited as they are mitigated by several elements. First, the risks of potential liquidity shortfalls in domestic banks through the interbank market were identified using extreme stress test assumptions (IMF, 2017). Second, most banks in Luxembourg benefit from potentially sizeable intragroup liquidity support from their parent institutions in case of stress. Third, the recent activation of international regulations on liquidity has improved the enforcing power of supervisory authorities to ensure sufficient liquidity levels are maintained by financial institutions, which is also reflected by large

deposits with the Central Bank. Finally, the very diversification of investment funds and their large holding of very liquid securities make a run on funds highly unlikely under normal market conditions, as sufficient time is generally allowed between a redemption query and the final pay-out to prevent liquidity shortfalls. However, the *Commission de surveillance du secteur financier* has started internal work to better assess the potential risks on system-wide liquidity stemming from investment funds liquidity shocks.

The insurance sector is diversified and growing.

Luxembourg hosts 45 life insurance companies, 49 non-life insurers and 202 re-insurers. The sector employs 4,000 full time equivalents in Luxembourg, and its total assets accounted for EUR 235 billion in 2017, 3.2% more than in 2016. The bulk of the balance sheet (EUR 179 billion) was held by the life-insurance sector, while 90% of premiums came from non-residents. Profits grew for life insurance, remained stable for non-life insurance, but fell 80% for re-insurers due to the impact of several natural catastrophes. Several insurers have decided to relocate some activities from the United Kingdom to Luxembourg in recent months. This notably reflects the competitiveness of the country's tax environment, which allows for generous deductions, and the advantages of providing a specialised focus through a dedicated supervisory entity.

3.2.2. PRIVATE SECTOR INDEBTEDNESS

Corporate indebtedness remains high due to Luxembourg's position as an international treasury centre, but leverage can be assessed as moderate. The non-consolidated debt of non-financial corporations accounted for 3.5 times GDP as of June 2018, down from 3.8 in 2015. This remains very high, well above the EU average. The ratio of gross consolidated corporat debt, as a share of GDP, is also well above prudential and fundamental-based benchmarks⁽⁴³⁾, with gaps of 132% and 166% of GDP respectively in 2017. As explained in previous reports, this high level of indebtedness stems from Luxembourg's position as an international business treasury centre and

⁽⁴³⁾ Methodology to compute the fundamentals-based and the prudential benchmarks based on Bricongne, J. C., L. Coutinho and N. Philipponnet (2018)

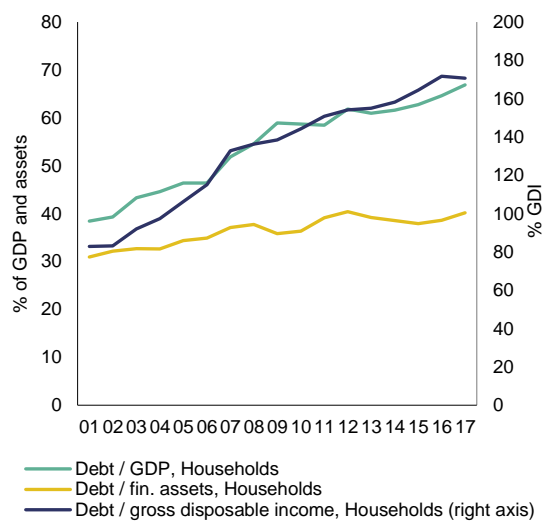
reflects large amounts of intra-company cross-border loans. Liabilities are therefore usually matched by equivalent assets, which is illustrated by the relatively moderate leverage ratios when comparing debt to equity or financial assets.

Despite a favourable aggregate wealth position, households' indebtedness remains high compared to income. Household debt is growing slowly and accounts for a moderate share of households' financial assets (40% in 2017) highlighting the largely positive aggregate net asset position of households of about 100% of GDP. However, debt accounted for 178 % of gross disposable income, one of the highest levels in the EU, as mortgage loans registered sustained growth in recent years thanks to low interest rates and surging property prices. As illustrated in previous reports (European Commission, 2018) rising indebtedness generates some concerns as to the solvency risks for lower income households, notably in case of rising interest rates or economic downturn. This was notably pointed out by the European Systemic Risk Board in its 2016 warning about the medium term risks linked to household indebtedness and residential prices.

A package of borrower-based prudential measures is intended to address concerns over some households' solvency. The government has proposed the introduction of mortgage borrower-based tools, placing limits on loan to value, loan to income, debt to income, debt service-to-income ratio, and loan maturities⁽⁴⁴⁾. The proposal allows the financial sector supervisor (*la Commission de Surveillance du Secteur Financier*) to set thresholds. As these limits will have distributional consequences, the Conseil d'Etat ordered to better define the accountability framework in which the Commission de surveillance du secteur financier will set these limits. The draft bill is currently pending approval in the Parliament, but is expected to pass parliament in early 2019.

⁽⁴⁴⁾ LTV: loan to value, i.e. the ratio between the credit obligations of a borrower and market value of a given property; LTI and DTI: loan (debt) to income, i.e. the ratio between a loan (debt) and annual net income DSTI: debt service-to-income ratio, i.e. the ratio between the total monthly amount of a borrower's repayment obligations resulting from all credit agreements and the borrower's total available annual net income divided by 12; maturity limits are upper limits expressed in years concerning the loans' redemption.

Graph 3.2.1: Household debt and leverage ratios

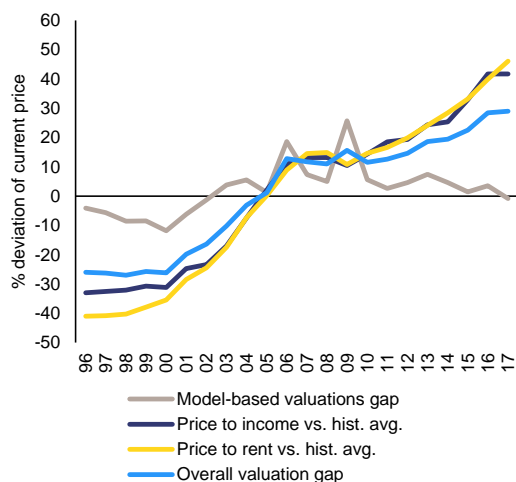


Source: European Commission

3.2.3. HOUSING MARKET DEVELOPMENTS

Housing prices continue to rise amid increasing indications of overvaluation. Real residential property prices increased by 4.5 % on the year in June 2018, compared with 5.1% in the same period of 2017. Prices appear markedly above their long-term average when compared to the level of rents and income, with a gap of 39 % and 37 % respectively as of June 2018. This rather large overvaluation estimate contrasts with a more measured model-based estimate taking into account other fundamental variables (Graph 3.2.2). The overall house price gap calculated by the Commission, an average of the above indicators, shows signs of an overvaluation of prices close to 30 %. Other institutions have estimated overvaluation of 6.9% (Banque Centrale du Luxembourg, 2018) and between 4% and 52% (European Systemic Risk Board, 2018). Although their range is very wide, there seems to be a consensus pointing towards a moderate overvaluation of housing prices, which might, if continued, lead to a potential correction in the future.

Graph 3.2.2: **Housing prices overvaluation gap with respect to income, rents and fundamentals**



(1) Overvaluation gap estimated as an average of the price/income, price/rent and fundamental model valuation gaps. Long-term values are computed over 1995-2016.

Source: European Commission

Strong housing demand remains driven by demographic growth, benign financing conditions and a large cross-border workforce.

The population of Luxembourg increased by 2.2% on the year in 2017, bringing overall growth from 2010 to 17.6%. 82% of the demographic growth since 2010 is due to migration, as Luxembourg's dynamic economy attracts labour from neighbouring countries. The low interest rate environment eased financing conditions and supported housing price increases (BCL, 2018). The large share of cross-border workers (40 % of employment), combined with high traffic congestion and insufficient supply of public transport (see section 3), also contribute to a sustained housing demand.

Significant investment is needed to increase housing supply. At this point investment in

dwelling remains insufficient, constrained by insufficient land availability and low housing density, and largely due to lack of incentives to landowners to build new housing. The pace of construction of new dwelling has increased by 50% between 2011 and 2015 but remains only slightly above the annual average observed since 2000 (2,700 new housing units per year). As a result the built-up areas in Luxembourg increased marginally in the past two decades (Luxembourg's built up area only moved from 8.1% of the territory in 2000 to 9.8% in 2016), which contrasts heavily with a very dynamic demographic growth. This is despite the apparent efficiency of Luxembourg's procedures regarding building permits and property registration (World Bank, 2018) and the recent increase in building permits⁽⁴⁵⁾. As analysed in past reports (European Commission, 2018), there currently seem to be insufficient incentives for private landowners, who own more than 90 % of available land, to sell their assets or undertake construction projects. Luxembourg is one of few EU countries where the investment in dwellings as a percentage of GDP does not increase. Indeed, as real estate values increase steadily and property taxes remain very low, land and property ownership provide high potential returns for a very low risk. The low density of housing built in Luxembourg also contributes to the scarcity of supply, as 80 % of dwellings are one-family houses and half of collective housing units contain less than four apartments. Therefore, part of the constraints weighing on housing supply appears to stem from insufficient fiscal, financial and regulatory incentives to extend built-up areas and achieve higher-density housing.

⁽⁴⁵⁾ 5203 housing building permits were granted on average each year between 2014 and 2017, from 4070 per year from 2010 to 2013.

Box 3.2.1: The rental market in Luxembourg

Mostly concentrated around Luxembourg city, rented housing is becoming increasingly expensive, notably for lower income households. In 2017, about 30% of Luxembourg residents rented a dwelling in the private market, and almost half of rental housing units were located in the Luxembourg canton (45.5%). One of the reasons driving this concentration of the rental market in Luxembourg is linked to the presence of international and European public institutions, and international firms, whose employees tend to favour renting instead of buying, for flexibility reasons. Rental is more prevalent for lower income households, as about 50% of households at risk of poverty are homeowners. The rental burden has increased for lower income households over the last decade, with 26% of tenants dedicating more than 40% of their income to rental costs in 2016 (in line with the EU and euro area averages). The introduction of a rental subsidy in 2016 intends to alleviate the housing cost burden for the most vulnerable. The limited supply of housing in the main cities, particularly in the capital city of Luxembourg, is the main driver of the rise in rental costs. The comparatively lower housing costs and better housing supply in neighbouring countries therefore contribute to explaining the large number of cross-border workers and the high level of traffic congestion in Luxembourg.

Social housing remains largely underdeveloped compared to neighbouring countries, pointing to some investment needs so as to increase the supply of affordable housing units. In 2017, there were 2,000 publicly-owned social housing units, accounting for 0.9% of the total housing stock (compared to close to 20% in France). The new Government's coalition agreement highlights plans to develop the supply of affordable housing through the Housing Fund (Fonds du Logement) and the Société nationale des habitations à bon marché (SNHBM). The medium-term objective is to multiply by three the supply of affordable housing units for rent. Delegated social housing is also promoted, whereby privately-owned dwellings are rented, through a public entity, at lower rents to people who are not eligible to social housing or who are on the waiting list. This service is provided by the Agence Immobilière Sociale, which rents about 300 housing units. The State also grants subsidies to social associations (non-profit organizations, foundations) acting as intermediaries between private homeowners and low-income households. These associations rented about 500 housing units in 2017. Given the very low starting point, the government's objective regarding the supply of social housing might not be sufficient to significantly alleviate the existing tensions in the rental market. This might point to more important public investment needs in this particular area.

Luxembourg intends to introduce measures to stimulate housing supply and investment. A consultation process was initiated in May 2018 towards adapting urban planning laws. Proposed legislative changes would increase the area dedicated to housing by 13% and would raise the share of this area set aside for social housing from 10% to 30%. This would also allow State authorities to supersede municipal authorities in defining the areas dedicated to housing. In addition, a series of measures are envisaged in the new government's coalition agreement to increase housing supply. The authorities intend to make more land available for real estate development, either through public purchase of private land, the introduction of tax incentives or increased technical assistance to municipalities. Stronger incentives are envisaged to encourage owners of vacant land or properties in urban areas to make their properties available on the market. Public authorities also intend to strengthen their powers to

expropriate or exchange land to unblock development projects.

Rising rents and property prices could be having negative consequences on competitiveness and social inclusion. Relatively high compensation levels in some key sectors (finance, business services, and technology) allow Luxembourg to remain an attractive workplace internationally. However, the comparatively faster growth of property prices compared to income might eventually weigh negatively on the attractiveness of working in Luxembourg, notably in sectors where wages are less dynamic. This could exert upwards pressure on salary expectations. Rising housing costs might increase the currently low share (10% in 2017, STATEC, 2018) of households dedicating more than 40% of income to housing (see Box 3.2.1), notably for more vulnerable low income and single-parent households. In addition, lower income households

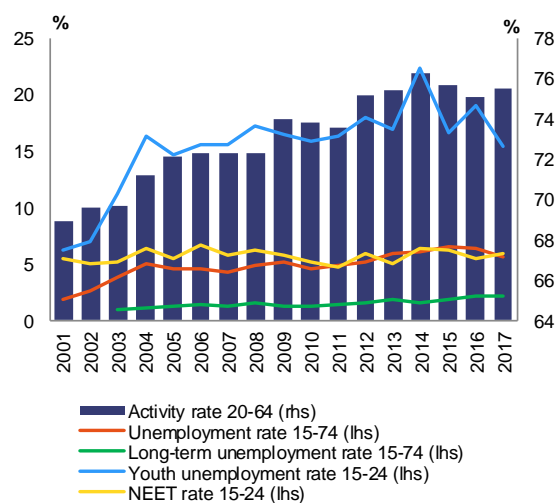
might be pushed further away from urban and economic centres, leading to more traffic congestion, longer commuting time and higher transport-related expenditure. It is uncertain whether the expected increase in the supply of affordable housing and in the availability of rental subsidies will prove sufficient to offset the consequences of rising housing costs.

3.3. LABOUR MARKET, EDUCATION AND SOCIAL POLICIES

3.3.1. LABOUR MARKET

Supported by a favourable economic environment, the labour market is showing strong and continued job creation with a low and declining unemployment rate. In 2017, total employment grew by 3.3%, up from 3% in 2016, still benefitting more cross-border workers (+4.2%). This trend is expected to continue in 2018 and progressively stabilise towards 2019. The most dynamic sector remains business services, while industrial employment has also been growing since 2015. After a continuous increase between 2011 and 2015, unemployment fell in 2016 and again in 2017 (5.6% against 6.3% in 2016) and even declined to 4.9% by the end of 2018. Youth unemployment decreased from 19.1% in 2016 to 15.4% in 2017, and reached 12.3% in the last quarter of 2018. However, the rate of young people not in employment, education or training, though still low, increased from 5.4 % in 2016 to 5.9% in 2017.

Graph 3.3.1: Activity, unemployment, long-term unemployment, youth unemployment and not in employment and education or training rates

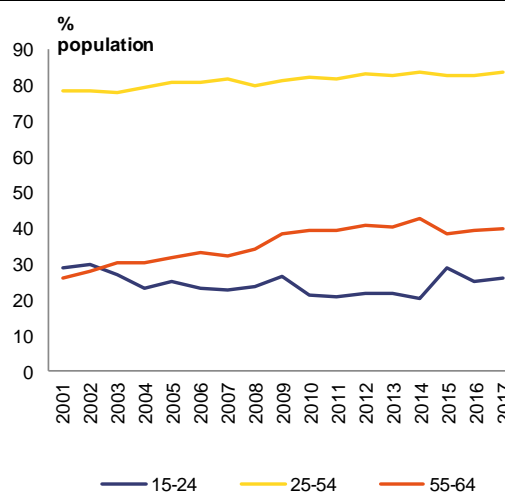


Source: Eurostat, LFS

Despite the overall good labour market performance, the employment rate is stagnating and specific groups still face challenges. With an employment rate of 72% in the third quarter of 2018, Luxembourg has not yet reached its Europe 2020 target of 73%. According to the National Statistics Institute, the decline in the employment

rate (20-64) over the last years is mainly due to longer studies of young people, parental leave and an ageing population. In this context, substantial untapped potential stems from the low labour market participation of some groups, in particular older people, underlining further investment needs.

Graph 3.3.2: Employment rate by age group in Luxembourg



Source: Eurostat, LFS

Old-age employment

The employment rate of older workers (55-64) has stagnated since 2010 and remains the second lowest in the EU (39.8% in the first three quarters of 2018, against 57.1% on EU average). Limited progress has been made on reducing early retirement (see European Commission 2018, 3.1.2 and 3.3.1) and targeted activation policies did not improve substantially the older workers' participation in the labour market. Age management strategies which should also help to keep senior workers in employment are not a legislative priority, neither for the government nor for the social partners, as the draft bill introduced in 2014 seems definitely stalled in parliament (see European Commission, 2018, section 3.3.1, page 29). In the same vein, the transposition of the European-level framework agreement on active ageing between social partners is yet to be negotiated in Luxembourg.

Box 3.3.1: Monitoring performance in light of the European Pillar of Social Rights

The **European Pillar of Social Rights** is designed as a compass for a renewed process of upward convergence towards better working and living conditions in the European Union ⁽¹⁾. It sets out twenty essential principles and rights in the areas of equal opportunities and access to the labour market; fair working conditions; and social protection and inclusion ⁽²⁾.

SOCIAL SCOREBOARD FOR LUXEMBOURG		
Equal opportunities and access to the labour market	Early leavers from education and training (% of population aged 18-24)	Good but to monitor
	Gender employment gap	Better than average
	Income quintile ratio (S80/S20)	On average
	At risk of poverty or social exclusion (in %)	To watch
	Youth NEET (% of total population aged 15-24)	Good but to monitor
Dynamic labour markets and fair working conditions	Employment rate (% population aged 20-64)	On average
	Unemployment rate (% population aged 15-74)	Better than average
	Long-term unemployment (% population aged 15-74)	On average
	GDHI per capita growth	On average
	Net earnings of a full-time single worker earning AW	Best performers
Social protection and inclusion	Impact of social transfers (other than pensions) on poverty reduction	To watch
	Children aged less than 3 years in formal childcare	Best performers
	Self-reported unmet need for medical care	Better than average
	Individuals' level of digital skills	Best performers

Members States are classified according to a statistical methodology agreed with the EMCO and SPC Committees. The methodology looks jointly at levels and changes of the indicators in comparison with the respective EU averages and classifies Member States in seven categories (from "best performers" to "critical situation"). For instance, a country can be flagged as "better than average" if the level of the indicator is close to EU average, but it is improving fast. For methodological details, please consult the draft Joint Employment Report 2019, COM (2018)761 final. Data update of 29 January 2019. NEET: neither in employment nor in education and training; GDHI: gross disposable household income.

Luxembourg performs overall well on most indicators of the Social Scoreboard supporting the European Pillar of Social Rights. The labour market in Luxembourg shows very good results with low unemployment and gender employment gap, accompanied by good childcare provision for very young children. Although there are signs of weakening with regard to the overall risk of poverty or social exclusion rate and the impact of social transfers on poverty reduction, the social situation in Luxembourg remain close or better than in the EU. Income inequality is currently at a level close to the EU average, and remained stable since 2016. Despite good overall performance some challenges related to the labour market and education still remain. In particular, important skills shortages have recently emerged in certain sectors. Furthermore, the education system still faces inequalities in opportunity among pupils in relation to their socioeconomic status and migrant background.

The employment rate of older workers has not improved. The fundamental reforms have not been considered yet or are pending approval, such as the so-called 'Age Pact', which includes a whole package of measures to keep senior workers longer in employment.

The Luxembourg government took steps towards a better work-life balance for

fathers and more equal sharing of care responsibilities between women and men. The government explicitly referred to the Social Pillar and to the Commission proposal for a Directive on work-life balance for parents and carers to amend its bill on paternity leave. The law (passed in December 2017 ⁽³⁾) extends paternity leave from 2 to 10 days starting in January 2018, among other changes related to family leave.

⁽¹⁾ The European Pillar of Social Rights was proclaimed on 17 November 2017 by the European Parliament, the Council and the European Commission.

⁽²⁾ The European Pillar of Social Rights in 20 principles: https://ec.europa.eu/commission/priorities/deeper-and-fairer-economic-and-monetary-union/european-pillar-social-rights/european-pillar-social-rights-20-principles_en

⁽³⁾ *Loi du 15 décembre 2017 portant modification du Code du travail, de la loi modifiée du 31 juillet 2006 portant introduction d'un Code du travail et abrogeant la loi modifiée du 12 février 1999 portant création d'un congé parental et d'un congé pour raisons familiales.*

The financial disincentives to work stemming from the tax-benefit system are a persistent problem, especially for older people. The issue of high disincentives to work embedded in the tax and benefit system, in particular for older people, has been addressed in previous country reports (see European Commission 2017, page 29, and 2018, page 29). In 2017, 24.5% of the total working age population (20-64 years) was inactive in Luxembourg (respectively 20.5% of the working age men and 28.8% of women). 59% of those aged 55-64 were inactive and Luxembourg has one of the highest rates of inactive people aged 60-64 (82.3% in the EU). In 2016, for people aged 55-64 and inactive, 58% of men and 37% of women were inactive due to retirement or early retirement, 1% of men and 12% of women because of family/care responsibilities, 6% of men and 7% of women were inactive because of illness/disability. At least for men, financial disincentives to work were the main reasons for low old age activity rates in 2016. However, this situation might evolve due to recent changes in the income tax between 2016 and 2018.

People aged above 50, people with disabilities and workers with reduced working capacity make up a large share of the long-term unemployed. Long-term unemployment, although well below the EU average, reached its highest level in 2016 (2.2%) but slightly decreased in 2017 (2.1% against 3.4% on EU average), a downward trend further confirmed with 1.6% in the third quarter of 2018. The share of long-term unemployment in total unemployment increased from 30.7% in 2015 to 37.2% in 2017 (Eurostat), highlighting the difficulty in integrating some unemployed people in the labour market.

Many employment measures target the most vulnerable job seekers, in particular those aged 45 or 50 and more, to help them re-integrate the labour market. According to the Public Employment Service, many new measures already show positive results. The creation of subsidised permanent jobs in the public sector and social enterprises to give long-term job seekers better prospects and avoid job insecurity (see European Commission 2018, page 29) already covered workers whose 83% are 50 years old or more (October 2018). The professionalisation placement programme (six-week work placement) and re-integration employment contracts (12 months)

deliver respectively a job placement rate of 68% and 94%. Other measures (known as "social initiatives") support vulnerable people furthest from the labour market for up to two years. The law reforming the professional reclassification scheme for persons with working disabilities confirmed its impact with only 45% of people affected by external reclassification in 2018 (i.e. registered in the public employment service) instead of 70% before the adoption of the law. In March 2018, the Government presented a draft law establishing assistance to help employees with disabilities or in external reclassification to better integrate themselves in their job (for the private sector), a step towards the transposition of the Convention on the rights of persons with disabilities. The ongoing legislative process involves social partners, as usual in Luxembourg.

Labour market participation of women

Despite increasing participation in the labour market, there is still untapped potential of female workers. The female employment rate continued to increase, reaching 68.0% in the third quarter of 2018 (against 65.1% in 2016) whereas the male employment rate further declined in the third quarter of 2018 to 75.0% (against 76.1% in 2016), resulting in a significant reduction in the gender employment gap (7.0 pp). The labour market performance of non-EU born women remains weak with an employment rate (age group 20-64) of 54.4% in 2017 (same as the EU average) against 72.5% for their male counterparts and 66.7% for native-born women, resulting in a gap slightly below the EU average.

The gender gap in part-time employment remains very high. It stood at 25.2 pp. in the third quarter of 2018 with 31.0% of women working part-time against 5.8% of men. Part-time work is more widespread among native than foreign workers. The impact of family and care responsibilities decreases with age. This suggests that the presence of small children in the household is a contributing factor to inactivity despite the high number of available places in childcare and good affordability with free vouchers or at a very low fee for low-income groups, Luxembourg being one of the best performers in this field.

Training and upskilling

Adapting skills and training to labour market needs remains an important venue to improve labour market participation. The analysis on macroeconomic skills mismatch shows that skills mismatches in Luxembourg have remained low throughout the last decade. Luxembourg has the second lowest shortage in the EU after Ireland according to the labour shortage index in the period 2013 to 2017. However, Luxembourg is among the member states where the low-skilled comprise the majority of the inactive population, justifying particular attention to low-skilled in activation measures. In 2017 45.84% of the inactive were low-skilled (ISCED 0-2) while only 12.02% of the inactive were high-skilled (ISCED 5-8).

At the same time, sizeable labour shortages have recently emerged in certain sectors. For example, the public employment service reports that around 70% of vacancies registered by the Information and Communication Technology and financial sectors remain unoccupied while the average overall vacancy rate is 28% (see also sections 3.3.3 and 3.4.1 below). Vacancies also concern some low and medium-skilled jobs such as butchers, electricians or in the *Horeca* sector. Though high-skilled workers are less vulnerable to changes in economic trends, the public employment service also intends to adapt its services to this specific group, which represents a non-negligible share of the job seekers (around 20% in October 2018). Prioritising investments to both upskill and reskill the labour force could strengthen its employability.

The public employment service has strengthened its cooperation with employers to better match labour market needs. The development of training courses for job seekers remains a priority, notably for those aged 30-45, in particular at the request of a company or a specific sector. Comparing to 2016, the number of job seekers participating in training has increased by 17% in 2017 and training measures represent about 29% of total measures undertaken. The partnership between the public employment service and the business federation (Union des entreprises luxembourgeoises) was renewed in 2018 for a further three years, including, among others, tailor made training sessions. In June 2018, the Ministry

of Labour and the public employment service also signed a one-year cooperation agreement with the Federation for Recruitment, Search & Selection, created under the auspices of the industrial association to improve the prospects of highly qualified job seekers whose share has been growing among those registered with the public employment service.

3.3.2. SOCIAL POLICIES

Luxembourg shows relatively good social outcomes, but with some negative trends. The overall risk of poverty or social exclusion (21.5% in 2017) remains below the EU average (22.5%) but shows negative developments. From 2016 to 2017, the risk of poverty or social exclusion increased for young people (16-24) from 29.2% to 31%, working age adults (25-54), from 18.5% to 20.4%, and even the elderly (> 65), from 9.1% to 11.8%. Single-parent families showed the highest rate regarding the risk of poverty or social exclusion in 2017 (48.5%). Though social transfers still have a favourable impact on poverty reduction (35.52% in 2017), there was a decrease compared to 2016 (39.11%).

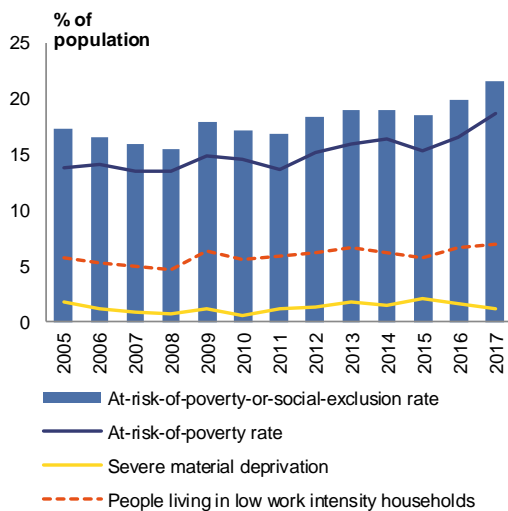
Luxembourg performs well with regard to adequacy of minimum income benefits overall⁽⁴⁶⁾. Although the at-risk-of-poverty threshold still remains above the minimum income level in Luxembourg, other benefits are available to low income groups such as childcare vouchers and housing benefits. According to the National Statistics Institute, childcare vouchers reduce the at-risk-of poverty rate by 1.6 pp (even by 5 to 6 pp for children). Moreover, people with modest incomes no longer have to pay healthcare expenses up-front. However, the “national reference budget”⁽⁴⁷⁾ is above the poverty threshold for most

⁽⁴⁶⁾ According to the Benchmarking Framework on Minimum Incomes conducted within the SPC Committee. Looking at the case of single-person households, in 2016, adequacy was the highest in the Netherlands, Ireland, Denmark and Luxembourg. In Luxembourg, the level of the benefit represented 85.7% of the poverty threshold and 78.2% of the income of a low-wage earner (against respectively 57.5% and 46.1% on EU average). For details, see the draft Joint Employment Report 2019, COM(2018) 761 final.

⁽⁴⁷⁾ The National Statistics Institute calculated the cost of living decently (meeting needs and actively participating in society) in Luxembourg for different family types, setting a “reference budget”: this reference budget is a set of baskets of goods and services that represent a certain

types of households. In other words, households with incomes between the poverty threshold and the reference budget are not registered as at risk of poverty or social exclusion though they cannot lead a decent life according to the reference budget criterion.

Graph 3.3.3: **At-risk-of-poverty or social exclusion rate and its components in Luxembourg**



Source: Eurostat, EU-SILC

In-work poverty is becoming a growing challenge. In-work poverty is increasing since 2011 and remains above the EU average. In 2017, it was 13.7% against 9.6% in the EU. Since 2011, it has increased by 3.8 pp. Those most at risk are self-employed workers (22%), employees on temporary contracts (31.4% against 16.3% in EU28) and single-parent households (34%). As a result of a further indexation in August 2018 the monthly minimum wage has increased to €2,048.54 and €2,458.25 for unqualified and qualified workers above 18, respectively,, reinforcing Luxembourg's position as the country with the highest (nominal and real) minimum wage in the EU. However, when considering minimum wages as a percentage of median wages, this ratio has fallen over the last 4 years and is moderate compared to the rest of the EU. Furthermore, according to the latest available data the share of minimum wage earners among all employees stood

standard of living in a given society. The amounts allocated to the different baskets cover primary or secondary needs. (<https://statistiques.public.lu/fr/publications/series/cahiers-economiques/2016/122-budget-de-reference/index.html> and <https://statistiques.public.lu/catalogue-publications/regards/2018/PDF-12-2018.pdf>).

at 14% in 2016 (among the highest in the EU) suggesting that the share of employees potentially affected by the minimum wage is significant. Among minimum wage earners 51% were below the age of 25 and 29% were unskilled, pointing also to the need for upskilling.

People born outside the EU tend to face particularly poor labour market and social outcomes. Non-EU born residents, which are over-represented in low-skilled occupations (75%), face high unemployment rates of 12.8% in 2017, below average incomes and a very high risk of poverty or social exclusion of 42.7% in 2017. On the other hand, the employment rate of second-generation people (aged 15-34) moved closer to that of the natives with a very low gap of 3.7 pp. A particularly alarming trend is the in-work poverty for non-EU born employees, which at 32.1% in 2017 is one of the highest in the EU (23.4% for the EU). In-work poverty gap between the non-EU and natives is also one of the highest in the EU.

Children with a migrant background are facing linguistic and integration issues that have an impact on their educational performance. Non EU-born are 2.7 times more likely to fall under the category 'not in education, employment or training' than native-born children. Luxembourg raised its public financing for day care, opened more places and made the service more affordable, which could help foster a better integration of children with a migrant background by giving them earlier access to the three official languages of the country.

The reform of the minimum income intends to better tackle social exclusion, in particular for households with children, labour market inactivity and unemployment traps. The *Revenu d'inclusion sociale* scheme has replaced the previous guaranteed minimum income in January 2019 and aims at tackling poverty with a particular focus on children and single-parent families. In addition to the low lump sum component (benefit) this scheme also has an activation component (registration as unemployed with the public employment service and participation in active labour market policies is required). Furthermore, the *Revenu d'inclusion sociale* scheme allows two adults in a household to accept a job as part of the active labour market policies, whereas only one person per household was allowed to do so under

the previous guaranteed minimum income system. The National Statistics Institute made simulations for five family types (including single persons, couples without children and with children, lone parents). The comparison of the monthly net revenues to the reference budget shows that under the *Revenu d'inclusion sociale* scheme, provided the recipients are activated, their income will be above the reference budget⁽⁴⁸⁾ for all configurations, except the case of the single adult activated at 75%. The European Commission Joint Research Centre and the OECD also made simulations on the effect of this scheme which largely corroborate the findings of the national statistics office. According to the OECD model, the reform improves the adequacy of the social safety net for those with children who are not entitled to unemployment insurance while there is no significant impact on those without children. The Joint Research Centre's analysis, based on the EUROMOD micro-simulation model demonstrates that, assuming full take-up of the social assistance, 9.1% of the households would benefit from the reform, while 3.6% would lose some of their disposable income. Nevertheless, the reform is expected to have a positive impact on poverty and inequality, as 70.7% of the households in the first (lowest) decile of the income distribution will benefit, while only 11% of the losers are in the first (lowest) decile. The impact of the new scheme on poverty will actually depend largely on the success of activation measures and prioritising investments to promote active inclusion and ensure transitions towards employment.

3.3.3. EDUCATION AND SKILLS

Luxembourg ranks at the top of European countries with regard to enrolment in early childhood education and care, tertiary education attainment and the employability of recent graduates but shows declining basic skills attainment combined with an increasing level of inequality. The increasingly diverse school population struggles with the trilingual education system: performance is strongly linked to students' linguistic background and socio-economic status. Grade repetition remains frequent, with high costs for the education system and strongly impacting students' motivation to

complete their studies. The school population is growing and getting more mixed, with 46.7 % of the pupils being foreign-born, which may require investments in adapting the number and qualifications of teachers and other education professionals.

Education performance is below the EU average and strongly linked to socioeconomic status. Luxembourg's average performance, as measured in the Programme for International Student Assessment, worsened between 2012 and 2015, especially in reading and science. The impact of socio-economic status on performance is one of the strongest among EU countries (European Commission, 2018x). It outweighs (by 2.7 times) the impact of the language spoken at home (Ministère de l'Éducation Nationale, de l'Enfance et de la Jeunesse – MENJE – and the University of Luxembourg 2016) and even a migrant background. Controlling for socio-economic status, the performance gap of the children of migrants is reduced by two-thirds (OECD, 2017a). Students with lower socio-economic status are the most likely to fall behind in all subjects and to be oriented towards the technical tracks of secondary school.

Educational tracking is particularly rigid. Changing tracks is extremely rare (Klapproth and al., 2013). The difference in the language regimes of the general and the technical tracks of secondary education — the first being French-based and the second German — also plays a role in orientation decisions and narrows the scope for switching. Pupils of foreign nationality are less frequently oriented towards the higher tracks of secondary education.

Luxembourg's early school leaving rate is significantly below the EU average but national surveys indicate a steady increase. The early school leaving rate, as measured by the Labour Force Survey, stood at 7.3% in 2017. However, this data should be interpreted with caution because of the limited sample size in Luxembourg. National estimates based on the actual number of young people not completing upper secondary education indicate that dropouts have been on the rise since 2009 and stood at 13.5 % in 2015 (MENJE, 2017a).

⁽⁴⁸⁾ See footnote 40

Grade repetition is frequent and strongly linked with early school leaving. About 20% of pupils have already repeated a grade by the third grade of primary school (MENJE, 2017b); by the end of secondary education, this is true for half of all pupils. Grade repetition is particularly high in technical secondary education: by the final grade, 71% of technical education pupils will have repeated a year at least once (MENJE, 2017b) against 30% in general, secondary education, which is still significant. Failing two years in the course of one's studies is the strongest predictor of early school leaving (MENJE, 2017a).

New policy initiatives aim to close the achievement gaps among pupils of different backgrounds and to reduce early school leaving. A 2017 amendment of the Act on Youth established national quality standards in early childhood education which all providers had to comply with by September 2017. The Law on secondary education of July 2017 introduced several measures to improve school quality and better adapt the school offer to the needs of an increasingly diverse school population.

Participation in vocational education and training remains high but the vocational pathway is marked by school continuity challenges. The proportion of upper secondary students (ISCED 3) in vocational education and training was 61% in 2016, well above the EU average (49.3%). However, vocational education and training is characterised by high levels of year repetition and dropout. The insufficient number of apprenticeship positions, in particular for the students in the lowest levels of vocational training is one of the causes of dropout as businesses are reluctant to hire apprentices whose initial training is deemed inadequate.

Reforms are underway to improve vocational education and training. Luxembourg has continued to implement its 2016 vocational education and training reform, aiming to improve completion rates but a new reform originally foreseen for the 2018-2019 school year has been delayed by one year due to reservations by the Conseil d'Etat. Guidance and counselling services for young people were restructured with more emphasis on social and psychological support and self-guidance education (Cedefop ReferNet, 2018). In March 2018, Luxembourg and Land Rhineland-

Palatinate signed an agreement on a cross-border cooperation to boost the attractiveness of the dual system of apprenticeships and allow apprentices to complete the practical part of the training in one country and the theoretical part in the other. In March 2018, the Chamber of Employees and the Chamber of Professions launched Basic-check, a tool to assess skills of fifth-graders and thus help orient them towards the right profession.

Adult participation in lifelong learning is high but is lower among low-skilled people and older workers. At 17.2%, participation by adults in lifelong learning is considerably higher than the EU average (10.9%) but much lower among low-skilled workers (at 6%)⁽⁴⁹⁾ and older workers (6.5% in 2017), increasing the risk of their skills becoming outdated and of them ending up in inactivity or early retirement. The employment rate of older workers remains particularly low at 39.8% in 2017, making it especially important to improve their participation in lifelong learning (see European Commission 2018, 3.3.1, page 30). According to the last European survey, 77.1% of Luxembourg companies provided vocational training to their employees (above the EU average of 72.6%) and 61.8% of employees participated in this training (well above the EU average of 40.8%), with a majority of women. The decrease in the state's co-financing provisions for training provided by companies (see European Commission 2018, 3.3.1, page 30) does not seem to have resulted in a decrease in training offers by businesses. Moreover, public co-financing remains higher for vulnerable target groups (low-skilled and older workers), indicating that this challenge represents an investment priority.

Luxembourg records very good results in connectivity and digital skills but lags behind in the business integration of digital technologies. Though it belongs to the high-performance cluster of countries in the Digital Economy and Society Index⁽⁵⁰⁾, its overall good performance levels mask a need for improvement in some areas, in particular in the integration of digital technologies by companies, for e-business, e-commerce and in public services.

⁽⁴⁹⁾ See the draft Joint Employment Report 2019, COM(2018) 761 final on the significant discrepancies across Member States (Figure 28) with an EU average of 4.3% of low-qualified adults participating in learning.

⁽⁵⁰⁾ See <https://ec.europa.eu/digital-single-market/en/desi>

Providing digital skills training that respond to businesses' needs remains a key challenge due to the large digital skills gaps. While the country ranks 1st in percentage of individuals who have at least basic Digital Skills (85%), the share of companies reporting that their vacancies for Information and Communication Technology specialists are hard to fill remains well above the EU average (see section 3.4.1 below). Over the last decade, Luxembourg has undertaken an ambitious economic diversification strategy identifying digital as a core pillar and requiring investments to meet the demands of the labour market in terms of digital skills. In May 2018, the Ministry of Labour presented the study Working 4.0 – Opportunities and Challenges for Luxembourg commissioned by the Ministry and social partners to show the potential impact of digitisation on labour. On average, 90% of employees need basic (71%) or advanced (20%) IT knowledge for their job and the direct impact of digitisation is high or very high for 55% of them.

Several programmes have been put in place since 2015 as part of the government's wider digital education strategy. In May 2017, Luxembourg launched the national coalition for digital skills and jobs, with the purpose of bringing together government, the education sector,

professional federations, non-governmental organisations and the private sector to effectively address the shortage of Information and Communication Technology specialists. Another promising initiative is the Digital Skills Bridge programme launched by the Ministry of Labour together with the Ministry of Economy. It aims to support companies needing to up-skill or re-skill their workforce in response to the disruptive changes brought by digitisation and automation. Participating companies can stem from a wide range of sectors, such as banking, insurance, industry and logistics.

3.3.4. INVESTMENT NEEDS

Increased investment in skills, employability, education and training are important for improving Luxembourg's productivity and employment, and for fostering equal opportunities. While skills shortages are growing, some population groups continue to face particular difficulties on the labour market pointing at the need to invest more in education and training, while better aligning education curricula to labour market needs.

3.4. COMPETITIVENESS REFORMS AND INVESTMENT

3.4.1. PRODUCTIVITY AND INVESTMENT CHALLENGES

Focussing investments⁽⁵¹⁾ on fostering digitisation and innovation, improving housing supply and sustainable transport infrastructure, and stimulating skills development would improve economic resilience, and strengthen the long-term potential growth of Luxembourg. Strategic public investment remains high and focussed on knowledge-intensive sectors, including a strong Information and Communication Technology sector. However, this has not spilled over, nor helped to stimulate private investment in innovation and digitisation, which remains low and appears insufficient to support the transition to a data-driven economy, and to improve significantly the low levels of economic digital integration and sluggish productivity growth. Despite their relatively high wages in international comparisons, shortages of qualified workers are increasingly seen as an obstacle to investment, but rising housing costs and heavy traffic congestion may be lowering the country's attractiveness, and could affect competitiveness (see Section 3.2), which calls for significant investments in construction and sustainable transport infrastructure (see Section 3.4). Effective investments in education and training are needed to make the most of people's potential and thus improve inclusion and employability, and foster technological and digital transformations to improve productivity and long-term growth potential (see Section 3.3).

Luxembourg exhibits one of the highest GDP per hour worked among the Organisation for Economic Co-operation and Development economies, but labour productivity growth has been among the lowest in the period 2010-2016.

Luxembourg did not record productivity gains in sectors that significantly contributed to productivity growth in other EU economies. A publication from the National Statistical Institute STATEC (*Note de Conjoncture 1-2018*) points out the absence of enduring productivity gains in industry and wholesale and retail sectors, unlike other countries where these significantly contributed to labour productivity growth between

2000 and 2016. By contrast, in the business services sector, information and communication showed consistent labour productivity growth (+6% in the period 2010-2016, cf. Organisation for Economic Co-operation and Development 2018). Over the same timeframe, professional, scientific and technical activities and administrative and support service activities showed productivity gains compared to the previous decade and being above the Organisation for Economic Co-operation and Development average.

The recently established National Productivity Board is expected to further investigate productivity drivers and potential productivity measurement pitfalls (i.e. weight of the financial sector, statistical sensitivity, significant increase in working population). Among the drivers, limited take-up of digitisation among small and medium-sized enterprises and perceived lack of qualified workforce across sectors are among the key priorities, along with other sustainable quality-growth enhancing policies (including through the "Third Industrial Revolution" or "Rifkin" strategy).

Indicators suggest that Luxembourg competitiveness ranks above EU average, but private investment is low and some challenges may undermine the attractiveness of the country. According to the National Competitiveness Scoreboard, Luxembourg ranks as the ninth more competitive economy in the EU in 2017. According to the World Economic Forum's Global Competitiveness Index 2017-2018, Luxembourg ranks 19th worldwide, among the best performers in most of the sub-indicators. However, the investment to GDP ratio is among the lowest in the EU and below pre-crisis level (although the services structure of the economy has to be taken into account). Competitiveness limitations would in part stem from its market size, but emerging challenges, such as the perceived shortage of qualified workforce crosscut sectors (issue exacerbated by the actual limited supply of skills in the bordering regions), mobility concerns and expensive and rising housing prices may drag down the country's attractiveness.

⁽⁵¹⁾ Both private and public investment.

Box 3.4.1: Investment challenges and reforms in Luxembourg

Section 1. Macroeconomic perspective

Productivity is at high level, largely reflecting past efficiency gains in the financial sector, obtained from participation in global markets. While economic expansion has been remarkable, it has also become more dependent on a narrow base of goods and services and sensitive to external shocks. Productivity gains from off-shoring have been significant but also highly conditional on access to global markets, which may lead to widening productivity gaps vis-à-vis some domestic more lagging sectors. Productivity gains have been limited since 2015, while extensive off shoring might have contributed to a lesser investment in the country.

The business investment to GDP ratio is among the lowest in the EU and remains below pre-crisis levels. While this may be partly owed to external factors, domestic challenges are also emerging. Specifically, the perceived shortage of qualified workforce across sectors (issue exacerbated by the shrinking supply of skills in the bordering regions), mobility concerns and expensive and rising housing prices might be also negatively affecting the country's attractiveness. Meanwhile, compliance requirements in a changing regulatory and technological environment may also reduce the country's attractiveness for investors and international firms.

Section 2. Assessment of barriers to investment and ongoing reforms

Public administration Business environment	Regulatory/ administrative burden	Some progress	Financial Sector / Taxation	Taxation	No barrier to investment identified
	Public administration	No barrier to investment identified		Access to finance	No barrier to investment identified
	Public procurement / PPPs	No barrier to investment identified	R&D&I	Cooperation btw academia, research and business	Some progress
	Judicial system	No barrier to investment identified		Financing of R&D&I	No barrier to investment identified
	Insolvency framework	Some progress	Sector specific regulation	Business services / Regulated professions	CSR
	Competition and regulatory framework	No barrier to investment identified		Retail	No barrier to investment identified
Labour market/ Education	EPL & framework for labour contracts	No barrier to investment identified		Construction	Some progress
	Wages & wage setting	No barrier to investment identified		Digital Economy / Telecom	No barrier to investment identified
	Education	No barrier to investment identified		Energy	No barrier to investment identified
				Transport	No barrier to investment identified

Legend:

No barrier to investment identified	Some progress
CSR Investment barriers that are also subject to a CSR	Substantial progress
No progress	Fully addressed
Limited progress	Not assessed yet

Infrastructure bottlenecks and the lack of skilled labour remain the main barriers holding back investment in Luxembourg. Around 71 % of firms surveyed by the European Investment Bank encountered difficulties to invest due to the unavailability of skilled labour in Luxembourg. This compares with 77% in the EU as whole, which gives a measure of the size of the challenge at the EU level.

Main barriers to investment and priority actions underway:

1. The availability of housing and transport infrastructure remains the major barrier to investment. Investment in dwellings remains constrained by insufficient land availability and low housing density, largely due to lack of incentives to landowners. Although the recent adoption of an ambitious set of reforms has somewhat improved the outlook for the provision of housing, it will take time to reduce the current deficits in dwellings investment, also in view to the expected increase in population (see Section 3.2). Prices should therefore continue to grow, contributing further to rising inequalities and urban sprawl. Higher prices, compared to income, might also weigh negatively on the attractiveness of working in Luxembourg, and exert upwards pressure on wages and the commercial the real state, with an impact on competitiveness.

2. Public investment is high, with the government pursuing its strategy for developing five knowledge-intensive sectors, which now contribute around 10 pps to GDP growth. By contrast, private investment in research and innovation remains low in the broad business sector and appears insufficient to improve significantly the current low levels of digital economic integration and sluggish productivity growth, which has quasi stagnated since 2015. While shortage of qualified workforce is increasingly perceived as an obstacle for investment, the public investment strategy has developed technologies with the potential to support a broader digital integration of the economy. Focussing investments in digital diffusion and digital human capital may foster business innovative investment conducive to higher productivity growth.

In Luxembourg, the SNCI (Société Nationale de Crédit et d'Investissement) is a public banking institution, providing financial support to domestic firms for development investments, including fixed assets, innovations or commercial projects, either in Luxembourg or abroad. SNCI also grants transfer loans to start-ups and SME's and may take equity positions, either directly or in association with financial partners or its subsidiary, CD-PME S.A.

Diversification of the economy

The multi-specialisation strategy to diversify the economy exhibits a strong potential to stimulate high value added investment and to boost productivity growth. To boost investment and productivity growth and to reduce the risks related to the economic dependency on one economic sector (nowadays a diversified financial sector, see also section 3.2), since 2000 Luxembourg committed to an ambitious and forward looking strategy to diversify its economy in five key knowledge-intensive sectors (Information and Communication Technology, logistics, space industry, health-technologies and eco-technologies). These sectors, whose weight in the economy is overall increasing since 2008, now represent approximately 9.6% of the Gross Value Added and almost 31.000 jobs (cf. *Bilan de Compétitivité*, 2018) and are characterised by high-value added potential and a need for high-skilled workers, in accordance with the country's salary levels and comparative advantages.

The Information and Communication Technology sector exhibits strong performance and it is expected to be the driver for the transition towards a data driven economy. The Information and Communication Technology sector is by far the most successful key diversification sector, representing 5.2% of GDP in 2016 (6.8% including space technologies), down from 6.2% in 2014 (cf. *Observatoire de la Compétitivité* 2018), remaining however one of the highest shares of Information and Communication Technology sector to GDP in the EU. Additionally, the Information and Communication Technology sector accounted for 17,319 salaried jobs in total in 2017 and 2,266 operating companies in 2016. Over the past 20 years, the Government has heavily invested in Information and Communication Technology infrastructure, including data centres, ultrafast broadband and other key advanced digital infrastructures. Luxembourg is clearly committed to the advancement of new technologies and is a signatory to several cross-border initiatives orchestrated by the Commission. These include the declaration setting up a joint undertaking for High-Performing Computing (Euro HPC), but also the European Blockchain Partnership and the European approach Artificial intelligence. Additionally, in September 2018 Luxembourg

launched its national 5G Strategy which sets out the deployment of several 5G pilots and the ambition of the country to lead in the development and roll-out of 5G.

Information and Communication Technology specialists are in high-demand, and the difficulty to recruit them may affect the success of the diversification strategy, reducing the growth potential of the Information and Communication Technology sector and those where Information and Communication Technology specialists are needed (see also section 3.3). Yet, despite the share of Information and Communication Technology specialists is among the highest in the EU, amounting to 5% of total employment in 2017, up from 4.1% in 2016 (and well above the EA average of 3.5%) skills labour shortages in terms of Information and Communication Technology specialists may constitute an obstacle for the future growth of the key diversification sectors. In fact, in 2017, 65% of the enterprises who recruited or tried to recruit Information and Communication Technology specialists reported to have had hard-to-fill vacancies (61% in 2016, 47% the EA Average). This rate is up to 78% for companies in the Information and Communication Technology sector (Eurostat). The capacity to continuously attract and train skilled workers in this sector remains a relevant short-medium term challenge for the transition towards a data driven economy.

Luxembourg continues its engagement and investment in the commercial space industry, where the country is attempting to develop a unique ecosystem in the domain of space resources. According to the *Bilan de Compétitivité 2018*, the space industry in 2016 accounted for 1.8% of value added and 0.2% of employment, with several active players spread over the space value chain. In September 2018, the commercially oriented Luxembourg Space Agency started its operations, primarily with the goal of promoting the further economic development of the Grand Duchy's space industry notably by attracting businesses. Several challenges are associated to the development in the medium-term of a market of space resources and the attraction of private investments, such as regulatory uncertainty, financial constraints and technical capabilities needed.

The logistics sector showed an increase in generation of value added in absolute terms over the past decade, while other key diversification sectors, such as Eco-tech and Health-tech, did not yet achieve a critical mass of operating firms. Luxembourg's logistics sector, characterised by a few big players, is the second key sector of diversification in terms of generation of value added (2.4% in 2016 according to the *Bilan de Compétitivité 2018*). Since 2011, the logistics sector is growing along with the logistics surface. According to the *Observatoire de la Compétitivité*, the logistics sector, while exhibiting a growing gross value added in absolute terms over the past years, maintained a stable share as part of total gross value added (2.5% in 2008 and 2.4% in 2016). Despite some excellences active in Eco and Health technologies domains and strong public investment, both remain small so far in the private sector (cumulatively representing less than 0.5% of the gross value added) and failed to attract a consistent number of companies and related investments to achieve a critical mass.

Digital integration and Entrepreneurship

The integration of digital technologies by firms is a challenge for Luxembourg, and several initiatives have been taken in this respect. Small and medium-sized enterprises are lagging behind and the digitisation of industry remains well below the EU average. Luxembourg has one of the lowest performances of small and medium-sized enterprises selling online with only 7.8% doing so at either national or cross-border level. This remains well below the EU average (17.2% and 8.4%), despite the small size of the Luxembourg home market. Programmes for the digitisation of small and medium-sized enterprises have been put in place, through the initiatives *E-Handwerk* and *Go-Digital*. These programmes operate in synergy within the programme *Fit4Digital* run by Luxinnovation, providing financial assistance in the form of vouchers to diagnose the digitisation opportunities for companies. With a similar voucher system, the programme *Fit4Service* has been launched in October 2018 aiming at helping small and medium-sized enterprises to improve their interaction with consumers as regards services. The initiative *Letzshop.lu* has been launched in 2018 to digitise the retail sector (see section 4.4.2 on retail). In addition, sectorial programmes have been launched, such as the

platform *Creativecluster.lu* aimed at increasing synergies in the creative industry.

New and past initiatives aim at fostering a take up in entrepreneurship, but the entrepreneurial culture remains weak, especially among Luxembourg nationals. Despite a rise in newly created businesses in recent years and a host of new policy support measures, there is a dearth of entrepreneurial activity as compared to other EU countries. Only 43% of the population consider entrepreneurship as a desirable career choice, which is one of the lowest scores in the EU. The rate of established business ownership slightly increased to 3.3% but this also remains well below the EU average which overall reflects the limited entrepreneurial culture in the country, where the majority of entrepreneurs comes from abroad. Additionally, the costs for resolving insolvencies in Luxembourg are almost 50% higher in Luxembourg than in the EU. The result is an increased 'fear of failure', which may contribute to the hesitating attitude towards entrepreneurship. In 2018, Luxembourg introduced new initiatives to support entrepreneurship, such as Creative Clusters, the House of Start-ups, which operates in synergy with the House of Entrepreneurship initiatives and *Fit4Services*. Moreover, initiatives introduced in the past have shown to be successful, such as Entrepreneurial Schools.

Investment in Research and Innovation

The further development of other high-added value activities is required to boost productivity growth. Knowledge-intensive sectors – such as Information and Communication Technology or space – request the provision of knowledge from the public research system and large investments in research and development from the business sector, which are two of the key challenges for Luxembourg. With a rapid development of its public science base over the last decade, Luxembourg had the highest compound annual growth rate of public research and development intensity among EU Member States, rising from 0.26% of the GDP in 2007 to 0.58% in 2017. In addition, Luxembourg's public science base has become one of the top performers in the EU in terms of quality outputs, efficiency, and internationalisation of the system.

Nevertheless, the valorisation of research results remains a challenge requiring additional investment to boost knowledge transfer. Although there are several initiatives to strengthen science-business collaboration (i.e. BRIDGES programme), the declining levels of collaboration between the public research system and the business sector calls for adequate funding schemes to boost knowledge transfer in the country.

Business investment in research and development continued to decline, and, while above the EU average, research and innovation capacities of small and medium-sized enterprises have decreased from 2010 to 2017⁽⁵²⁾, although several initiatives have been taken by the authorities. Private research and development intensity in Luxembourg has been declining over the last 15 years, reaching 0.68% of GDP in 2017. Small and medium-sized enterprises' investments in research and development have decreased dramatically (from 0.41% of the GDP in 2007 to 0.12% in 2015) and are well below the EU average of 0.30% of the GDP. The stagnation of public direct support to business research and development activities since 2007 (at only 0.05 of GDP, one of the lowest in the EU) might be one of the reasons behind this drop and shows that further investments are needed to boost research in firms. The RDI promotion law adopted in June 2017 provides the legal framework for several aid schemes for enhancing research, development and innovation activities in businesses, notably supporting innovation capacity in Small and medium-sized enterprises and shared research infrastructures between the public and private sectors. Luxinnovation keeps providing support to Small and medium-sized enterprises in several areas –such as improving their innovation performance or increasing digitisation activities. Nevertheless, additional financial resources in the areas highlighted in the law, will not only help reversing the declining trend in business research and development investments but will also support the diversification strategy of the country.

⁽⁵²⁾ Even if above the average, the innovation performance of small and medium-sized enterprises measured by the 2018 European Innovation Scoreboard decreased from 2010 to 2017.

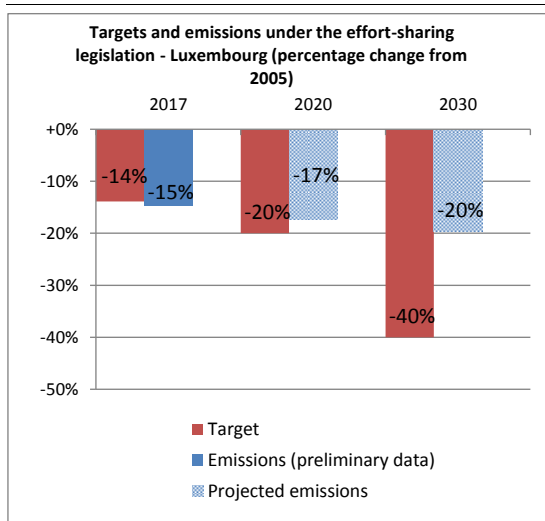
Luxembourg lacks a national strategy for research and innovation linked to its technological, environmental and socio-economic challenges and opportunities. The country did not yet develop a common single policy approach for research and development with a prioritisation based on a robust assessment of expected economic impacts. In addition, the public support to public research and business research and innovation is fragmented among several governmental structures. The national authorities are currently working in several long-term plans, such as in the design of a new strategy on a data-driven economy (see also diversification of the economy). The reformulation of these research and development priorities, implemented by the National Research Fund, under the mandate of the Luxembourg Government, aims at providing an input for the future national R&I strategy and at better supporting the connection between the research and the economy by concentrating financial resources in strategic sectors. Luxembourg adopted its smart specialisation strategy in December 2017, aiming at addressing key socio-economic challenges, while concentrating on a limited number of specific sectors, namely Industry 4.0, Cleantech, Healthtech and Information and Communication Technology.

Energy, Environment and climate change

Showing ambition on issues such as climate change, renewables, energy efficiency and clean energy innovation provides opportunities for growth and jobs through increased productivity, exports and business creation. In this regard, Luxembourg is in line with its indicative trajectory to achieve its binding target for renewable energy of 11% of final energy consumption by 2020 with a provisional share of renewable energy of 6.38% in 2017. Luxembourg must achieve an average rate of 7.47% for 2018. Luxembourg is also on track to meet its energy efficiency targets for 2020, as published in the fourth national action plan for energy efficiency (dated June 2017). In addition, Luxembourg has also set an energy savings target of 5,993 GWh to be achieved by December 31st, 2020 through a mechanism of energy efficiency obligations set up in 2015. However the energy savings achieved up to 2017 are below 60% of what is needed, putting at risk the achievement of the target. In addition,

Luxembourg is also expected to miss its 2020 and 2030 greenhouse gas emission reduction targets in the sectors not covered by the emissions trading system. The gap in 2020 would be 3 percentage points, and unless additional measures are taken, this will rise to 20% by 2030 (see graph 3.4.1).

Graph 3.4.1: **Targets and emissions under the effort-sharing legislation - Luxembourg (percentage change from 2005)**



Source: European Commission

Attracting investment and unlocking private financing into energy efficiency, renewable energy deployment on the necessary scale and other low carbon technologies is crucial to secure the Union's energy transition. The coalition agreement for the new government underlines the vision of Luxembourg becoming an international leader in energy efficiency and to pursue an ambitious policy of tackling climate change and promoting renewable energy sources. In addition, Luxembourg recently approved its National Climate Change Adaptation Strategy and Action Plan for 2018-2023.

In its National Energy and Climate Plan to be adopted by 31 December 2019 in line with the Regulation on the Governance of the Energy Union and Climate Action ⁽⁵³⁾, Luxembourg will

⁽⁵³⁾ Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives

provide an overview of its investment needs until 2030 for the different dimensions of the Energy Union, including renewable energy, energy efficiency, security of supply, and climate mitigation and adaptation. The information provided, including in the draft plan, will further contribute to the identification and assessment of energy and climate-related investment needs for Luxembourg.

Luxembourg is advanced in the field of circular economy, but in some aspects exhibits insufficient results. Luxembourg is a top player within Europe in eco-innovation. It is performing well above the EU average in terms of resource productivity, and small and medium-sized enterprises' score in the environmental dimension of the small business act. A new national waste management plan was adopted in June 2018 ⁽⁵⁴⁾, which aims to promote transition towards a circular economy and sees waste as a resource. Investments for projects higher in the waste hierarchy and recycling, such as re-use projects and awareness raising, extended producer responsibility or improving waste data reporting, may help to meet the more ambitious future environmental targets.

3.4.2. SINGLE MARKET INTEGRATION

Companies in Luxembourg have to deal with four different regulatory and fiscal frameworks for the provision of their services in neighbour countries. In some aspects obstacles for the smooth functioning of the internal market remain, such as obstacles to unhindered temporary provision of services cross-border. Formalities prior to the commencement of service provision imposed on foreign providers are growing in number and, themselves, more and more demanding in terms of information and documentation to be submitted and even administrative charges to be paid. Many of these formalities apply to posting of workers, although controls of service providers outside of posting situations are also becoming widespread. A uniform, interconnected and multilingual platform has been suggested by stakeholders to simplify

2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council (Text with EEA relevance.);

⁽⁵⁴⁾ [Plan national de gestion des déchets](#)

compliance. This is particularly relevant for the construction sector, but also other sectors such as food delivery. Teleworking for commuters from other Member States, pushed by the Government to reduce mobility-related issues, also faces fiscal difficulties. Other aspects undermining the free movements of goods and services stem from territorial supply constraints (impeding to source goods from where they are cheaper) and geo-blocking (making some services unavailable in Luxembourg).

Professional business services

Restrictions in the business services sector could hamper competition for some economically relevant regulated professions. According to the European Commission restrictiveness indicator as regards regulated professions (see COM (2016) 820 final and SWD (2016) 436 final) the level of restrictiveness would result higher in Luxembourg compared to the EU weighted average for several economically important professions. In particular, the wide scope of reserved activities for several professions, including lawyers, may create obstacles to market competition. According to the new OECD intra-EEA Services Trade Restrictiveness Index, the level of regulatory restrictiveness in Luxembourg vis-à-vis other EU Member States is higher than the Single Market average in sectors such as accounting, legal, architecture, engineering, computer services as well as construction services and distribution services (including wholesale and retail services). A reassessment in view of the proportionality and necessity of the wide scope of reserved activities for regulated professions may help to identify obstacles hampering competition and growth in those sectors.

Retail sector

Over the last year, Luxembourg continued to reform the retail sector. The law of 18 July 2018⁽⁵⁵⁾ simplified retail establishment rules by

⁽⁵⁵⁾ Loi du 18 juillet 2018 portant modification

1° de la loi modifiée du 29 juin 1989 portant réforme du régime des cabarets ;

2° de la loi modifiée du 2 septembre 2011 réglementant l'accès aux professions d'artisan, de commerçant, d'industriel ainsi qu'à certaines professions libérales ; et

3° de la loi du 23 décembre 2016 sur les ventes en soldes et sur trottoir et la publicité trompeuse et comparative.

<http://legilux.public.lu/eli/etat/leg/loi/2018/07/18/a616/jo>

repealing the special authorisation procedure for large stores. The Commission's retail restrictiveness indicator published in April 2018 (cf. European Commission, 2018c), where Luxembourg ranks as one of the most restrictive Member States in retail establishment, does not yet reflect this reform. The government has also undertaken a review of the opening hours regime with a view to reduce restrictions. In this respect, a study was commissioned by the Luxembourg Institute of Socio-Economic Research (LISER) to carry out a comprehensive review of the issue of opening hours and its implications.

Territorial supply constraints are a concern to businesses in Luxembourg. The national authorities have been investigating into the issue of territorial supply constraints, which could help explain at least part of a difference in consumer prices between the Benelux countries and other EU countries. Food prices in Luxembourg were among the highest in the EU in 2017. A study carried out by the Benelux countries showed that the supply of goods and the level of prices vary greatly depending on the location. This could be explained, at least in part, by practices of suppliers who fragment the market not allowing retailers to source products from the country of their choice. Such practices may have negative consequences for both consumers and retailers. 89% of firms indicated they were affected by territorial supply constraints. Between 67 and 77% of respondents to the survey indicated that territorial supply constraints had a negative impact, leading to increases on consumer prices, restrictions in product range, and decreases in their businesses' profit margins. In addition, between 44 and 50% of the companies indicated that such practices adversely affected the quality of products, delivery times and product characteristics. Data collected in Luxembourg suggested that territorial supply constraints also affect businesses outside the retail trade.

Other challenges affect retail, such as market size and limited digitisation. The small size of Luxembourg's market offers limited economies of scale opportunities and retailers would benefit from stronger internationalisation. Luxembourg is one of the leading countries for connectivity, digital skills and Internet usage while the

integration of digital technologies by companies remains its relative weakness (in the DESI 2018, Luxembourg ranked 26th in terms of small and medium-sized enterprises' online sales). In Luxembourg, the e-commerce supply is limited compared to the high demand from consumers. In the framework of the Pakt PRO Commerce, which aims in particular to support the development and digitisation of the urban retail trade, the platform "LetzShop.lu" has been launched recently to help retailers embrace the digital transition and to raise awareness among consumers on the local shopping opportunities. The rationale is to provide an online platform to shops that, due to small size and low digital awareness, normally would not have gone online and to increase their stock management capacities. Finally, there is a perception of lack of qualified workforce in retail, including managerial skills. According to the sector, most of retailers would have insufficient financial literacy and limited planning capacity.

Energy

Consumer engagement in the energy market is currently limited in Luxembourg. The rates of change of supplier remain very low for electricity and gas. A possible explanation could be the retail market prices for gas and electricity in Luxembourg which are lower than the EU average, while consumer satisfaction is above the EU average. The roll out of smart meters – a precondition for engaging consumers in the market – has started in Luxembourg and it is legally due to reach the 80 % threshold in 2020 ⁽⁵⁶⁾, although current penetration of smart meters is much lower. Around 3 % of households have installed residential solar photovoltaic, while the technical potential for such activities is at 8% ⁽⁵⁷⁾.

3.4.3. THE GRANDE RÉGION

Luxembourg is the second-smallest country in the EU, characterised by an open economy with

⁽⁵⁶⁾ As per Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC.

⁽⁵⁷⁾ https://ec.europa.eu/commission/sites/beta-political/files/study-residential-prosumers-energy-union_en.pdf

a favourable location at the heart of Europe. Cooperation across borders as well as transnational cooperation constitutes a prerequisite for the sustainable development of the country, which experiences border obstacles, border effects and cross-border interdependencies. While an analysis of regional differences within Luxembourg may prove to be of limited pertinence due to its small size, the integration of the country within the "Grande Région" and the cross-border dimension provides essential insights in analysing Luxembourg's economy.

Luxembourg is a major partner of the "Grande Région". This political organisation focuses on facilitating access to the cross-border labour market through different labour mobility initiatives (including those linked to transport, education and training). It also endeavours on promoting an eco-friendly lifestyle (eco-technologies, waste treatment, cultural heritage, etc.), on developing health and social care services as well as supporting research and innovation. While Luxembourg greatly benefits from free movement of workers, with regard to employment and economic growth, differences in national social security legislations remain.

In terms of innovation and competitiveness, Luxembourg needs to continue developing partnerships in the context of the Grande Région, building on its Smart specialisation strategy. The Luxembourg smart specialisation strategy is firmly anchored within the larger national innovation strategy and economic perspective. The strategy aims at addressing key challenges, namely the diversification and digitisation of the economy, while concentrating on a limited number of specific sectors. Collaboration and co-operation at interregional and national level is of the essence in order to build a critical mass, to access global value chains and accelerate the uptake of new ideas. In a context of rising worldwide competition in research and innovation, where no Member State can succeed in isolation, it is thus crucial for Luxembourg to continue developing partnerships in this sector, in particular by strengthening collaboration between stakeholders in the research community, businesses and higher education. In this aspect, the *Grande Région* is rather competitive and has relatively high levels of innovation potential. The conditions for supporting effective growth in

competitiveness and innovation-based development, and the critical mass to support innovation and cooperation, are present. The region as a whole features strong institutional capacities, stable macroeconomic conditions, good regional infrastructures, healthy populations, relatively high shares of employment in high-tech sectors, the presence of regional larger-scale markets (many urban/ metropolitan centres) and high levels of technological readiness.

Cross-border workers currently represent about 45 % of Luxembourg's labour force, contributing to road traffic congestion in the greater region at peak hours, resulting in time losses, impacting productivity and affecting, among others, quality of life and air quality. In 2016, the transport sector has been responsible for 47% of gas emissions (down from 55% in 2015 but still more than double of the EU average of 21%).

Recent measures have encouraged the development of a more sustainable mobility, notably through the 2017 tax reform, but also through significant investment in public transport. In May 2018, the Government adopted the new Sustainable Mobility Strategy (MoDu 2.0) which foresees to reduce by 2025 the peak-hour congestion while transporting 20% more people than in 2017. Projects are ongoing to, inter alia, research collaborations in developing smart and sustainable multimodal mobility-on-demand transit solutions. The new carpooling platform, "CoPilote" was thought to reduce congestion during rush hours. The website and the application for mobile devices connect people with similar journeys so that they share their journey in a single car and cover the whole territory of the Grande Région. The objective of carpooling is to achieve a car occupancy rate of 1.5 persons on journeys from home to work by 2025, to reduce the number of vehicles on Luxembourg's roads by 50,000 per day and to cut CO₂ emissions by 130,000 tonnes per year. The recent coalition agreement also envisages the elimination of all fares for trains, trams and buses by the first quarter of 2020.

Larger offer of public transport, low emission mobility and connected mobility complete the tools to reach the 2025 target. Soft mobility is expected to alleviate the current pressure on mobility of employees. In parallel, significant

infrastructure investments including additional P+R stations, mainly at the borders, but also in France and Belgium with a financial support from Luxembourg, will be made in the next couple of years.

Rail passenger transport met an extraordinary increase since 2005 (+ 70% over the last 15 years). A capital-centric mixed rail system and very dense cross-border traffic required appropriate solutions to remove bottlenecks. Infrastructure investments were significantly increased since 2013. Ongoing projects include the extension of the central station and the development of a new track connecting the city with Bettembourg (South). Improvements include investments beyond the Luxembourg border based on the basis of bilateral agreements with the neighbouring countries. Some rail projects are also supported by Connected Europe Facility (CEF). Luxembourg remains a strong supporter of EU rail interoperability and since 2015 the whole rail network has been equipped with the European signalling system ERTMS.

Luxembourg's involvement in the EU integration of electricity and gas markets relies on its participation on regional initiatives. Important regional initiatives to which Luxembourg participates are the intraday market coupling projects within the North West Europe market and the flow based day-ahead capacity calculation project in Central West Europe. As regards gas, since 1 October 2015 with the integrated "BeLux" gas market between Belgium and Luxembourg, suppliers who wish to deliver gas in Luxembourg can purchase gas at the Zeebrugge purchase point in Belgium or through interconnection points between the new BeLux zone and neighbouring countries. The BeLux market constitutes a bigger and more competitive environment giving Luxembourg consumers access to a bigger market.

3.4.4. GOVERNANCE AND QUALITY OF THE INSTITUTIONS

The availability and accuracy of statistical data in Luxembourg may represent a challenge. For small economies, data are often challenging as reflecting fast changes in the economy with important variations. At the same time, the often-

limited size of the samples may lead to missing observations in international statistical classifications. Additionally, the frequent revisions of national accounts-data are witness of the uncertainty surrounding national accounts statistics, which need to be taken with caution, and may raise questions on the actual standing of Luxembourg compared to its EU counterparts. Another challenge stems from a correct interpretation of data of the sizeable commuting population which bias upwards or downwards indicators). This issue is particularly important for Luxembourg, since its ambition to become a data driven economy. An increased accuracy, quality and availability of data could help the identification of challenges for policy-makers and increasing the confidence in data.

Digital public services show limited usage. Only 49% of internet users are using eGovernment services (compared to 59% at EU level). In 2015 the Government adopted three principles to underpin government policy on digital public services: ‘digital by default’, ‘once only’ and transparency. The implementation of these principles aims to support three objective: The *Einfach Lëtzebuerg* program aimed at simplifying administrative procedures, the development of the *Myguichet.lu* portal centralising online administrative procedures, and greater transparency, in particular through the development of an Open Data strategy. With respect to Open Data, Luxembourg has made remarkable progress over the last few years thanks to the launch of its Open Data Portal, and Open Data is now Luxembourg’s best performance of this dimension of the DESI with a score of 85% compared to an EU average of 73%. Luxembourg also remains slightly below average in the provision of digital public services for businesses, both domestic and cross-border (82 out of 100 compared to an EU average of 83).

Despite good performance of the small and medium-sized enterprises sector in recent years, challenges remain in the business environment.

In the period 2013-2017, small and medium-sized enterprises value added rose by 18.4 % and small and medium-sized enterprises employment increased by 10.5 %. Although good comparative performance in some areas (for example access to finance for relatively small amounts), legislative vacuums in certain areas and delayed action

contribute to persisting bottlenecks in the business environment. According to the World Bank, Luxembourg is ranked 66th in doing business (cf. World Bank 2018), lagging behind the majority of EU countries. Opening a business is still burdensome, requiring on average 16.5 days and five procedures (cf. World Bank 2018) while in most EU countries procedures are faster. Nonetheless, following the entry into force of the SARL-S law the costs to start a business, especially for non-capital intensive businesses, do not seem to represent a major challenge (since January 2018, around 1.300 new companies opted for this legal form). The approval of the bill on bankruptcies presented in 2013, encompassing among others the regulatory framework on second chance for honest entrepreneurs, has been further delayed to 2019. The bill shall also include an early warning mechanism for enterprises in difficulty. Additionally, an important challenge concerns business transfer, since estimations foresee approximately 3.000 firms’ transmissions within the next decade. Finally, the internationalisation of small and medium-sized enterprises may suffer regulatory inconsistencies in labour and social laws with neighbouring countries when providing services across the border (see section 3.4.2).

ANNEX A: OVERVIEW TABLE

Commitments	Summary assessment ⁽¹⁾
2018 country-specific recommendations (CSRs)	
<p>CSR 1: Increase the employment rate of older people by enhancing their employment opportunities and employability while further limiting early retirement, with a view to also improving the long-term sustainability of the pension system.</p>	<p>Luxembourg has made Limited Progress in addressing CSR 1</p>
<p>Increase the employment rate of older people by enhancing their employment opportunities and employability</p>	<p>Limited Progress Limited Progress The employment rate of older workers has stagnated since 2010 and remains one of the second lowest in the EU (39.8% in 2017). Some labour demand oriented policies have been implemented so far, which are having positive results on other population groups, but have failed to improve substantially older workers' participation in the labour market.</p>
<p>while further limiting early retirement,</p>	<p>Limited Progress Limited Progress The average effective retirement age stood at 60.2 in 2016, well below the statutory age of 65. 59.2 % were early old-age pensions (average effective age: 59.8). but its impact on the average effective retirement age and on expenditure is still difficult to assess due to an easing of restrictions on other kinds of early retirement schemes. No further measures intending to provide incentives for senior workers to stay longer at work have been announced so far.</p>
<p>with a view to also improving the long-term sustainability of the pension system.</p>	<p>Limited Progress Limited Progress No evolution since 2017. The 2016 reform of the professional reclassification scheme for persons with working disabilities is expected to reduce the share of disability pensions and the 'pré-retraite de solidarité, a special scheme allowing people to retire from the age of 57, was abrogated in 2018 but its impact on the average effective retirement age and on expenditure is still difficult to assess due to an easing of restrictions on other kinds of early retirement schemes. No further measures intending to provide incentives for senior workers to stay longer at work have been announced so far. In 2018, the working group on pensions mandated by the Government concluded that the pension system appears to be not sustainable, amid high uncertainty levels, in the long term projections at unchanged policies.</p>
<p>CSR 2: Further reduce regulatory restrictions in the business services sector.</p>	<p>Luxembourg has made Limited Progress in addressing CSR 2: Regulatory restrictions remain above EU weighted average in several regulated professions (according to available indicators). Luxembourg engaged in further reforming the profession of architects (a new draft law is envisaged in the first half of 2019). With the law of 18 July 2018, Luxembourg removed the requirement for professional qualifications to obtain a standard business license.</p>

Europe 2020 (national targets and progress)	
Employment rate target set in the National Reform Programme: 73%	The overall employment rate of the resident population slightly increased from 70.7% in 2016 to 71.5% in 2017 but remains below both its Europe 2020 target and the EU average of 72.2%.
Research and development target set in the National Reform Programme: 2.3 %-2.6 % of GDP, of which 0.7 % to 0.9 % for public spending (1.6%-1.7% for private sector)	<p>In 2017, research and development investment in Luxembourg decreased slightly to 1.26% of GDP, down from 1.30% in 2016. It remains below the EU average of 2.07 % of GDP and far from the National research and development target.</p> <p>Business enterprise expenditure in research and development also decreased slightly from 0.70 in 2016 to 0.68% in 2017. Private research and development intensity has been declining over the last 15 years and continues to be far from the EU average (1.36% of GDP in 2017). On the contrary, Luxembourg is on track to reach the target of public expenditure on research and development.</p>
National greenhouse gas emissions target: 20% in 2020 compared with 2005 (in sectors not included in the EU emissions trading system)	Preliminary data for 2017 show that Luxembourg has reduced its greenhouse gas emissions by 15% relative to 2005 in the sectors not included in the EU emissions trading system. This is 1 percentage point below the annual emission allocation for that year (-14%). According to the latest national projections submitted to the Commission and taking into account existing measures, it is expected that Luxembourg will have reduced by 17% in 2020 compared with 2005 – the target would be missed by a projected shortfall of 3 percentage points.
2020 renewable energy target: 11 %	Preliminary data for 2017 put Luxembourg's share of renewable energy in gross final energy consumption at 6.38%. In 2017 and 2018, Luxembourg has introduced additional measures, including cooperation mechanisms with other Member States, to ensure the achievement of its 11% renewable energy target set for 2020.
Energy efficiency, 2020 energy consumption targets: Luxembourg's 2020 energy efficiency target is 4 481,6 Mtoe expressed in primary energy consumption (4 239,2 Mtoe expressed in final energy consumption)	Luxembourg is currently on track to meet its energy efficiency targets for 2020. In 2017, energy consumption in Luxembourg was at 4.3 Mtoe expressed in primary energy consumption in 2016 and 4.2 Mtoe expressed in final energy consumption.
Early school/training leaving target: 7.3 %	Luxembourg's early school leaving rate, as measured by the Labour Force Survey, stood at 7.3 % in 2017. While significantly below the EU average, this data should be interpreted with caution because of the limited sample size in Luxembourg. National estimates based on the actual number of young people not completing upper secondary education indicate that dropouts have been on the rise since 2009 and stood at 13.5 % in 2015.
Tertiary education target: 52.7 % of	Luxembourg has set the national target of increasing its tertiary attainment rate to 66 % by 2020. At 52.7 %, the country has already

population aged 30-34	one of the EU's highest tertiary attainment rates. This is partly due to the high proportion of the migrant population with a tertiary degree (55.6 %), compared to 49.1 % among the native-born.
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¹ The following categories are used to assess progress in implementing the country-specific recommendations (CSRs):

No progress: The Member State has not credibly announced nor adopted any measures to address the CSR. This category covers a number of typical situations to be interpreted on a case by case basis taking into account country-specific conditions. They include the following:

- no legal, administrative, or budgetary measures have been announced
- o in the national reform programme,
- o in any other official communication to the national Parliament/relevant parliamentary committees or the European Commission,
- o publicly (e.g. in a press statement or on the government's website);
- no non-legislative acts have been presented by the governing or legislative body;
- the Member State has taken initial steps in addressing the CSR, such as commissioning a study or setting up a study group to analyse possible measures to be taken (unless the CSR explicitly asks for orientations or exploratory actions). However, it has not proposed any clearly-specified measure(s) to address the CSR.

Limited progress: The Member State has:

- announced certain measures but these address the CSR only to a limited extent; and/or
- presented legislative acts in the governing or legislative body but these have not been adopted yet and substantial further, non-legislative work is needed before the CSR is implemented;
- presented non-legislative acts, but has not followed these up with the implementation needed to address the CSR.

Some progress: The Member State has adopted measures

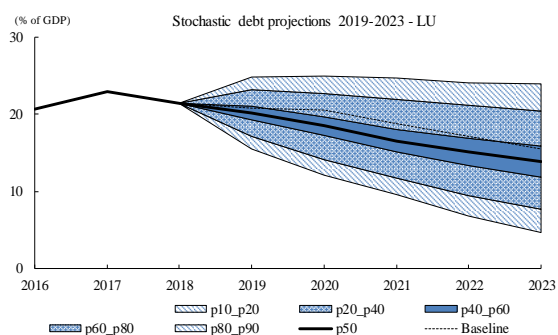
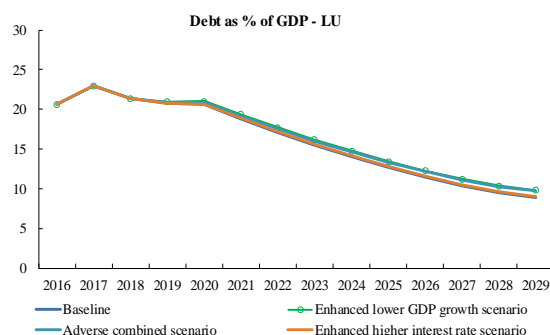
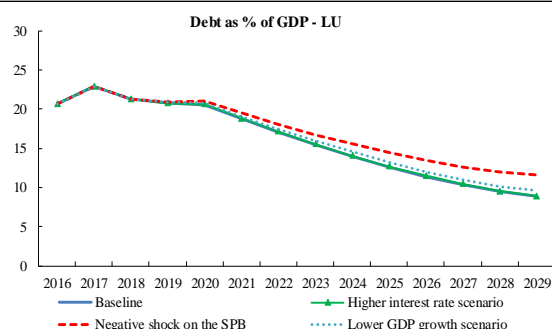
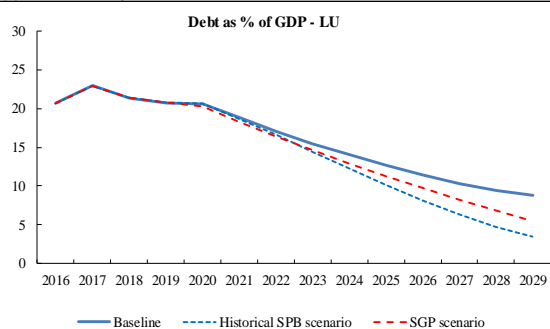
- that partly address the CSR; and/or
- that address the CSR, but a fair amount of work is still needed to fully address the CSR fully as only a few of the measures have been implemented. For instance, a measure or measures have been adopted by the national Parliament or by ministerial decision but no implementing decisions are in place.

Substantial progress: The Member State has adopted measures that go a long way towards addressing the CSR and most of them have been implemented.

Full implementation: The Member State has implemented all measures needed to address the CSR appropriately.

ANNEX B: COMMISSION DEBT SUSTAINABILITY ANALYSIS AND FISCAL RISKS

General Government debt projections under baseline, alternative scenarios and sensitivity tests													
LU - Debt projections baseline scenario	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Gross debt ratio	23.0	21.4	20.8	20.6	18.8	17.1	15.5	14.0	12.7	11.4	10.4	9.5	8.9
Changes in the ratio (-1+2+3) of which	2.3	-1.6	-0.6	-0.2	-1.8	-1.7	-1.6	-1.5	-1.4	-1.2	-1.1	-0.9	-0.6
(1) Primary balance (1.1+1.2+1.3)	1.7	1.7	1.6	1.2	1.3	1.2	1.2	1.1	1.0	1.0	0.8	0.7	0.4
(1.1) Structural primary balance (1.1.1-1.1.2+1.1.3)	1.9	1.7	1.4	1.1	1.2	1.2	1.2	1.1	1.0	1.0	0.8	0.7	0.4
(1.1.1) Structural primary balance (bef. CoA)	1.9	1.7	1.4	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
(1.1.2) Cost of ageing					0.0	0.0	0.1	0.2	0.4	0.5	0.7	1.0	1.2
(1.1.3) Others (taxes and property incomes)					0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.5
(1.2) Cyclical component	-0.2	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(1.3) One-off and other temporary measures	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(2) Snowball effect (2.1+2.2+2.3)	-0.4	-0.8	-0.7	-0.5	-0.5	-0.5	-0.4	-0.4	-0.3	-0.3	-0.2	-0.2	-0.2
(2.1) Interest expenditure	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2
(2.2) Growth effect	-0.3	-0.7	-0.6	-0.5	-0.5	-0.4	-0.4	-0.3	-0.3	-0.2	-0.2	-0.2	-0.2
(2.3) Inflation effect	-0.4	-0.4	-0.4	-0.3	-0.4	-0.3	-0.3	-0.3	-0.3	-0.2	-0.2	-0.2	-0.2
(3) Stock-flow adjustments	4.4	0.9	1.6	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0



Short term	Medium term	S1	Debt sustainability analysis (detail)						DSA	S2	Long term
			Baseline	Historical SPB	Lower GDP growth	Higher interest rate	Negative shock on SPB	Stochastic projections			
LOW (S0 = 0.1)	LOW	LOW (S1 = -4.8)	LOW	LOW	LOW	LOW	LOW	LOW	HIGH (S2 = 8.1)	HIGH	
			8.9	3.5	9.6	8.9	11.6				
			2018	2018	2018	2018	2018				
			37.0%	29.0%							
								17.3%			
								19.3			

Note: For further information, see the European Commission Fiscal Sustainability Report (FSR) 2018.

[1] The first table presents the baseline no-fiscal policy change scenario projections. It shows the projected government debt dynamics and its decomposition between the primary balance, snowball effects and stock-flow adjustments. Snowball effects measure the net impact of the counteracting effects of interest rates, inflation, real GDP growth (and exchange rates in some countries). Stock-flow adjustments include differences in cash and accrual accounting, net accumulation of assets, as well as valuation and other residual effects.

[2] The charts present a series of sensitivity tests around the baseline scenario, as well as alternative policy scenarios, in particular: the historical structural primary balance (SPB) scenario (where the SPB is set at its historical average), the Stability and Growth Pact (SGP) scenario (where fiscal policy is assumed to evolve in line with the main provisions of the SGP), a higher interest rate scenario (+1 pp. compared to the baseline), a lower GDP growth scenario (-0.5 pp. compared to the baseline) and a negative shock on the SPB (calibrated on the basis of the forecasted change). An adverse combined scenario and enhanced sensitivity tests (on the interest rate and growth) are also included, as well as stochastic projections. Detailed information on the design of these projections can be found in the FSR 2018.

[3] The second table presents the overall fiscal risk classification over the short, medium and long-term.

a. For the short-term, the risk category (low/high) is based on the S0 indicator. S0 is an early-detection indicator of fiscal stress in the upcoming year, based on 25 fiscal and financial-competitiveness variables that have proven in the past to be leading indicators of fiscal stress. The critical threshold beyond which fiscal distress is signalled is 0.46.

b. For the medium-term, the risk category (low/medium/high) is based on the joint use of the S1 indicator and of the DSA results. The S1 indicator measures the fiscal adjustment required (cumulated over the 5 years following the forecast horizon and sustained thereafter) to bring the debt-to-GDP ratio to 60% by 2033. The critical values used are 0 and 2.5 pps. of GDP. The DSA classification is based on the results of 5 deterministic scenarios (baseline, historical SPB, higher interest rate, lower GDP growth and negative shock on the SPB scenarios) and the stochastic projections. Different criteria are used such as the projected debt level, the debt path, the realism of fiscal assumptions, the probability of debt stabilisation, and the size of uncertainties.

c. For the long-term, the risk category (low/medium/high) is based on the joint use of the S2 indicator and the DSA results. The S2 indicator measures the upfront and permanent fiscal adjustment required to stabilise the debt-to-GDP ratio over the infinite horizon, including the costs of ageing. The critical values used are 2 and 6 pps. of GDP. The DSA results are used to further qualify the long-term risk classification, in particular in cases when debt vulnerabilities are identified (a medium / high DSA risk category).

ANNEX C: STANDARD TABLES

Table C.1: **Financial market indicators**

	2013	2014	2015	2016	2017	2018
Total assets of the banking sector (% of GDP) ¹⁾	1967.4	1932.5	1944.1	1982.4	1876.1	1821.3
Share of assets of the five largest banks (% of total assets)	33.7	32.0	31.3	27.6	26.2	-
Foreign ownership of banking system (% of total assets) ²⁾	87.5	88.4	87.9	87.8	86.8	86.7
Financial soundness indicators: ²⁾						
- non-performing loans (% of total loans)	-	1.4	1.1	0.8	0.7	0.6
- capital adequacy ratio (%)	24.4	19.6	20.9	24.3	22.5	22.4
- return on equity (%) ³⁾	6.4	7.2	7.2	7.5	5.7	5.7
Bank loans to the private sector (year-on-year % change) ¹⁾	-4.8	3.2	5.4	8.0	6.6	5.4
Lending for house purchase (year-on-year % change) ¹⁾	6.7	7.0	6.2	6.5	8.3	8.0
Loan to deposit ratio ²⁾	-	91.5	88.0	83.3	76.6	75.4
Central Bank liquidity as % of liabilities ¹⁾	-	0.5	0.6	0.7	0.9	0.8
Private debt (% of GDP)	313.3	356.6	379.4	353.4	322.9	-
Gross external debt (% of GDP) ²⁾ - public	10.0	10.2	9.1	8.4	10.6	9.8
- private	4592.1	5074.3	5700.6	6086.3	5613.7	5455.6
Long-term interest rate spread versus Bund (basis points)*	28.2	17.3	-12.7	16.5	22.6	16.4
Credit default swap spreads for sovereign securities (5-year)*	-	-	-	-	-	-

(1) Latest data Q3 2018. Includes not only banks but all monetary financial institutions excluding central banks.

(2) Latest data Q2 2018.

(3) Quarterly values are annualised.

* Measured in basis points.

Source: European Commission (long-term interest rates); World Bank (gross external debt); Eurostat (private debt); ECB (all other indicators).

Table C.2: **Headline Social Scoreboard indicators**

	2013	2014	2015	2016	2017	2018 ⁶
Equal opportunities and access to the labour market						
Early leavers from education and training (% of population aged 18-24)	6.1	6.1	9.3	5.5	7.3	:
Gender employment gap (pps)	14.1	12.9	11.7	11.0	7.9	7.6
Income inequality, measured as quintile share ratio (S80/S20)	4.6	4.4	4.3	5.0	5.0	:
At-risk-of-poverty or social exclusion rate ¹ (AROPE)	19.0	19.0	18.5	19.8	21.5	:
Young people neither in employment nor in education and training (% of population aged 15-24)	5.0	6.3	6.2	5.4	5.9	:
Dynamic labour markets and fair working conditions[†]						
Employment rate (20-64 years)	71.1	72.1	70.9	70.7	71.5	71.8
Unemployment rate ² (15-74 years)	5.9	6.0	6.5	6.3	5.6	5.3
Long-term unemployment rate ³ (as % of active population)	1.8	1.6	1.9	2.2	2.1	1.4
Gross disposable income of households in real terms per capita ⁴ (Index 2008=100)	100.0	103.1	102.5	101.5	105.6	:
Annual net earnings of a full-time single worker without children earning an average wage (levels in PPS, three-year average)	30763	31367	31922	32320	:	:
Annual net earnings of a full-time single worker without children earning an average wage (percentage change, real terms, three-year average)	-1.2	0.2	0.4	0.7	:	:
Public support / Social protection and inclusion						
Impact of social transfers (excluding pensions) on poverty reduction ⁵	45.9	40.6	43.8	39.1	35.5	:
Children aged less than 3 years in formal childcare	46.0	49.0	51.9	50.9	60.9	:
Self-reported unmet need for medical care	0.9	0.8	0.9	0.4	0.3	:
Individuals who have basic or above basic overall digital skills (% of population aged 16-74)	:	:	86.0	86.0	85.0	:

(1) People at risk of poverty or social exclusion (AROPE): individuals who are at risk of poverty (AROP) and/or suffering from severe material deprivation (SMD) and/or living in households with zero or very low work intensity (LWI).

(2) Unemployed persons are all those who were not employed but had actively sought work and were ready to begin working immediately or within two weeks.

(3) Long-term unemployed are people who have been unemployed for at least 12 months.

(4) Gross disposable household income is defined in unadjusted terms, according to the draft Joint Employment Report 2019.

(5) Reduction in percentage of the risk of poverty rate, due to social transfers (calculated comparing at-risk-of poverty rates before social transfers with those after transfers; pensions are not considered as social transfers in the calculation).

(6) Average of first three quarters of 2018 for the employment rate, long-term unemployment rate and gender employment gap. Data for unemployment rate is annual.

Source: Eurostat.

Table C.3: Labour market and education indicators

Labour market indicators	2013	2014	2015	2016	2017	2018 ⁴
Activity rate (15-64)	69.8	70.8	70.9	70.0	70.2	70.8
Employment in current job by duration						
From 0 to 11 months	11.0	12.2	13.3	11.3	12.4	:
From 12 to 23 months	8.8	8.6	9.0	10.1	10.6	:
From 24 to 59 months	18.0	17.2	18.3	17.6	17.6	:
60 months or over	61.1	60.6	56.9	58.0	56.6	:
Employment growth*						
(% change from previous year)	1.8	2.6	2.6	3.0	3.4	3.8
Employment rate of women						
(% of female population aged 20-64)	63.9	65.5	65.0	65.1	67.5	67.9
Employment rate of men						
(% of male population aged 20-64)	78.0	78.4	76.7	76.1	75.4	75.5
Employment rate of older workers*						
(% of population aged 55-64)	40.5	42.5	38.4	39.6	39.8	39.8
Part-time employment*						
(% of total employment, aged 15-64)	18.7	18.4	18.4	19.2	19.5	17.8
Fixed-term employment*						
(% of employees with a fixed term contract, aged 15-64)	7.0	8.1	10.2	9.0	9.1	10.1
Participation in activation labour market policies						
(per 100 persons wanting to work)	55.5	61.0	40.0	51.3	:	:
Transition rate from temporary to permanent employment						
(3-year average)	32.4	34.5	34.2	34.2	33.1	:
Youth unemployment rate						
(% active population aged 15-24)	16.9	22.3	16.6	19.1	15.5	13.5
Gender gap in part-time employment (aged 20-64)	31.0	30.9	28.1	28.7	29.4	26.4
Gender pay gap ¹ (in unadjusted form)	6.2	5.4	5.5	5.5	5.0	:
Education and training indicators	2013	2014	2015	2016	2017	2018
Adult participation in learning						
(% of people aged 25-64 participating in education and training)	14.6	14.5	18.0	16.8	17.2	:
Underachievement in education ²	:	:	25.8	:	:	:
Tertiary educational attainment (% of population aged 30-34 having successfully completed tertiary education)	52.5	52.7	52.3	54.6	52.7	:
Variation in performance explained by students' socio-economic status ³	:	:	20.8	:	:	:

* Non-scoreboard indicator

(1) Difference between the average gross hourly earnings of male paid employees and of female paid employees as a percentage of average gross hourly earnings of male paid employees. It is defined as "unadjusted", as it does not correct for the distribution of individual characteristics (and thus gives an overall picture of gender inequalities in terms of pay). All employees working in firms with ten or more employees, without restrictions for age and hours worked, are included.

(2) PISA (OECD) results for low achievement in mathematics for 15 year-olds.

(3) Impact of socio-economic and cultural status on PISA (OECD) scores. Values for 2012 and 2015 refer respectively to mathematics and science.

(4) Average of first three quarters of 2018 for the activity rate, employment growth, employment rate, part-time employment, fixed-term employment. Data for youth unemployment rate is annual.

Source: Eurostat, OECD.

Table C.4: Social inclusion and health indicators

	2012	2013	2014	2015	2016	2017
Expenditure on social protection benefits* (% of GDP)						
<i>Sickness/healthcare</i>	5.7	5.8	5.6	5.4	5.3	:
<i>Disability</i>	2.5	2.5	2.5	2.4	2.3	:
<i>Old age and survivors</i>	8.5	8.5	8.3	8.4	8.5	:
<i>Family/children</i>	3.6	3.6	3.4	3.4	3.3	:
<i>Unemployment</i>	1.3	1.5	1.4	1.4	1.3	:
<i>Housing</i>	0.3	0.3	0.3	0.3	0.4	:
<i>Social exclusion n.e.c.</i>	0.5	0.5	0.5	0.5	0.5	:
Total	22.3	22.7	22.1	21.7	21.6	:
<i>of which: means-tested benefits</i>	0.8	0.8	0.8	0.8	0.8	:
General government expenditure by function (% of GDP, COFOG)						
<i>Social protection</i>	18.7	18.6	18.1	18.2	18.1	18.4
<i>Health</i>	4.9	5.2	4.9	4.7	4.8	4.9
<i>Education</i>	5.8	5.1	4.9	4.9	4.9	5.0
Out-of-pocket expenditure on healthcare (% of total health expenditure)	10.4	10.3	10.8	11.0	11.2	:
Children at risk of poverty or social exclusion (% of people aged 0-17)*	24.6	26.0	26.4	23.0	22.7	23.6
At-risk-of-poverty rate ¹ (% of total population)	15.1	15.9	16.4	15.3	16.5	18.7
In-work at-risk-of-poverty rate (% of persons employed)	10.2	11.2	11.1	11.6	12.0	13.7
Severe material deprivation rate ² (% of total population)	1.3	1.8	1.4	2.0	1.6	1.2
Severe housing deprivation rate ³ , by tenure status						
<i>Owner, with mortgage or loan</i>	0.9	0.6	0.6	0.4	0.9	1.8
<i>Tenant, rent at market price</i>	6.0	5.9	5.7	6.0	6.6	5.8
Proportion of people living in low work intensity households ⁴ (% of people aged 0-59)	6.1	6.6	6.1	5.7	6.6	6.9
Poverty thresholds, expressed in national currency at constant prices*	17261	17043	17270	17626	16890	18010
Healthy life years (at the age of 65)						
<i>Females</i>	11.9	10.6	10.8	8.7	8.0	:
<i>Males</i>	11.6	10.9	11.3	10.7	9.5	:
Aggregate replacement ratio for pensions ⁵ (at the age of 65)	0.8	0.8	0.9	0.8	0.9	0.9
Connectivity dimension of the Digital Economy and Society Index (DESI) ⁶	:	:	62.6	71.0	74.4	78.8
GINI coefficient before taxes and transfers*	48.6	50.3	48.5	48.1	47.3	49.2
GINI coefficient after taxes and transfers*	28.0	30.4	28.7	28.5	31.0	30.9

* Non-scoreboard indicator

(1) At-risk-of-poverty rate (AROP): proportion of people with an equivalised disposable income below 60 % of the national equivalised median income.

(2) Proportion of people who experience at least four of the following forms of deprivation: not being able to afford to i) pay their rent or utility bills, ii) keep their home adequately warm, iii) face unexpected expenses, iv) eat meat, fish or a protein equivalent every second day, v) enjoy a week of holiday away from home once a year, vi) have a car, vii) have a washing machine, viii) have a colour TV, or ix) have a telephone.

(3) Percentage of total population living in overcrowded dwellings and exhibiting housing deprivation.

(4) People living in households with very low work intensity: proportion of people aged 0-59 living in households where the adults (excluding dependent children) worked less than 20 % of their total work-time potential in the previous 12 months.

(5) Ratio of the median individual gross pensions of people aged 65-74 relative to the median individual gross earnings of people aged 50-59.

(6) Fixed broadband take up (33%), mobile broadband take up (22%), speed (33%) and affordability (11%), from the Digital Scoreboard.

Source: Eurostat, OECD.

Table C.5: Product market performance and policy indicators

Performance indicators	2012	2013	2014	2015	2016	2017
Labour productivity per person ¹ growth (t/t-1) in %						
Labour productivity growth in industry	3.90	16.34	-5.68	16.28	7.73	-3.51
Labour productivity growth in construction	-9.72	0.71	10.59	-1.86	-2.17	-5.19
Labour productivity growth in market services	-4.14	0.49	2.06	1.04	-1.65	-2.58
Unit Labour Cost (ULC) index ² growth (t/t-1) in %						
ULC growth in industry	-2.33	-11.49	7.13	-12.36	-6.85	5.77
ULC growth in construction	12.06	0.65	-3.05	2.34	2.63	9.34
ULC growth in market services	6.19	2.11	1.84	0.82	2.89	6.17
Business environment	2012	2013	2014	2015	2016	2017
Time needed to enforce contracts ³ (days)	321	321	321	321	321	321
Time needed to start a business ³ (days)	16.5	16.5	16.5	16.5	16.5	16.5
Outcome of applications by SMEs for bank loans ⁴	:	0.29	0.00	0.32	0.56	0.36
Research and innovation	2012	2013	2014	2015	2016	2017
R&D intensity	1.27	1.30	1.26	1.28	1.30	1.26
General government expenditure on education as % of GDP	5.80	5.10	4.90	4.90	4.90	5.00
Employed people with tertiary education and/or people employed in science and technology as % of total employment	36	38	40	37	37	36
Population having completed tertiary education ⁵	33	35	40	35	36	34
Young people with upper secondary education ⁶	72	77	74	69	77	75
Trade balance of high technology products as % of GDP	-0.72	-1.32	-1.40	-3.25	-2.01	-2.40
Product and service markets and competition				2003	2008	2013
OECD product market regulation (PMR) ⁷ , overall				1.60	1.44	1.46
OECD PMR ⁷ , retail				4.17	4.47	4.54
OECD PMR ⁷ , professional services				3.52	3.55	3.47
OECD PMR ⁷ , network industries ⁸				2.96	2.72	2.73

(1) Value added in constant prices divided by the number of persons employed.

(2) Compensation of employees in current prices divided by value added in constant prices.

(3) The methodologies, including the assumptions, for this indicator are shown in detail here:

<http://www.doingbusiness.org/methodology>.

(4) Average of the answer to question Q7B_a. "[Bank loan]: If you applied and tried to negotiate for this type of financing over the past six months, what was the outcome?". Answers were codified as follows: zero if received everything, one if received 75% and above, two if received below 75%, three if refused or rejected and treated as missing values if the application is still pending or don't know.

(5) Percentage population aged 15-64 having completed tertiary education.

(6) Percentage population aged 20-24 having attained at least upper secondary education.

(7) Index: 0 = not regulated; 6 = most regulated. The methodologies of the OECD product market regulation indicators are shown in detail here: <http://www.oecd.org/competition/reform/indicatorsofproductmarketregulationhomepage.htm>

(8) Aggregate OECD indicators of regulation in energy, transport and communications (ETCR).

Source: European Commission; World Bank — Doing Business (for enforcing contracts and time to start a business); OECD (for the product market regulation indicators); SAFE (for outcome of small and medium-sized enterprises' applications for bank loans).

Table C.6: **Green growth**

Green growth performance		2012	2013	2014	2015	2016	2017
Macroeconomic							
Energy intensity	kgoe / €	0.11	0.10	0.10	0.09	0.09	0.09
Carbon intensity	kg / €	0.29	0.26	0.24	0.22	0.21	-
Resource intensity (reciprocal of resource productivity)	kg / €	0.26	0.27	0.27	0.29	0.32	0.31
Waste intensity	kg / €	0.20	-	0.16	-	0.21	-
Energy balance of trade	% GDP	-6.3	-5.4	-4.4	-3.1	-2.5	-2.8
Weighting of energy in HICP	%	11.6	14.9	14.5	12.3	10.9	11.7
Difference between energy price change and inflation	%	3.9	-3.5	-6.3	-8.0	-8.2	0.6
Real unit of energy cost	% of value added	11.5	11.2	10.1	10.7	11.5	-
Ratio of environmental taxes to labour taxes	ratio	0.14	0.13	0.12	0.11	0.10	-
Environmental taxes	% GDP	2.4	2.2	2.0	1.8	1.7	1.7
Sectoral							
Industry energy intensity	kgoe / €	0.15	0.14	0.14	0.12	0.12	0.12
Real unit energy cost for manufacturing industry excl. refining	% of value added	45.3	46.3	39.6	41.8	44.2	-
Share of energy-intensive industries in the economy	% GDP	2.6	3.2	3.8	3.8	3.5	3.1
Electricity prices for medium-sized industrial users	€ / kWh	0.10	0.10	0.10	0.09	0.09	0.08
Gas prices for medium-sized industrial users	€ / kWh	0.05	0.05	0.04	0.04	0.03	0.03
Public R&D for energy	% GDP	0.00	0.00	0.00	0.00	0.00	0.00
Public R&D for environmental protection	% GDP	0.02	0.02	0.02	0.02	0.02	0.02
Municipal waste recycling rate	%	47.4	46.6	47.7	47.4	48.2	48.3
Share of GHG emissions covered by ETS*	%	19.3	16.5	17.8	15.9	15.0	-
Transport energy intensity	kgoe / €	1.65	1.50	1.32	1.12	1.03	1.04
Transport carbon intensity	kg / €	4.18	3.77	3.22	2.63	2.33	-
Security of energy supply							
Energy import dependency	%	97.5	97.1	96.5	95.9	96.1	95.4
Aggregated supplier concentration index	HHI	2.8	2.7	2.9	2.7	2.7	-
Diversification of energy mix	HHI	0.46	0.46	0.45	0.43	0.43	0.43

All macro intensity indicators are expressed as a ratio of a physical quantity to GDP (in 2010 prices)

Energy intensity: gross inland energy consumption (Europe 2020-2030) (in kgoe) divided by GDP (in EUR)

Carbon intensity: greenhouse gas emissions (in kg CO₂ equivalents) divided by GDP (in EUR)

Resource intensity: domestic material consumption (in kg) divided by GDP (in EUR)

Waste intensity: waste (in kg) divided by GDP (in EUR)

Energy balance of trade: the balance of energy exports and imports, expressed as % of GDP

Weighting of energy in HICP: the proportion of 'energy' items in the consumption basket used for the construction of the HICP

Difference between energy price change and inflation: energy component of HICP, and total HICP inflation (annual % change)

Real unit energy cost: real energy costs as % of total value added for the economy

Industry energy intensity: final energy use in industry (in kgoe) divided by gross value added of industry, including construction (in 2010 EUR)

Real unit energy costs for manufacturing industry excluding refining : real costs as % of value added for manufacturing sectors

Share of energy-intensive industries in the economy: share of gross value added of the energy-intensive industries in GDP

Electricity and gas prices for medium-sized industrial users: consumption band 500–20 000MWh and 10 000–100 000 GJ; figures excl. VAT.

Recycling rate of municipal waste: ratio of recycled and composted municipal waste to total municipal waste

Public research and development for energy or for the environment: government spending on R&D for these categories as % of GDP

Proportion of GHG emissions covered by EU emissions trading system (ETS) (excluding aviation): based on GHG emissions (excl land use, land use change and forestry) as reported by Member States to the European Environment Agency.

Transport energy intensity: final energy use in transport sector including international aviation, (in kgoe) divided by transport industry gross value added (in 2010 EUR)

Transport carbon intensity: GHG emissions in transport sector divided by gross value added of the transport activities

Energy import dependency: net energy imports divided by gross inland energy consumption plus consumption of international maritime bunkers

Aggregated supplier concentration index: Herfindahl-Hirschman index for net imports of crude oil and NGL, natural gas and hard coal. Smaller values indicate larger diversification and hence lower risk.

Diversification of the energy mix: Herfindahl-Hirschman index of the main energy products in the gross inland consumption of energy

* European Commission and European Environment Agency

Source: European Commission and European Environment Agency (Share of GHG emissions covered by ETS); European Commission (Environmental taxes over labour taxes and GDP); Eurostat (all other indicators).

ANNEX D: INVESTMENT GUIDANCE ON COHESION POLICY FUNDING 2021-2027 FOR LUXEMBOURG

Investment Guidance on Cohesion Policy Funding 2021-2027 for Luxembourg⁽⁵⁸⁾

Building on the Commission proposal for the next Multi-Annual Financial Framework for the period 2021-2027 of 2 May 2018 (COM (2018) 321), this Annex presents the preliminary Commission services views on priority investment areas and framework conditions for effective delivery for the 2021-2027 Cohesion Policy. These priority investment areas are derived from the broader context of investment bottlenecks, investment needs and regional disparities assessed in the report. This Annex provides the basis for a dialogue between Luxembourg and the Commission services in view of the programming of the cohesion policy funds (European Regional Development Fund and European Social Fund Plus).

Policy Objective 1: A Smarter Europe – Innovative and smart industrial transformation
<p>Luxembourg appears too dependent on the financial sector and lags behind in diversification of its economic structure. Strengthen innovation performance and foster productivity growth by identifying smart specialisation areas on the basis of national and regional needs and potential.</p> <p>Investment needs⁽⁵⁹⁾ have been identified to enhance research and innovation capacities and the uptake of advanced technologies, and in particular to:</p> <p>support technology transfer and diffusion of innovation through networks between businesses and research centres and through networks of digital innovation hubs and incubators;</p> <p>enhance cooperation in key digital technologies, eco-innovation, support cluster development through the implementation of interregional projects across EU national borders;</p> <p>stimulate integrated cooperation in new value chains across programmes and across borders.</p>
<p>Even though companies perform above the EU average in business digitisation, electronic information sharing, radio frequency identification and the use of social networks, small and medium-sized enterprises lag behind in e-commerce. Investment needs have been identified to reap the benefits of digitisation for citizens, companies and governments and in particular to:</p> <p>facilitate the integration of digital technologies by companies;</p> <p>develop sustainable and circular district and cities;</p> <p>invest in common smart mobility systems through cooperation with neighbouring countries.</p>
<p>Most of the Scoreboard's indicators on innovation in small and medium-sized enterprises are on a declining trend, including commercialisation of innovation. The percentage of small and medium-sized enterprises introducing product or process innovations also declined as did the percentage of small and medium-sized enterprises innovating in-house. Investment needs have been identified to enhance growth and competitiveness of small and medium-sized enterprises and in particular to:</p> <p>encourage industrial cluster development and enhanced cooperation between small and medium-sized enterprises and universities/research centres, and the sustained engagement of small and medium-sized</p>

⁽⁵⁸⁾ This Annex is to be considered in conjunction with the Proposal for a Regulation of the European Parliament and of the Council on the European Regional Development Fund and on the Cohesion Fund COM(2018) 372 and the EC Proposal for a Regulation of the European Parliament and of the Council on the European Social Fund Plus COM(2018) 382, in particular as regards the requirements for thematic concentration and urban earmarking outlined in these proposals.

⁽⁵⁹⁾ The intensity of needs is classified in three categories in a descending order – high priority needs, priority needs, needs.

<p>enterprises in the Entrepreneurial Discovery Process;</p> <p>develop small and medium-sized enterprises skills and capacities in the exportation of their products and services and the commercialisation of innovation, especially online.</p>
<p>A large share of companies report difficulties in filling Information and Communications Technology vacancies, which suggests a skills mismatch. Investment needs have been identified to develop skills for smart specialisation, industrial transition and entrepreneurship, and in particular to:</p> <p>provide small and medium-sized enterprises with training and reskilling possibilities for smart specialisation areas with a particular attention to digital skills and encourage them to mutualise their training needs by supporting and co-financing clusters, and joint national, regional, transnational and international cooperation in innovation sectors.</p>
<p>Policy Objective 4: A more social Europe – Implementing the European Pillar of Social Rights</p>
<p>Some groups face particular difficulties on the labour market, in particular those born outside the EU, while skills shortages are growing, in particular with regard to digital skills. The employment rate of older workers is one of the lowest in the EU. Investment needs have therefore been identified to improve access to employment and to promote lifelong learning, notably flexible upskilling and reskilling, taking into account digital skills, better anticipating change and new skills requirements, facilitating career transitions and promoting professional mobility, and in particular to:</p> <p>enhance active labour market policies for jobseekers furthest from the labour market (especially low-skilled and long-term unemployed senior workers, young people not in employment education or training; people with a migrant background, in particular women);</p> <p>upskill and reskill the labour force, in particular older workers and people with a migrant background.</p>
<p>The overall risk of poverty or social exclusion (though below the EU average) shows negative developments and in-work poverty is high. Investment needs have therefore been identified to foster active inclusion, and improve employability, and in particular to:</p> <p>support integrated active inclusion measures, through enhancing cooperation between employment and social services aimed at increasing outreach to disadvantaged people and implementing personalised, needs-based services and training;</p> <p>develop social entrepreneurship as a way to enhance the variety of routes to employment.</p>
<p>Factors for effective delivery of Cohesion policy</p>
<p>Building on what has been developed so far in the smart specialisation strategy and strengthened cooperation between stakeholders and in particular between the research community, businesses and higher education;</p> <p>Broader use of financial instruments and/or contributions to Luxembourg's compartment under InvestEU for all revenue-generating and cost-saving activities;</p> <p>Strong support and involvement of social partners, local authorities and other public bodies and stakeholders are essential for effective implementation;</p>

Support for innovative actions and experimentation to increase effectiveness of measure implementation.

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