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Executive Summary

Growth has been robust and well-being is high
Reducing households’ and banks’ financial risks should be a priority
Fiscal policy should support sustainable growth
Future prosperity will require stronger productivity growth
The housing market needs to become more efficient and equitable
Growth has been robust and well-being is high

The economy has continued to expand rapidly (Figure A). GDP grew by 2.6% in 2018, mainly underpinned by private consumption. Over most of the past decade, GDP growth in Luxembourg has strongly outpaced the euro area average. Coupled with other strengths, such as relatively low gender inequality and a healthy work-life balance, high income levels are a mainstay of Luxembourg’s well-being.

**Figure A. Post-crisis economic performance has been strong**

Source: OECD Economic Outlook: Statistics and Projections (database), June.

StatLink 2 http://dx.doi.org/10.1787/888933950981

However, slower growth is projected (Table A), and there are downside risks. In case of a slowdown, the authorities should allow automatic stabilisers to operate. A fiscal stimulus could be envisaged in case of a severe downturn, which might result from rising trade tensions and financial volatility. Building on recent measures, one option to stimulate the economy could be to further reduce taxes on low wages, which would have the side-benefit of making the labour market more inclusive by favouring job insertion of low-skilled workers.

**Table A. The expansion is projected to continue**

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gross domestic product (GDP)</strong></td>
<td>2.6</td>
<td>2.0</td>
<td>2.5</td>
</tr>
<tr>
<td>Private consumption</td>
<td>4.2</td>
<td>2.8</td>
<td>3.6</td>
</tr>
<tr>
<td>Government consumption</td>
<td>4.0</td>
<td>4.2</td>
<td>3.2</td>
</tr>
<tr>
<td>Gross fixed capital formation</td>
<td>-2.8</td>
<td>5.5</td>
<td>4.5</td>
</tr>
<tr>
<td>Exports of goods and services</td>
<td>4.6</td>
<td>3.8</td>
<td>4.1</td>
</tr>
<tr>
<td>Imports of goods and services</td>
<td>5.1</td>
<td>4.4</td>
<td>4.8</td>
</tr>
<tr>
<td>Unemployment rate (% of labour force)</td>
<td>5.5</td>
<td>5.2</td>
<td>5.1</td>
</tr>
<tr>
<td>Consumer price index</td>
<td>2.0</td>
<td>2.1</td>
<td>2.1</td>
</tr>
</tbody>
</table>

Source: OECD Economic Outlook.

Reducing households’ and banks’ financial risks should be a priority

Rising household indebtedness creates vulnerabilities for some families and some banks. Mortgage debt has continuously increased in line with rising house prices (Figure B), creating a high debt service burden for a larger share of households than in most other countries. Though the regulator has imposed higher capital buffers, domestic banks have large exposures to the residential real estate market, which is a source of risk. Introducing borrower-based macroprudential instruments, such as caps to loan-to-value or debt service-to-income ratios, as envisaged in draft legislation, would help avoid the further build-up of vulnerabilities.

**Figure B. Real house prices are growing strongly**

Source: OECD, Analytical house prices indicators database.

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Reinforced supervision and regulation can further enhance financial sector resilience and foster the transition to a low-carbon economy. The large investment fund industry is sensitive to external risks, and sizeable intra-group exposures of international banks likewise call for close monitoring. The financial sector is globally exposed to climate-related risks, inter alia through holdings of high-carbon assets which are likely to lose value when policies are implemented to meet international climate change mitigation targets. Building on Luxembourg’s leading role in green bonds, strengthening climate-related disclosure requirements for financial intermediaries will increase transparency and thus the allocative efficiency of financial markets.
Fiscal policy should support sustainable growth

The fiscal position is very strong, but ageing creates a long-term fiscal challenge. The 2018 budget surplus exceeded 2% of GDP, and gross public debt is low and far outweighed by financial assets. However, under unchanged policies, ageing-related costs are projected to rise substantially, posing a long-run fiscal sustainability challenge. Taking steps to increase the retirement age with life expectancy and/or reduce the generosity of pensions would help address this challenge. Options outlined in the 2012 pension reform should be discussed in this context.

The composition of revenues should be also revised to support more sustainable growth (Figure C). Increasing environmental taxes, such as those on transport fuel or on motor vehicles, would reduce CO2 emissions and pollution. More reliance on recurrent real estate taxes would also be desirable. This would allow less reliance on base-narrowing tax arrangements that in the past attracted multinationals to Luxembourg and thus helped increase corporate tax revenues. Those provisions are being gradually phased out as part of Luxembourg’s engagement in international efforts towards tax transparency, which should continue.

Future prosperity will require stronger productivity growth

Productivity growth has disappointed, especially in services. The level of productivity is high, but its growth has been subpar for two decades (Figure D). Weak growth can largely be traced to services, where often the most productive firms have failed to pull ahead and weaker firms have fallen further behind. Within services, the financial sector has remained the main area of activity, despite declining productivity growth. Policy initiatives to diversify the economy need to be further pursued, with systematic monitoring and evaluation.

Firms that are not top-performers, but viable, need to catch up. Firms often face skill shortages, inter alia in digital technologies, which weighs on productivity outcomes. Market congestion by inefficient firms compounds the problem. Training offers should be stepped up and need to be better informed by regular skill foresight exercises. Restrictive regulations in professional services hamper productivity in that sector but also in downstream production. A more efficient insolvency regime would foster entrepreneurship and help struggling firms to either restructure or exit.

Top-performing firms could still become more innovative. This can take place through more widespread adoption of cutting-edge technologies, such as artificial intelligence or blockchain applications, where public sector use can have a valuable demonstration effect. R&D investment is low by international standards, and the share financed by firms has been declining. Income-based R&D tax incentives have been recently made more targeted, but remain likely to benefit large firms disproportionately. Introducing expenditure-based tax incentives could thus be considered.
The housing market needs to become more efficient and equitable

Housing supply has not kept pace with growing demand. Strong demographic growth, coupled with a trend towards smaller households, have fuelled housing demand, while structural constraints have hampered supply (Figure E). Limited use of land available for construction and cumbersome zoning restrictions have made land prices soar. In turn, this has worsened land hoarding, left unchecked by the low opportunity cost of vacant constructible land, but also by weak incentives of municipalities to enforce an obligation to build on private landowners. Complex construction norms set by municipalities have made building costs rise further.

Figure E. Population growth has outpaced new construction

Note: Population data for Germany refers to 2016.
Source: OECD (2018), International Migration Outlook; and OECD Affordable Housing Database.
StatLink 2 http://dx.doi.org/10.1787/888933951057

High urban sprawl weighs on housing affordability and on the environment. Single-family houses still account for half of the housing stock, which contributes to high urban sprawl in international comparison. This private preference for low-density housing entails major social costs in terms of pollution, traffic congestion (not least due to massive cross-border commuting) and more expensive public infrastructure. Enhanced incentives for densification are hence called for. As with other supply constraints, better coordination between central and local government, as well as across different municipalities, is key.

Tax provisions hamper housing supply, fuel mortgage indebtedness and harm equity. Recurrent real estate taxes are very low, partly because they are based on outdated cadastral valuations. Besides raising little revenue, these taxes hardly provide any incentives for socially efficient land use and territorial development. For instance, unused constructible land is seldom taxed, thus encouraging land hoarding. Rising house prices are also due to the favourable income tax treatment of owner-occupied housing, inter alia through mortgage interest deductibility, which tends to be regressive.

Equitable access to housing is also made difficult by a small social rental sector. The stock of social rental housing is very low (Figure F), partly reflecting the past practice of re-sale of subsidised housing on the unregulated market. Social rental agencies can alleviate this shortage by acting as intermediaries between landlords and vulnerable tenants, providing rent payment guarantees and maintenance services to the owners and supporting tenants in their future transition to unsubsidised housing. Financial support for these agencies should be stepped up and municipalities could provide up-to-date information on unoccupied dwellings.

Social housing allocation can be improved. Social rental housing should be targeted at those households most in need, to provide them with an affordable dwelling and prevent socio-economic segregation. However, the admission criteria for social housing are often flexible and with low transparency. Moreover, partly due to unlimited tenure contracts, many tenants come from the two top income quintiles. Recurrent means-testing should be combined with tailored plans for re-entering the private rental sector, similar to those used by social rental agencies. Rents in the social housing sector should also increase more steeply with tenant income.

Figure F. Social rental housing is scarce

Note: Data refer to 2011 Luxemburg; 2012 for Germany; 2014 for France.
Source: OECD Affordable Housing Database.
StatLink 2 http://dx.doi.org/10.1787/888933951076
## EXECUTIVE SUMMARY

### MAIN FINDINGS

<table>
<thead>
<tr>
<th>Reducing households’ and banks’ financial risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rising house prices and household indebtedness create vulnerabilities for some families and for some banks.</td>
</tr>
<tr>
<td>As elsewhere, the financial sector faces risks from exposures to high-carbon assets which could lose value in the context of policies to meet internationally agreed climate change mitigation targets.</td>
</tr>
<tr>
<td>The financial sector is exposed to risks arising in international markets.</td>
</tr>
</tbody>
</table>

### KEY RECOMMENDATIONS

<table>
<thead>
<tr>
<th>Using fiscal policy to make growth sustainable and inclusive</th>
</tr>
</thead>
<tbody>
<tr>
<td>As in the euro area, there are signs of a slowdown in activity and the most vulnerable workers would be the first affected.</td>
</tr>
<tr>
<td>In a no-policy-change scenario, ageing-related costs are projected to rise substantially over the long run.</td>
</tr>
<tr>
<td>Recurrent taxes on immovable property are very low.</td>
</tr>
<tr>
<td>Past tax arrangements for large corporations have contributed to raise significant tax revenues, but are no longer a sustainable attractiveness factor.</td>
</tr>
<tr>
<td>Luxembourg has low environmental taxation. Fuel tourism is high.</td>
</tr>
</tbody>
</table>

### Reviving productivity growth

| Productivity growth has long been slow, partly due to skill shortages. | Undertake regular skill foresight exercises and ensure their outcomes feed into enhanced training offers. |
| In services, the less productive firms have tended to fall further behind, which weighs on aggregate productivity. | Modernise bankruptcy law to ease early restructuring and second-chance opportunities, as well as the exit of non-viable firms. |
| Regulations for some professional services remain restrictive in international comparison. | In those professional services, eliminate restrictions on advertising and marketing. |
| Even top firms often fail to innovate. | Promote the adoption of cutting-edge technologies, inter alia through the demonstration effect of public sector use. |

### Addressing pressures and improving inclusiveness in the housing market

| Limited use of land available for construction and cumbersome zoning restrictions have fuelled land prices and encouraged land hoarding. | Increase the opportunity cost of unused land by reforming recurrent taxes on immovable property. One option is to increase land value taxes on land zoned for construction. Make part of government financing of municipalities conditional on municipalities penalising landowners and developers for non-use of building permits. |
| The personal income tax treatment of owner-occupied housing favours home ownership, encouraging indebtedness and house price rises. | Phase out or at least reduce mortgage interest deductibility. |
| High urban sprawl increases pollution, traffic congestion and the cost of public infrastructure. | Increase residential density, in particular around transport network hubs, namely by building higher buildings. |
| The social rental housing stock is small and often allocated to high-income tenants. The 2019 budget includes a new budget line to acquire land for housing purposes, currently endowed with an amount of EUR 100, which can be increased according to budgetary procedures. | To increase the stock of social rental housing while preserving social mixity, directly finance new land acquisition by public providers of social housing. Use recurrent means testing to better target the provision of social housing. |
| Housing allowances and rents in the social housing sector are not spatially differentiated, despite highly heterogeneous housing and rental market prices across municipalities. | Link housing allowances and rents in the social housing sector to reference rents at the local level. |
Luxembourg is one of the most prosperous economies in the OECD. Thanks to overall sound policies and institutions, the financial sector remains competitive and has made inroads into new areas, such as fintech and green finance. Dynamic job creation has reduced unemployment and enabled Luxembourg to integrate numerous immigrants, who have become an essential pillar of the labour force while embracing the opportunity of a better life. A very large number of residents in neighbouring countries have also found work in Luxembourg, illustrating the high interconnectedness of the economy. The strong fiscal position is well illustrated by a long-standing AAA rating and the large accumulation of government financial assets.

Well-being benefits from high income levels, but also relies on many other strengths (Figure 1). Most people enjoy a healthy work-life balance and supportive social connections. Housing is generally spacious and well-equipped. Gender inequalities are comparatively low, especially as regards wages (Figure 2).

**Figure 1. Wellbeing is high in multiple dimensions**

Better Life Index, country rankings from 1 (best) to 35 (worst), 2017

Note: Each well-being dimension is measured by one to four indicators from the OECD Better Life Index set. Normalised indicators are averaged with equal weights.


However, prosperity and quality of life cannot be taken for granted, and face some risks. For example, important challenges remain in education and skills, partly due to the large diversity of the resident population. Furthermore, though most immigrants find a job, they tend to earn less than the native-born and are more exposed to poverty, which weighs on the poverty rate for the population as a whole (Figure 3). The provision of multilingual
education and 20 hours per week of free care for children aged 1-4, introduced in 2017, is a worthy policy initiative to address these challenges, which were extensively analysed in the 2017 OECD Economic Survey of Luxembourg.

**Figure 2. Gender wage and employment gaps are comparatively small**

Percentage, 2017 or latest year available

Note: The gender wage gap is defined as the difference between median earnings of men and women relative to median earnings of men, for full-time employees. The employment gap is defined as the difference in percentage points between the employment rates of men and women.


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This Survey focuses on three main challenges. The first relates to housing, which is analysed in the thematic chapter. Strong population growth and supply constraints have made housing prices surge, which worsens affordability problems and creates vulnerabilities for some households and for some banks. The second main challenge is sluggish productivity growth, which has been lasting for several years. The third challenge is to achieve a more sustainable and inclusive growth. Environmental quality has deteriorated due to transport emissions and congestion related to cross-border commuting and urban sprawl. Facilitating labour market integration of older people is also an issue, notably since under unchanged policies ageing will create a long-term fiscal challenge.

Against this background, this Survey has three main messages:

- Tackling housing supply constraints, such as land hoarding, and increasing the supply of social rental housing are key to improving housing affordability.
- Reviving productivity growth will require supporting viable non-frontier firms to catch up, *inter alia* through digitalisation and related upskilling, and to help frontier firms to innovate more.
- Growth, equity and sustainability would all benefit from fiscal reforms to address rising pension expenditure and tilt revenues towards environmental and property taxation.
Figure 3. The risk of poverty among immigrants is a concern

Percentage of population at a risk of poverty, age 18 and above, 2017 or latest year available

A. All population

B. Native born

C. Foreign born

Note: The at-risk-of-poverty rate is the share of people with an equivalised disposable income (after social transfers) below the at-risk-of-poverty threshold, which is set at 60 % of the national median equivalised disposable income after social transfers.

Source: Eurostat, "Income and living conditions".

StatLink  
https://doi.org/10.1787/888933951133
Growth has been solid, but there are risks ahead

After somewhat lower figures in 2016-2017, mainly caused by disappointing developments in the non-financial sector, GDP growth rebounded in 2018, outperforming the euro area average (Table 1 and Figure 4, Panel A). The lasting effects of the 2017 cuts in personal income taxation, high household confidence and a strong labour market have all boosted private consumption. The unemployment rate has declined to just above 5%, although it remains elevated among young workers (Figure 4, Panel B).

Table 1. Macroeconomic indicators and projections

<table>
<thead>
<tr>
<th>Annual percentage change, volume (2010 prices)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>2015 Current prices (billion EUR)</td>
</tr>
<tr>
<td>2016  2017  2018  2019  2020</td>
</tr>
<tr>
<td><strong>Gross domestic product (GDP)</strong></td>
</tr>
<tr>
<td>Private consumption</td>
</tr>
<tr>
<td>Government consumption</td>
</tr>
<tr>
<td>Gross fixed capital formation</td>
</tr>
<tr>
<td>Housing</td>
</tr>
<tr>
<td>Final domestic demand</td>
</tr>
<tr>
<td>Stockbuilding¹</td>
</tr>
<tr>
<td>Total domestic demand</td>
</tr>
<tr>
<td>Exports of goods and services</td>
</tr>
<tr>
<td>Imports of goods and services</td>
</tr>
<tr>
<td>Net exports¹</td>
</tr>
<tr>
<td><strong>Other indicators (growth rates, unless specified)</strong></td>
</tr>
<tr>
<td>Potential GDP</td>
</tr>
<tr>
<td>Output gap²</td>
</tr>
<tr>
<td>Employment</td>
</tr>
<tr>
<td>Unemployment rate</td>
</tr>
<tr>
<td>GDP deflator</td>
</tr>
<tr>
<td>Harmonised consumer price index</td>
</tr>
<tr>
<td>Harmonised core consumer price index</td>
</tr>
<tr>
<td>Household saving ratio, net³</td>
</tr>
<tr>
<td>Current account balance⁴</td>
</tr>
<tr>
<td>General government fiscal balance⁴</td>
</tr>
<tr>
<td>Underlying general government fiscal balance²</td>
</tr>
<tr>
<td>Underlying government primary fiscal balance²</td>
</tr>
<tr>
<td>General government gross debt (Maastricht)⁴</td>
</tr>
<tr>
<td>General government net debt⁴</td>
</tr>
<tr>
<td>Three-month money market rate, average</td>
</tr>
<tr>
<td>Ten-year government bond yield, average</td>
</tr>
</tbody>
</table>

<table>
<thead>
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<tbody>
<tr>
<td></td>
<td>51.6</td>
<td>2.4</td>
<td>1.6</td>
<td>2.6</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>15.9</td>
<td>1.7</td>
<td>3.0</td>
<td>4.2</td>
<td>2.8</td>
</tr>
<tr>
<td></td>
<td>8.7</td>
<td>2.5</td>
<td>3.5</td>
<td>4.0</td>
<td>4.2</td>
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<td></td>
<td>9.4</td>
<td>10.1</td>
<td>3.9</td>
<td>-2.8</td>
<td>5.5</td>
</tr>
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<td>1.6</td>
<td>8.3</td>
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<td>15.3</td>
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<td>3.9</td>
</tr>
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<td></td>
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<td>-0.4</td>
<td>-0.5</td>
<td>0.6</td>
<td>-0.6</td>
</tr>
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<td>34.4</td>
<td>3.5</td>
<td>2.6</td>
<td>3.3</td>
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</tr>
<tr>
<td></td>
<td>115.9</td>
<td>3.8</td>
<td>-1.9</td>
<td>4.6</td>
<td>3.8</td>
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<td>98.8</td>
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</tr>
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<td>17.1</td>
<td>0.1</td>
<td>-0.1</td>
<td>0.5</td>
<td>0.1</td>
</tr>
</tbody>
</table>

1. Contribution to changes in real GDP.
2. As a percentage of potential GDP. Based on OECD estimates of cyclical elasticities of taxes and expenditures. For more details, see OECD Economic Outlook Sources and Methods.
3. As a percentage of household disposable income.
4. As a percentage of GDP.

Figure 4. Macroeconomic developments are solid

However, growth has slowed down towards the end of 2018, in line with developments in the euro area as a whole. Prospects of subdued euro area growth in the near future are likely to affect Luxembourg, given the very strong trade and financial linkages with euro area partners (Figure 5). In case of a downturn, the government should allow automatic stabilisers to operate and, if the downturn intensifies, implement a countercyclical fiscal expansion, taking advantage of Luxembourg’s ample fiscal space. Building on recent measures, further lowering labour taxation at modest income levels would provide short-run stimulus and foster labour market inclusiveness by reducing unemployment among low-skilled workers.

Risks are both of internal and external nature and have become tilted to the downside (Table 2). At home, rising real estate prices and mortgage indebtedness have stoked vulnerabilities in asset markets and in the resident non-financial sectors; indicators point to historically high risk in the credit and housing markets (Figure 6). As a consequence, house price reversals or steep interest rate hikes could affect some banks. On the external front, rising trade tensions could lower GDP growth by about 1pp in 2019 (STATEC, 2018b).
The impact of Brexit is uncertain. On the one hand, potential disruptions could harm the financial sector in case of a “hard Brexit”; on the other hand, some financial firms have already announced the reallocation of their activities to Luxembourg.

**Figure 5. Luxembourg mainly trades with European partners**

Share of exports by sector and destination, 2017

**A. Goods by destination**

<table>
<thead>
<tr>
<th>Destination</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Euro area</td>
<td>70%</td>
</tr>
<tr>
<td>Other Europe</td>
<td>19%</td>
</tr>
<tr>
<td>Asia and Oceania</td>
<td>6%</td>
</tr>
<tr>
<td>North America</td>
<td>5%</td>
</tr>
<tr>
<td>Africa</td>
<td>4%</td>
</tr>
<tr>
<td>South America</td>
<td>1%</td>
</tr>
</tbody>
</table>

**B. Services by destination**

<table>
<thead>
<tr>
<th>Destination</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Euro area</td>
<td>55%</td>
</tr>
<tr>
<td>Other EU</td>
<td>19%</td>
</tr>
<tr>
<td>Other Europe</td>
<td>10%</td>
</tr>
<tr>
<td>Asia and Oceania</td>
<td>8%</td>
</tr>
<tr>
<td>North America</td>
<td>7%</td>
</tr>
<tr>
<td>Africa</td>
<td>6%</td>
</tr>
<tr>
<td>South America</td>
<td>4%</td>
</tr>
</tbody>
</table>

**C. Goods by sector**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufactured goods</td>
<td>38%</td>
</tr>
<tr>
<td>Machinery and transport equipment</td>
<td>27%</td>
</tr>
<tr>
<td>Chemicals and related products</td>
<td>19%</td>
</tr>
<tr>
<td>Miscellaneous manufactured articles</td>
<td>11%</td>
</tr>
<tr>
<td>Food and live animals</td>
<td>8%</td>
</tr>
<tr>
<td>Commodities and transactions</td>
<td>6%</td>
</tr>
<tr>
<td>Others</td>
<td>5%</td>
</tr>
</tbody>
</table>

**D. Services by sector**

<table>
<thead>
<tr>
<th>Service</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial services</td>
<td>58%</td>
</tr>
<tr>
<td>Other business services</td>
<td>19%</td>
</tr>
<tr>
<td>Transport</td>
<td>8%</td>
</tr>
<tr>
<td>Travel</td>
<td>4%</td>
</tr>
<tr>
<td>ICT services</td>
<td>4%</td>
</tr>
<tr>
<td>Cultural, and recreational services</td>
<td>3%</td>
</tr>
<tr>
<td>Insurance and pension services</td>
<td>3%</td>
</tr>
<tr>
<td>Others</td>
<td>3%</td>
</tr>
</tbody>
</table>

*Note*: In Panel C, Others include crude materials, beverages and tobacco, mineral fuels and lubricants, and animal and vegetable oils. In Panel D, Others include intellectual property charges, insurance and pension, construction services, maintenance services, and manufacturing services. In 2017, goods made up 13% of exports while services made up 87% of exports. *Source*: OECD International Trade Statistics. 

StatLink: https://doi.org/10.1787/888933951171
Table 2. Low probability events that could lead to major changes in the outlook

<table>
<thead>
<tr>
<th>Vulnerability</th>
<th>Possible outcome</th>
<th>Possible policy action</th>
</tr>
</thead>
<tbody>
<tr>
<td>High household indebtedness and rising real estate prices</td>
<td>Sharp reversals in real estate prices and steep increases in interest rates could put some households in financial distress, and endanger some banks.</td>
<td>Expand the macroprudential toolkit with borrower-based measures to contain credit growth, as proposed in draft legislation. Address structural factors in housing markets that contribute to rising prices. In case of a housing market downturn, consider taking fiscal policy measures, which could take the form of a temporary cut in transaction taxes for houses sold in a low price range. Maintain close supervision of banks and investment funds. Continue to participate in international collaboration platforms that promote free markets and a rules-based trade system.</td>
</tr>
<tr>
<td>Rising trade tensions or heightened financial volatility could affect the fund industry.</td>
<td>Degradation of the external environment and materializing risks in international markets would impact demand for financial services and lower growth.</td>
<td></td>
</tr>
<tr>
<td>Disorderly exit of the United Kingdom from the European Union.</td>
<td>As the United Kingdom is a major trading partner, particularly for financial services, its disorderly exit from the EU could lead to disruptions for Luxembourg’s financial activities. At the same time, Luxembourg could benefit from the reallocation of banks and insurance companies.</td>
<td>Implement contingency plans.</td>
</tr>
</tbody>
</table>

Figure 6. Macro-financial vulnerabilities have increased in housing and credit markets

Index scale of -1 to 1 from lowest to greatest potential vulnerability, where 0 refers to long-term average, period since 1970

Note: Each aggregate macro-financial vulnerability dimension is calculated by aggregating (simple average) normalised individual indicators from the OECD Resilience Database. Individual indicators are normalised to range between -1 and 1, where -1 to 0 represents deviations from long-term average resulting in less vulnerability, 0 refers to long-term average and 0 to 1 refers to deviations from long-term average resulting in more vulnerability.

Source: Calculations based on OECD (2019a), OECD Resilience Database, February.

StatLink ² https://doi.org/10.1787/888933951190

Strengthening financial regulation to address risks

External risks to the large financial sector call for enhanced monitoring

The financial sector is the most important pillar of Luxembourg’s economy, accounting in 2017 for 28% of GDP and 10% of total employment (Figure 7). As such, the financial sector is also a major driver of the country’s macroeconomic performance (Figure 8).
Luxembourg’s attractiveness for finance is explained by its stable macroeconomic and political environment, multilingual and multicultural society, favourable overall tax settings, efficient legal framework, openness and technological readiness, as well as by its capacity to attract and retain talent, thus creating a pool of labour with the required skills and expertise (Global Competitiveness Report, 2017).

**Figure 7. The financial sector accounts for a large share of total value added**

Share of total value added, 2010 prices

Source: OECD National Accounts database.
StatLink [https://doi.org/10.1787/888933951209](https://doi.org/10.1787/888933951209)

**Figure 8. The contribution to growth from financial services has been high**

Contributions to total value added growth, y-o-y changes

Source: OECD National Accounts database.
StatLink [https://doi.org/10.1787/888933951228](https://doi.org/10.1787/888933951228)

Luxembourg investment funds rank second worldwide in terms of assets held, after the US, and operate on global financial markets. Indeed, actors from around the world invest in funds domiciled in Luxembourg, which in turn invest in various markets and asset classes abroad. The banking sector mainly comprises international banks with many cross-border activities. Many of these banks are foreign-owned with parent companies abroad, such that
at the end of 2017, 83% of total inter-bank credit consisted in intra-group lending (BCL, 2018). Finally, these various actors are strongly inter-connected since investment funds hold deposits and claims over depository banks, although, according to the financial supervisor, the Commission de Surveillance du Secteur Financier (CSSF), internal stress testing shows that this interconnection does not represent a major channel of risk.

Linkages of credit institutions and investment funds to international markets expose the domestic economy to external financial shocks. In particular, heightened financial volatility and tensions on global stock markets could affect the fund industry. Assets under management have been growing rapidly since the global financial crisis, due to decreased bank intermediation, the expansion of the ECB balance sheet and the low interest rate environment, which created abundant liquidity and motivated search for higher yield (Figure 9). However, the financial market volatility observed in 2018 weighed on the expansion of the sector compared to previous years, illustrating its sensitivity to the materialization of external risks (STATEC, 2018b).

![Figure 9. Assets under management have been on an upward path since the crisis](image)

StatLink [https://doi.org/10.1787/888933951247](https://doi.org/10.1787/888933951247)

The financial sector’s exposure to external risks warrants substantial surveillance and monitoring. In addition to the supervision conducted by the ECB, the CSSF has been increasing its staff and runs on-site inspections and fund-bank stress tests twice a year, which is welcome, in addition to engaging in international institutions. Efforts to monitor and supervise must continue to keep pace with the financial sector’s size and complexity. For example, regarding the fund industry, authorities must keep up on-site inspections and pursue efforts to close remaining data gaps, so that supervision on an individual fund basis can be enhanced. Furthermore, credit risks on intra-group exposures in the banking sector should continue to be closely monitored. These exposures build up through liquidity transfers to parent banks abroad, under an exemption from large exposure limits for intra-group exposures. The supervisor should continue to verify that these exemptions still comply with the conditions set out by law, assess the risk arising from the resulting intra-group exposure, and recall the exemption if need be.
**Macroprudential tools can help contain soaring house prices**

Housing prices have been increasing strongly since the crisis (Figure 10), which is likely to reflect structural factors, as discussed in the thematic chapter. Strong economic and demographic growth has been pushing up demand. Owing to low interest rates and tax deductibility of mortgage interest payments, this demand has been increasingly financed by indebtedness. As residential real estate construction has remained subdued due to supply constraints, this has resulted in steep price rises.

**Figure 10. Real house prices are growing strongly**

Percentage change in real house price indexes from Q1-2008 to Q4-2018, s.a.

Mortgage debt represented 91% of total household liabilities in 2014 (Girshina et al., 2017). Rising debt has made Luxembourg’s debt-to-income (DTI) ratio comparatively high, at 176% in 2017 against 108% for the EU average (BCL, 2018). The same holds for the debt-service-to-income (DSTI) ratio (17%, against 14% for the OECD average). In contrast, at 34%, the loan-to-value (LTV) ratio is below the OECD average (43%), reflecting households’ high assets, which are partly a consequence of rising house prices.

One way to assess vulnerabilities linked to the real estate market is to determine the share of households whose debt burden exceeds some commonly accepted thresholds. These households could be vulnerable to real estate price drops, income losses or interest rate hikes, as most outstanding loans are variable-rate ones (BCL, 2018). In Luxembourg, the share of vulnerable households on the basis of the debt-to-income and debt-service-to-income ratios is internationally high, while the opposite is true for the loan-to-value ratio (Figure 11).

For all three indicators, however, Luxembourg’s shares are among the highest when focussing on households in the bottom wealth quintile. Moreover, younger households are more likely to be financially vulnerable (Giordana and Ziegelmeier, 2017). As regards bank vulnerabilities, exposures to the real estate market represent 50% of GDP (ESRB, 2016) and are concentrated in a small number of domestic banks, including some identified as systemically important (BCL, 2018). However, according to the CSSF, regular stress testing shows that banks would withstand extreme mortgage default rates and house price declines as observed in the context of the 2008 crisis without the need of recapitalization.
Figure 11. The share of over-indebted households is high, in particular for those with low wealth

A. Share of households with debt-to-income ratio exceeding 300%

B. Share of households with loan-to-value ratio exceeding 75%

C. Share of households with mortgage-debt-service-to-income ratio exceeding 40%

Note: Computations of these shares only include households with mortgage on their main residence. The debt-to-income ratio calculates outstanding debt on main residence divided by annual household gross income. The loan-to-value ratio computes the outstanding stock of main residence mortgages divided by the current value of the main residence. The debt-service-to-income ratio represents monthly debt service payment on main residence (including interest and principal, excluding taxes) divided by monthly household gross income. The thresholds of respectively 300%, 75% and 40% are commonly used in the literature on household financial vulnerabilities, for example in studies covering Luxembourg (Giordana and Ziegelmeyer, 2017), the euro area (ECB, 2013) or the UK (IMF, 2011).

Source: HFCS database, LWS database, OECD Affordable Housing Database.

StatLink: https://doi.org/10.1787/888933951285
Sustained increases in housing prices and household indebtedness warrant expanding the macroprudential toolkit. In 2016, the ESRB issued a warning to Luxembourg, considering that the existing policies were insufficient to contain risks and financial vulnerabilities in the residential real estate market (ESRB, 2016). In the light of fast-paced credit growth, Luxembourg has been stepping up its macroprudential capital requirements, upon recommendations of the Comité du Risque Systémique (CdRS). Since 2012, banks must use a 75% (instead of the standard 35%) risk weight for the part of a new mortgage loan above an LTV of 80%. In 2014 Luxembourg introduced a capital conservation buffer of 2.5%, in 2016 an O-SII (Other Systemically Important Institutions) buffer, and at the end of 2018 the counter-cyclical capital buffer was raised to 0.25%. However, there are currently no measures focusing specifically on borrower risks in Luxembourg, while this type of instrument has been increasingly adopted in OECD countries (Figure 12). The relatively recent implementation of these measures makes it difficult to assess their impact. However, a growing empirical literature points to the effectiveness of LTV and DSTI ratios to contain mortgage lending and house price increases (Cerutti et al., 2017; IMF, 2014; Lim et al., 2011; Kuttner and Shim, 2013).

A 2018 draft law would enable the CSSF to set limits to mortgage credit, including DTI, LTV and DSTI caps, upon the recommendation of the Conseil du Risque Systémique (CdRS) and after consulting with the central bank. The draft law received a favourable opinion from the ECB and is pending Parliament approval. Like other European countries facing tensions in their housing markets, Luxembourg should move ahead in the implementation of this type of borrower-based macro-prudential instruments.

Additionally, the authorities should be prepared to use remedial measures in the event of a serious housing market downturn, which could depress household consumption through negative wealth effects, and produce financial stress. For instance, the authorities could consider a temporary cut in transaction taxes for houses sold in a given (low) price range. Such policy has been found effective in the UK to uphold consumer spending and minimise house price falls (Best and Kleven, 2017).

**Figure 12. Borrower-based macroprudential measures have been increasingly implemented**

Number of OECD countries with limits to debt-service-to-income (DSTI) and loan-to-value (LTV)

![Graph showing number of OECD countries with limits to LTV and DSTI](https://doi.org/10.1787/888933951304)

Source: OECD Resilience database.
**Luxembourg has become a gateway for fintech and big tech firms**

Luxembourg has succeeded in attracting prominent fintech and big tech companies. Licensed by the Minister of Finance (upon advice from the CSSF) to perform different activities (e.g. those of banking, payment or e-money institutions), these companies then service customers all over Europe. Some of these firms offer online checking accounts and payment services with lower fees than those charged by incumbent banks. Others operate trading platforms for virtual assets (or cryptoassets). Others still are exploring the use of blockchain (or distributed ledger technology) to cut costs in the fund distribution (ILNAS, 2018).

It is still early to assess the contribution of these strands of innovative finance to economic activity through conventional metrics, like value added or employment. But they clearly have the potential to help preserve and enhance Luxembourg’s competitive edge in financial services. At the same time, fintech and big tech activities raise important regulatory issues, often with a cross-border dimension, which calls for action at the EU level.

**Large cryptoasset trading platforms raise unfair trading concerns**

Cryptoasset trading platforms allow buying and selling cryptoassets as well as the conversion of cryptoassets into fiat currency. Luxembourg is home to two entities of two large groups active in trading, Bitstamp and bitFlyer, which also operate as payment institutions. Bitstamp, for instance, ranks third among cryptoasset trading platforms with respect to the Bitcoin trading against the Euro, with around 10% of global market share. Bitstamp Europe S.A. (the Luxembourg entity) operates as a payment institution only and does not have any cryptoasset trading platform in Luxembourg, whereas bitFlyer Europe S.A. (the Luxembourg entity), in addition to payment services, operates a cryptoasset trading platform.

The CSSF was the first EU supervisor to have granted a license of a payment institution to these platforms, covering the fiat currency part of their activities, thus requiring compliance with legislation to prevent money laundering and terrorist financing, as well as with relevant regulation in other areas (e.g., governance, internal control). However, the payment regulations in Europe do not cover risks related to cryptoasset trading, such as market manipulation and insider trading. There is growing evidence of price manipulation in the bitcoin markets (Gandal et al., 2018; Griffin and Shams, 2018). In this context, a recent report based on questionnaires sent to major platforms operating in the US (Office of the New York Attorney General, 2018) found that often those platforms have not implemented any formal policy to detect market manipulation and it is not clear either whether those platforms prevent insider trading. Furthermore, there is no European or Luxembourg regulation setting rigorous standards for listing a new cryptoasset, and platforms themselves do not have such standards either.

There is therefore a case for regulation of trading activities of cryptoasset trading platforms, but still no international “best practices” in this domain. The EU authorities have not yet decided whether to consider cryptoassets as transferable securities and, hence, the EU financial rules (e.g. MiFID II, the Market Abuse Directive) do not apply to their trading (ESMA, 2019). The authorities in Luxembourg have always been in favour of trying to fit the new business models into existing European regulation (such as the directive on payment services PSD2), rather than developing specific regulation on their own while waiting for a common EU solution. Other jurisdictions have designed a specialized license (e.g. BitLicense in New York, amended Payment Services Act in Japan and the recently
adopted PACTE law in France), and China has banned these platforms altogether (in 2017). Numerous consultations and reports suggest that policy makers are in the process of learning about this new asset class (e.g. ESMA, 2018, 2019; OECD, 2019a; Le Moign, 2018).

To foster learning on how best to ensure fair trading, the CSSF should have the legal capacity to conduct inquiries into the activities of trading platforms. As of now, the legal power of the CSSF is limited to issuing warnings to retail investors about cryptoasset related risks and it does not have any supervisory power over these cryptoasset activities. Eventually, trading platforms should be subject to regulation similar to the regulation of other market operators, preferably at the EU level, to prevent regulatory competition (ESMA, 2019). In addition, the CSSF should continue, in line with the warnings issued in 2018, to disseminate information to investors about the risks of virtual currencies.

**Enforcement against international corruption needs to be stepped up**

Luxembourg is regarded as one of the least corrupt countries in the world, according to different indices of perception of corruption (Figure 13). Fighting corruption is important for ethical, political and economic reasons. On the economic front, it undermines the business climate, distorts competition and can be a major driver of public spending inefficiency. Across the EU, Luxembourg residents are among those who perceive corruption to be less of a problem both in public institutions and as part of the country’s business culture (European Commission, 2017).

**Figure 13. Corruption is perceived as very low**

![Graph A: Transparency International indicators](image)

**A. Transparency International indicators**

100=best

![Graph B: World Economic Forum indicators](image)

**B. World Economic Forum indicators**

100=best

*Note:* “Transparency International indicators” refers to the average of five sub-indicators available for all OECD countries in the “Corruption Perception Index”; “WEF indicators” refers to the World Economic Forum’s Executive Opinion Survey.

*Source:* Transparency International; and World Economic Forum.

*StatLink* [https://doi.org/10.1787/888933951323](https://doi.org/10.1787/888933951323)

However, the large magnitude of capital flows involving Luxembourg poses associated risks of economic crime, especially of a cross-border nature. A case in point is bribery of foreign public officials. Luxembourg’s enforcement of the OECD Anti-Bribery Convention remains very modest, with only one criminal case concluded over 1999-2017, and only one individual sanctioned (OECD, 2018f). The authorities claim that recent draft legislation will, when approved, implement two OECD recommendations for combatting...
this form of corruption. They have also mentioned that Luxembourg has adequately responded to requests for mutual legal assistance from other countries, sanctioned one case in 2018, and investigated two more cases that are still ongoing. Progress on enforcement will be assessed by the OECD Working Group on Bribery, with the next evaluation of Luxembourg scheduled for 2021.

Luxembourg faces an inherent high risk of money laundering of foreign proceeds. The legal framework to fight money laundering has been upgraded with the transposition into national law of the 4th EU Anti-Money Laundering Directive, which was completed in 2018. Active enforcement is key for risk mitigation, and should be informed by the national risk assessment exercise completed in 2018. In this context, a register of beneficial owners of corporate and other legal entities, which will help detection, has been set up by recent legislation (January 2019), and will be accessible to the authorities as of September this year. A draft bill setting up a separate register of beneficial owners of trusts and other types of legal arrangements is under preparation as part of the transposition of the 5th EU Anti-Money Laundering Directive.

Fiscal reforms for inclusive growth and sustainability

_The fiscal position is strong, but ageing poses a long-term challenge_

Luxembourg has a fiscal surplus, which has been on an upward trend since the crisis (Figure 14). After a slight decline in 2017, due to expansionary measures included in the tax reforms and the loss of e-commerce VAT, the surplus exceeded 2% of GDP in 2018, far above Luxembourg’s Medium Term Objective for 2016-2019 (-0.5% of GDP). Gross public debt is among the lowest in the OECD, at 21% of GDP by end-2018. The government’s objective to keep the public debt ratio below 30% and preserve the AAA rating in the 2018-2023 legislature appears well within reach. Being a small open economy, it is important for Luxembourg to maintain ample fiscal space. However, there is significant budgetary room for manoeuvre, which could be used to support the economy in case of a downturn characterised by weak demand.

*Figure 14. The fiscal balance is sound*

Source: OECD Economic Outlook (database).  
StatLink [https://doi.org/10.1787/888933951342](https://doi.org/10.1787/888933951342)
The pension system enjoys a comfortable situation in the short to medium term, with a sizeable surplus of contributions over outlays and considerable accumulated assets. Luxembourg has a detailed monitoring system in place, including a reassessment of the financing of the general pension scheme every 5 years. In the future, when some conditions are met, the authorities will be under a legal obligation to implement reforms, to be decided and fully specified at the time. For instance, as per the 2012 pension reform, the automatic indexation of pensions to wage developments is to be reduced (to an adjustable extent) when contributions no longer cover pension expenditure. The 2012 reform also outlines other possibilities, such as a suspension of end-of-the-year pensions (“allocation de fin d’année”). Another mechanism is an increase in contributions, to be decided when the reassessment taking place every 5 years concludes that, under current parameters, the financial viability of the system is no longer guaranteed according to pre-defined thresholds.

However, the relatively high replacement rates and low effective retirement age of the pension system (OECD, 2017a) will entail considerable fiscal pressure in the long run. Under the current parameters, ageing-related costs are projected to rise substantially (EC, 2018a; Figure 15): for instance, public expenditure on pensions is estimated to reach 18% of GDP by 2070, against 11% on average in the EU. In this no-policy-change scenario, there would be a large impact on public debt (Figure 16). Soaring pension costs stem from an increasing dependency ratio (due to rising longevity) which is not compensated, unlike in other EU countries, by an increasing retirement age or decreasing replacement rates (EC, 2018a).

**Figure 15. Ageing related costs are projected to rise substantially**

Percentage of GDP

![Graph showing projected ageing related costs](https://doi.org/10.1787/888933951361)

*Note: Costs are interpolated based on projected figures for every 5 years, assuming no change in the current parameters of the pension system. Net ageing-related costs amount to public expenditure on pensions, long-term care and health care minus pension contributions.

*Source: European Commission (2018a).*
Figure 16. Debt is sustainable in the long-term provided ageing related costs are dealt with

Gross public debt, Maastricht definition, percentage of GDP

Note: The baseline consists of the Economic Outlook No. 105 projections up to 2020, and the long-term projections of the Economic Outlook No. 105 database afterwards. These long-term projections include a primary balance gradually converging from 2 to 1% of GDP over the long-term, a real GDP growth rate close to 2.5% and a real interest rate close to 1%. The "Lower growth" scenario assumes real GDP growth lower by 1% each year compared to the baseline. The "Without offsetting ageing costs" scenario assumes no change in the current parameters of the pension system, and hence increased net ageing-related costs (reaching 17.8% of GDP by 2070), in line with European Commission (2018a). All three scenarios assume that over the projection horizon general government gross financial assets remain constant as a fraction of GDP, which implies that the change in the general government gross debt-to-GDP ratio is larger than what would be implied by government net lending and nominal GDP growth only.


StatLink 2 https://doi.org/10.1787/888933951380

To contain these costs and ensure long-term sustainability, Luxembourg should adapt its pension system, with the involvement of social partners and, if needed, gradual phasing-in of reforms. Unlike in many other European countries, there are no plans to link the retirement age to changes in life expectancy (OECD, 2017b), and therefore creating this link should be considered. Furthermore, the gap between the statutory and effective retirement age (65 against 61 in 2016) indicates that there is scope to restrict early retirement schemes. Increasing the retirement age can have a regressive impact since more educated and richer people tend to live longer; however, when the increase is linked to longevity, the overall impact depends on how even across socio-economic groups gains in life expectancy are (OECD, 2017c). Compensatory measures could be taken (or kept) for those who started to work at a very young age since they are also those who tend to have a lower life expectancy. In parallel or as an alternative to a higher retirement age, the generosity of the replacement rate could be reviewed (IMF, 2019a).

Further adjusting corporate taxation to a globalised world

As a highly open economy, Luxembourg is sensitive to taxation developments at the European and global levels. Luxembourg has been supportive of initiatives for greater tax transparency and for tackling tax avoidance, such as the OECD/G20 Base Erosion and
Profit Shifting (BEPS) project. Notably, the country was among the 49 “early adopters” of the OECD’s Common Reporting Standard for the automatic exchange of financial account information, with the first such exchange, which now covers almost 100 partner countries, taking place in 2017. Additionally, Luxembourg has been found “largely compliant” with the OECD standard for exchange of information on request, and agreed to implement provisions against tax avoidance in bilateral tax treaties. Furthermore, in line with efforts under the BEPS project and at the EU level, Luxembourg has since 2016 made substantial progress as regards exchange of information on tax rulings with partners’ tax administrations (OECD, 2018a). Past tax arrangements may have contributed to very low effective tax rates on large corporations (Wright and Zucman, 2018).

Hybrid mismatches can cause undue tax advantages, arising from cross-country differences in the tax classification of payments, entities or business activities. This will be the case, for example, if an entity of a multinational firm located in a specific country makes a tax-deductible payment to another entity of the same multinational in another country, where this revenue is not taxed. Luxembourg transposed into law the Anti-Tax Avoidance Directive 1 (ATAD 1), entering into force in 2019, which inter alia neutralises hybrid mismatches between EU member states. The authorities should continue to implement tax transparency rules, in particular through the transposition into law of the ATAD 2 rules. They include rules on hybrid mismatches which extend the scope of ATAD 1 rules by covering mismatches with third countries.

To partly offset the broadening of the tax base induced by these developments, the corporate income tax rate was decreased to 18% in 2018 and cut by a further 1% in 2019, bringing the maximum statutory combined rate (inclusive of a municipal surcharge) down to 25% in Luxembourg city.

Existing tax rules for the allocation of taxable profit among countries are under pressure from the challenges posed by the digitalisation of the economy (OECD, 2018a; Devereux and Vella, 2017). Innovative finance strands, such as fintech, are concerned by these issues. Luxembourg should continue to take part in the ongoing work on a global and consensus-based approach to address the tax challenges arising from the digitalised economy.

**Improving work incentives and diversifying tax bases**

Individual taxation for resident and cross-border workers was introduced on an optional basis in 2018. This reduces the marginal taxation of second earners, increasing their work incentives. Since second earners tend to be women, sometimes working part-time, individual taxation is also welcome from a gender neutrality and inclusion perspective. The authorities are analysing the feasibility of full individual taxation, which would be welcome as it would reinforce the impact on work decisions (OECD, 2017a). In addition, further efforts have been announced to simplify the tax system, and to promote and improve electronic tax declaration.

Other avenues for fiscal policy to promote an inclusive labour market should be exploited. Vulnerable groups like young low-skilled workers still face higher unemployment (Figure 17). The participation rate of women lags behind that of men, at 66% against 74% in 2017 respectively. Addressing disincentives from the tax-benefit system would promote labour market inclusiveness. The welfare system is generous: in 2015, total social expenditure reached 33% of GNI, against 20% for the OECD average. However, the loss of social benefits combined with labour taxation when taking up a job often generates important unemployment traps, and low-earning households may find that it is not worth re-entering employment (Figure 18). The newly implemented Revis (Revenu d’inclusion
sociale), which replaced the minimum guaranteed income, is a welcome step to alleviate these disincentives (Box 1). From 2019, an existing tax credit for wage earners (the crédit d’impôt salarié), at most 600 euros per year, will be complemented by a new minimum social wage tax credit of 70 euro per month for salaries at or closely above the minimum social wage. Greater use of in-work tax credits for earners further above the minimum social wage could still be considered.

**Figure 17. Unemployment mainly affects young low-skilled workers**

Percentage, 2017

![Bar chart showing unemployment rates for different educational attainment levels in Luxembourg and OECD countries](https://doi.org/10.1787/888933951399)

*Note:* For Luxembourg 25-34 year old bottom upper secondary educational attainment group, 2015 is the latest data available.

*Source:* OECD Education and Training Database.

**Box 1. The Revenu d’inclusion sociale**

Some measures have been taken to address work disincentives, such as the introduction of the Revenu d’inclusion sociale (Revis), which replaces the minimum guaranteed income as of 2019. The Revis is made of two components. The first is a social inclusion benefit calculated for the household and accounting for personal and common expenses such as housing. Not to discourage work, 25% of professional income (as well as of replacement income and pensions) are excluded from the calculation of this component. The second component of Revis is an activation benefit consisting in an allowance for activities organized by the social inclusion office (ONIS), such as community work or activities favouring social stabilization. The former eligibility criterion of no more than 40 hours of activation measures per week for the household as a whole has been removed. Beneficiaries who are evaluated as being fit for work must be registered at the employment agency (ADEM) and provide evidence that they are actively looking for a job.
Unemployment traps are significant particularly for low-earners.

Percentage of earnings lost to either higher taxes or lower benefits when a jobless person takes up employment, 2018

Source: OECD Benefits and Wages database.

StatLink: [https://doi.org/10.1787/888933951418](https://doi.org/10.1787/888933951418)

To make the tax mix more supportive of sustainable growth and accommodate potential revenue losses from greater international corporate tax transparency (IMF, 2019b), Luxembourg should diversify its tax revenues. Currently, Luxembourg obtains more revenue from the corporate income tax than other European countries (4.6% of GDP against 2.8% in 2016), including a volatile share from the financial sector (OECD, 2017a). The tax base could be diversified on two fronts. First, recurrent taxes on immovable property are the lowest in the OECD (Figure 19). Measures to increase taxation of the real estate sector should be envisaged, with the additional benefit of addressing some of the structural factors responsible for the strong increases in housing prices over the past years. For example, increasing effective taxation of non-used constructible land could be an avenue to address the low incentives to build on available land. The thematic Chapter discusses property taxation in more detail. Additionally, phasing out or at least reducing the tax deductibility of mortgage interest payments would be welcome.

Second, Luxembourg lags behind in environmentally-related taxation (Figure 19). Fuel taxation revenues are close to the average, reflecting significant fuel tourism induced by lower taxes than in neighbouring countries. Diesel taxes are particularly low. Although the authorities have raised petrol tax by 1 cent and diesel tax by 2 cents in 2019, such increases do not appear sufficient to curb incentives to cross the border and buy fuel in Luxembourg (OECD, 2018b). Taxes and excise duties on transport fuel should therefore be increased further, combined with targeted social support measures. There are CO₂-based tax incentives to encourage purchases and usage of cars with low emissions (the “taxe sur les véhicules routiers”).
The 2017 tax reform also modified the benefit in kind for company vehicles, depending on the type of engine and CO₂ emissions, and introduced a tax allowance for personal hybrid and electric cars. However, car taxation is comparatively low (Figure 19), which may help to explain why average CO₂ emissions from new cars are above the EU average (European Environment Agency, 2018). This suggests that there is scope to increase car taxation further, for example by taking account of both CO₂ emissions and local air pollution. Box 2 shows that recommended reforms whose fiscal impact lends itself more easily to quantification would amount to a non-negligible increase in taxation. However, other tax reforms, which are harder to quantify, would tend to have the opposite impact. In any case, even if the overall impact could be broadly neutral, recommended tax increases should be deferred in case a substantial downturn materializes.

**Figure 19. Environmental taxes and recurrent taxes on immovable property are low**

As a percentage of GDP, 2016 or latest available year

*Note:* OECD average is a simple average of the countries shown on the figure. For environmental taxes, data is for 2015 for France, 2014 for Canada, Greece, Israel, and Korea. Motor vehicle taxes refer to one-off import or sales taxes, recurrent taxes on registration or road use and other transport taxes.

*Source:* OECD Green Growth Indicators; and OECD Global Revenue Statistics.

*StatLink* [https://doi.org/10.1787/888933951437](https://doi.org/10.1787/888933951437)
Box 2. Quantifying the fiscal impact of selected policy recommendations

These estimates roughly quantify the annual fiscal impact of selected recommendations in this Survey. Some other recommendations with first-round fiscal impacts are not quantifiable given available information or the complexity of the policy design. This is the case, for instance, with eliminating or reducing mortgage interest deductibility, with decreasing labour taxation at modest income levels and with implementing tax transparency measures. The combined revenue impact of these measures would likely be negative.

### Table 3. Illustrative annual fiscal impact of recommended reforms

<table>
<thead>
<tr>
<th>Category</th>
<th>% of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Expenditures</strong></td>
<td></td>
</tr>
<tr>
<td>- Increased spending on active labour market policies</td>
<td>-0.15</td>
</tr>
<tr>
<td>- Reduced spending on pensions through increased retirement age</td>
<td>+0.2</td>
</tr>
<tr>
<td><strong>Revenues</strong></td>
<td></td>
</tr>
<tr>
<td>- Increase in recurrent taxation of immovable property (*)</td>
<td>+0.25</td>
</tr>
<tr>
<td>- Increase in environmental taxation (*)</td>
<td>+0.35</td>
</tr>
<tr>
<td>- Impact of structural reforms</td>
<td>+0.2</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>0.85</td>
</tr>
</tbody>
</table>

*Note:* The estimated effects abstract from behavioural responses that could be induced from policy changes, in line with past OECD work modelling long-term scenarios (Johansson et al., 2013). The estimates are short-run effects and are based on the following assumptions: i) an increase in active labour market spending as a share of GDP to the average of the top third of OECD countries (from 0.8% to 0.95% of GDP); ii) the estimated change in public pension spending when the retirement age increases in line with a 1% gain in life expectancy (projected at a 5-year horizon), calculated by the European Commission (2018a); iii) an increase in recurrent taxation of immovable property as a share of GDP to the average of the bottom third of OECD countries (from 0.07% to 0.32% of GDP), since political and technical constraints (e.g. related to the updating of cadastral values) would likely prevent a larger increase in a short-run horizon; iv) an increase in environmental taxation as a share of GDP to the OECD average (from 1.77% to 2.32% of GDP), with flanking measures to support poor households most affected costing about one third of the increase in revenues; and v) the annual GDP impact stemming from higher employment of the structural reforms quantified in Box 4 (two-year effect). Tax increases marked with (*) should be postponed in the event of a substantial downturn.


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Reviving productivity growth in Luxembourg

**Understanding productivity developments**

Luxembourg enjoys high levels of productivity vis-à-vis other OECD countries, but productivity growth has been subdued since the turn of the century (Figure 20). Even though most advanced countries saw a productivity slowdown starting in the early 2000’s (OECD, 2015), Luxembourg’s performance appears to be particularly weak. To some extent, this may reflect the intrinsic difficulty of increasing productivity levels for countries close to or at the frontier (Gordon, 2012), but its long lasting nature also signals the presence of structural dimensions. Policy action aiming at increasing productivity features prominently in the agenda of the new government (Box 3).
Box 3. Selected policy measures announced in the Coalition Agreement for 2018-2023

The new government has outlined its planned policy reforms for the 2018-2023 legislative period in the Coalition Agreement of November 2018. The main measures include:

**Digitalisation**
- Providing 5G coverage across the country;
- Developing a legal framework for businesses of the “sharing economy”, to prevent unfair competition, and to ensure maintenance of ecological and social standards, notably with respect to worker protection;
- Expanding the range of E-government services and strengthening public support services, for instance through chatbots;
- Fostering the use of open source software in the public sector;
- Strengthening digital inclusion of the elderly, through intergenerational computer classes;
- Developing a national “e-learning” strategy, which will comprise the introduction of a new section for information and communication students in secondary schools and guarantee students access to either laptops or tablets (project “one2one”).

**Housing**
- Increasing the public rental housing stock and limiting the sale of public social housing;
- Reforming the housing assistance system, focusing on single parents and families with children;
- Stepping up technical assistance to municipalities in the areas of land development, housing construction, sale or renting of land and rental property management;
- Establishing a New Housing Pact (Pacte logement 2.0) between the state and municipalities, including simplified and generalised use of the pre-emption right;
- Reforming the property tax to replace the system of specific municipal taxes on undeveloped land and vacant dwellings;
- Setting up a Committee for acquisition of constructible land involving the Ministry of Housing and the Ministry of Finance;
- Introducing contracts for housing development and reforming rules for construction on land covered by such contracts.

**Mobility**
- Making public transport free of charge from 2020;
- Introducing a national mobility strategy to accommodate mobility needs until 2035;
- Doubling the capacity of Park and Ride (P+R) parking by 2025.
Taxation
- Increasing excise duties on fuel and petrol;
- Increasing net minimum wages by introducing a minimum social salary tax credit;
- Revisiting the tax system for cross border commuters to facilitate working from home.

Figure 20. Productivity is high, but has grown sluggishly in recent years

_GDP per hour worked, USD 2010 PPPs_  

Looking beneath aggregate trends indeed shows that the composition of sectors sustaining business sector productivity growth has changed over time. In particular, the contribution of financial services, a strong driver of aggregate productivity growth in the decade preceding the crisis, significantly diminished in recent years (Figure 21). With persistently low interest rates and tightened banking regulations weighing on value added outcomes, both factors likely contributed to this trend (STATEC, 2018a). Productivity growth in other services sectors and in construction even turned negative. Only the manufacturing sector succeeded to increase its already high levels of productivity growth after 2010. However, since this occurred in tandem with a declining share of value added, the impact on aggregate productivity growth remains limited.
Figure 21. The contribution of the financial sector to productivity growth declined, and other service sectors struggle to catch up

Average growth of gross value added per hour worked (left scale); average share of total value added (right scale)

Source: OECD Productivity Indicators.

Firm-level evidence suggests that the source of low aggregate productivity growth lies in the services sector (Figure 22). In this sector, productivity growth for firms at the median and the top of the productivity distribution – hereafter referred to as “median” and “frontier” firms – declined up to 2011 and has broadly stagnated since, while for firms at the bottom of the distribution (“laggards”) productivity levels plunged by 40% between 2005 and 2016. Indeed, a number of services sectors display significant differences between median and average productivity performance, suggesting the presence of low-productivity outliers (Figure 23). In contrast, manufacturing witnessed a decline in productivity growth in the run-up to the global financial crisis, but also a vigorous rebound afterwards, especially for laggards (Figure 22). In the same vein, median productivity almost equals average levels. Although productivity growth since 2005 was particularly weak for small firms (0-49 employees), the observed slowdown in services sector laggards’ productivity performance cannot certainly be associated to only one firm size class (Figure 24).

Overall, the productivity developments above call for policy initiatives to regularly monitor and analyse sectoral changes, especially those induced by Luxembourg’s diversification efforts; to support viable non-frontier firms in their recovery, or ease their exit otherwise; and to help frontier firms push the boundaries towards higher levels of productivity. These three avenues are discussed below. Implementing the recommended reforms is estimated to have significant positive effects on GDP per capita (Box 4).
Figure 22. Depressed productivity growth stems from a stagnating frontier and tumbling laggards in services

Labour productivity, value added per worker (2005=100)

Note: Frontier firms are defined as the top 20% of firms with the highest labour productivity levels by industry; median firms are in the 40th-60th percentiles; and laggard firms correspond to the bottom 20%. Productivity deciles are calculated on a yearly basis. Services refer to non-financial business services. The underlying dataset was cleaned following Berlingieri et al. (2017).

Source: Authors’ calculations based on data from STATEC, structural business statistics.

StatLink 2 https://doi.org/10.1787/888933951494

Figure 23. Numerous sectors are characterised by low productive outliers

Difference between median and average labour productivity by sector, 2016

Note: Labour productivity is calculated as value added per person employed. The difference is positive (negative) for sectors in which the median exceeds the average (or vice versa).

Source: Authors’ calculations based on data from STATEC, structural business statistics.

StatLink 2 https://doi.org/10.1787/888933951513
Figure 24. Weak productivity developments concern firms of all sizes
Labour productivity developments by firm size class, 2005=100

Note: Labour productivity is calculated as value added per person employed. The underlying dataset was cleaned following Berlingieri et al. (2017).
Source: Authors’ calculations based on data from STATEC, structural business statistics.

StatLink 2 https://doi.org/10.1787/88893951532

Box 4. Quantification of the structural reforms recommended in this survey
This box quantifies the effect of some of the structural reforms for Luxembourg recommended in this Survey based on the OECD’s most recent quantification framework (Égert and Gal, 2017). The effects are derived from a range of reduced-form panel regressions on a sample of OECD countries and in some cases non-OECD countries as well. The estimated effects are allowed to vary across countries as a result of differences in factor shares, the level of the employment rate and a country’s demographic composition. The approach is illustrative and results should be interpreted with care.

Additional positive effects could be expected from other recommendations, but these are harder to quantify. Examples include a tax shift towards recurrent real estate taxes, a reform of the insolvency regime and measures to reduce financial risks (which likely decrease the frequency and severity of crises, and therefore the associated hysteresis effects).
### Table 4. Illustrative impact of structural reforms on GDP per capita

<table>
<thead>
<tr>
<th></th>
<th>Total effect on GDP per capita</th>
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<tbody>
<tr>
<td></td>
<td>5-year effect</td>
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<tr>
<td><strong>Product market regulations (PMR)</strong></td>
<td></td>
</tr>
<tr>
<td>Make regulations in professional services less restrictive</td>
<td>0.2%</td>
</tr>
<tr>
<td><strong>Labour market policies</strong></td>
<td></td>
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<tr>
<td>Improve active labour market policies</td>
<td>0.9%</td>
</tr>
<tr>
<td><strong>Pension reforms</strong></td>
<td></td>
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<tr>
<td>Link retirement age to life expectancy</td>
<td>0.4%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1.5%</td>
</tr>
</tbody>
</table>

*Note: Calculations are based on (i) a reduction of the OECD Product Market Regulations sub-indicator of professional services regulations to the average of the top (i.e. less restrictive) third of OECD countries, which corresponds to lowering the overall PMR indicator from 1.73 to 1.55; (ii) increasing ALMP spending as a share of GDP to the average of the top third of OECD countries (from 0.8% to 0.95% of GDP), which corresponds to increasing ALMP spending per unemployed as a ratio to GDP per capita from 27% to 31%; and (iii) an increase in the legal retirement age by 1%.*

*Source: OECD calculations.*

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**Evaluating and adjusting diversification efforts**

Luxembourg’s authorities made considerable efforts to diversify the economy over the past years, according to the “Smart Specialisation Strategy” formally adopted by the government in December 2017. The process is based on inputs from the “Third Industrial Revolution”, a large foresight exercise commissioned by the government in 2015 with a view to preparing society for upcoming megatrends and inherent disruptive forces (TIR Consulting Group LLC, 2016; OECD, 2017a). In line with previous recommendations (OECD, 2016a), the strategy focuses primarily on a small number of knowledge-intensive priority sectors, to achieve critical mass and impact (Ministry of the Economy, 2017). For instance, significant efforts were put onto Luxembourg’s space sector, which has recently seen the creation of its own Space Agency (Luxembourg Space Agency). Overall, the strategy is therefore a welcome step towards greater economic resilience, and provides a well-articulated approach of directing innovation policy in a comprehensive way.

Within Luxembourg’s diversification strategy, the information and communication technologies (ICT) sector occupies a special position, as it serves as a common strategic layer on which all other sectors can be grounded. Through cluster policies reinforcing the links between business and research, especially in high-potential areas (e.g. cybersecurity, FinTech, blockchain), continuous investment in connectivity and high-end data centres (OECD, 2016a), and a growing start-up ecosystem fostered by dedicated seed funds (Digital Tech Fund; Fit4Start), Luxembourg indeed succeeded in establishing itself as an ICT hub in Europe (Ministry of the Economy, 2018). As a result, ICT patents doubled from 2000 to 2015 (OECD, 2017d), and employment in the ICT sector as a percentage of total employment is now among the highest in the OECD (OECD, 2017e).

Contrary to these positive developments, however, diversification efforts were not sufficient to strengthen the sector’s share of value added over the past decade, nor could
they put a halt to the sector’s declining levels of productivity (Figure 21). Since national accounts data measuring ICT sector productivity growth were recently subject to considerable revisions, the magnitude of the decline should be treated with caution though (see Box 5).

Evaluating the impact of diversification efforts is crucial to assess their efficacy and adjust policy programs if needed. For instance, regularly performing the benchmark exercise proposed by the “Smart Specialisation Strategy” would allow monitoring diversification outcomes and adapting policies to businesses’ innovation progress, while ensuring coherence between all stakeholders involved in the diversification process. Considering the dual role played by the ICT sector (its own growth contributes to the diversification of the economy, but the sector is also key to the digitalisation of the whole business sector), successfully strengthening its growth could entail a double dividend, and therefore merits special attention. In this context, the role of demand-side policy initiatives propelling business sector digitalization should also be examined.

Box 5. Data and measurement issues in Luxembourg

Luxembourg’s national accounts underwent significant revisions in October 2018, due to technical difficulties in measuring the performance of a few multinational corporations in non-financial sectors. These revisions had a significantly negative impact on GDP, as average annual GDP growth was corrected downwards from 3.5% to 3.0% over 2014-18 (STATEC, 2018b). Changes to value added were especially pronounced for the ICT sector, initially displaying strong value added growth in 2016-17, which turned negative following the revisions.

Moreover, policies aimed at enhancing productivity greatly benefit from, and increasingly rely on, firm-level analysis, but the availability of micro-founded data for Luxembourg remains scarce. For instance, identifying firm-level determinants of productivity, comparing multinationals’ productivity to that of domestic firms, or determining the role of financial frictions on firm-level productivity are all issues that can only be satisfactorily studied with firm-level data (Kalemli-Özcan et al., 2015). One ongoing initiative to address this shortage is Luxembourg’s participation in the next round of the OECD MultiProd project, but micro-level data that is already available within national institutions should be further exploited.

Finally, an additional difficulty in measuring and interpreting economic activity in Luxembourg is the vast difference between GDP and GNI (gross national income), which in relative terms is the highest across the OECD. GNI excludes income from domestic production accruing to non-residents. Given that cross-border workers account for over 40% of employment, and that numerous multinational corporations operate in Luxembourg, GNI only amounts to 71% of GDP (2017 data). Still, GNI per capita is the highest in the OECD.

Luxembourg’s recently established national productivity board, the Conseil National de la Productivité (CNP), would be well placed to assist the government in this process. Its institutional set-up being built on three existing national bodies – namely the Observatoire de la Competitivité, STATEC, and the Economic and Social Council – the CNP can tap into the expertise of several established institutions. This positions the productivity board as the ideal support to the government to run in-depth evaluations of various policy areas.
and to carry out early stakeholder consultations on proposed reforms (Renda and Dougherty, 2017).

**Reviving productivity growth for firms below the frontier**

The pool of firms below the productivity frontier, and especially those falling into the category of “laggards”, is highly heterogeneous. Laggard firms are on average smaller and younger than the rest, but they range from old firms with ageing technologies to young firms with a high potential for productivity growth (Berlingieri et al., 2019). Addressing the weak productivity performance of Luxembourg’s non-frontier firms thus requires a set of policies targeting each sub-category.

**Reducing the share of zombie firms**

Some laggard firms in Luxembourg likely correspond to the so-called “zombie firms”. Zombies are defined as firms aged 10 years at least that are unable to cover interest payments with profits for three consecutive years (Adalet McGowan et al. 2017). Since such firms capture scarce resources, their survival (or delayed restructuring) not only drags down average productivity growth, but also constrains the efficient reallocation of their resources (i.e. capital and labour) towards more productive firms. Based on firm-level balance sheet data, the share of capital sunk in Luxembourg’s zombie firms stood at a relatively high 12.5% in 2013, a figure that may have risen further in the light of the continued productivity decline of laggard firms in services (Figure 25, left scale). In turn, investment rates of non-zombie firms could increase by at least 1% if zombie congestion was reduced (Figure 25, right scale).

The appropriate design of insolvency regimes plays a crucial role to facilitate the exit of non-viable firms and the restructuring of viable firms that encounter temporary financial distress (Adalet McGowan and Andrews, 2016). There is substantial scope for raising the efficiency of Luxembourg’s insolvency framework (Figure 26). For example, failed entrepreneurs in Luxembourg must wait more than three years to start another business, compared to just one year in the United Kingdom. Moreover, courts are involved in almost all stages of both liquidation and restructuring processes, thus increasing the associated costs, while other countries only require court involvement in one stage (e.g. Korea, where courts are only involved in the launch of the insolvency procedure). Finally, new financing has no priority over unsecured creditors in the event of liquidation, although international best practice shows that this could lead to successful restructuring and a higher final recovery value for all creditors (Adalet McGowan and Andrews, 2018; EC 2014a and 2014b; Berghalmer et al., 2015).

Draft legislation to ease early business restructuring and modernise bankruptcy law (bill no. 6539) could remedy these concerns, but the bill has been pending since 2013. Swiftly implementing this legislation is key to help honest entrepreneurs get a second chance by no longer holding them personally responsible for the outstanding debt of the failed business after the closure of personal bankruptcy proceedings. Moreover, the legislation would enact a series of preventive measures that would ease early identification of businesses in financial difficulty, thereby allowing for more effective restructuring and resolution procedures.
Figure 25. There is scope to reduce zombie congestion

Note: Firms aged $\geq$ 10 years and with an interest coverage ratio $< 1$ over three consecutive years. Capital stock refers to the share of capital sunk in zombie firms. Right-hand size axis shows counterfactual gains to investment of a typical non-zombie firm from reducing the share of zombies to the sample minimum level, here Slovenia.

Source: Adalet McGowan, Andrews and Millot (2017a), based on ORBIS data.

StatLink 2 https://doi.org/10.1787/888933951551

Figure 26. Luxembourg’s insolvency regime is weak, calling for reforms

Deviation from the OECD average measured in standard deviations, OECD=0

Note: Data bars to the right of zero show better performance than the OECD average and data bars to the left show worse performance than the OECD average.

Source: World Bank, Trade and Competitiveness data.

StatLink 2 https://doi.org/10.1787/888933951570

Lessening current skill shortages and anticipating future ones

Skill shortages directly and indirectly affect productivity outcomes by forcing firms to operate below their potential capacity and by diminishing the returns from investment in
intangible capital, including digital technologies (Gal et al, 2019). This is because highly productive firms have access to the necessary human capital, while firms of average or low productivity find it more difficult to compete for available talent on the market. In turn, laggard firms more likely fail to adopt digital technologies in the first place or to make the best use of them.

Assessments of skill shortages undertaken by Luxembourg’s employment agency ADEM indicate a 30% y-o-y increase in the number of reported vacant positions in 2018. The majority of unfilled vacancies related to financial and administration professionals, partly because of the sector’s size, but critical shortages are also reported for digital experts (ADEM, 2018). A similar picture is conveyed by the share of firms facing difficulties in filling vacant ICT positions, where Luxembourg has led the skill shortage ranking since 2012 (Figure 27, Panel A).

Figure 27. ICT skills shortages remain high but ICT training offers in firms remain scarce

1. All enterprises with 10 or more employees, excluding the financial sector.
2. For Iceland, data is for 2017.

StatLink 2 https://doi.org/10.1787/888933951589

As an immediate solution to the shortage of qualified ICT workers, the government created more favourable immigration schemes for a range of relevant occupations by optimizing
Blue Card requirements and lowering the associated wage thresholds. Moreover, matchmaking events organised by the government help to connect recruiters with professionals.

In tandem with attracting talent from abroad, policies should focus on maximizing the human capital of Luxembourg’s residents. In this regard, training plays a crucial role. Despite the pervasive role of digitalisation, only about a quarter of all firms provide training to their personnel to develop and upgrade their ICT skills (Figure 27, Panel B). “Digital Skills Bridge”, a pilot programme ranked by the Financial Times among the 100 digital champions in 2018, aims to fill this gap by providing firms undergoing digital disruption with technical and financial assistance to upskill their employees. In so doing, the initiative not only contributes to retraining the current workforce but also facilitates the transition of workers whose jobs may be at risk of automation to other sectors. Once the pilot phase reaches its end, ensuring enough funds and outreach efforts towards prospective participants will be vital for a rapid scaling-up, together with careful programme evaluation and subsequent redesign if needed.

Luxembourg’s innovation agency, Luxinnovation, also supports digital adoption in SMEs by linking firms with external experts. Digitalisation indeed tends to lag behind in smaller firms, precisely due to the lack of investment in complementary human skills (Figure 28; OECD, 2018c). Fit4Digital thus provides firms with tailored recommendations as to which digital tools promise the highest returns and accompanies them in their transformation journey, which often starts with simple changes (e.g. creating a website). More general advice on different areas of SME digitalisation (i.e. visibility, reputation, customer acquisition, business models & beyond) is provided by the programme GoDigital. Both initiatives go in the right direction, but achieving measurable impact will require further investment into advertising these programs among small businesses to increase participation rates, which still lie below 100 firms per year.

**Figure 28. In Luxembourg, as elsewhere, digitalisation lags behind in smaller firms**

Percentage of firms with more than 10 employees that adopted each technology, 2018*

Note: Value for Enterprise Resource Planning and Customer Relationship Management refer to 2017.

StatLink 2 https://doi.org/10.1787/888933951608
Adults, especially those with low or medium skills, often fail to value lifelong learning and should be made aware of the need to continuously upgrade their skills in the face of automation and structural changes (Windisch, 2015). In Luxembourg, 77% of firms offer some form of training but only 17% of the population engage in adult learning (Figure 29). Yet, employees who have been working with the same employer for at least six months are entitled to 80 days of training during their professional career. Matching future skill needs and protecting workers at risk will therefore require the use of targeted public awareness campaigns, preferably through various channels to maximise outreach. Countries pursuing similar strategies include Slovenia, whose Institute for Adult Education organises an annual lifelong-learning week since 1996 and Portugal, who launched in 2016/17 a public campaign titled “More Qualification, Better Jobs” (OECD, 2019b).

To better identify future skill needs, regular skill foresight exercises would also be appropriate. Luxembourg already performs some studies assessing skill needs (e.g. through its multi-sectoral business federation, FEDIL), but most of them focus on current shortages or specific sectors of interest. Moreover, the extent to which they inform skill-related policies is uncertain (Skills Panorama, 2017). Building a structured process that feeds the outcomes of regular foresight exercises, including those performed at the EU level (i.e. CEDEFOP; see OECD, 2016b, OECD, 2017a) into training offers of all bodies delivering vocational training is thus critical to help alleviating future skill shortages. ADEM and the UEL (Union des Entreprises Luxembourggeoises) recently entered a cooperation that foresees the regular publishing of a list of job profiles in high need. While this initiative goes into the right direction, its effectiveness remains yet to be gauged.

Figure 29. Too few firms and workers recognise the importance of continuous training

![Graph showing the percentage of adult population and firms engaged in adult learning.](https://doi.org/10.1787/888933951627)

**Note:** Adult learning covers formal and non-formal learning activities, both general and vocational, undertaken by adults after leaving initial education and training.

**Source:** Eurostat, and OECD (2019).

### Raising the productivity contribution of professional services

Professional services represent a growing share of value added in the Luxembourg services sector, but average productivity growth has been negative for the past two decades (Figure 21). Moreover, since professional services are often intermediate inputs to other
sectors, their low productivity performance can curb efficiency in downstream production (Arnold et al., 2011; Bourlès et al. 2013; van der Marel, 2016).

Lifting anti-competitive product market regulations would contribute to stronger market selection and post-entry growth of efficient firms in the professional services sector. Regulation in Luxembourg tends to be more restrictive than the OECD average (Figure 30), especially for civil engineers, which are often unregulated in other OECD countries. This is despite recent reforms facilitating the recognition of professional qualifications and eliminating fixed prices in public contracts for architects and engineers (Ministry of the Economy, 2018). Eliminating restrictions on advertising and marketing for architects and engineers is thus strongly advised.

**Figure 30. Product market regulations remain high despite recent reform**


StatLink [https://doi.org/10.1787/888933951646](https://doi.org/10.1787/888933951646)

**Stimulating the innovation engine to push the frontier**

As countries approach the technological frontier, sustaining productivity growth increasingly relies on their innovative capacity (OECD, 2015). In Luxembourg, innovative activity appears to be high at first sight, as one third of SMEs reported introducing new or significantly improved products, services or organisational methods in 2018 (EC, 2018b). This, however, contrasts Luxembourg’s weak multifactor productivity growth (MFP), in turn pointing to firms’ inability to translate these innovations into productivity gains (Figure 31). MFP is a residual measure capturing changes to output that cannot be explained by changes in labour and capital, and is therefore often used as a proxy for innovation. In services, even the productivity performance of frontier firms has been disappointing. Hence, further efforts are needed to stimulate experimentation with cutting-edge technologies and to foster investment in R&D.
Embracing new, disruptive technologies

Artificial intelligence (AI) is set to transform the existing innovation landscape and holds the promise of reviving productivity growth. AI use has already spread to most industrial activities, from optimising multi-machine systems to enhancing industrial research (OECD, 2018d), although its greatest commercial application is expected to lie in supply chains, logistics and process optimisation (McKinsey Global Institute, 2018).

As requested by the European Commission in its Coordinated Action Plan on AI, Luxembourg will shortly launch its national AI strategy (EC, 2018c). Among other things, skills related to AI development and use, as well as public sector use of AI will figure prominently in this plan. Indeed, making Luxembourg’s public administration a frontrunner of AI use could entail a double dividend through positive demonstration effects for the private sector and potentially large benefits for the public sector itself. Selected public data is already available online for training purposes as stipulated by the European Directive on the re-use of public sector information. In addition, the government could also act as a catalyst to arrange partnerships between firms with valuable but confidential data and AI start-ups with the competence to draw value from it (OECD, 2018d).

As with other disruptive technologies enabling automation, the uptake of AI will likely alter the nature of some existing jobs, and might even put them at risk. While it is too early to fully gauge the labour market implications of AI use, low-skilled jobs tend to be especially vulnerable to the wider use of AI applications (Nedelkoska and Quintini, 2018). Preparing for the labour market changes brought about by AI therefore also requires the provision of retraining offers and social protection for workers whose jobs are at risk. To some extent, the Digital Skills Bridge project, once scaled up, remedies these concerns, but a more holistic approach to protecting workers at risk could be anchored in the national AI strategy.

In a similar vein, Blockchain technologies have recently sparked lively debates. Blockchain applications are widely known from financial markets (e.g. investment fund distribution, remittances, inter-bank transfers and securities trading) but their scope of usage is much
broader. In collaboration with private actors, Luxembourg’s authorities established *Infrachain*, a non-profit organisation and blockchain community with the aim to create a European community of certified host operators to host private chain instances with third party distributed trust and to support the diffusion of blockchain technologies in Europe. In so doing, it bridges the gap between this new technology and the regulators, and positions Luxembourg as a competence centre in Europe. As for AI, however, public sector use would help raise awareness of its potential outside the financial sector and address trust issues related to the data placed on the blockchain, although legal certainty when making financial transactions by way of distributed ledger technology has recently been increased (bill of law 7363).

More generally, Luxembourg has made considerable efforts to provide an appropriate infrastructure for existing and new digital technologies, through the foreseen rollout of 5G, and more importantly, by hosting EuroHPC, the European strategic project in High Performance Computing (HPC). This joint undertaking between 13 EU countries will oversee the pooling of resources within Europe to develop supercomputers for processing big data (Luxinnovation, 2018). However, demonstrating the technical and commercial implications of HPC would be helped by greater awareness of industrial use cases and cost-benefit analyses. Moreover, since SMEs often fail to recognize the potential of new digital technologies, the government should also consider developing a one-stop source of HPC services and advice, while providing low-cost or free experimental HPC use for SMEs for a limited period of time (OECD, 2018d).

*Incentivising more firms to invest in R&D*

Investment in R&D is a widely acknowledged key factor driving innovation (Bloom and Van Reenen, 2002; Hall et al., 2010; Westmore, 2013), and in turn, productivity growth. Governments across the OECD support R&D to compensate for market failures related to firms’ difficulties in finding external finance, especially in the case of small firms, and in fully appropriating R&D investment returns (OECD, 2015). Support can be provided directly (i.e. through grants) or indirectly (i.e. through tax incentives). While direct support can be more easily targeted at high-potential projects or at smaller, younger and first-time R&D-active firms, take-up can be deterred by the high fixed cost of applying to grants (Veugelers, 2016). Tax incentives, on the other hand, are generally easier to operate than grants, but have less scope to identify projects that would not have been carried out in the absence of tax relief (Appelt et al. 2016).

At 1.3%, Luxembourg’s share of GDP allocated to R&D activities stands far below the OECD median and its own national 2020 target of 2.3%-2.6% of GDP (Ministry of the Economy, 2018). In particular, business R&D strongly decreased over the past decade, (Figure 32). While the underlying drivers of this phenomenon are still unexplored, there are reasons to believe that the behaviour of few multinational companies could potentially have had large bearings on official business R&D statistics. In addition, although to a lesser extent, the observed decline could also be attributed to composition effects, since traditionally low R&D intensive services sectors account for a growing share of the economy.

Implementing effective R&D policies has become a priority for Luxembourg, which tripled expenditures for government and higher education R&D over the past decade (Figure 32; NRP, 2018). Luxembourg also recently expanded the list of available grant schemes and broadened the scope for action of Luxembourg’s innovation agency, Luxinnovation, which now generates a third of business R&D expenditures through its programs, and thus
considerably more than its European equivalents (Taftie, 2018). More evidence on the use and impact of individual support measures would be helpful, however, in assessing their value.

**Figure 32. R&D spending remains far from EU 2020 headline target for R&D**

Luxembourg’s tax-related R&D incentives are confined to income-based schemes, which provide a 80% exemption on qualifying income associated with R&D outputs (e.g. patent or other forms of knowledge-capital). In place since 2008, this incentive has largely failed to spur business expenditure on R&D (Figure 32), as the R&D activity underlying the exempted income was not required to have been performed in Luxembourg. The scheme was amended in April 2018 to only provide relief for entities bearing the risk of the developments that are located in Luxembourg (Draft Law No. 7163). While this amendment is welcome, income-based incentives can disproportionately benefit large firms and innovations susceptible to protection by patents (Appelt et al., 2016). Therefore, complementing the use of income-based schemes with expenditure-based tax incentives through enhanced allowances or tax credits should be considered, as in a large majority of
OECD economies (OECD, 2017f). This would provide incentives to a larger proportion of firms, and especially SMEs, to increase R&D spending, and could help come closer to Luxembourg’s 2020 target. However, expenditure-based tax incentives should be carefully designed to take into account that young innovative firms are often in a loss position in the early years of an R&D project, by including the use of carry-forward provisions, cash refunds or reductions in social security and payroll taxes (Appelt et al. 2016).

Avenues for greener growth

There is scope to further reduce CO₂ emissions, especially from transport

Luxembourg has made progress in decoupling CO₂ emissions from economic growth in recent years, as energy intensity of production has fallen and the share of renewable energy has increased (Figure 33, panels A-C). CO₂ emissions have fallen by around 20% since 2010. Nonetheless, per capita emissions are among the highest in the OECD. Road transport accounts for more than one half and also causes air pollution. More than half of the population is exposed to small particle emissions above the limit recommended by the World Health Organisation (10 micrograms per m³), a larger share than the OECD average (Figure 33, panel D). Outdoor air pollution raises premature mortality substantially (Roy and Braathen, 2017). It also affects children the most (World Health Organisation, 2018). One study suggests that air pollution may have a negative impact on young children’s education outcomes (Heissel, Persico and Simon, 2019).

Urban sprawl has contributed to large built-up surfaces, fostering car dependency and traffic congestion (Figure 33, panel F). Policies to limit urban sprawl, discussed in chapter 1, reduce pollution, energy consumption and CO₂ emissions markedly and lastingly (OECD, 2018e). They would also lower the cost of deploying public infrastructure substantially, including public transport, and improve its quality, for example, by making it easier to improve frequency of service. The 2017 Economic Survey also called for improving the quality of public transport services in cooperation with neighbouring regions in Belgium, France and Germany. Integrated multimodal services are key. This needs to be complemented with investment to facilitate walking and cycling, as well as electromobility. Low-emission zones, which restrict access by polluting vehicles to certain urban areas, are also seen as cost effective (ITF, 2018a). Like car use pricing, they create incentives for using low-emission transport options.

As discussed above, there is scope to curb CO₂ emissions and air pollution by increasing taxes on transport fuel and on cars. Car use pricing which takes into account congestion and pollution would also boost efficiency and environmental performance (ITF, 2018a). Indeed, the economic and environmental costs of car use far exceed what car drivers pay in urban areas (OECD, 2018e). Luxembourg plans to introduce free public transport in 2020, which can encourage some switching of mobility to public transport. As planned, public financing should be provided to ensure that quality of public transport services does not deteriorate and the new policy should be reviewed after a few years of implementation.
Luxembourg should take the lead in rolling out electric charging infrastructure for vehicles with the aim of fully decarbonising transport and reducing local pollution. It is welcome that Luxembourg is rolling out the Chargy infrastructure, with the ambition to become the most densified network of electric charging infrastructure in Europe. It could follow France, which has committed to ending the sale of cars with petrol and diesel combustion engines by 2040. A promising avenue for reducing congestion, pollution and CO₂ emissions sharply, while improving connectivity and accessibility, especially for low income households and at low cost to the public purse, is to explore options to move away from individual car use, towards digital-based ride sharing, as recently modelled for Dublin, for example (ITF, 2018b).

The volume of household waste remains large, although much is recycled (Figure 33, panel E). Policies to avoid waste lower natural resource and energy consumption in products consumed domestically. This would reduce greenhouse gas emissions, including in sectors which are relatively difficult to decarbonise. An option to avoid waste is to reinforce policies to extend producers’ responsibility over the life cycle of their products.
This can for example include product take-back requirements on retailers, refundable deposits, or disposal fees levied at purchase based on the estimated costs of treatment. Luxembourg could consider making more use of such instruments. Charging taxes for landfilling of municipal waste could encourage more recycling.

**Harnessing finance for the transition to a low-carbon economy**

Being a major financial center, Luxembourg can play a concomitantly large role in financing the global transition to a low-carbon economy. The first-ever green bond was issued by the EIB in 2007 on the Luxembourg Stock Exchange, LuxSE. In 2016, LuxSE launched the Luxembourg Green Exchange, the first platform dedicated to green and sustainable securities. Between them, these two exchanges have become the world leader of green bond listing (Figure 34). Further transparency is given by Luxembourg’s labelling agency LuxFLAG, which offers a series of labels intended to clarify the content and impact of various asset classes. These include labels on climate finance, on green bonds and on Environmental, Social and Governance (ESG) criteria. Furthermore, in 2018 Luxembourg created a legal framework for the renewable energy covered bond.

It is not clear whether this new asset class has contributed to additional investment in renewable energy and energy-saving projects or whether it has just provided labeling to projects that would have been realized anyway. Indeed, such labeling is beneficial because at issuance green bonds have on average been priced at a premium relative to conventional bonds (Ehlers and Packer, 2017). There are currently several competing frameworks setting standards for green bond labelling. As a step towards more transparent and demanding requirements, the EU is currently developing an EU Green Bond Standard. In this context, The Luxembourg Green Exchange has been a member of the High-Level Expert Group on Sustainable Finance created by the European Commission.

A more comprehensive approach to green finance is required for a successful financing of the transition to low-carbon economy. To this end, the Luxembourg government has published a Sustainable Finance Roadmap, covering inter alia governance arrangements, promoting innovation, developing expertise and measuring progress. Furthermore, a project assessing the current portfolio exposure to climate risks is underway in the insurance sector (through the sector’s association, ACA). The Task Force on Climate-related Financial Disclosures (TCFD) has recommended more ambitious and concrete disclosure practices (TCFD, 2017). For instance, banks would need to disclose the amount and percentage of carbon-related assets relative to total assets, while asset managers and asset owners would disclose the weighted average carbon intensity for each product, fund or investment strategy. Governments and financial regulators from other countries have already expressed support for this initiative. Current work on a EU regulation on disclosure of sustainability risks may help strengthen the disclosure of climate-related risks, in line with TCFD recommendations.

Major risks do arise from exposures to high-carbon assets which could have to be written off before the end of their economically useful life because they are inconsistent with reaching climate objectives. These assets could amount to one trillion US dollars worldwide for the energy supply and industry sectors alone, and could treble if decisive climate mitigation action is delayed to 2025 (OECD, 2017g). Furthermore, financial institutions should also start to stress test their assets under an adverse scenario of bursting a ‘carbon bubble’ (Schoenmaker and van Tilburg, 2016).
Figure 34. Luxembourg has become a leader in green bond listing

Total issuance of labelled green bonds to July 2018, billion USD

Note: The figure includes only green bonds listed on exchanges and excludes over-the-counter bonds and the category “not available/not applicable.”

Source: Climate Bond Initiative data for Global Green Finance Index 2.

StatLink: [http://dx.doi.org/10.1787/888933951722](http://dx.doi.org/10.1787/888933951722)
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Annex. Progress in main structural reforms

This annex reviews action taken on recommendations from the previous Survey released in June 2017.
## Recommendations from the previous Survey

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Actions taken</th>
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<tbody>
<tr>
<td><strong>Making growth more resilient and greener</strong></td>
<td></td>
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<tr>
<td>Develop further the capacity to undertake regularly system-wide stress tests of fund-bank linkages and consider publishing their results.</td>
<td>The CSSF now runs fund-bank interlinkage stress tests twice a year. High-level results are shared with interested external public organisations.</td>
</tr>
<tr>
<td>Introduce additional macro prudential measures, such as limits to loan-to-value or loan-to-income ratios.</td>
<td>A draft law for the implementation of LTV, DTI and DSTI caps was presented to Parliament in December 2017 but not yet passed.</td>
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<tr>
<td>Improve access to credit for SMEs by introducing a central credit registry.</td>
<td>Anacredit, a central credit register for Luxembourg, is currently under construction by the BCL in cooperation with the European System of Central Banks.</td>
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<tr>
<td>Reform land planning and introduce time-limited building permits.</td>
<td>Draft law no. 7139 of May 2017 proposes a development contract (Baulandvertrag) according to which land classified as residential area must be developed within 3 years.</td>
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<tr>
<td>Increase taxation of non-used constructible land.</td>
<td>No action taken.</td>
</tr>
<tr>
<td>Limit further mortgage interest deductibility to reduce housing demand.</td>
<td>No action taken.</td>
</tr>
<tr>
<td>Align the legal age of pension entitlement with increases in life expectancy.</td>
<td>No action taken.</td>
</tr>
<tr>
<td>Link more closely the level of pensions to the level of contributions.</td>
<td>No action taken.</td>
</tr>
<tr>
<td>Increase taxes and excise duties on transport fuel.</td>
<td>In 2019, the authorities increased excise duties on petrol and diesel by 1 and 2 cents per litre respectively.</td>
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<td>Explore the introduction of a system of congestion charges.</td>
<td>No action taken.</td>
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<tr>
<td>Improve cross-border railway connections and transport infrastructure.</td>
<td>A 10-year investment plan has been signed between Luxembourg and France in 2018 for cross-border public transport infrastructures. Significant investments in railways are already underway.</td>
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<td><strong>Better skills for more inclusive growth</strong></td>
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<tr>
<td>Reduce grade repetition by providing earlier individualised support to students falling behind.</td>
<td>In 2018, Luxembourg introduced seven specialized centres for improving the support for pupils with special educational needs and a mediation service for inclusion and integration addressing individual complaints from pupils, with a view to lower drop-out rates.</td>
</tr>
<tr>
<td>Improve the mobility between secondary tracks via curriculum alignment and differentiated teaching.</td>
<td>The law of 13 March 2018 created a national syllabus council and two national syllabus commissions, one for elementary and one for secondary education, aimed at improving the syllabus consistency in national education.</td>
</tr>
<tr>
<td>Create individual learning accounts and expand the individual study leave to enhance access to lifelong learning.</td>
<td>No action taken.</td>
</tr>
<tr>
<td>Make systematic use of the tools for assessing and anticipating skills needs in policy making, especially in education policy and immigration policy.</td>
<td>A new “National Observatory for School Quality” was created in 2018 to evaluate the school system and to issue policy recommendations with a special focus on equity.</td>
</tr>
<tr>
<td>Strengthen career guidance and counselling to improve responsiveness of tertiary education to labour market needs.</td>
<td>The law of 22 June 2017 introduces the “Maison de l’orientation”, whose responsibility is to ensure consistent professional and educational guidance to young and adult students. There is a strong collaboration between the new structure, the national employment agency ADEM and the department of vocational training.</td>
</tr>
<tr>
<td>Tailor lifelong learning programmes to the needs of the low skilled and older workers.</td>
<td>The State’s financial participation increased by 20% for the wages cost of low-skilled and participants over 45 years.</td>
</tr>
<tr>
<td>Provide incentives for fathers to share parental leave. Consider introducing bonus parental leave if fathers take up a minimum amount and remove the cap on parental leave allowance.</td>
<td>Implementation of a 2016 reform has made the share of fathers in total parental leaves increase from 25% (2016) to 50% (December 2018).</td>
</tr>
</tbody>
</table>
### Recommendations from the previous Survey

<table>
<thead>
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<tbody>
<tr>
<td>Adjust the tax and benefit system to increase incentives to work for low-skilled youth, older workers and second earners. For example, limit the access to unemployment benefits for young people with no employment record.</td>
<td>The newly implemented “Revis” (revenu d’inclusion sociale) replaces the minimum guaranteed revenue as of 2019 and reduces some of the work disincentives by excluding 25% of professional income from the computation of the benefit amount, and by permitting more than 40 hours of work per week and per household. A new minimum social wage tax credit of 70 euro per month on monthly gross salaries between the minimum social wage and 2,500 euro was introduced in January 2019.</td>
</tr>
<tr>
<td>Improve the evaluation of existing active labour market policies and set and partly publish output measures for local PES offices.</td>
<td>The EvaLab4Lux project will improve evaluation of ALMP by providing systematic studies and conducting impact evaluation studies.</td>
</tr>
<tr>
<td>Move to a system of fully individual taxation to make the tax system more gender neutral.</td>
<td>No action taken.</td>
</tr>
<tr>
<td>Close off various routes into early retirement and support more flexible workplace practices to strengthen labour market attachment of older workers.</td>
<td>Conditions to enter partial retirement, which keeps older workers attached to the labour market, have been eased in 2017.</td>
</tr>
</tbody>
</table>

### Improving the integration of immigrants

<table>
<thead>
<tr>
<th>Recommendations from the previous Survey</th>
<th>Actions taken</th>
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<tbody>
<tr>
<td>Ease immigrants’ access to public sector jobs.</td>
<td>Since 2017, measures have been taken within the civil service to facilitate the learning of the Luxembourgish language.</td>
</tr>
<tr>
<td>Continue to increase public supply of language courses.</td>
<td>The Government introduced several classes for learners of different ages to enhance language skills.</td>
</tr>
<tr>
<td>Speed up decisions on asylum applications. While waiting for a decision, ease provisional labour market access for applicants with high prospects of being allowed to stay.</td>
<td>The average duration from the submission of the application for international protection to the first decision has decreased from 21 months in 2015 to 6.5 months in 2018. No action has been taken to ease provisional labour market access.</td>
</tr>
<tr>
<td>To attract talent and better respond to skill shortages, reduce the time needed for non-EU citizens to obtain a work and residence permit.</td>
<td>In July 2018, the Grand-Ducal Regulation laying down the conditions and procedures for the issue of a residence permit as a salaried worker has been modified to reduce the administrative burden on the applicant and to simplify the procedure for obtaining a work and residence permit.</td>
</tr>
<tr>
<td>As planned, increase the provision and affordability of early childhood education and care, and familiarise children aged 1-4 with both Luxembourgish and French. Ensure that all providers comply with quality standards.</td>
<td>The initiative “Staark Kanner” (Strong Children; Law of 29 August, 2017) provides multilingual education and 20 hours of free child care in nursery facilities for children ages 1 to 3 (until they turn 4, when compulsory school starts). Public funding is conditional on compliance with high quality standards. Data from December 2017 states that 58% of the children aged 1 to 3 have been benefitting from this measure.</td>
</tr>
<tr>
<td>Make resource allocation across schools more equitable, and introduce incentives to attract more qualified and experienced teachers to disadvantaged schools.</td>
<td>No action taken.</td>
</tr>
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