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NOTE DE CONJONCTURE

The economic situation in Luxembourg
Recent developments and outlook

STATEC

LEGAL NOTICE

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Preface

Economic activity in Luxembourg has reached pre-COVID-19 level

The STATEC analysis clearly shows that COVID-19 did indeed prematurely end lives, despite the propaganda of some "conspiracy" sites that deny the reality of the pandemic. In fact, the mortality rate observed in 2020 in Luxembourg saw a significant increase compared to the last ten years. This increase in deaths was slightly more pronounced for men and mainly affects people over the age of 75.

STATEC has not stopped warning decision-makers and readers of this Note de conjoncture of the unusual nature of the COVID-19 anthropozoonosis health crisis, which involves a high dose of uncertainty. It is therefore preferable, like the practice of international organisations, to remain cautious and proceed by constructing scenarios.

Indeed, social distancing and partial confinement measures weigh on the confidence of consumers and companies that cannot easily make use of teleworking. The infamous example of the poorly affected HORECA sector is one such example.

The vaccination campaign is speeding up around the developed world, but it is dependent on the availability of preferred vaccines, their effectiveness against virus mutations and the propensity of citizens to get vaccinated. Many see the arrival of a European vaccination passport as the key to a return to deconfined mobility and the start of a vigorous economic recovery in OECD countries.

... but it is too early to announce a return to normal

According to this Note de conjoncture, economic growth in Luxembourg could reach 6% this year (in the central scenario). Pitfalls in the vaccination campaign or a decline in its effectiveness require caution, as economic growth, employment, and revenue from the public purse may be less favourable. In addition, attention must be paid to the provisional and revisable nature of quarterly accounts that could alter the statistical perspective on the recent epidemic episode.

Alongside a recovery in consumption and investment and a significant rise in consumer prices this year, somewhat overshadowed issues will resurface: climate change, housing prices and the level of purchasing power (and its unequal distribution). This Note de conjoncture suggests that the average salary will increase in 2021, after a year marked by a (slight) decrease; on the other hand, it predicts that greenhouse gas emission – following a significant reduction in atmospheric pollution in 2020 – will increase by 2.5% in 2021. The broad guidelines of European fiscal, monetary and trade policy will certainly play a decisive role.

Dr Serge Allegrezza

Summary and key facts

Table 1
Macroeconomic forecasts

	1995-2020	2020	2021	2022
		% change unless otherwise specified		
Real GDP	3.2	-1.3	6.0	3.5
Domestic salaried employment	3.2	2.0	2.5	2.5
Unemployment rate (% of active pop.)	4.5	6.3	6.4	6.3
Consumer Price Index (CPI)	1.8	0.8	2.0	1.6
Average salary cost	2.6	-0.7	2.3	4.1
Public balance (% of GDP)	1.7	-4.1	-0.7	0.7
Greenhouse gas emissions[1]	-1.9	-17.2	2.5	2.6

Source: STATEC (2021-2022: forecast)
[1] Evolution 2005-2019.

Vaccination and recovery plans will revitalise the global economy

The global economy suffered a historic crisis in 2020, but the decline observed was ultimately to a lesser extent than expected. Industrial production and international trade in goods rebounded well in the 2nd half of 2020, albeit with supply difficulties. The surge in vaccination campaigns suggests a sharp rebound in activity in the euro-zone from the 2nd half of 2021, enabling the GDP to record growth of more than 4% per year this year and in 2022.

To support the recovery, major stimulus programmes have been planned in the United States and the eurozone, supported by very accommodating monetary policies. However, there are still elements of uncertainty regarding the impacts of these measures, as well as the recycling of the savings accumulated by households, the financial health of companies, changes in financial conditions following the sharp increase in government debt or even changes in commodity prices.

A moderate recession in 2020 in Luxembourg, followed by a sharp rebound in 2021

Following a sharp decline in the 1st half of 2020, economic activity in Luxembourg rebounded well in the second half of the year. And for 2020 as a whole, the recession is much less pronounced there than in other eurozone countries.

The economic indicators available in the 1st quarter of 2021 are generally quite positive, with the notable exception of those of the hotel, restaurant and catering sector. And by the start of spring, the results of business and consumer surveys had recovered significantly for non-financial services and consumers. This phenomenon, also observed throughout the eurozone, probably owes much to the progress in vaccination. This will make it possible to relax restrictions on activity and free up some consumption.

For 2021, STATEC expects GDP growth in Luxembourg volume of 6%, then +3.5% in 2022. Over these two years, the market sector should regain momentum in terms of activity and investment, gradually taking over from public spending, which was largely used in 2020.

Contained pressures on inflation

Since the end of 2020, the persistent rise in oil prices has helped to revive inflation in Luxembourg, which has stood at around 2% in recent months. But, as in the eurozone as a whole, the risk of an inflationary drift seems limited, with prices excluding oil products rising very moderately. However, some temporary factors are expected to trigger a short-lived resurgence in inflation, such as the release of accumulated demand following the gradual lifting of restrictions, or the increase in certain input costs (raw materials, transport costs). For Luxembourg, STATEC expects an inflation rate of 2.0% for this year, then slowing down to 1.6% for 2022, when the temporary surge linked to the rebound in the oil price has ceased.

In 2020, the average wage cost fell by 0.7% in Luxembourg, in line with the trend observed in the eurozone. The decline is due to the massive use of short-time working as the main tool for keeping workers in employment during this health crisis. Short-time working schemes and other measures have reduced the cost of work for companies, while maintaining income for employees. For 2021 and 2022, STATEC expects again a more dynamic trajectory of salaries (+2% then +4%), higher than that relating only to automatic indexation to inflation, their main short-term determinant, under the effect in particular of the evolution of labour productivity which should remain well oriented over the next two years.

The unemployment rate is expected to stabilise at just over 6%

In 2021, the labour market in Luxembourg remains the most dynamic in the eurozone. Part of this high resilience is explained by the measures implemented by the Luxembourg government to maintain employment, such as the extension of the short-time working scheme. However, Luxembourg is not particularly different from other European countries in its use of this type of aid.

Despite the continuous increase in the number of jobs created, the volume of hours worked is still on the decline at the beginning of 2021. This does not prevent (traditional) unemployment from falling, helped by employment measures supervised by Luxembourg's National Employment Agency (ADEM).

Employment growth is not expected to exceed 2.5% this year and the next, a much slower pace than economic activity. Elements of uncertainty persist, such as the high volatility of recent monthly data (which makes its cyclical interpretation and forecast difficult) and even the potential but staggered repercussions of the crisis on the sectors most affected by the crisis. Nevertheless, STATEC sees unemployment stabilising in its central forecast scenario and it could even decline if certain parameters move in a suitable manner (increased use of ADEM unemployment support schemes, favourable economic scenario based on accelerated vaccination in Europe).

The public deficit is expected to be noticeably reabsorbed this year and could give way to a slight surplus in 2022

The high resilience of the Luxembourg economy in the face of the sweeping pandemic is also reflected in public accounts. Revenues thus showed only a slight fall, of around 1% last year, compared to -4% for the eurozone on average. The shock was limited by the good performance of household taxes and social security contributions as well as the rapid rebound in VAT revenues after the slump in spring 2020. STATEC expects a rebound in growth in public revenues, slightly higher than 7% per year in 2021 and 2022.

The exceptional increase in public spending in 2020 (+14%) is largely the result of measures taken to counter the effects of the COVID-19 crisis. But the expansion remains significant even by removing these extraordinary expenses and neutralising the impact of inflation. According to STATEC, public spending is expected to stagnate overall in 2021, before rising by around 4% in 2022.

Luxembourg thus has a deficit of 4.1% for 2020, which is certainly historic, but which is the lowest in the entire eurozone. According to STATEC forecasts, the public balance is expected to move closer to balance this year (-0.7%) and become slightly positive next year.

The pandemic affected energy consumption, but domestic production rose

For the first time, STATEC includes the analysis of the energy situation and greenhouse gas emissions (GHG) in its Note de conjoncture. Decarbonisation of the economy is governed by climate objectives and the energy transition is its main pillar. In this new chapter, STATEC analyses the energy market in Luxembourg, the evolution of consumption and the corresponding direct GHG emissions. Since 2020, the latter have been an integral part of STATEC's short- and medium-term macroeconomic forecasts.

Limited by its territory, Luxembourg has always been among the most energy-dependent economies in Europe (95% of energy consumption is imported). However, domestic production – renewable electricity in particular – continued to grow in 2020 due to the increase in installed capacity.

The downturn in economic activity linked to the pandemic crisis has resulted in a fall in energy imports (fuels, natural gas and electricity). With the lifting of restrictions and the resumption of activity, energy consumption and imports rebounded rapidly, nevertheless hampered by the introduction of the CO_2 tax on 1st January 2021. Following a 17% decrease in 2020, GHG emissions should increase by around 2.5% per year in 2021 and 2022.

1 International context

The global economy suffered a historic crisis in 2020, but the decline observed was ultimately to a lesser extent than expected. Industrial production and international trade in goods rebounded well in the 2nd half of 2020, albeit with supply difficulties. The surge in vaccination campaigns suggests a sharp rebound in activity in the eurozone from the 2nd half of 2021, enabling the GDP to record growth of more than 4% per year this year and in 2022.

To support the recovery, major stimulus programmes have been planned in the United States and the eurozone, supported by very accommodating monetary policies. However, there are still elements of uncertainty regarding the impacts of these measures, as well as the recycling of the savings accumulated by households, the financial health of companies, changes in financial conditions following the sharp increase in government debt or even changes in commodity prices.

Table 1.1
European Commission forecasts

	GDP at constant prices			Implicit prices of private consumption			Number of unemployed			Budget balance		
	2020	2021	2022	2020	2021	2022	2020	2021	2022	2020	2021	2022
					% variation		In % of active population				In % of GDP	
Belgium	-6.3	4.5	3.7	0.7	1.8	1.5	5.6	6.7	6.5	-9.4	-7.6	-4.9
Germany	-4.9	3.4	4.1	0.7	2.3	1.4	3.8	4.1	3.4	-4.2	-7.5	-2.5
Ireland	3.4	4.6	5.0	0.2	0.9	1.3	5.7	10.7	8.1	-5.0	-5.0	-2.9
Greece	-8.2	4.1	6.0	-1.3	-0.2	0.6	16.3	16.3	16.1	-9.7	-10.0	-3.2
Spain	-10.8	5.9	6.8	0.2	1.0	1.2	15.5	15.7	14.4	-11.0	-7.6	-5.2
France	-8.1	5.7	4.2	0.6	1.4	1.2	8.0	9.1	8.7	-9.2	-8.5	-4.7
Italy	-8.9	4.2	4.4	-0.2	1.3	1.1	9.2	10.2	9.9	-9.5	-11.7	-5.8
Luxembourg[1]	**-1.3**	**4.5**	**3.3**	**1.0**	**1.7**	**1.7**	**6.8**	**7.4**	**7.3**	**-4.1**	**-0.3**	**-0.1**
Netherlands	-3.7	2.3	3.6	1.4	1.6	1.4	3.8	4.3	4.4	-4.3	-5.0	-1.8
Austria	-6.6	3.4	4.3	1.1	1.6	1.6	5.4	5.0	4.8	-8.9	-7.6	-3.0
Portugal	-7.6	3.9	5.1	0.9	1.2	1.6	6.9	6.8	6.5	-5.7	-4.7	-3.4
Finland	-2.8	2.7	2.8	0.4	1.2	1.2	7.8	7.6	7.2	-5.4	-4.6	-2.1
Denmark	-2.7	2.9	3.5	0.3	1.3	1.5	5.6	5.5	5.2	-1.1	-2.1	-1.4
Sweden	-2.8	4.4	3.3	1.1	1.5	1.3	8.3	8.2	7.5	-3.1	-3.3	-0.5
EU	**-6.1**	4.2	4.4	**0.7**	**1.8**	**1.5**	**7.1**	**7.6**	**7.0**	**-6.9**	**-7.5**	**-3.7**
Eurozone	-6.6	4.3	4.4	**0.5**	**1.6**	**1.3**	**7.8**	**8.4**	**7.8**	**-7.2**	**-8.0**	**-3.8**
United Kingdom	-9.8	5.0	5.3	1.6	1.7	2.4	4.4	5.6	5.9	-12.3	-11.8	-5.4
United States	-3.5	6.3	3.8	1.2	2.0	2.0	8.1	4.6	3.4	-16.1	-16.0	-6.8
Japan	-4.8	3.1	2.5	0.4	0.4	0.8	3.0	2.9	2.6	-13.2	-9.5	-4.1

[1] The forecasts of the European Commission for Luxembourg may differ from those of STATEC.
Source: European Commission 12/05/2021

Still much uncertainty surrounding the extent of the global recovery

Under the effects of the health crisis, the global economy experienced a historic contraction of just over 3% in 2020 according to International Monetary Fund estimates. This is less than the approximately -4.5% expected by the organisation last autumn, as the data observed during the second half of the year proved better than expected in most countries. According to the same source, global growth is expected to reach 6.0% this year (+5.1% in advanced economies, +6.7% in emerging economies), then 4.4% in 2022[1]. The uncertainty surrounding these forecasts remains high, but less so than six months ago, as many parameters remain difficult to predict.

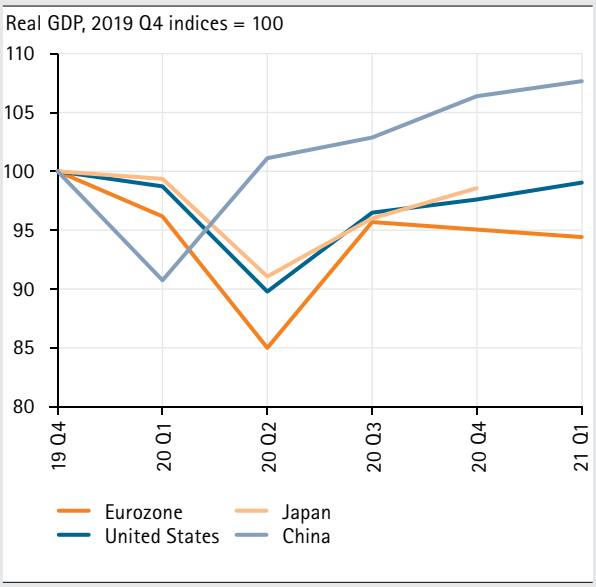
From the point of view of the health situation, the increase in vaccination campaigns certainly suggests improved prospects. But the increase in vaccinations is very uneven across countries and regions of the world and faces new forms of COVID-19 variants that complicate the situation. There are also many uncertainties surrounding the measures to support the economy, both in terms of their scale (even though it is now clearly determined for advanced economies) and their impact. For example, policies supporting employment/household income in the face of "impeded" consumption have generated a very large savings surplus (especially in rich countries) for which it is not clear when and to what extent it will be spent. Uncertainty also surrounds the potential consequences of this crisis (on the financial health of companies, on potential growth, etc.), changes in financial conditions (in particular through the sharp increase in government debt) or changes in the prices of goods (raw materials in particular) and services.

Nor is the recovery synchronised (which generates pressures related to imbalances between supply and demand) or homogeneous. China saw its GDP rebound as early as in the 2nd quarter of 2020, but most advanced economies had to wait until the 3rd quarter for this. And even in advanced economies, there are strong differences between countries. The United States – where vaccination has been relatively rapid[2] and with massive budgetary support – has thus followed two consecutive quarters of growth after this rebound, while the eurozone has fallen back into recession.

[1] The European Commission's forecasts for the global economy are almost the same: +5.6% in 2021 and +4.3% in 2022.

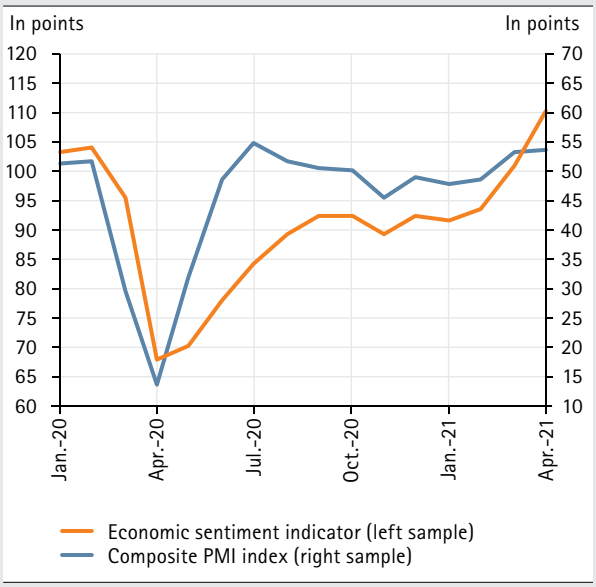
[2] At the beginning of May 2021, the share of the population that received at least one vaccine injection against COVID-19 reached 45% in the United States, compared to just 30% in the European Union.

Graph 1.1
The eurozone is back in recession...



Source: Eurostat

Graph 1.2
... but confidence is on the rebound in spring 2021



Sources: European Commission, Markit

Eurozone: decline in activity at the 2020/2021 crossroads, but more favourable signals for the approach to spring

According to initial estimates, the eurozone GDP fell by 0.6% over one quarter in the 1st quarter of 2021. After a fall of 0.7% in the 4th quarter of 2020, the eurozone is therefore once again in a situation of technical recession (i.e. two consecutive quarters of decline in GDP), although this is on a completely different scale than that of the 1st half of 2020. This loss of momentum is due in particular to tighter restrictions in many Member States from the end of last year that weighed on service activities and household consumption. Despite vaccination campaigns starting in the 1st quarter of 2021, their slow start[3] did not lead to a significant recovery in business and household confidence over this period.

However, this new recession does not emerge as a generalised phenomenon (unlike the previous one). Of the 10 Member States for which we have results in the 1st quarter of 2021, only 2 are in technical recession (Italy and Belgium). While it was mainly France's results (-1.4% over one quarter) and Italy (-1.8%) that had compromised the overall performance in the 4th quarter of 2020, it is primarily the decline in the German GDP (-1.7%) that is dragging the eurozone down in the 1st quarter of 2021[4]. In fact, it is also one of the Member States where the tightening of restrictions was most pronounced in the same quarter[5].

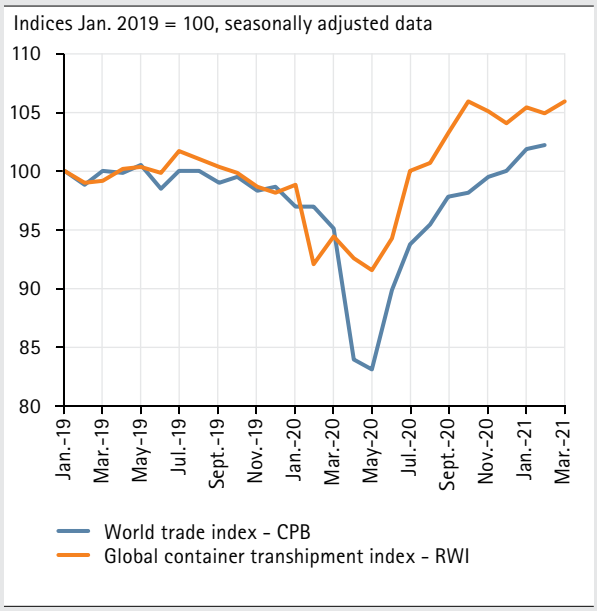
The outlook is much better for the 2nd quarter, as indicated by the business and consumer surveys in the eurozone (see graph 1.2), whose results have improved significantly since last March. This improvement is due on the one hand to the growing confidence in the industry, which was already at high levels in the previous months and, on the other hand, to services, which had shown serious signs of weakness since the end of 2020. The PMI (Purchasing Managers' Index) for services for the eurozone thus rose to above 50 percentage points in April, indicating that activity is again expanding. In particular, the prospects of service companies have improved, with the rise in vaccinations – and the fact that the most vulnerable have benefited as a priority – suggesting a relaxation of restrictions in the short term.

[3] In the EU-27, the rate of people who received their first vaccine injection against COVID-19 reached roughly 2% of the population at the end of January 2021, 5% at the end of February and 10% at the end of March.

[4] Given that Germany accounts for around 30% of the eurozone's GDP, this result explains 0.5 percentage points of the 0.6% reduction.

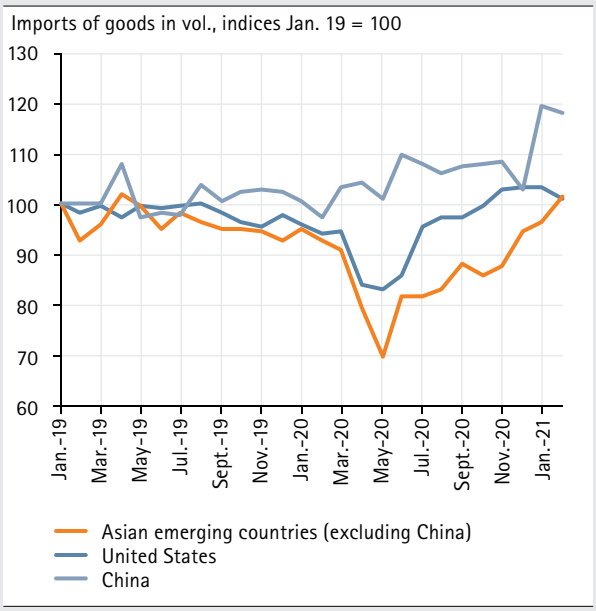
[5] Based on the Stringency Index developed by the University of Oxford.

Graph 1.3
Trade in goods well above pre-crisis levels...



Sources: CPB Netherlands, RWI/ISL

Graph 1.4
... with a sharp rise in imports in economies showing an early recovery



Source: CPB Netherlands

The asynchronous recovery of world trade is accompanied by pressures

International trade in goods rebounded considerably in the 2nd half of 2020, a rise that coincides with that of global industrial production. At the start of 2021, both are tending to stabilise (at a relatively high level).

This strong recovery in trade in goods would be a good sign from an economic point of view, but it is not without some difficulties. The fact that the recovery is not synchronised between the different countries of the world has something to do with it. China's early recovery from the 2nd quarter of 2020, with positive spillovers to its Asian partners and strong budgetary support to US households, has largely boosted imports there. But in other regions, particularly those more effected (or constrained) by the health crisis, supply has not been able to adequately adapt to this rise in demand. This results in supply difficulties or shortages, which increase the price of certain raw materials or components (see chapter 3).

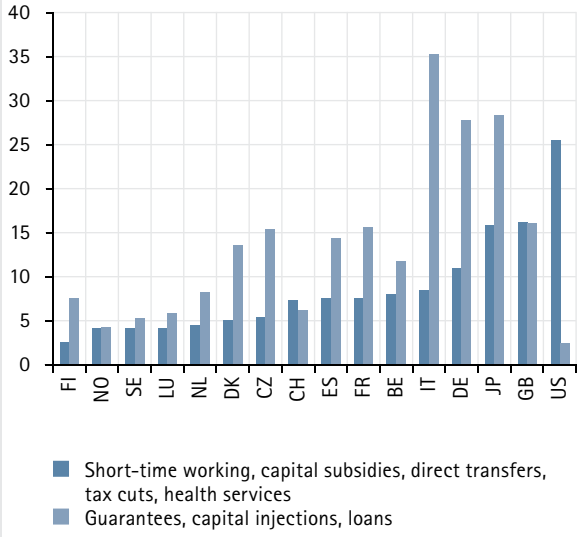
Certain factors specific to the pandemic have also played a role in this phenomenon. For example, in the case of semiconductors (used for electronic chips), demand for personal computer equipment (via the development of teleworking, the run on games consoles) has increased sharply. And as soon as demand for other products that also require chips (cars, household appliances) rose again (it had collapsed in the 2nd quarter of 2020), bottlenecks formed.

Supply problems also arise from a certain saturation in sea freight, again with a supply that has struggled to adapt to the increase in demand, creating pressure on prices[6] and a delay in shipping times.

These factors are leading to supply problems in the industrial or construction sectors, which had largely supported activity since mid-2020, even though the recovery of service activities has not been achieved.

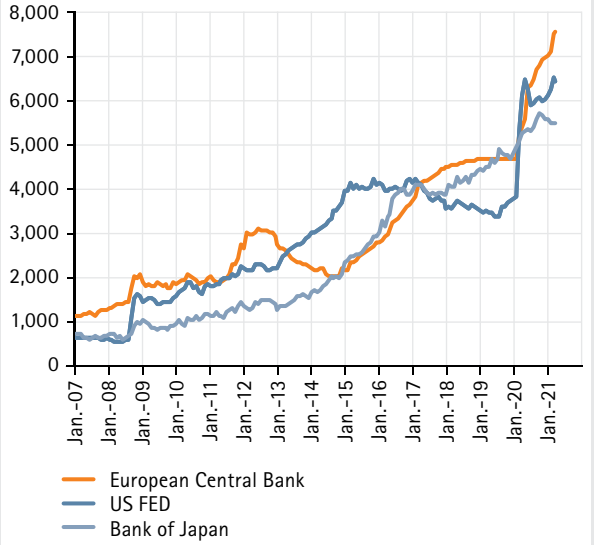
[6] The Baltic Dry index (BDI) on sea freight prices, which had fallen sharply at the beginning of 2020, returned in May 2021 to its highest level since June 2010.

Graph 1.5
Strengthening of State budgetary support mechanisms



Source : IMF (17 March 2021)

Graph 1.6
European Central Bank accelerates asset purchases



Source: Macrobond (data in EUR)

Extension and strengthening of budgetary and monetary support measures

In the face of the second wave of the epidemic, governments and central banks have adapted, strengthened and extended the temporary measures to support the economy which were put in place in March/April 2020. Recovery plans were also decided at the end of 2020 / beginning of 2021 to stimulate recovery. Graph 1.5 summarises direct and indirect budgetary support measures decided in different States between January 2020 and March 2021. The aid granted by the Luxembourg Government is explained and quantified in study 7.1 of this Note de conjoncture.

The US support and recovery programmes are the most considerable (10% of the GDP in 2020, 11% in 2021 and 2% in 2022)[7]. The US recovery plan adopted in March 2021 includes an aid package of USD 1,900 billion for households, education, local authorities and small businesses. The European NextGenerationEU recovery plan provides for EUR 750 billion to be borrowed from the capital markets to be distributed as loans and subsidies to Member States from 2021 to 2023[8]. This plan still needs to be ratified by eight Member States at the time of writing this Note de conjoncture.

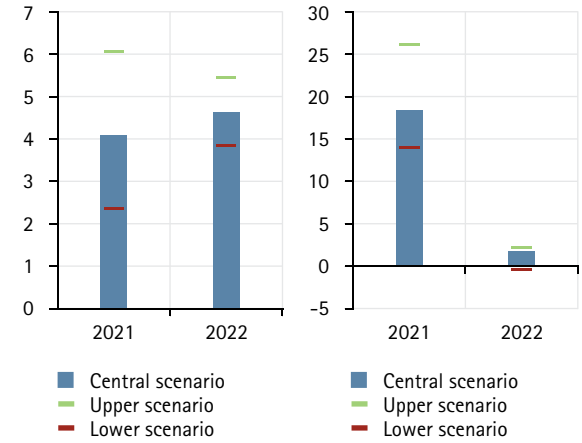
Central banks provide financial support to governments and companies through massive monthly purchases of private and public securities (to contain the increase in risk premiums). The assets of the US, European and Japanese central banks increased by 71%, 62% and 14%, respectively, between January 2020 and April 2021[9]. In the eurozone, the ECB's programme for emergency pandemic purchases launched in March 2020 was extended to March 2022 and the budget was increased by EUR 500 billion (to EUR 1,850 billion). To limit the rise in sovereign rates in 2021, the pace of purchases is expected to pick up in the 2nd quarter. This unprecedented programme is reinforced by the quantitative easing programme put in place before the crisis, which continues at a rate of EUR 20 billion per month, and with the targeted longer-term refinancing operations (TLTRO III), which encourage banks to lend to companies and households thanks to favourable financing conditions from the ECB. The conditions set for the 3rd wave of the TLTRO were recalibrated at the end of 2020: they were extended by one year until June 2022 and the amounts were increased from 50% to 55% of eligible loans outstanding.

[7] Source: Congressional Budget Office. The "American Jobs Plan" (USD 1,800 billion) and "American Families Plan" (USD 1,000 billion in spending and USD 800 billion in tax cuts over 10 years) programmes decided in March and April 2021 are not included here.

[8] All EU support measures are explained in the box on the last page of study 7.1.

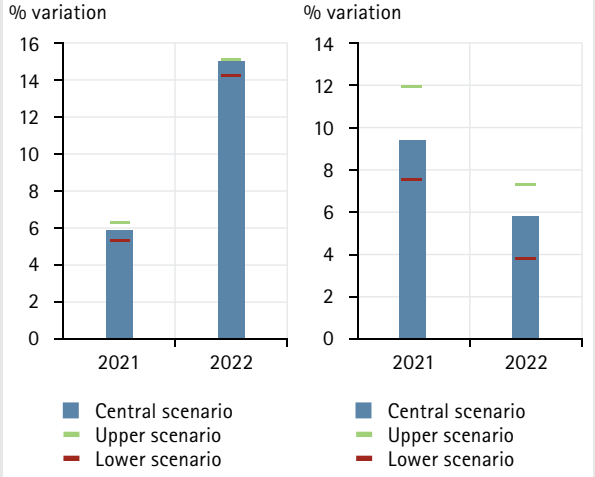
[9] At the beginning of 2021, the FED more or less normalised its lending facilities and buy-back operations thanks to better market conditions (which could also affect key rates), while the eurozone and Japan extended and strengthened their emergency measures. In particular, the Bank of Japan extended its additional purchases of corporate debt securities and its special zero-interest lending arrangements (until September 2021) by 6 months and introduced a loan promotion programme and new fixed-rate purchases in March 2021.

Graph 1.7
Forecasts of main exogenous variables



Source: Oxford Economics

Graph 1.8
Growth forecasts for foreign demand



Source: Oxford Economics

Growth forecast of more than 4% per year in the eurozone in 2021 and 2022, dependent on advances in vaccination

According to the assumptions used by STATEC for this forecast exercise, based on forecasts prepared by Oxford Economics, the eurozone GDP is expected to grow by 4.1% this year, then accelerate to 4.8% in 2022[10]. This trajectory differs slightly from those recently forecast by the IMF[11] (+4.4% in 2021, then a downturn to 3.8% in 2022) and the European Commission[12] (+4.3% in 2021, +4.4% in 2022). However, these differences appear marginal with regard to the uncertainty factors mentioned at the beginning of the chapter.

This uncertainty arises here from the joint development of two alternative scenarios to this central forecast, one more favourable (upper scenario) and the other more unfavourable (lower scenario). The major difference in these two alternative scenarios relates to the course of the vaccine campaign and its implications on the macroeconomic environment (the assumptions for these two scenarios are described in more detail in table 1.2). Depending on the scenario adopted, the eurozone GDP could increase from 2.5% to 6% this year and from 4% to 5.5% in 2022.

The uncertainty is therefore much higher for 2021 than for 2022. This can be seen in particular in the significant differences between the alternative scenarios for the current year concerning stock market developments (formalised here by that of the Euro Stoxx 50 index, see graph 1.7). There is also a significant difference, from the point of view of uncertainty, between forecasts for the foreign demand for goods (with a relatively wide range in both 2021 and 2022) and that for services (much tighter, see graph 1.8).

Moderate upward pressure on inflation and interest rates until 2022

Price pressures are expected to increase but remain limited, with GDP prices in the eurozone rising by 1.2% in 2021 and 1.9% in 2022. However, these pressures would be much stronger in the case of the favourable scenario, with inflation approaching 3% (primarily due to an increased oil price of USD 6/barrel than in the central scenario, but also stronger underlying pressures).

[10] It should also be noted that the fall in the eurozone GDP in 2020 was less significant than expected: -6.8%, compared with -7.5% in the previous Note de conjoncture (3 December 2020) and -7.3% in the medium-term projections (1 March 2021).

[11] World Economic Outlook (6 April 2021).

[12] Spring 2021 forecasts (12 May 2021).

Table 1.2
International assumptions

			Central scenario		Upper scenario[1]		Lower scenario[2]	
	1995-2020	2020	2021	2022	2021	2022	2021	2022
			% change unless otherwise specified					
Real eurozone GDP	1.2	-6.8	4.1	4.8	6.1	5.5	2.4	3.9
Global demand (goods, vol.)	4.1	-6.7	9.4	5.8	12.0	7.4	7.6	3.9
Global demand (services, vol.)	3.3	-18.7	5.9	15.0	6.4	15.2	5.4	14.3
European Euro Stoxx 50 stock market index	3.5	-4.7	18.4	1.7	26.3	2.4	14.2	-0.6
Eurozone GDP price	1.5	1.5	1.2	1.9	1.1	2.8	1.1	1.1
Oil prices (USD/barrel)	54.6	41.8	62.3	60.2	64.7	66.5	60.1	54.9
Exchange rate (EUR/USD)	1.20	1.14	1.18	1.18	1.18	1.18	1.17	1.18
Greater Region unemployment rate (% of the act. pop)	8.7	7.1	7.7	8.0	7.3	7.3	7.9	8.6
Short-term interest rate (EUR)	2.2	-0.4	-0.5	-0.4	-0.5	-0.4	-0.5	-0.4
Long-term interest rate (EUR)	3.7	0.1	0.1	0.5	0.2	0.7	0.1	0.4

Source: Oxford Economics (2021-2022: forecast)
[1] In the upper scenario, the global success of the vaccination campaign facilitates faster easing of social distancing restrictions and a rapid return to full economic production capacity. Confidence is increased for investors, businesses and households. The result is a more robust global recovery in the short term..
[2] In the lower scenario, social distancing measures are relaxed at a more gradual pace in 2021 while the deployment of mass vaccination programmes is progressing slowly. Global economic recovery in 2021 is slowing and stock markets are declining.

In all cases, short-term interest rates would remain very low and negative (-0.5% in 2021, -0.4% in 2022). On the other hand, long-term rates – which are an important parameter for Member State financing – are expected to rise significantly, especially in the case of the higher scenario (also reflecting the higher inflation outlook).

The euro to dollar exchange rate would barely differ depending on the different scenarios (see table 1.2). The assumption used, 1.18 dollars for 1 euro, is, however, slightly lower than the rate observed since the beginning of May (it has risen slightly above USD 1.20).

The unemployment rate in the Greater Region is expected to rise, unless...

The evolution of unemployment in the Greater Region is a determining parameter in the forecasts of labour market variables in Luxembourg because it reflects the pressures exerted by the frontier workforce and its development potential in Luxembourg in a certain way.

Unemployment in the Greater Region is expected to continue to rise this year (to 7.7% of its active population, following 7.1% in 2020) and next year (to 8%). While unemployment in Luxembourg is expected to more or less stabilise over the forecast horizon (6.3% in 2020, 6.4% in 2021 and 6.3% in 2022 according to the central scenario, see chapter 4), stabilisation would only be observed for the Greater Region if the favourable scenario were achieved.

Economic activity 2

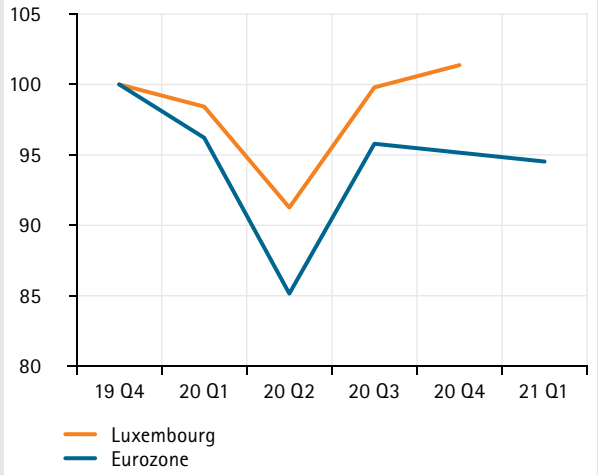
Following a sharp decline in the 1st half of 2020, economic activity in Luxembourg rebounded well in the second half of the year. And for 2020 as a whole, the recession is much less pronounced there than in other eurozone countries.

The economic indicators available in the 1st quarter of 2021 are generally quite positive, with the notable exception of those of the hotel, restaurant and catering sector (HORECA). And by the start of spring, the results of business and consumer surveys had recovered significantly for non-financial services and consumers. This phenomenon, also observed throughout the eurozone, probably owes much to the progress in vaccination. This will make it possible to relax restrictions on activity and free up some consumption.

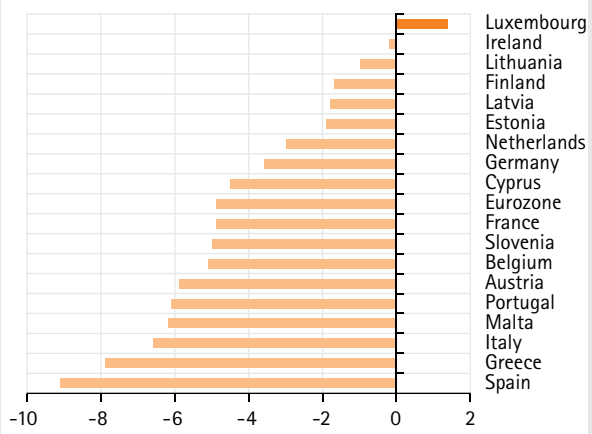
For 2021, STATEC expects real GDP growth in Luxembourg of 6%, then +3.5% in 2022. Over these two years, the market sector should regain momentum in terms of activity and investment, gradually taking over from public spending, which was largely used in 2020.

Graphs 2.1
Activity in Luxembourg has already recovered to its pre-crisis level

Real GDP, Luxembourg vs eurozone



Annual GDP variation in the 4th quarter of 2020



Sources: Eurostat, STATEC

An increase in the GDP in the 4th quarter of 2020...

As in all European countries, activity in Luxembourg had reduced significantly in the first half of 2020. Then the easing of restrictions in the run-up to summer, enabled in particular by relatively low levels of coronavirus-related infections and hospitalisations, led to a strong rebound in the GDP in the 3rd quarter.

In the 4th quarter of 2020, Luxembourg's real gross domestic product (GDP) grew by 1.6% over one quarter[1] (+1.4% in one year). This increase stands out from the trend observed throughout the eurozone over the same period (-0.7% over one quarter), even though some Member States also recorded a positive result. At the end of 2020, growth was predominantly driven by information and communication services (+10.5%) and financial activities (+4%), which widened the gap with the eurozone. These changes are reflected in exports of financial and non-financial services (+4.6%, after a fall of 0.3% in the 3rd quarter). On the domestic demand side, following a very strong rebound in the 3rd quarter, household consumption and investment, on the other hand, contracted (by -2% and -12%, respectively, over one quarter), without reflecting any worrying elements from an economic point of view[2].

Luxembourg's GDP had already almost reached its pre-crisis level (that of the 4th quarter of 2019) in the 3rd quarter of 2020 and it significantly exceeded this in the following quarter. It is the only country in the eurozone in such a case.

... and a reduction limited to 1.3% for the entire year

With this 4th quarter result, 2020 as a whole ended in the first estimate with a reduction in the GDP of 1.3%. This is the biggest decline since the 2008-2009 crisis, but in the very particular context of COVID-19, this result is a good one[3]. In the eurozone as a whole, the GDP shrank by around 7% over the same period, and Luxembourg is clearly visible among the countries least affected by this crisis.

1 First estimate (15 March 2021).

2 Private consumption suffered, in particular, from the fact that restaurants closed from late November to early April and that shops deemed non-essential had to close their doors from 26 December (until 10 January). Much of the fall in capital expenditure is due to smaller acquisitions of aircraft and satellites.

3 Like most forecasting institutes, STATEC expected its forecasts to fall much more sharply throughout 2020.

Table 2.1
Value added by sector in 2020 – Evolution and contributions

Nace code	Sector name	2020 variation	Contribution to the evolution of total value added in 2020
		In %	In % points
TOTAL	Total	**-0.7**	**-0.7**
A	Agriculture, forestry and fishing	0.2	0.0
B-E	Industry	-6.4	-0.5
F	Construction	-2.9	-0.2
G-I	Trade, transport, accommodation and catering activities	-9.6	-1.4
G	Trade; repair of cars and motorcycles	-9.4	-0.8
H	Transport and warehousing	-2.1	-0.1
I	Accommodation and catering	-30.7	-0.5
J	Information and communication	17.0	1.8
K	Financial and insurance activities	-1.9	-0.5
L	Real estate activities	2.2	0.2
M_N	Business services and leasing	-2.1	-0.3
M	Specialised, scientific and technical activities	-1.8	-0.1
N	Administrative services and support activities	-2.8	-0.1
O-Q	Public administration, defence, education and health	4.5	0.7
O	Public administration	5.7	0.4
P	Education	4.4	0.2
Q	Human health and social action	3.4	0.2
R-U	Other services	-0.3	0.0

Source: STATEC

This high resilience of the Grand Ducal economy compared to other European countries is primarily linked to the following factors: marked growth in the value added by information and communication services and, to a much lesser extent, business services and predominantly non-market activities[4], as well as a limited decline in transport services (mainly due to the good performance of air freight, see below). A lower negative contribution from industry must be added to this[5].

Information and communication services, with a 17% increase in value added in 2020 (after approximately +10% in 2019), make a remarkable contribution of around 2 percentage points to GDP growth in 2020. Digitisation players have undoubtedly benefited from opportunities, in particular through the development of teleworking and online purchasing. Moreover, at European level, it is one of the only sectors where value added has not reduced (+0.1% in 2020, after +5% in 2019). However, we must remain cautious with regard to Luxembourg's performance for this sector, as it is still based on estimates and must be consolidated by statistical elements that are not yet available.

More broadly, the national accounts data will be subject to a major revision next autumn and will certainly provide a different, but also more faithful, picture of Luxembourg's performance in the context of this crisis (and in previous years). However, other statistical elements that will not or will marginally be subject to significant revisions (turnover or hours worked, for example) also indicate that the Grand Ducal economy has held up well in the past year compared to that of other eurozone countries.

Domestic demand affected, exports stand firm

The development in private consumption is relatively similar between Luxembourg and other eurozone countries in 2020. In its form, with a sharp fall in the first half of the year (particularly in the 2nd quarter), then a marked rebound in the 3rd quarter and a slight decline in the 4th quarter. In scope, with a fall of 7% in volume in 2020 in Luxembourg and of 8% in the eurozone.

[4] Administration, education, health and social action.

[5] Industry accounts for 7% of total value added in Luxembourg, compared with almost 20% in the eurozone (2019 data).

Table 2.2
GDP and demand components

	Year					Quarter			
	2016	2017	2018	2019	2020	20 Q1	20 Q2	20 Q3	20 Q4
	Annual variation in %								
Final household consumption expenditure	3.4	2.2	3.3	2.8	-6.9	-3.1	-19.7	-0.9	-3.4
Final pub. admin. consumption expenditure	1.0	4.7	4.1	4.8	6.9	5.6	8.0	7.1	7.1
Gross fixed capital formation	4.6	5.6	-5.9	3.9	-8.8	-11.9	-20.4	9.2	-9.6
Exports of goods and services	2.6	0.7	0.5	0.8	2.5	3.2	-1.7	1.4	6.7
Exports of goods	0.0	0.5	-1.2	-0.9	-10.8	-8.5	-25.7	-5.1	-3.2
Exports of services	3.8	1.4	0.3	1.8	6.9	6.9	5.3	3.8	11.1
Exports of financial services	-0.2	-2.8	1.6	-2.7	0.2	0.9	-0.2	-1.2	1.4
Exports of non-financial services	9.0	6.5	-1.0	6.9	13.7	14.0	11.2	8.9	19.6
Imports of goods and services	1.6	0.6	-0.3	0.9	2.1	1.8	-2.7	3.0	6.2
Imports of goods	1.4	1.6	-0.4	1.8	-9.1	-8.0	-21.2	-0.5	-6.5
Imports of services	2.3	1.4	-0.5	1.7	6.2	6.0	3.2	4.6	10.6
Imports of financial services	-1.7	-5.5	0.5	-4.1	1.8	-1.6	1.5	1.7	5.8
Imports of non-financial services	5.3	6.3	-1.2	5.3	8.7	11.0	4.2	6.2	12.9
GDP	**4.6**	**1.8**	**3.1**	**2.3**	**-1.3**	**1.3**	**-7.7**	**0.0**	**1.3**

Source: STATEC (volume data)

And in its composition, with marked decreases for vehicle purchases, fuel, travel and catering expenses, all areas for which we can make the link with measures restricting mobility and physical distancing. On the other hand, public consumption expenditure increased in the majority of Member States last year, with the notable exception of France.

Investment also suffered in 2020, with another very similar decline between Luxembourg and the eurozone (of around 10%). In the Grand Duchy, it is mainly the lower expenditure on software development, road vehicles and construction that is the cause.

Where Luxembourg stood out in particular in 2020 was in the good performance of its exports: +2.5% in volume, against a reduction of almost 10% in the eurozone. This performance is exclusively due to the increase in exports of non-financial services[6], supported in particular by data banking and data processing services[7], air freight transport and market research.

No alarming signals for activity in the 1st half of 2021

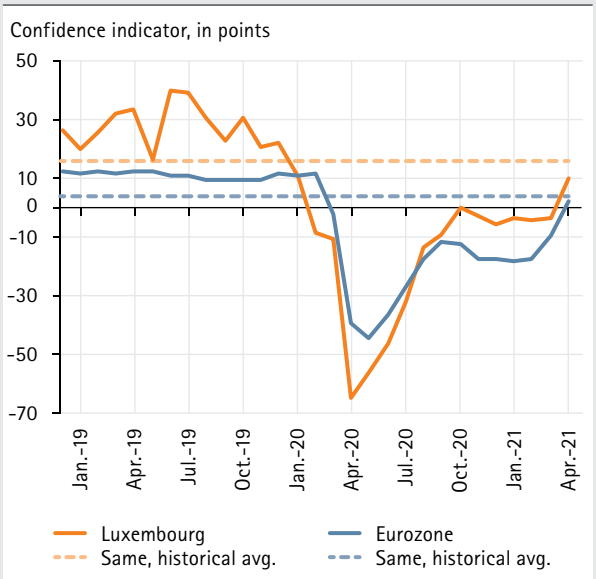
While the eurozone GDP fell by 0.6% over one quarter in the 1st quarter of 2021, this does not mean that Luxembourg's GDP is heading in the same direction (an initial estimate will be available on 31 May). Indeed, the Luxembourg economic indicators available in the first months of the current year are generally rather positive, with the notable exception of the HORECA sector. They do not send any alarming signals. The financial environment continues to benefit from the dynamic evolution of stock market indices in the first half of the year, which should support the results of the Luxembourg financial sector.

Moreover, at the start of the 2nd quarter, the morale of non-financial service companies increased significantly in Luxembourg and the eurozone. It was relatively stable in the previous months, where it was primarily the industrial sector that sent out the most positive signals.

[6] Exports of goods fell by 10% in 2020, while exports of financial services stagnated overall compared to the previous year.

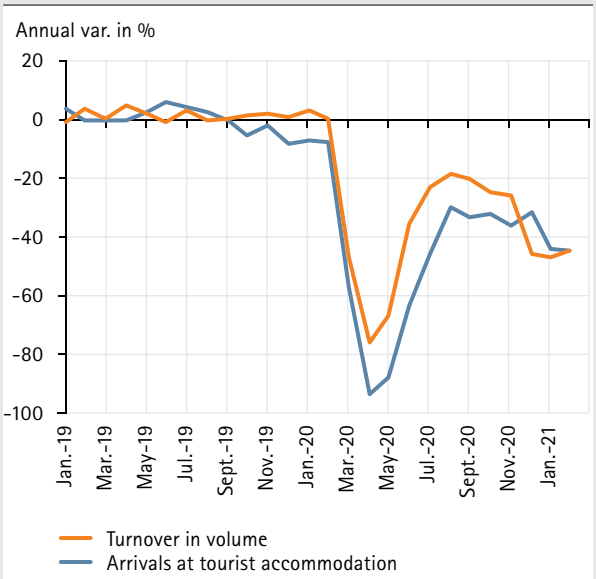
[7] These are in line with the strong increase in the value added by information and communication services. In this regard, it should also be borne in mind that they are likely to undergo significant revisions in future annual national accounts campaigns.

Graph 2.2
Confidence rebound in non-financial services in two stages



Sources: Eurostat, STATEC

Graph 2.3
Relapse of activity in HORECA



Source: STATEC (last update: February 2021)

There's light on the horizon for services

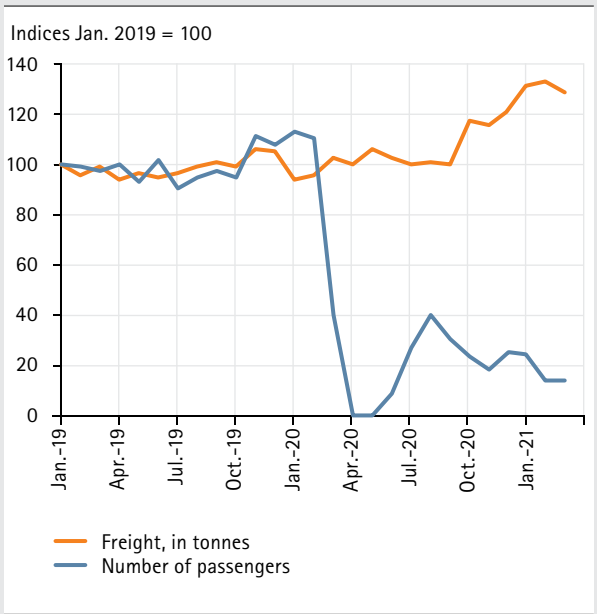
Confidence in non-financial service companies improved significantly in the 3rd quarter of 2020. The further deterioration of the health situation at the turn of 2020 and 2021 and the subsequent tightening of restrictions had interrupted this movement. Whether in the eurozone or in Luxembourg, morale in services stagnated below pre-crisis levels and its long-term average. At the beginning of spring, the views of entrepreneurs significantly improved (since March in the eurozone, since April in Luxembourg), particularly regarding the short-term business outlook. The acceleration of vaccination campaigns, which suggests less severe restrictions in the second half of 2021, is bound to have something to do with it.

There is also certainly a phenomenon of adapting companies to the constraints associated with the pandemic. In Luxembourg, the share of non-financial service companies estimating that COVID-19 weighs on their activity is gradually decreasing: around 70% in March-April 2021 – which is still a lot – whereas it was over 90% a year earlier. This reduced pressure from the effects of the pandemic is particularly evident in business services (particularly for head office activities and the management board, architecture, engineering, technical control and analysis). In HORECA, however, this share remains anchored to 100% of respondents.

HORECA: returning to normal will take time

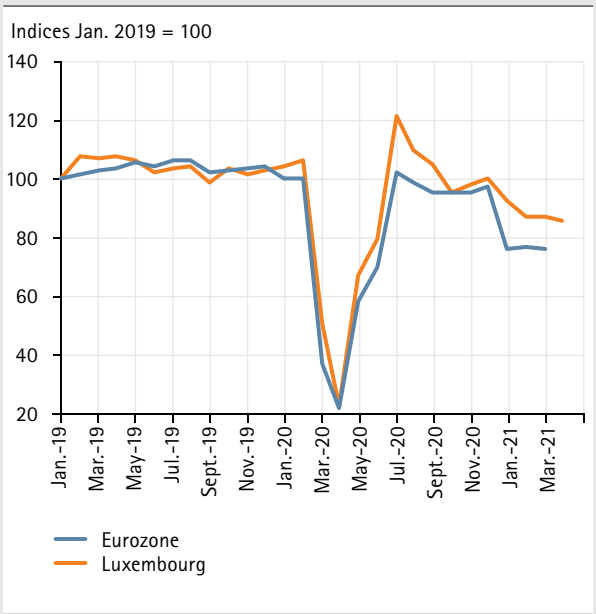
Throughout 2020, HORECA activity fell by around one third (in terms of value added). The accommodation sector - hotels, hostels, campsites – saw its turnover in volume fall by around 45% (compared with a fall of around 30% for restaurants, which were also severely affected by the consequences of the health crisis). There has been an equivalent decrease in the number of arrivals and overnight stays in accommodation establishments in Luxembourg over the past year, and this trend continues over the first two months of 2021 (-45% for arrivals over one year, -36% for overnight stays).

Graph 2.4
Findel traffic remains strong for freight



Sources: ANA, STATEC (seasonally adjusted data)

Graph 2.5
Passenger car registrations fall again



Sources: SNCT, ACEA (seasonally adjusted data)

At the end of the 1st half of 2020, the decline in tourist numbers was almost identical in Luxembourg and throughout the eurozone. But Luxembourg's results have been better since the summer, boosted in particular by the government's accommodation vouchers[8].

Bars and restaurants had to close to the public from 26 November 2020 to 6 April 2021 (only takeaway continued). From December to February, the fall in activity was around 40% in one year[9] for restaurants, i.e. much lower than that recorded in April-May 2020 (approximately -75% in one year), probably revealing a better adaptation than during the 1st confinement (where the closure conditions were identical). The establishments have been gradually reopening since April[10], but working conditions will remain difficult (gauges to be respected, etc.). In the area of accommodation too, reduced international travel will have a lengthy impact on visitor numbers.

Transport supported by air freight

This reduction in international mobility is being felt at Luxembourg airport, where passenger traffic remains low in the 1st quarter of 2021. It fell by around 70% in 2020, a proportion almost similar to that recorded in our neighbouring countries. In terms of freight, however, the positive trend recorded last year (+6%, compared with falls of 3% in Germany and 10% in France) continued in the first months of 2021. This good performance of air freight contributed significantly to that of the value added by transport last year (with a reduction limited to 2% in volume, while it exceeded 10% in most European countries).

As regards land transport, Luxembourg's results for 2020 roughly follow those of neighbouring countries: -15% freight and -40% passengers for rail, -40% for road freight. Lastly, for warehousing and ancillary transport services, Luxembourg also stood out favourably last year, with a 3% increase in turnover (compared with a reduction of more than 10% in the eurozone).

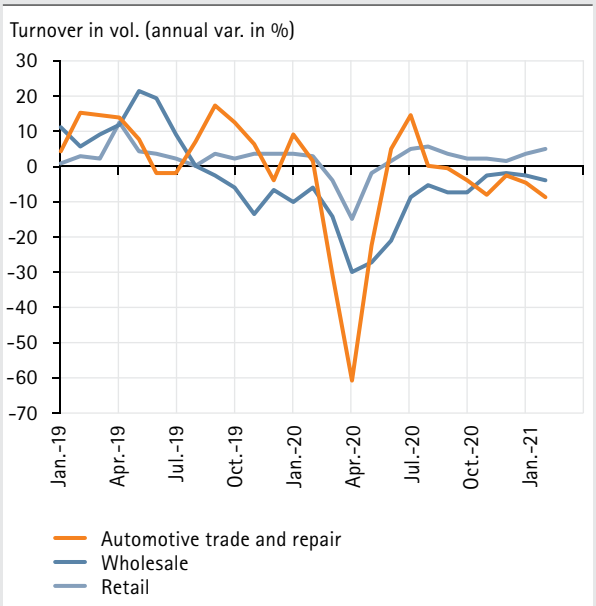
Reduced mobility, probably associated with a slowdown in significant household spending, also weighed on car registrations.

[8] According to a tally carried out in March 2021, almost 110,000 vouchers had been used (out of the 700,000 distributed), which represents just over 10% of the number of overnight stays recorded since their introduction. The expiry date for using the vouchers has been extended until 15 September 2021.

[9] In terms of turnover in volume.

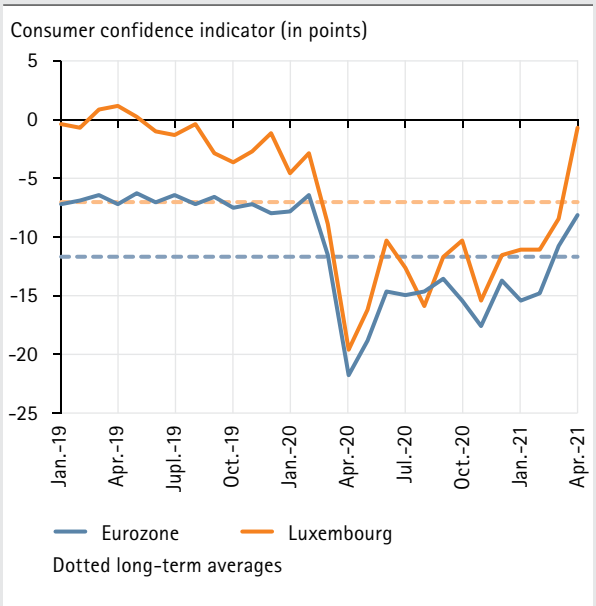
[10] Partial reopening of terraces since 7 April, reopening of indoor bars and restaurants from 16 May (and closing at 10 pm compared to the previous 6 pm).

Graph 2.6
Good retail performance



Sources: Record Administration, STATEC

Graph 2.7
A "vaccination" effect on consumer morale?



Sources: BCL, European Commission

These fell by almost 20% in Luxembourg in 2020 (compared with -25% in the eurozone). In March 2021, sales of cars increased by around 80% year-on-year in Luxembourg and 95% across the eurozone. These results would be impressive in normal circumstances, but they are due to the extreme deficiency in registrations in March 2020. These two- or even three-digit[11] growth rates should therefore continue for at least the entire 2nd quarter of 2021. In the 1st quarter of 2021, however, registrations are still well below their pre-crisis levels, but also below the results of the 2nd half of 2020 (see graph 2.5).

Trade: good results for retail sales (excluding fuel)

Despite this, turnover in terms of volume of automotive trade tends to recover at the beginning of 2021 (approximately +3% compared to the 4th quarter of 2020). For wholesale trade, turnover in volume also rebounded well after the 1st confinement, but it has tended to stabilise since last summer. In the first two months of 2021, it remained around 3% below its pre-crisis level.

Retail sales are the most dynamic. Their volume has more or less stagnated over the whole of 2020, but with strong differences between the different types of brands. One big winner being generalist food-focused stores (+7.5% in 2020), which were spared by the opening bans and which undoubtedly benefited from positive spillovers linked to the closure of restaurants and the increase in teleworking. And a major loser being fuel flows (-11% in volume[12] in 2020), which suffered from the reduced geographical mobility. In the first two months of the current year, retail sales in volume terms increased by around 1% year-on-year (+6% excluding brands specialising in the sale of fuels).

The sharp recovery in consumer confidence in March and April 2021, primarily due to better prospects for the general economic situation, the personal financial situation and the intentions to purchase capital goods, is a good sign for household consumption and the trade sector in the 2nd quarter.

[11] In Luxembourg, there was a 260% year-on-year increase in April 2021.

[12] Fuel sales fell by around 20% in 2020, but tobacco sales (of which service stations are a major debtor) increased.

Table 2.3
Information and communication services – Turnover in value

Nace code	Name	2020	Jan.-21	Feb.-21
		Annual change in %		
J	**Information and communication**	**27.8.**	**42.9**	**40.2**
J58	Edition	-4.3	-3.3	4.7
J59	Production of film, video and television programmes; sound recording and music publishing	-34.1	-35.3	-26.3
J60	Programming and broadcasting	-4.1	2.4	-4.8
J61	Telecommunications	-2.5	1.5	-0.5
J62	Programming, consulting and other IT activities	1.9	4.2	1.6
J63	Information services	37.9	54.6	52.5

Sources: Record Administration, STATEC

Table 2.4
Business services – Turnover in value

Nace code	Name	2020	Jan.-21	Feb.-21
		Annual change in %		
M	**Specialised, scientific and technical activities**	**1.0**	**-3.8**	**1.6**
M69_702	Legal, accounting, management consulting activities	1.3	-3.8	2.1
M71	Architecture, engineering, control and analyses	2.5	-2.5	-1.5
M73	Advertising and market research	-11.4	3.3	2.6
M74	Other activities	1.6	-14.2	3.6
N	**Administrative services and support activities**	**-15.1**	**-8.1**	**-8.8**
N78	Employment-related activities	-19.8	4.0	-0.6
N79	Travel agencies, tour operators	-72.7	-91.0	-90.7
N80	Investigations and security	4.9	5.1	3.9
N81	Building services and landscaping	-1.2	6.7	11.4
N82	Administrative and other activities	-5.5	4.7	-1.6

Sources: Record Administration, STATEC

Information and communication: very good results, but isolated phenomena

In early 2021, revenue from information and communication services remained very strong, up by around 40% in value in one year. These are, predominantly, several isolated information service companies, active in data processing and hosting in particular, that contribute to this result (and to the very good value added figures for this sector). It is also in this category that employment growth was strongest in 2020 (approximately +10%, almost at the same pace as in the previous two years). For all information and communication services, however, employment slowed last year (to +2.8%, compared with +3.6% in 2019), with job cuts in audiovisual production and programming and broadcasting.

Business services: limited damage compared to the European trend

Throughout 2020, the value added by services in Luxembourg fell by 2%, a relatively good result compared to the 9% reduction recorded in the eurozone over the same period. More detailed turnover data (only available until September 2020 for the eurozone) allows for a refined comparison.

In particular, they reveal much greater resilience in Luxembourg for legal, accounting and management consulting activities[13] (+3% in Luxembourg, compared with -5% in the eurozone[14]), architecture and engineering activities (+3%, compared with -3% in the eurozone) and investigation and security services (+4%, compared with -2% in the eurozone). However, the addition was heavier for employment-related activities[15] (-23%, compared with -19% in the eurozone) and tour operators[16] (-68%, compared with -57% in the eurozone).

In the beginning of 2021, business services turnover tends to roughly reach the levels they had a year before the crisis emerged (except for tour operators who are still very far from it). The increase in confidence in non-financial services at the beginning of the spring calls for continued improvement.

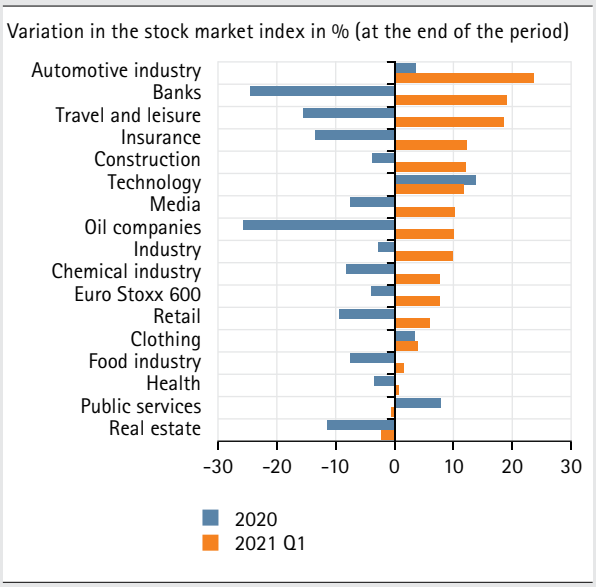
[13] For these activities, the period of the 1st confinement (March-April 2020) even appears to have generated an increase in activity in Luxembourg (+11% year-on-year, compared with a reduction of 10% in the eurozone).

[14] Annual variation in value recorded over the first nine months of the year.

[15] These include, in particular, temporary employment agencies and recruitment agencies. The reduction was much more pronounced during the 1st confinement in Luxembourg than in the eurozone, certainly linked to the closure of construction sites (this was not the case in other European countries), which had a strong impact on the needs for temporary workers.

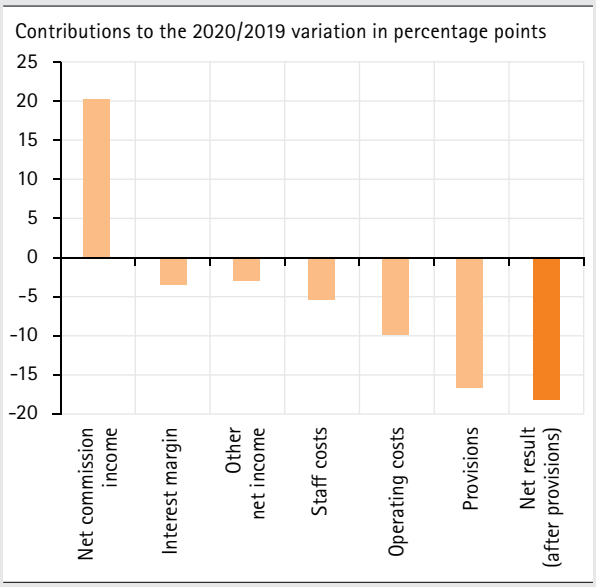
[16] Travel agencies, tour operators, booking services and related activities.

Graph 2.8
Sharp rise in valuations in the sectors most affected by the crisis



Source: Macrobond

Graph 2.9
Bank results driven down by provisions but supported by commissions



Source: CSSF (December 2020)

Recovery outlook lifts stock market valuations

European stock market indices resumed an upward trend from November 2020 with the finalisation of the first vaccines against the virus – pointing to gradual deconfinement and a rise in corporate profits in 2021 – and the intensification of monetary and budgetary policies. The indices were boosted by the rebound in banking share prices, which were negatively affected in 2020 by the rise in risks to be covered and the ban on the distribution of dividends, and by companies in the automotive, travel and leisure and construction industries. Following the surge in stock markets at the beginning of the year[17], the indices stabilised in April. With valuations at record highs for certain sectors, such as technology, investors have become more alert to bad news and the expectations of rising inflation, and have also sold stocks to crystallise profits at the start of the year.

The financial sector adapts to default risks and market volatility

In 2020, the value added of the financial sector in Luxembourg fell slightly (-1.9%), due to the losses recorded on life insurance activities and banks' interest margins. On the other hand, the activities of investment funds and financial and insurance auxiliaries recovered well in the 2nd half of 2020, driven by the recovery on the stock markets following the crash and the first confinement, which had heavily affected these activities (+3.3% GVA in one year for auxiliary activities, +0.7% in volume).

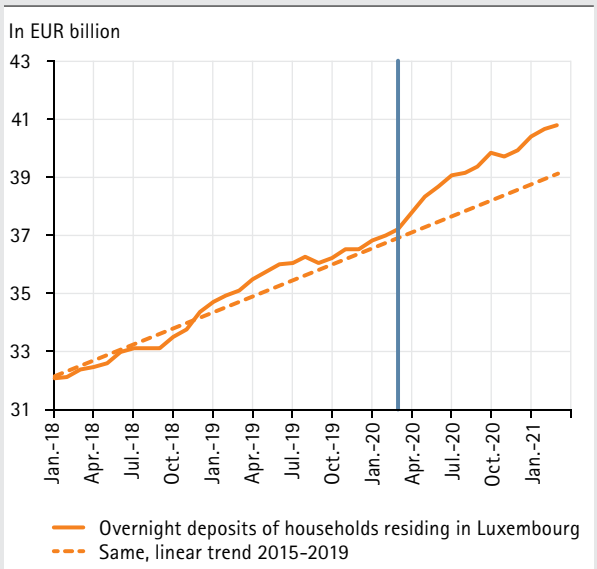
Banks benefited from stock market volatility thanks to commissions received on numerous financial transactions, but they had to increase provisions to cover default risks on corporate loans and received less interest[18] (see graph 2.9). The banking sector's result consequently fell by 18% between 2019 and 2020 (-1% excluding provisions). Provisions are not included in the calculation of value added, which fell by only 1.6% year-on-year in 2020. Banks should be able to improve their results in 2021 by reducing their provisions and benefiting from the good momentum of the stock markets[19], but they would remain constrained by low interest margins and corporate default risks.

[17] The Euro Stoxx 50 and 600 indices returned to their pre-crisis levels in March 2021, one year after the stock market crash at the start of the epidemic in Europe (-38% for the Euro Stoxx 50 index between mid-February and mid-March 2020).

[18] In particular, banks granted almost 18,000 moratoria until June 2020, allowing for up to 6 months of deferral on credit repayments. At the end of April 2021, 1,700 moratoria were still ongoing.

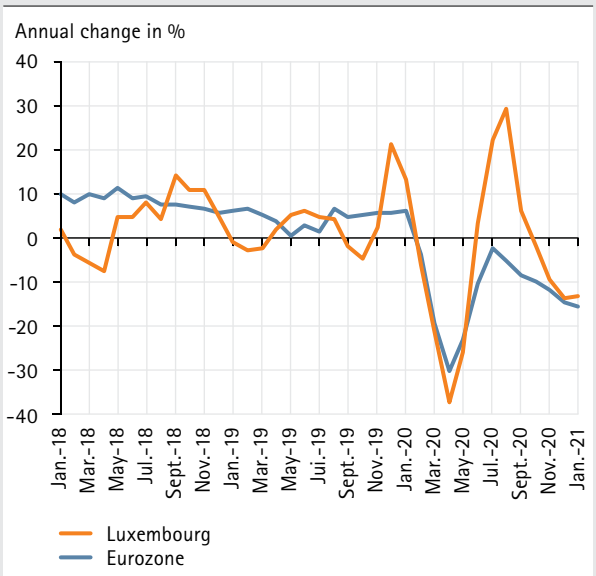
[19] Publications of the results from the 1st quarter by major European banks (UniCredit, Société Générale, BNP Paribas, Deutsche Bank) reported very good results in market, financing and investment activities and lower provisions to cover the risk.

Graph 2.10
More savings in household deposits



Source: BCL

Graph 2.11
Decline in new consumer loans at the beginning of the year



Sources: BCL, ECB (moving average centred on 3 months)

Life insurance activities suffered more from the concerns of savers who tended to adopt a wait-and-see stance on new investments and redemptions in the face of stock market volatility and low interest rates (-16% premiums between 2019 and 2020). In 2020, the value added of insurance activities finally fell by the same order of magnitude as that of the premiums collected, with -12% in volume over one year, i.e. the greatest annual reduction ever observed[20].

Investment funds quickly digested the stock market crash, recovering their pre-crisis assets in August 2020, i.e. almost EUR 4,700 billion[21]. Assets under management grew by 5.4% in 2020 and by 5.5% between the end of 2020 and March 2021. Luxembourg thus maintained its leading position in Europe with a 27% market share and recorded, in particular, the highest net issuance in March 2021 (+EUR 47 billion compared with less than EUR 10 billion in other European countries).

Savings accumulate and loans decline

With health restrictions on activities and consumption, many households have accumulated "forced" savings that they have invested in various forms. By comparing the overnight deposits outstanding of resident households observed with the pre-crisis trend (estimated on data from 2015 to 2019), a savings surplus is estimated at EUR 1.4 billion at the end of 2020 and EUR 1.7 billion in March 2021 (see graph 2.10)[22]. Households have also invested part of their savings in equities (EUR 0.6 billion of transactions in 2020) and investment funds (EUR 1.3 billion)[23].

With the extension of health measures in early 2021, savings continued to accumulate in deposits (+10% year-on-year in January), while consumer loans continued to decrease (-23% year-on-year on new contracts in January 2021, -11% in February under the effect of a less buoyant automotive festival than in previous years). These loans had fallen by 4.4% between 2019 and 2020. According to the bank lending survey of the 1st quarter of 2021, uncertainties linked to the health crisis and limited intentions to purchase durable goods have further dampened the demand for loans from households, but also from companies that are delaying their investments[24]. Outstanding loans to companies active in Luxembourg increased substantially in the 2nd quarter of 2020 for immediate liquidity requirements (+9.2%), then fell over the course of the year, before recovering in the 1st quarter of 2021 (+2% between December 2020 and March 2021).

[20] Since this data was compiled in 1995.

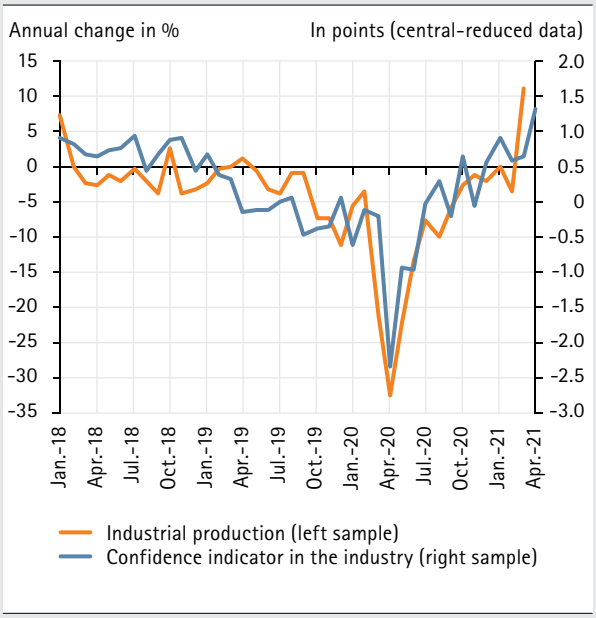
[21] The EUR 5,000 billion asset mark was crossed in January 2021.

[22] Overnight deposits increased by EUR 3.4 billion between the end of 2019 and the end of 2020, compared with an average increase of EUR 2.2 billion per year since 2015 (+EUR 1.3 billion difference).

[23] Financial accounts by institutional sector (transactions). Data available here: https://www.bcl.lu/en/statistics/series_statistiques_luxembourg/05_real_economy/05_09_Table.xlsx

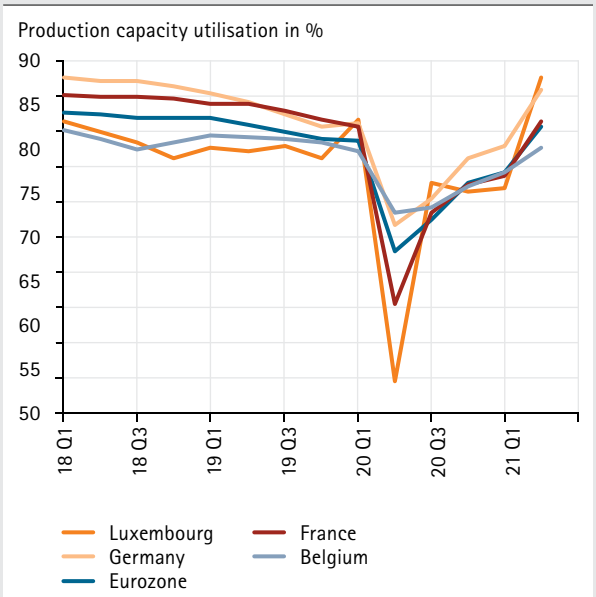
[24] Economic uncertainties also lead banks to tighten their lending criteria on loans to companies and households, but conditions remain accommodating and companies still have the possibility to request government-guaranteed loans until the end of 2021.

Graph 2.12
Rebound in industrial production and confidence



Source: STATEC

Graph 2.13
More use of industrial production capacity in 2021



Sources: Eurostat, STATEC

Industry: recovery in production, but signs of pressure

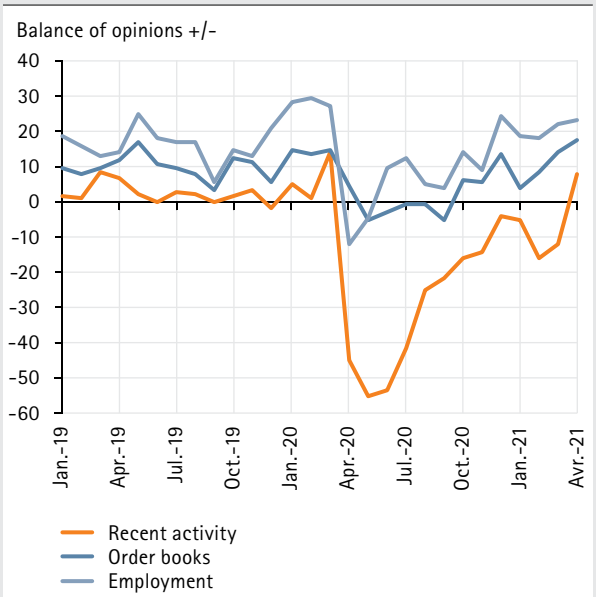
In 2020, the decline in industrial production in Luxembourg was comparable to that recorded at eurozone level, of around 10% (the same for the value added by the sector, with a reduction of around 6%). It was mainly during the 2nd quarter that production plummeted, but it then recovered significantly – in line with the rise in industrial morale – again in Luxembourg (see graph 2.12) as in the whole of the eurozone. Over the past year as a whole, the areas of activity that contributed most to the decline in Luxembourg's industrial production were metal products, machinery and equipment, rubber and plastic products and the food industry.

Unlike the Great Recession of 2009, where industrial activity had been permanently affected, it recovered much more quickly from this health crisis (especially once Chinese industries began to operate "normally" again, when their partial shutdown in early 2020 had led to disruptions in global production chains).

In contrast, employment in the sector continued to follow a negative trend in Luxembourg at the end of the 4th quarter of 2020, even though the decline was less significant (-0.3% in one quarter) than in the previous two quarters (-0.8% in each). However, manufacturers are more optimistic about the evolution of their workforce in the April 2021 economic survey and the latter also signals a sharp increase in the use of production capacity, which suggests that industrial employment will recover in the short term.

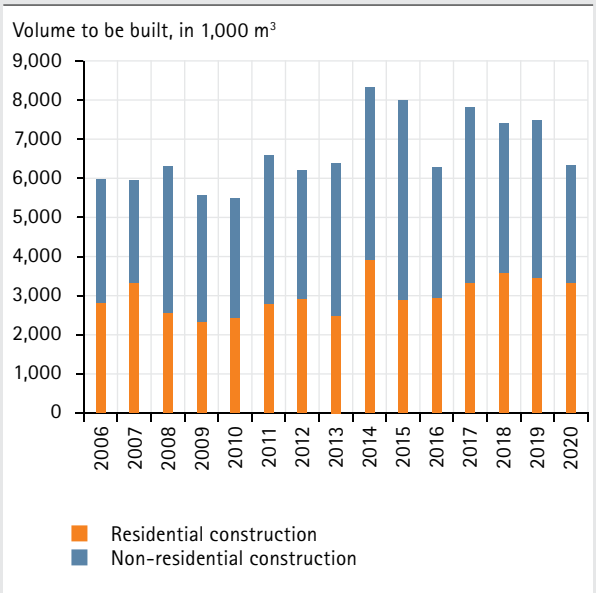
But on the other hand, with the rebound in global demand, there is a shortage phenomenon on certain components and equipment and a rise in the price of raw materials (see chapter 3). This is reflected in the prices of industrial products in Europe, which have been recovering since mid-2020. The phenomenon is somewhat masked in Luxembourg by developments of an isolated nature (prices in the manufacture of textile and plastic and rubber products had experienced a real surge at the beginning of 2020, but then largely fell back). This trend of pressure on Luxembourg producer prices can be seen more clearly in the first months of 2021 (also with a clear rise in expectations in this area in the economic surveys).

Graph 2.14
Positive signals in construction economic surveys



Source: STATEC (seasonally adjusted data)

Graph 2.15
Reductions in building permits in 2020



Source: STATEC

Construction: demand is there, but will supply follow?

Production in the construction sector is also returning to its pre-crisis levels. Not those at the very beginning of 2020, which had been particularly high[25], but those at the end of 2019. The turnaround was even faster than in the industry after the mandatory closing period for construction sites (from 23 March to 20 April 2020), a sign of demand that remained strong. Nevertheless, there is a difference between trades, as the decline recorded for all of 2020 for construction and civil engineering companies (-5.6%) was less pronounced than for those classified in specialised works[26] (-10.2%). It is possible that households have decided to postpone some of these works in the face of uncertainty about their future situation or fear of housing workers, but it is also possible that these specialised works companies have found it more difficult to adapt to health constraints.

Industry confidence declined significantly in April and May 2020, but even then remained above its historical average for the same period. In the first months of 2021, its components (state of the order book and employment prospects) continued to evolve favourably and assessments of recent activity recovered well in April. The volume relating to building permits fell by 15% in 2020, but especially for non-residential construction projects. In the residential sector, the trend is relatively stable, but still insufficient to counter the rise in sales prices, which reached record levels this year[27].

Construction is one of the sectors where employment has increased the most in 2020 (+3.6%, with only a slight downturn compared to +3.8% in 2019), and labour adjustments have mainly been reduced by the use of temporary workers. Recourse to short-time working has been relatively low, but this could change in the short term: many companies in the sector are complaining of supply problems with certain materials at present and are being forced to limit their activity.

[25] Construction activity benefited, in particular, from relatively mild temperatures in January and February 2020.

[26] Roofing, building closure, technical installations and finishing.

[27] House prices increased by 14.5% in 2020 (following 7.1% in 2018 and 10.1% in 2019). There is some evidence that price increases may be less significant this year, see study 7.2 in this Note de conjoncture.

Table 2.5
Main macroeconomic developments

				Baseline	Upper scenario[1]		Lower scenario[2]	
	1995-2020	2020	2021	2022	2021	2022	2021	2022
						% change unless otherwise specified		
Main aggregates								
GDP value (EUR billion)	5.8	64.14	69.26	72.31	70.91	75.08	68.06	70.04
Same, % change	.	1.0	8.0	4.4	10.6	5.9	6.1	2.9
GNI (EUR billion)	4.1	39.97	43.89	45.26	44.71	46.65	43.27	44.12
Same, % change	.	0.4	9.8	3.1	11.8	4.4	8.3	1.9
Potential GDP (vol.)[3]	3.2	2.2	2.7	2.6	2.7	2.6	2.7	2.6
Output gap (% of pot. GDP)[3]	-0.2	-3.5	-0.3	0.5	1.2	3.1	-1.5	-1.7
GDP vol.	3.2	-1.3	6.0	3.5	7.7	4.5	4.8	2.4
Domestic salaried employment	3.2	2.0	2.5	2.5	2.9	3.2	2.2	1.9
Unemployment rate (% of act. pop.)	4.5	6.3	6.4	6.3	6.3	5.7	6.5	6.7
Consumer Price Index (CPI)	1.8	0.8	2.0	1.6	2.0	1.8	1.9	1.6
Sliding wage scale	1.8	2.5	0.2	2.3	0.4	2.1	0.0	2.4
Average wage cost	2.6	-0.7	2.3	4.1	2.9	4.3	1.7	3.8
Greenhouse gas emissions[4]	-1.9	-17.2	2.5	2.6	5.2	4.2	-0.5	0.1
Public finances								
Total revenues	5.9	-1.2	7.7	7.2	9.2	8.5	6.6	5.9
Of which: taxes	6.1	-1.0	7.8	7.2	9.3	8.5	6.6	5.8
Expenses	6.8	14.1	0.1	3.8	0.2	3.5	-0.2	3.9
Public balance (% of GDP)	1.7	-4.1	-0.7	0.7	-0.2	1.9	-1.1	-0.3

Source: STATEC (2021-2022: forecast) [1] In the upper scenario, the global success of the vaccination campaign facilitates faster easing of social distancing restrictions and a rapid return to full economic production capacity. Confidence is increased for investors, businesses and households. The result is a more robust global recovery in the short term. [2] In the lower scenario, social distancing measures are relaxed at a more gradual pace in 2021 while the deployment of mass vaccination programmes is progressing slowly. Global economic recovery in 2021 is slowing and stock markets are declining. [3] Evolution 2000-2019; no difference between different scenarios for potential growth. [4] Evolution 2005-2019; ESD/ESR emissions (excluding ETS).

Growth rebounds as health constraints are lifted

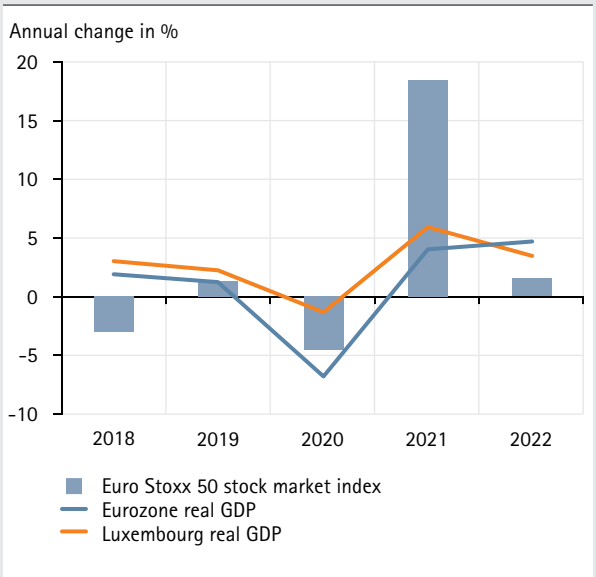
In 2020, activity held up better in Luxembourg than elsewhere and the return to growth appears to also be faster than in other European countries. The first estimate for 2020 gives a carry-over of nearly 4% for 2021, to which one should add positive stock markets and a rebound in European growth expected in the second half of the year. The gradual lifting of health constraints should boost foreign demand in Luxembourg and cement the rebound: +6% in 2021 and +3.5% in 2022. Unlike the partner countries, Luxembourg has already exceeded the pre-crisis level of activity and the output gap is expected to become positive in 2021. Potential growth, too, is ultimately unaffected, at least as long as support measures prevent bankruptcies and major damage to the labour market.

Uncertainty around vaccines, but not simply that

The return to normal is dependent on the achievement of herd immunity, and therefore on the speed of deployment of vaccines as well as their efficacy in the face of new variants of the virus. The central scenario is based on a gradual and persistent lifting of restrictions from the 2nd quarter of 2021, in most countries. Alternative scenarios – upper and lower – make it possible to quantify the impact of more or less rapid removal of health measures. In the upper scenario, restrictions would disappear more quickly, leading to a more pronounced rebound in morale and consumption. In the lower scenario, however, the restrictions would disappear more gradually over the course of the year due to a slower vaccination campaign.

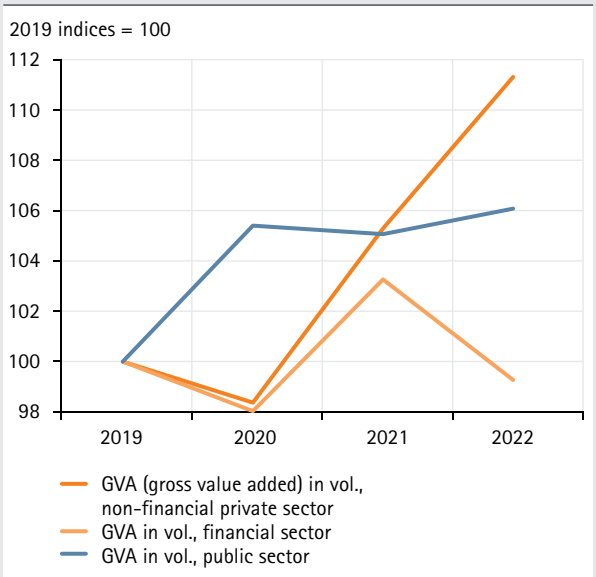
Compared to the epidemiological uncertainties that dominated 2020, the impact of the various alternative scenarios on Luxembourg's growth is now more limited, with only one and a half points up or down, to be added to or removed from the 6% forecast in the central scenario for 2021.

Graph 2.16
Activity boosted by the stock markets rebound and European growth



Sources: Eurostat, Macrobond, STATEC

Graph 2.17
Private sector takes over from non-market activity



Source: STATEC

The impact on wages, job creation and the unemployment rate would be even lower (below half a percentage point). On the other hand, CO_2 emissions would be more influenced by the different recovery scenarios, predominantly through the high elasticity of international freight transport to activity in Europe, which is the source of fuel sales to carriers passing through Luxembourg and whose emissions are attributed to it (see chapter 6). Alongside economic and health uncertainties, potential future revisions to Luxembourg growth for 2019 and 2020 could have an impact of several percentage points on forecasts for 2021 (via changed base effects)

Non-market activities (temporarily) boosted by the health crisis

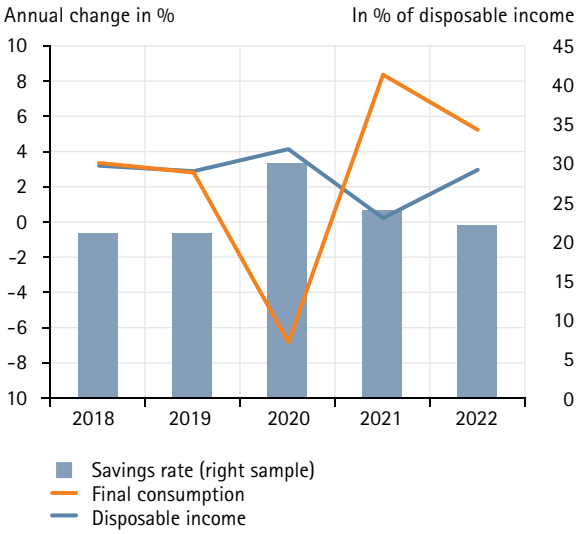
The public sector was in high demand during the crisis (GVA vol. +5-6% in 2020) but it should slow down by 2021/2022, as the government's anti-crisis intervention loses its raison d'être. These activities, whose value added mainly consists of payroll, benefited from a 5% increase in their workforce in 2020, primarily in healthcare (1,950 people), but also in administration (1,500 people) and education (1,150 people). In 2021 and 2022, workforce increases should be much lower, reducing the impact on GDP growth.

Private activities driven by the financial sector and European recovery

Market activities ultimately did well, with a decline of less than 2% in 2020. The financial sector continues to benefit in 2021 from the good performance of the financial markets, but also from the influx of COVID savings (see below). Following +5.3% in 2021, financial activities would however be penalised in 2022 (-3.8%) under the assumption of stock market stabilisation (+1.7% in 2022 following +18.4% in 2021).

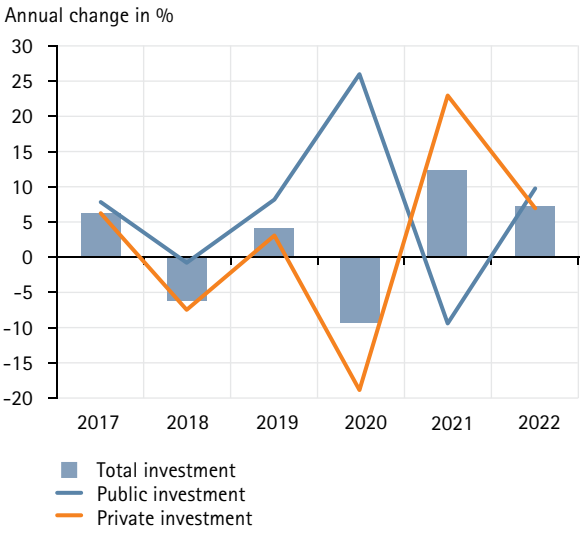
Excluding the financial sector, however, activity should continue to grow on the momentum of 2021 (+7%) with an increase of 6% in 2022. Growth would be driven by exports of non-financial goods and services (+10% in 2021) which continued to grow in 2020 (+3%) despite recessions in partner countries.

Graph 2.18
The savings rate should return to its pre-crisis level



Sources: Eurostat, Macrobond, STATEC

Graph 2.19
Private investment should take over



Source: STATEC

A gradual return to normal will boost final consumption

Health restrictions caused household consumption to plummet by almost 7% in 2020 and continues to limit it in 2021. The resulting savings surplus, i.e. the share of income that would have been consumed by households in the absence of restrictions, would thus amount to EUR 2.7 billion: more than EUR 2 billion in 2020 and an additional EUR 650 million in 2021. A surplus of EUR 1.3 billion was found in bank demand deposits at the end of 2020, the rest was therefore probably invested (financial securities or in real estate) or used to deleverage (see above, p. 26).

COVID savings, more specifically the possible recycling of the latter, is a major unknown for economic recovery in all countries. If the savings in question are consumed as a result of the lifting of restrictions, the rebound in activity will be much stronger. Otherwise, the corresponding amounts will only be returned to the economic circuit indirectly, via investment for example. However, savings are probably concentrated among the most affluent households, which have a rather low propensity to consume (see NDC 2-2020, p. 68). In the STATEC central scenario, COVID savings would not be recycled and the savings rate[28] would only return to its pre-crisis level in 2022. A reduction in the savings rate would therefore be a positive risk for economic growth, and this would be the case internationally.

Surge in private investment reinforces growth potential

Public investment was particularly high in 2020 (+25% or EUR 0.5 billion w.r.t. 2019) and thus played its role as an anti-cyclical stabiliser. Most of this increase is due to transport infrastructure expenditure and the acquisition of a military aircraft, but anti-COVID measures also contribute to this (EUR 125 million in 2020 and EUR 70 million in 2021). The reduction in public investment expected in 2021 (-10%) is explained by its exceptionally high level the previous year. Private investment would have the opposite profile: following a contraction of almost 20% in 2020, the rebound expected in 2021 would be slightly higher. The capital stock would not therefore suffer from two years of crisis, which has a positive impact on potential growth (estimated at around +2.5% per year).

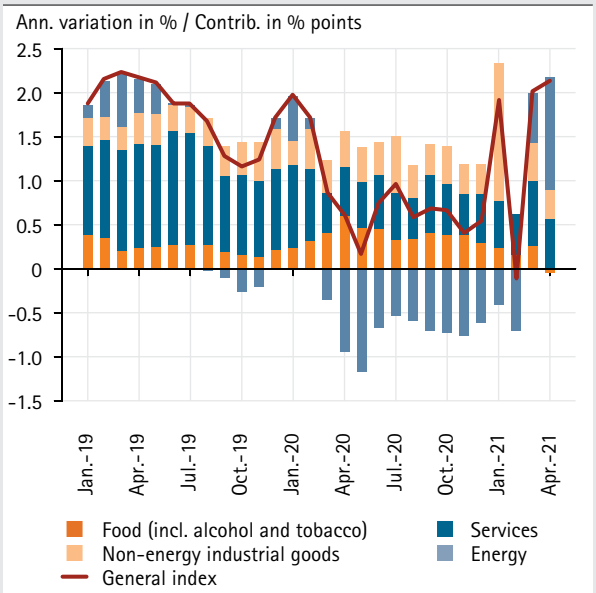
[28] If the savings surplus in the years 2020-21 were recycled in subsequent years, the savings rate would fall below its pre-crisis level.

Inflation and wages 3

Since the end of 2020, the persistent rise in oil prices has helped to revive inflation in Luxembourg, which has stood at around 2% in recent months. But, as in the eurozone as a whole, the risk of an inflationary drift seems limited, with prices excluding oil products rising very moderately. However, some temporary factors are expected to trigger a short-lived resurgence in inflation, such as the release of accumulated demand following the gradual lifting of restrictions, or the increase in certain input costs (raw materials, transport costs). For Luxembourg, STATEC expects an inflation rate of 2.0% for this year, then slowing down to 1.6% for 2022, when the temporary surge linked to the rebound in the oil price has ceased.

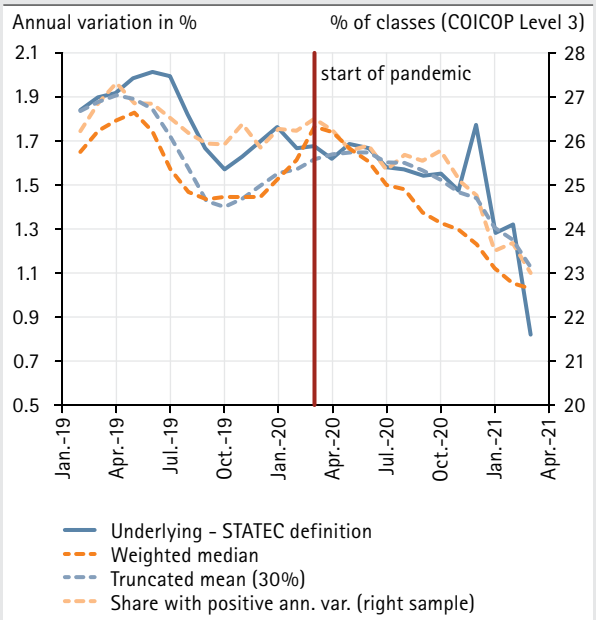
In 2020, the average wage cost fell by 0.7% in Luxembourg, in line with the trend observed in the eurozone. The decline is due to the massive use of short-time working as the main tool for keeping workers in employment during this health crisis. Short-time working schemes and other measures have reduced the cost of work for companies, while maintaining income for employees. For 2021 and 2022, STATEC expects again a more dynamic trajectory of salaries (+2% then +4%), higher than that relating only to automatic indexation to inflation, their main short-term determinant, under the effect in particular of the evolution of labour productivity which should remain well oriented over the next two years.

Graph 3.1
Oil rebound boosts inflation to around 2% in spring 2021



Source: STATEC

Graph 3.2
Underlying inflation has slowed since the start of the crisis



Source: STATEC (3-month moving averages)

Inflation in Luxembourg is accelerating to 2%...

The rebound in oil prices to pre-crisis levels is temporarily boosting inflation around the world. In Luxembourg, the introduction of a CO_2 tax at the beginning of the year also contributed to its recovery towards 2%, as did the dissipation of the downward effect linked to the introduction of free public transport in March 2020. The inflation rate had already approached 2% in January following the postponement of the winter sales, before falling again in February (see graph 3.1).

Food prices had soared in spring 2020, but they tended to normalise thereafter (-0.5% year-on-year in April 2021). They have thus returned to levels consistent with their (upward) long-term trend.

... while underlying inflation loses intensity

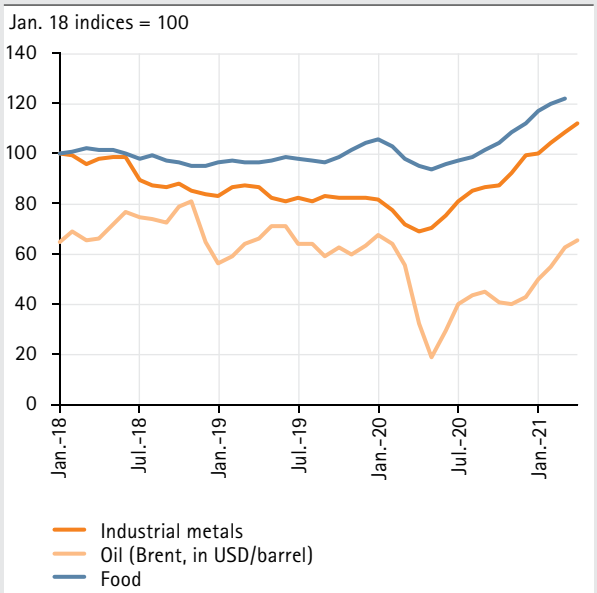
Overall, consumer prices have tended to decrease since the health crisis began. This can be seen from the fall in the underlying rate (1.0% year-on-year in April), shaken at the start of the year by various exceptional effects mentioned above, as well as alternative trend indicators[1] (see graph 3.2).

Disinflationary pressures – linked to wage moderation, the appreciation of the euro, the past weakness in commodity prices, as well as the drying up of demand for certain products – therefore still seem to dominate. The slowdown in demand is particularly evident for services relating to package travel and accommodation (-6% year-on-year in April) and air passenger transport (-9%), whose prices were still growing strongly at the end of 2019.

In contrast, the pandemic context has created pressures on the prices of certain goods, with a reorientation of demand (e.g. +26% year-on-year in April for computer accessories), or services facing adaptation costs (e.g. +5% for hairdressers, +7% for car maintenance and repair). Over the coming months, the gradual lifting of restrictions should also release strong demand for the services concerned and generate upward pressure on certain prices.

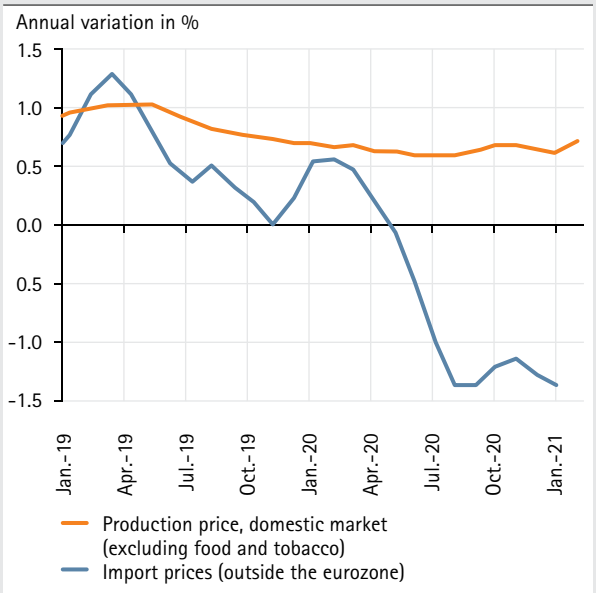
[1] In particular, weighted or truncated medians, see "Différents indicateurs pour passer au crible le ralentissement actuel de l'inflation sous-jacente" (Different indicators to screen the current downturn in underlying inflation), Note de conjoncture 1-2018, p. 64 ff.

Graph 3.3
Commodities have rebounded strongly in recent months



Source: Macrobond

Graph 3.4
Little pressure on eurozone consumer goods prices



Source: ECB (3-month mobile averages)

Prices of raw materials boosted...

In early 2021, prices for most commodities continued to rise. The speed of the rebound in demand for these materials exceeded that of supply, so prices recovered from the end of spring 2020. This speed reflects the strength of the recovery in some major economies (notably China and the US) and the catch-up in global manufacturing output[2]. Added to this was a layer of speculation, fuelled by optimism about the deployment of vaccines and very accommodating monetary and budgetary policies. Supply was struggling to restart and was also faced with logistical constraints that led to a sharp increase in transport costs at the beginning of the year (particularly for sea freight).

Price increases linked to the shift between supply and demand rebounds should be temporary. This is particularly the case for some metals, while others (copper, nickel, lithium, cobalt) are expected to remain expensive for longer as they are in high demand as part of the energy transition. In the case of oil, the risk that prices will rise further is limited by the existence of large unused capacities[3].

... but with an impact that is still not particularly visible in other prices

The significant pressure on input prices in industry and construction (see chapter 2) does not yet seem to be spreading to the prices of other goods in the eurozone (only +0.5% year-on-year in April, excluding energy). This is indicated by recent changes in prices for the production and import of consumer goods excluding food. In February, producer prices returned to their pre-crisis pace,[4] while import prices continued to fall (see graph 3.4). This decline primarily reflects the appreciation of the euro against the dollar (+9% year-on-year in the 1st quarter). Wage cuts are also expected to offset upward pressure from upstream in the production chain. On the other hand, sustained demand could support the transmission of higher input costs on consumers in the coming months. With regard to the increase in the cost of maritime transport at the beginning of the year, the OECD[5] estimates that it could increase the inflation rate by 0.2 percentage points after one year.

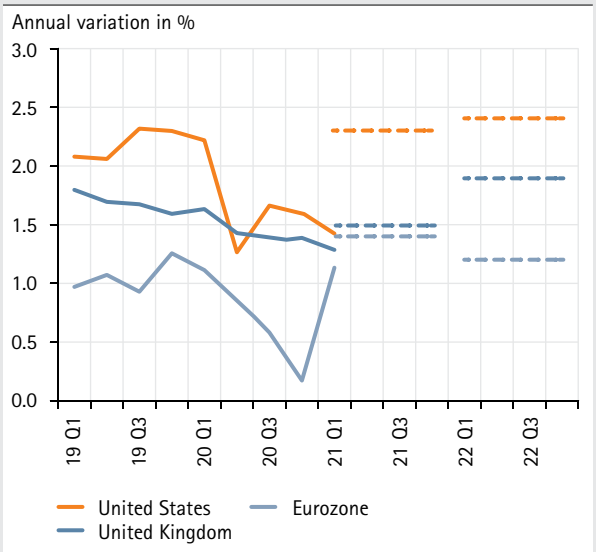
[2] Reflecting a shift in consumption towards goods, while some services have remained inaccessible.

[3] The OPEC+ coalition countries had decided to curb the supply extension in order to avoid a further decline in oil in the face of the winter wave of infections.

[4] However, the increase from 0.6% year-on-year in February to 0.9% in March could be the first sign of increased upward pressure.

[5] See "OECD Economic Outlook", May 2021.

Graph 3.5
Eurozone inflation should remain moderate



Sources: OECD (observed data), IMF (annual forecasts, April 2021)

Table 3.1
The price of oil products is projected to rise by 20% this year

		Forecasts – central scenario	
	2020	**2021**	**2022**
		Annual change in %	
Inflation (CPI)	0.8	2.0	1.6
Underlying inflation	1.6	1.2	1.6
Oil products	-13.5	19.6	2.3
Application rating	2.5	0.2	2.3
Application rating (1.1.1948=100)	834.8	836.5	855.6
Index bracket payment	Jan.-20	2021 Q4	-
Brent price (USD/barrel)	41.8	62.3	60.2
EUR/USD exchange rate	1.14	1.18	1.18

Source: STATEC (forecast of 30/05/2021)

Inflation is not expected to soar

In the United States, the rise in commodity prices – combined with the strength of the economic rebound and the announcement of a significant new budgetary stimulus – fuelled fears of an inflationary surge at the beginning of the year. According to the IMF's spring forecasts, the inflation rate should increase to 2.4% in 2022 (see graph 3.5).

In the eurozone, the inflation rate recently rose, from -0.3% in December to +1.6% in April. However, this rebound is entirely due to temporary effects, such as the positive base effect linked to the recovery in oil prices, the expiry of the VAT reduction in Germany and the adjustment of weightings for 2021 (reducing the weight of certain prices currently falling in the calculation of indices). The European Central Bank also notes that available measures of underlying inflation do not indicate an overall trend towards a sustained rise in underlying inflationary pressures[6]. In its March forecasts, it predicts only a very gradual rise in underlying inflation to 1.1% in 2022 following 1.0% for this year.

Most observers agree that the risk of a sustained sharp rise in inflation remains very limited, at least for the eurozone. In the short to medium term, the output gap should remain negative[7], limiting upward pressures. Moreover, the structural forces that have moderated inflation in recent years should continue to play a role.

For Luxembourg, STATEC is forecasting an acceleration in underlying inflation to 1.6% for 2022 (following 1.2% for 2021). It should be reinvigorated by the reduction in unused production capacity, the delayed impact of the recovery in raw material prices as well as by the index bracket planned for the end of 2021[8].

The price of Brent is expected to trend towards USD 60 per barrel by 2022. Its rebound and the introduction of the CO_2 tax on 1 January 2021 would boost headline inflation by 0.8 percentage points this year, but much less in 2022[9]. This explains the projected downturn in inflation to 1.6% for 2022, following 2.0% for 2021.

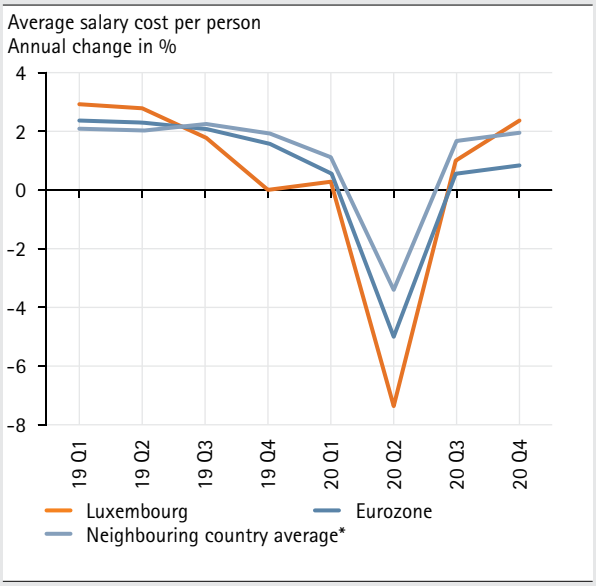
6 See ECB Economic Bulletin, No 3/2021.

7 According to Oxford Economics' forecasts underlying the STATEC central scenario, the output gap should still remain largely negative in the eurozone this year, and should then tend to close by 2025.

8 See also Statnews No 24 of 5 May 2021 on inflation forecasts.

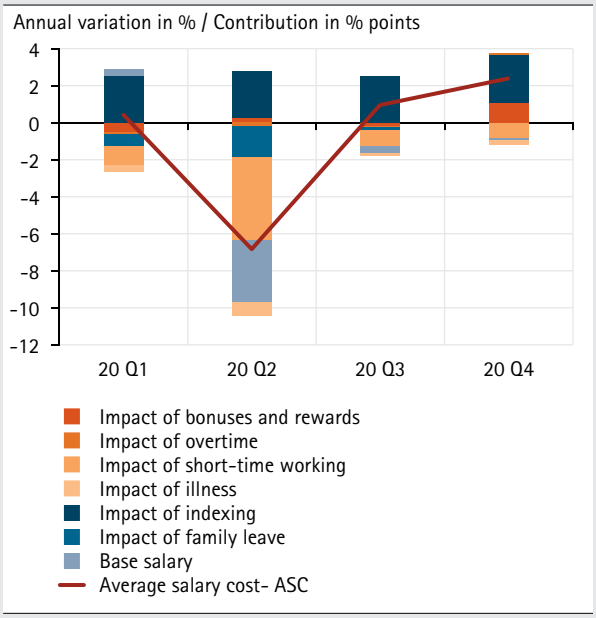
9 Following +20% in 2021, oil prices should rise by around 2% next year, primarily due to an increase in the CO_2 tax, from EUR 20 to EUR 25 per tonne (representing, for example, an additional cost of 1 cent per litre of diesel).

Graph 3.6
Salary costs rise again in late 2020



Sources: Eurostat, STATEC - National accounts
* Arithmetic average: Germany, Belgium, France, Netherlands

Graph 3.7
Key factors in salary cost evolution in 2020



Sources: STATEC (national accounts), IGSS

Salary costs hit hard in 2020

The salary cost, which includes all of the costs borne by companies (basic remuneration, overtime, supplements and accessories, bonuses and gratuities, employer and employee contributions) was significantly reduced during the health crisis. However, from the point of view of employees, remuneration was supported by replacement income (short-time working, family leave, etc.). The latter, being paid by the government, are not taken into account in the calculation of the salary cost. Replacement income thus reduced the cost of labour for companies, while maintaining income for employees.

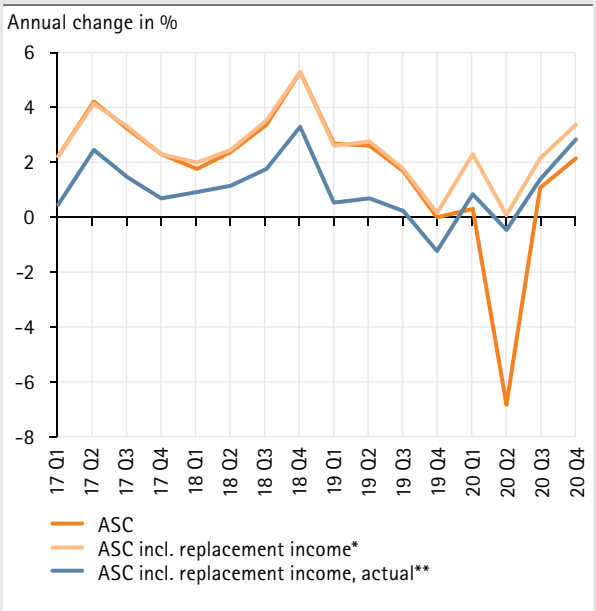
In 2020, the average salary cost fell by 0.7% in Luxembourg, much less than expected (-6% according to STATEC's autumn forecasts), but in line with the trend observed for the eurozone as a whole (-0.6%, see graph 3.6). With the exception of Italy, France and Belgium, the fall in the average salary cost is limited to the 2nd quarter, following the 1st strict confinement. According to the latest ILO report[10], the average salary cost has even increased in some countries (Italy, France and the United States in particular) due to composition effects linked to the loss of jobs among the most vulnerable and also the lowest paid. In Luxembourg, this effect is unlikely to have played a significant role, with vulnerable sectors accounting for only 7% of total employment and job losses remaining limited for the time being.

The limited fall in the average salary cost in 2020 in the Grand Duchy is due to the less pronounced than expected recourse to partial unemployment and the unexpected increase in premiums at the end of the year. Given the context of great uncertainty, many applications for short-time working have been submitted in a preventive manner[11]. Thus, throughout 2020, only 38% of applications (in terms of full-time equivalent jobs) were actually drawn, compared to approximately 2/3 over the last ten years. The real effect of partial unemployment on salaries is difficult to gauge, as it breaks down into two parts. Firstly, the 80% paid by the government (which reduces the average salary cost by 1.8 percentage points in 2020, see graph 3.7) and, secondly, the remaining 20%, which can be paid by the company in full, in part or not at all, depending on its choice. This second impact is not directly quantifiable but is reflected in the evolution of the base salary (which drove the overall cost down by -0.9 percentage points).

[10] International Labour Organization: "Global Wage Report 2020-21: Wages and minimum wages in the time of COVID-19".

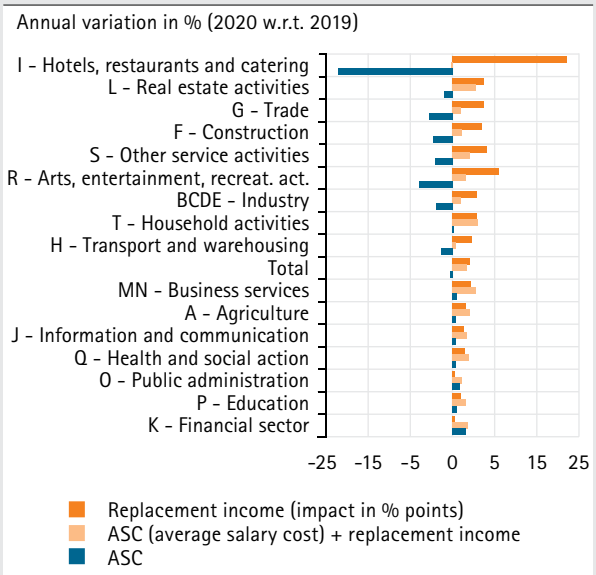
[11] Applications are made until the 12th of the month preceding the month for which the application for short-time working applies.

Graph 3.8
Paid remuneration supported by replacement income in 2020



Sources: STATEC – National accounts, IGSS
* Short-time working, Family leave, Sick leave
** Deflated by the CPI

Graph 3.9
Salary cost with and without replacement income, by activity[12]



Sources: IGSS, STATEC calculations

The impact of other replacement income on average salary costs was -0.6 percentage points for family leave (widely used during confinement following the closure of schools and care homes) and -0.3 percentage points for various sick leave. In addition, reduced overtime pulled the average salary cost down by 0.1 percentage point.

While STATEC was expecting a sharp decline in premiums paid in 2020, these rose by 3.2%, bringing average salary cost growth of 0.2 percentage points. To give an order of magnitude, if no bonus had been paid at the end of 2020, the average salary cost would have been impacted by -3 percentage points over the whole year! It was predominantly end-of-year bonuses (+10% year-on-year in Q4) that impacted the average salary price, particularly in a few isolated companies from legal and accounting activities. Another factor that contributed positively to the evolution of the average salary cost is the indexing of wages (+2.5 percentage points) at the beginning of 2020.

The average salary cost fell, in particular, in the sectors most affected by the crisis, such as HORECA (-22.8% in 2020), other service activities (-5.3%, a sector in which hairdressers account for 1/3 of the workforce), trade (-4.7%), construction (-4.2%) and industry (-2.6%).

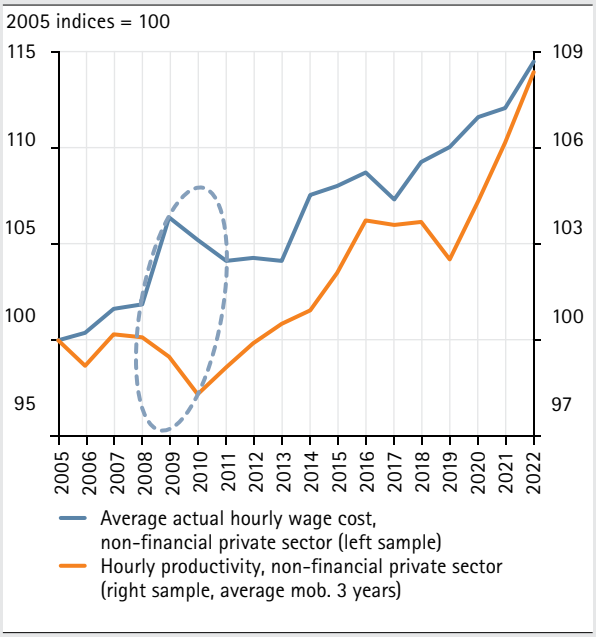
Replacement income was able to maintain remuneration in most sectors

If we add replacement income[12] to the average salary cost, the latter even grew throughout 2020 (+2% on average over the year) and even in real terms (+0.2% deflating it by the CPI, see graph 3.8). HORECA is the only sector to note a fall in this area (-0.8%)[13]. The industries with the lowest real salary growth were trade and industry (+0.8% each), transport (+0.9%), construction (+1.1%) and public administration (+1.2%). Business services (+3.7%), the financial sector and healthcare and social action (+3.4% each), gained the most (see graph 3.9).

[12] That is, the compensation paid and reimbursed for short-time working (and bad weather unemployment) as well as the credits reimbursed by the CNS, the health insurance organisation or the accident insurance, including in particular leave for family reasons.

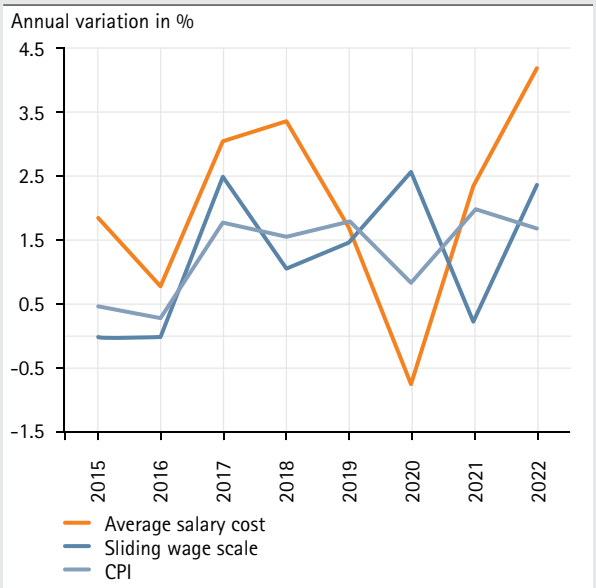
[13] Calculations by industry were made on the basis of IGSS data, which may differ from those of the national accounts, discussed above.

Graph 3.10
Productivity should recover faster than during the Great Recession, driving actual salaries upwards



Source: STATEC - National accounts, 2021-22: Forecasts

Graph 3.11
The average salary cost should only be temporarily affected by the crisis



Source: STATEC, National accounts, 2021-22: Forecasts

No prolonged downward impact of the short recession on labour costs in 2021/2022

STATEC does not expect the crisis to have a lasting impact on wage costs. During the Great Recession of 2008/2009, labour productivity fell in non-financial market sectors, also driving down the *real* cost of labour with a slight delay (both in terms of hours, see graph 3.10). Such a phenomenon is not expected with this health crisis. Two main reasons justify this: (a) the crisis was shorter, leading to a less pronounced reduction in activity and employment; (b) government support was faster and more pronounced, probably to counter the speed with which the crisis spread its negative effects in March 2020. The real cost of labour is therefore expected to continue to grow in 2021 and 2022 at more or less the same pace as that observed since 2015, i.e. 0.8% per year (versus 0.9% per year for hourly productivity).

After the slight decline in 2020, the *nominal wage cost per person* (see graph 3.11) should resume a much more dynamic trajectory, once again exceeding the increase on the sliding scale (resulting from automatic indexing to inflation), its main short-term determinant. In 2020, there was a negative difference of more than 3 points between the two, due to the fall in wage costs linked to the massive payments linked to short time working schemes. Moreover, the last indexation threshold was passed at the beginning of 2020, playing fully into 2020, just before the start of the crisis. In 2021, the impact of the indexation mechanism should be very low (+0.2%, while revised upwards compared to previous forecasts) but salaries should benefit from a base effect as well as the nascent economic recovery (+2.3%). Similarly, average wage growth is expected to accelerate further in 2022 (+4%), bringing wages to well above pre-crisis levels.

Only two sectoral collective agreements were signed at the closure of this Note de conjoncture, one in the care sector and another in favour of hospitals; their overall impact on wages should however remain marginal.

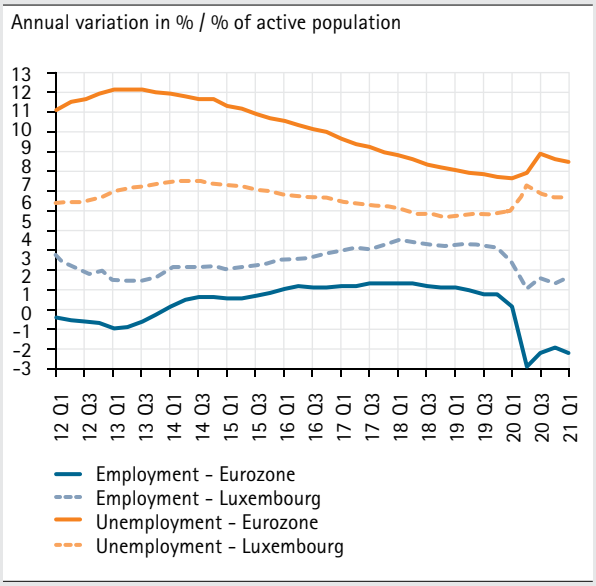
4 Labour market

In 2021, the labour market in Luxembourg remains the most dynamic in the eurozone. Part of this high resilience is explained by the measures implemented by the Luxembourg government to maintain employment, such as the extension of the short-time working scheme. However, Luxembourg is not particularly different from other European countries in its use of this type of aid.

Despite the continuous increase in the number of jobs created, the volume of hours worked is still on the decline at the beginning of 2021. This does not prevent (traditional) unemployment from falling, helped by employment measures supervised by Luxembourg's National Employment Agency (ADEM).

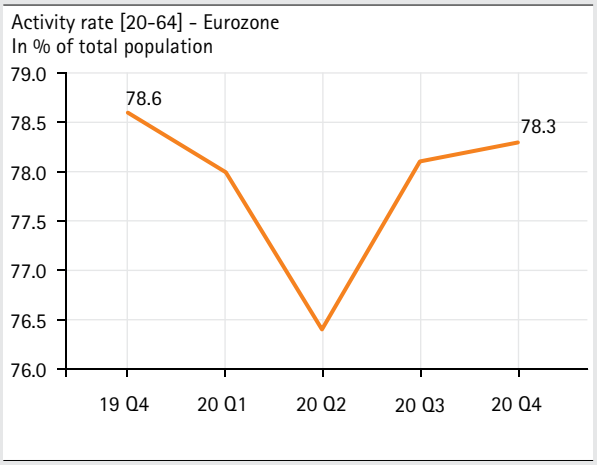
Employment growth is not expected to exceed 2.5% this year and the next, a much slower pace than economic activity. Elements of uncertainty persist, such as the high volatility of recent monthly data (which makes its cyclical interpretation and forecast difficult) and even the potential but staggered repercussions of the crisis on the sectors most affected by the crisis. Nevertheless, STATEC sees unemployment stabilising in its central forecast scenario and it could even decline if certain parameters move in a suitable manner (increased use of ADEM unemployment support schemes, favourable economic scenario based on accelerated vaccination in Europe).

Graph 4.1
Fall in unemployment in the eurozone and Luxembourg



Sources: STATEC, Eurostat

Graph 4.2
The activity rate is rising at the end of 2020



Source: Eurostat

Unemployment is falling in the eurozone but job creation is struggling to recover...

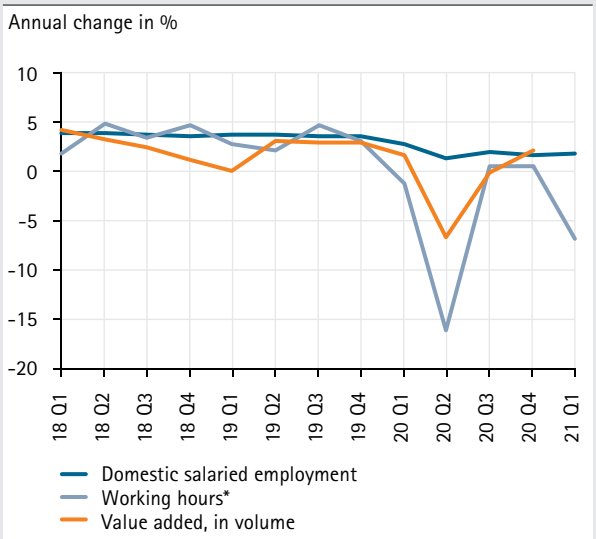
At the 2020/2021 crossroads, Luxembourg remains by far the country in Europe where the labour market has been most spared by the crisis and its consequences. The Grand Duchy has posted employment growth of around 2% year-on-year since the slump in the 2nd quarter of 2020, an unparalleled performance in Europe. In the last quarter of 2020, Belgium came in second place, with a decline in employment of 0.3% year-on-year, followed by Portugal (-0.6%), Malta (-0.9%) and the Netherlands (-1.0%). The losers are Spain (with -4.2% year-on-year), Estonia (-4.0%), Ireland (-2.7%) and Slovenia (-2.0%).

The eurozone once again created jobs in the last two quarters of the year, but the pre-crisis level has not yet been reached (a gap of around 2% remains). Unemployment has also started to fall since its peak in the 3rd quarter of 2020, but, with 8.2% of the active population in the first quarter of 2021, it is still higher than its pre-crisis level (although much lower than after the 2008/2009 financial crisis when it reached 12%). It is mainly the countries in the South that have seen their unemployment levels increase, mainly because of the large tourism sector.

In the first half of 2020, the increase in unemployment was significantly reduced by the inactivity of part of the population, particularly in Italy and France. People who were available to work but prevented from conducting active research due to confinement were counted as inactive and not unemployed. This factor partly explains why the rise in unemployment in the eurozone (+1.6 percentage points between March and August) is similar to that in Luxembourg (+1.5 percentage points from February to April), despite a much sharper fall in employment in the eurozone (see graph 4.1). However, the eurozone's activity rate almost returned to its pre-crisis level at the end of the year (see graph 4.2).

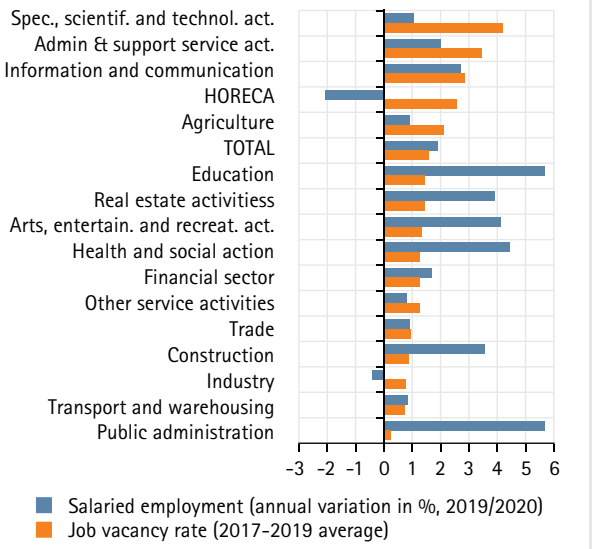
Oxford Economics forecasts indicate divergent unemployment trajectories for this year: Germany is expected to experience a slight and gradual decline, while it is expected to further increase in France and Italy. On the employment side, the eurozone has entered a recovery phase. Following a decline of 1.6% over the whole of 2020, employment should return to a growth of 0.3% in the current year (thanks to a very positive base effect in the 2nd quarter).

Graph 4.3
The crisis has impacted working hours much more than employment



Sources: STATEC, IGSS (*21 Q1=2 months)

Graph 4.4
Job creation in 2020 and job vacancy rates



Sources: IGSS, ADEM, STATEC
The job vacancy rate refers to vacancies in all positions (vacant or occupied).

... as activities continue in Luxembourg

At the beginning of 2021, most industries in Luxembourg ended up with more staff than before the crisis. In particular, business services continued to hire (+4.2% year-on-year in the 1st quarter of 2021), but also (in descending order of net job creation) health and social action (+4.5%), construction (+3.5%), public administration (+5.7%) and education (+5.8%). The losers of this crisis, in terms of employment, were HORECA (-8.3% over one year); industry (-1.9%); trade and personal services (-0.4%). Part of this high resilience in employment is explained by the measures implemented by the Luxembourg government to maintain employment, such as the extension of the short-time working scheme.

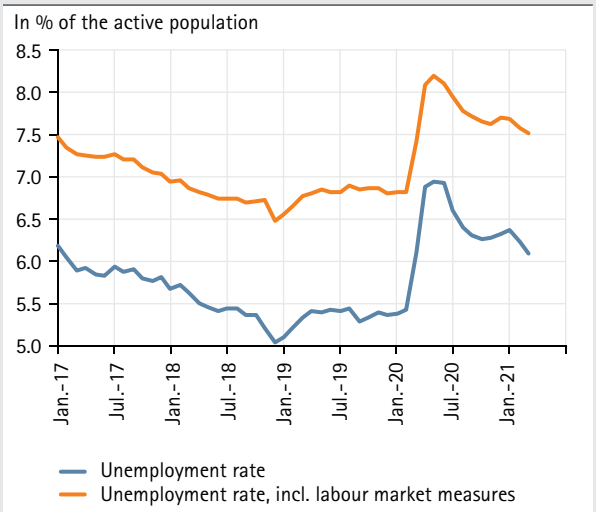
On the other hand, the volume of work performed, measured via hours worked, remains down compared to last year (-6.8% year-on-year in the first two months of 2021, see graph 4.3). It is still the HORECA sector that is the hardest hit (-31% year-on-year for the hours worked, data for the end of 2020). It is followed (in descending order of contributions) by industry (-3%), trade (-1.6%), transport (-2.1%), arts (-16.4%) and personal services (-4.6%). On the other hand, the financial sector (+5.7%), construction (+4.5%) and public administration (+4.7%) did increase their work volume compared to a year ago.

In 2020, recruitment fell by 9.4%. Only three sectors, which were very much in demand during this crisis, increased the figure: public administration, education and health and social action[1]. However, at the same time, there were far fewer contract terminations (leaving employment) than in previous years (particularly in HORECA, the financial sector, construction and trade), which contributed to the good performance of employment.

As many industries suffered from a certain lack of skilled workforce before this crisis, STATEC looked at whether there is a positive relationship between the employment vacancy rate of the past and the job creation rate of 2020. This does not seem to be the case (see graph 4.4), perhaps because many companies do not report open positions.

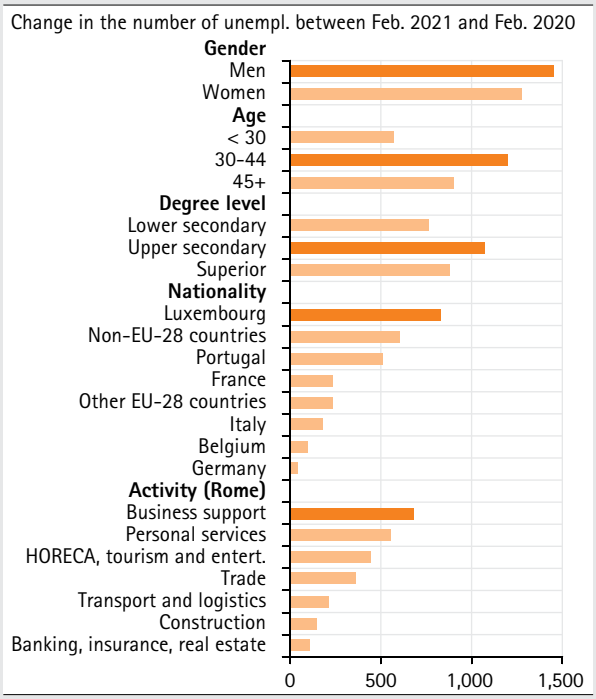
[1] In 2020, these sectors recorded the strongest increase in employment (+5.7% for the first two, +4.5% for health and social action), most probably in connection with the measures put in place to overcome the pandemic (large-scale testing, contact tracing, logistics to deal with the health crisis, home-schooling, return to school in alternation, etc.).

Graph 4.5
Unemployment down since mid-2020



Sources: ADEM, STATEC (seasonally adjusted data)

Graph 4.6
Unemployment has increased in particular for:



Sources: ADEM, STATEC (seasonally adjusted data)

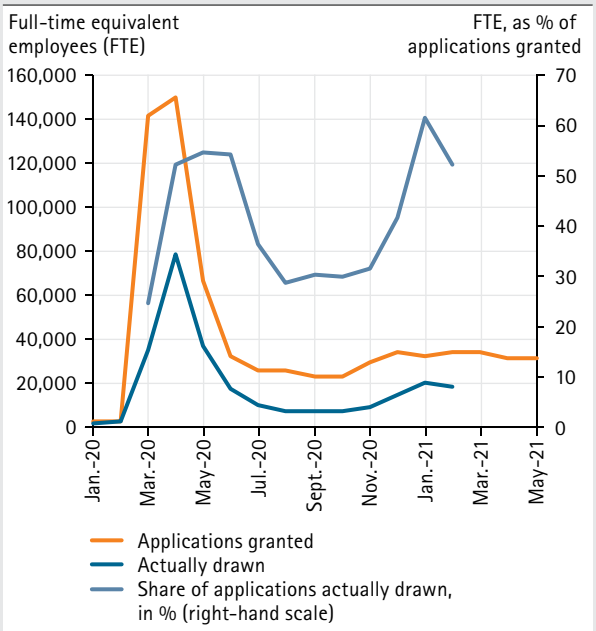
Unemployment down again in Luxembourg

After an initial fall in unemployment during the deconfinement in the summer and a slight rise at the end of the year, unemployment started to fall again in early 2021, reaching 6.1% of the active population in March 2021, following 6.4% in January. This decrease is due in part to a strengthening of employment measures, which have covered many more unemployed people since the beginning of the year (particularly in training) and are therefore no longer counted as job seekers. New unemployment figures remain low, at least compared to the flows observed in 2019. The trend is also downward, taking into account people in a labour market measure (see graph 4.5).

In 2020, it was mainly young people under the age of 30 - those with a higher level diploma, those of French or Italian nationality and those looking for a job in banking, insurance or real estate, health, hospitality, leisure and entertainment and business support – that experienced the greatest increase in unemployment. In terms of contribution, the categories most represented in the active population stand out above all: men, people between the ages of 30 and 44, those with a higher secondary qualification level and Luxembourgers (see graph 4.6).

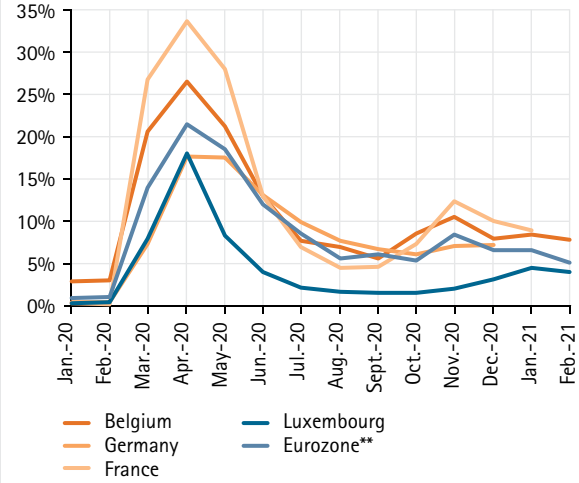
The same sectors also have the most people on short-time working: HORECA (39%), industry (21%), trade (16%), business services (10%) and transport (7%). It should be noted that people on partial unemployment remain "in employment" and are therefore counted among employees and not among the unemployed.

Graph 4.7
Recourse to partial unemployment barely declined at the start of the second quarter



Sources: Economic Committee, IGSS, STATEC calculations

Graph 4.8
The share of subsidised jobs in Luxembourg is relatively low



Sources: STATEC, Eurostat
* These are all government-subsidised jobs in the context of the pandemic (authorised and/or actually used).
** Unweighted average, country considered based on data availability.

The number of people on partial unemployment remains high in the first half of 2021

In 2020, an average of 5,100 companies had the agreement of the Economic Committee each month to be able to benefit from the short-time working scheme, which involved some 46,000 employees each month (in full-time equivalent). However, given the context of great uncertainty, many of these applications were made in a preventive manner, so that in 2020, only 40% of these applications were actually drawn (see graph 4.7), much less than in the past (approximately 2/3 of the requests from 2009 to 2019). In the middle of the second quarter of this year, applications granted still concern just over 30,000 people in full-time equivalent (7% of salaried employment), however, with a slight downward trend recently. At the same time, the share of applications that actually give rise to disbursement increased sharply at the end of 2020 / beginning of 2021, joining the reports observed at the height of the crisis, thereby highlighting the urgency of the situation in assisted companies.

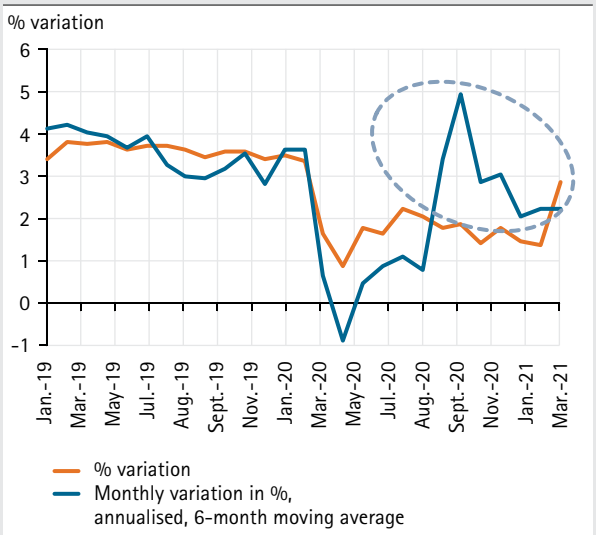
Recourse to partial unemployment is less pronounced in Luxembourg than elsewhere in Europe (see graph 4.8), certainly linked to the lesser presence of services linked to strong physical interaction (in the field of tourism, for example) or a less predominant industrial sector. Thus, the rate of "subsidised jobs" is only 4%[2] in Luxembourg, whereas it is almost double in neighbouring countries.

According to current legislation, partial unemployment for cases of force majeure linked to the COVID-19 crisis regime, introduced in March 2020, will end in July 2021, except for companies that are inactive following a government decision. However, traditional short-time working[3] will continue. More than 10,000 employees (including 7,000 from industry) could therefore remain in partial unemployment in the second half of the year.

[2] Based on partial unemployment actually drawn, expressed in full-time equivalent jobs.

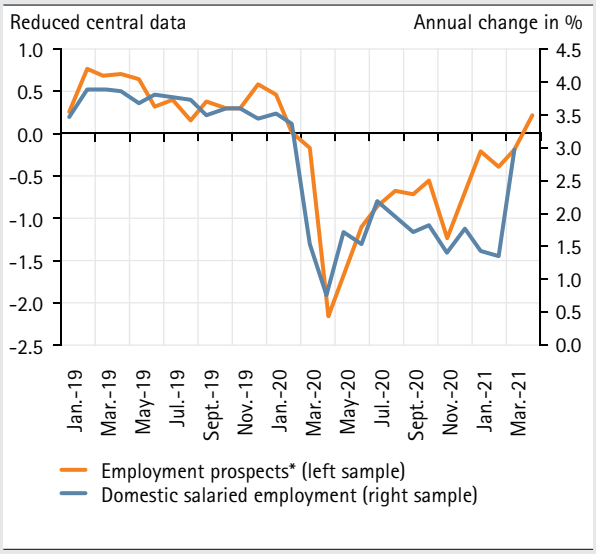
[3] Traditional short-time working provides aid for structural reasons (for companies with a recovery plan), economic reasons (for industrial companies in order to be able to react to disruptions in international markets) and for cases of force majeure (currently extended to companies facing supply problems).

Graph 4.9
Increase in employment at 2% year-on-year at the beginning of 2021



Source: STATEC, national accounts

Graph 4.10
Employment prospects are improving



Sources: IGSS, STATEC (economic surveys)
* Weighted average: industry, construction, retail, financial sector, other non-financial services.

Positive signals for leading employment indicators

Annual employment growth seems to be stabilising at around 2% in early 2021, excluding the base effects due to confinement in spring 2020, which have a strong impact on the interpretation of the series (see graph 4.9). While they still remain at low levels overall, the leading employment indicators continue to improve in early 2021, heralding a further improvement in the labour market in the 2nd quarter.

As proof, the employment prospects of entrepreneurs are increasingly oriented (see graph 4.10), reaching levels comparable to those of mid-2019 in April 2021. It is predominantly in industry where this indicator is gaining ground, but also in financial and non-financial services. In construction, it persists at a high level.

Overtime, which reflects a lack of workforce, also remains at slightly lower levels. In 2020, each employee worked approximately 5 hours less overtime than in 2019, with the difference ranging from -12.1 hours in the HORECA sector to +2.1 hours in the financial sector. The latter branch continues to see an upward trend in overtime at the turn of 2020/2021. In the public sector, overtime is stagnating at a high level, while remaining very low in the sectors hardest hit by the pandemic.

Temporary work, heavily affected during the first confinement in spring 2020, is also slowly returning to its pre-crisis level. At the end of 2020, temporary activity in construction and industry, the two main user sectors, is almost identical to that of one year previously.

The job vacancy rate, which records job offers versus all positions (vacant and occupied) increased slightly at the end of 2020/beginning of 2021 (to 1.6%, following 1.5% in Q3 2020, 1.3% in Q2 and 1.7% in Q1).

Table 4.1
Labour market

					Baseline	Upper scenario[1]		Lower scenario[2]	
	2020	1995-2020	2020	2021	2022	2021	2022	2021	2022
	Level (people)	Change (in % or % points)	% change unless otherwise specified						
Total population[3]	634 730	1.7	1.4	1.8	2.1	1.8	2.1	1.8	2.0
Migration balance (% of total pop.)	7 620	.	1.2	1.5	1.7	1.5	1.7	1.5	1.6
Working age population[4]	407 527	1.9	1.4	1.6	1.8	1.7	1.8	1.6	1.7
Active population	295 657	2.2	2.7	1.8	1.6	1.8	1.7	1.8	1.5
Activity rate (% of working age pop.)	.	0.2	72.5	72.6	72.5	72.6	72.6	72.6	72.5
Same, women	.	*0.7*	*68.8*	*68.8*	*68.8*	*68.8*	*68.8*	*68.8*	*68.8*
Domestic salaried employment	474 257	3.2	2.0	2.5	2.5	2.9	3.2	2.2	1.9
of which: incoming frontier	210 467	5.4	2.3	3.7	3.3	4.3	4.2	3.2	2.5
resident employment	276 984	2.0	1.7	1.7	1.8	1.8	2.3	1.5	1.4
Average working time	.	-0.5	-5.8	2.5	1.5	2.5	1.5	2.4	1.5
Number of unemployed (ADEM)	18 673	5.9	21.4	3.5	-0.7	1.1	-7.3	5.4	4.0
Unemployment rate (% of act. pop.)	.	0.1	6.3	6.4	6.3	6.3	5.7	6.5	6.7

Source: STATEC (2021-2022: forecast)
[1] In the upper scenario, the global success of the vaccination campaign facilitates faster easing of social distancing restrictions and a rapid return to full economic production capacity. Confidence is increased for investors, businesses and households. The result is a more robust global recovery in the short term.
[2] In the lower scenario, social distancing measures are relaxed at a more gradual pace in 2021 while the deployment of mass vaccination programmes is progressing slowly. The global economic recovery in 2021 is slowing and stock markets are declining.
[3] As at 31 December.
[4] 20-64.

Improved labour market outlook

STATEC expects domestic employment to rise by 2.5% in both 2021 and 2022, following +2% in 2020, a year of crisis. These prospects have been constantly revised upwards over the last twelve months, in tandem with those for the business. With this performance, Luxembourg ranks first among European countries, where, with few exceptions, employment would fall overall over these three years! This exceptional performance reflects the massive support implemented through short-time working, but Luxembourg is not particularly different to other countries. Above all, it reflects Luxembourg's certain resilience (which can be linked to its structural specificities or even the nature of the crisis) and higher structural growth. However, it conceals the fact that the total number of hours fell sharply in 2020 (-4%) and has not yet reached its pre-crisis level.

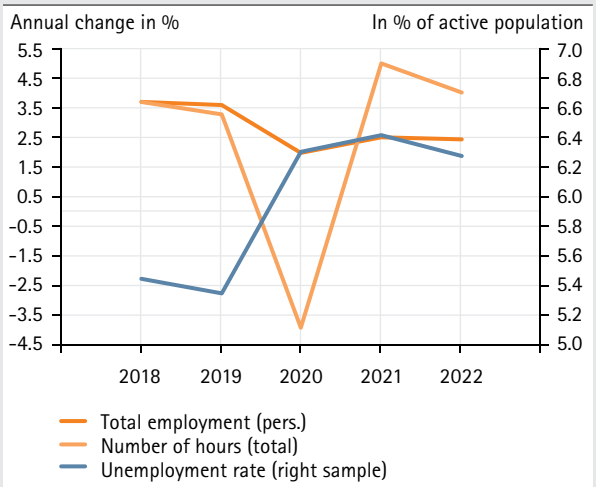
Unemployment is expected to peak in 2021 and 2022 at almost 6.5% (following 6.3% in 2020, definition from ADEM). It would, in this stagnation movement, still be helped by the short-time working scheme, for which STATEC is still counting on some 13,000 people in full-time equivalents in 2021, following approximately 18,500 in 2020. Statistically speaking, short-time working can be reinterpreted as follows, in order to better highlight its scale and key role:

- If all people found to be short-time working had joined the normal unemployment regime, the latter would have doubled in 2020, resulting in an unemployment rate of 12% (reasoning based on full-time equivalents);
- Also, in 2021, the support provided by short-time working remains substantial, reducing the unemployment rate by around 4 percentage points[4].

A support factor that would argue for a slight fall in unemployment in 2021 or even in 2022 is the training and employment measures from ADEM. The latter had not been able to play its supporting role in the market during the crisis, but recent monthly data point to an increased role in 2021 and 2022. According to STATEC estimates, some 6,000 people could benefit from these measures in 2021 and 2022, an all-time high, compared to 4,000 in previous years. This increase would reduce the unemployment rate by 0.5 percentage points in 2021.

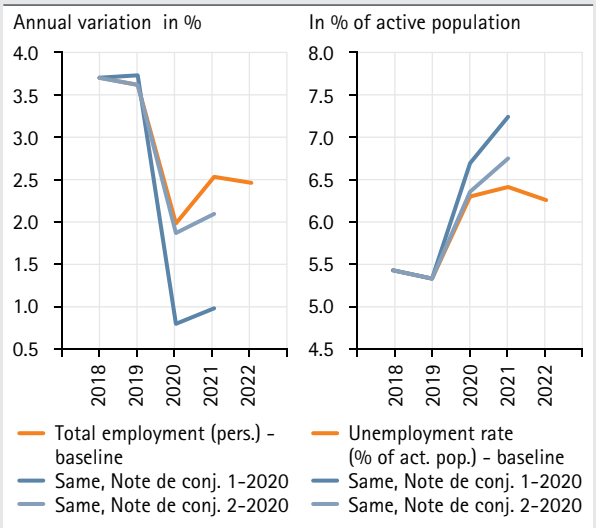
[4] For 2022, STATEC expects short-time working to continue, with only a few thousand people affected.

Graph 4.11
The shock in the labour market is largely absorbed by working hours (and falls back on total hours)



Sources: ADEM, IGSS, STATEC - National accounts, 2021/22 forecast

Graphs 4.12
Labour market forecasts have improved steadily since the start of the crisis



Sources: ADEM, IGSS, STATEC - National accounts, 2021/22 forecast

Recourse to short-time working – which results in a reduction in the payroll for companies and partial compensation for workers via social benefits – is also reflected in the hours worked. Its prominence has generated an unparalleled fall in average working hours in contemporary economic history, i.e. in the order of -6% for the economy as a whole (-7.5% in the market sectors and much more in the sectors most affected by the crisis, such as HORECA or trade)[5].

During the 2009 crisis, the average duration had fallen by around 3% with one major difference: at the time, it had fallen the most in the financial sector; whereas in 2020, the financial sector was not only spared by the crisis but was even strongly involved so that the average duration increased by 1%.

A recovery in employment at the expense of average working time

STATEC anticipates that the shock over time will only be corrected slowly and gradually, reflecting the continued high number of partially unemployed workers in 2021. But even in 2022, the average working time per person should remain 2% below the pre-crisis level (see graph 4.14). Another element that would contribute to this, which is much more difficult to quantify in anticipation, is the fact that working hours are falling tendentially (after the shock of 2009, there had been virtually no recovery) and that other factors than partial unemployment alone have led to a fall in 2020/21 (structural factors such as part-time work or cyclical such as overtime work[6]).

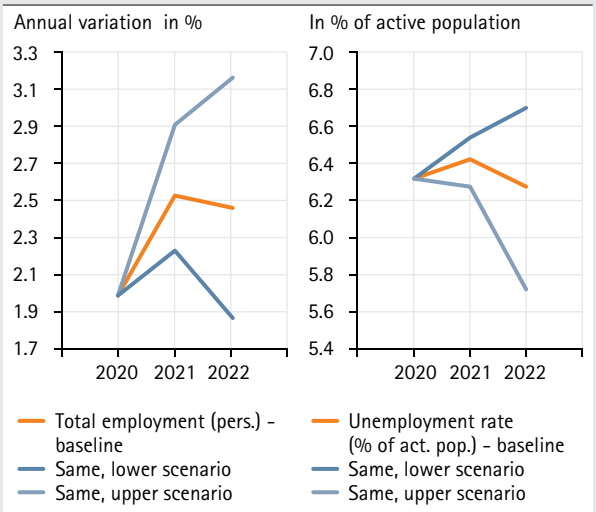
The labour market forecast therefore remains problematic. Added to this is the interpretation of the most recent monthly data (and their forecasts) which is clouded by base effects[7]. The adjustment which passes through the hours worked per person, which are more difficult to anticipate, and the threat of rising unemployment when the support schemes expire (short-time working scheme, see redundancies already made in the hotel, restaurant and catering sector, potential bankruptcies in other sectors also) are not such as to facilitate the task.

[5] Usually the average duration fluctuates with variations below half a per cent, up or down. In 2020, other factors also played a role in the average duration, such as family leave, sick leave or the reduction in overtime.

[6] Impact of overtime on the average duration: -0.2 percentage points in 2020.

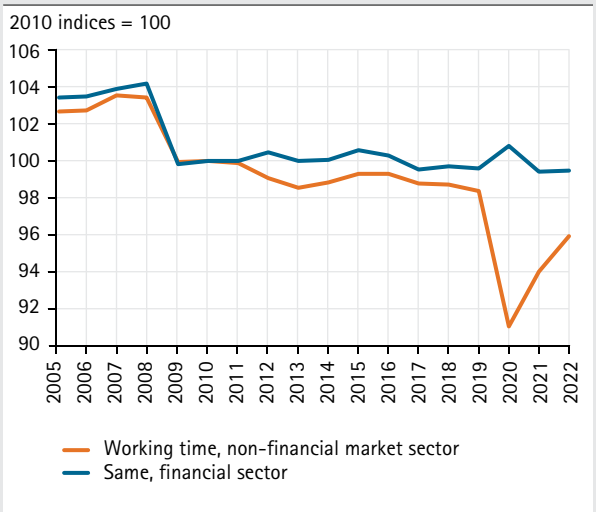
[7] Currently, employment is growing by just over 2% based on seasonally adjusted monthly figures, expressed as annualised rates. The annual growth rate should increase to more than 3% in March and April, given the very sharp fall in employment last year at the height of the first confinement. In the 3rd quarter, the opposite phenomenon will occur... Year-on-year figures are therefore unusually volatile and do not indicate a clear trend.

Graphs 4.13
Unemployment rate could fall below 6% in 2022



Sources: ADEM, IGSS, STATEC - National accounts, 2021/22 forecast

Graph 4.14
In contrast to 2009, the average duration increased in the financial sector in 2020



Sources: IGSS, STATEC - National accounts, 2021/22 forecast

The migration balance has fallen sharply, slowing resident employment

As usual, cross-border employment has fluctuated much more than that of resident workers. This is probably related to the fact that cross-border workers were, in the first phase, over-represented in the sectors most affected by the crisis (through partial unemployment in particular). In 2021, however, they should benefit most from the recovery (+3.7%) for inherent structural reasons (it is easier to hire in the Greater Region) but also since, according to STATEC forecasts, the crisis and its aftermath would still slow migration to Luxembourg.

In fact, the migration balance reached 7,600 in 2020, compared with an average of more than 10,000 since 2011. STATEC expects a partial and late catch-up (balance at almost 11,000 in 2022) so that the average increase in the population in 2020/2021, at just over 1.5%, will remain as one of the lowest in this millennium, and that a return to the high rates of population increase observed since 2010 is not currently in place[8].

Reduced uncertainty in Oxford Economics scenarios

The ranges for possible employment and unemployment trends in 2021 and 2022, based on scenarios developed by Oxford Economics, are smaller than in 2020, as overall uncertainty has reduced in recent months. According to the corresponding simulations carried out by STATEC, the increase in employment should be between 2.2% and 2.9% in 2021 but the potential range should increase in 2022 (2.0% to 3.2%). At best, the unemployment rate could return to below 6% as an annual average in 2022. At worst, it would be close to 7% of the labour force.

[8] There is also a downward revision of the natural balance due to the excess mortality linked to COVID-19, but also a decline in births due to the reduced migration to Luxembourg, which is generally concentrated in the age categories most conducive to procreation. This is a cumulative revision of around -1,500 people, compared to the medium-term forecast of March 2020 (this figure includes a slight downward revision relative to 2019 which is not linked to the crisis).

Public finances 5

The high resilience of the Luxembourg economy in the face of the sweeping pandemic is also reflected in public accounts. Revenues thus showed only a slight fall, of around 1% last year, compared to -4% for the eurozone on average. The shock was limited by the good performance of household taxes and social security contributions as well as the rapid rebound in VAT revenues after the slump in spring 2020. STATEC expects a rebound in growth in public revenues, slightly higher than 7% per year in 2021 and 2022.

The exceptional increase in public spending in 2020 (+14%) is largely the result of measures taken to counter the effects of the COVID-19 crisis. But the expansion remains significant even by removing these extraordinary expenses and neutralising the impact of inflation. According to STATEC, public spending is expected to stagnate overall in 2021, before rising by around 4% in 2022.

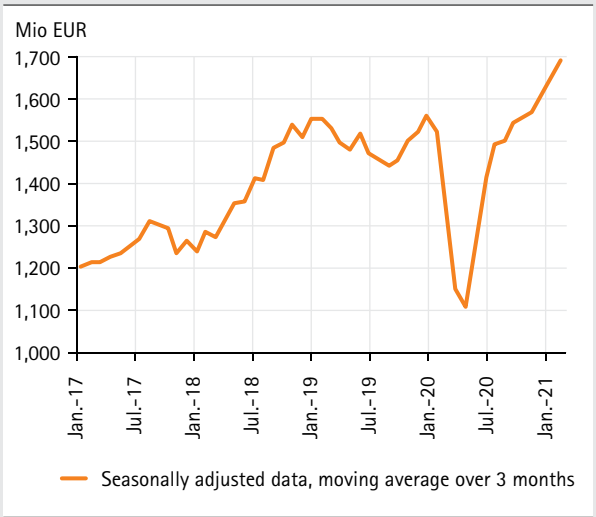
Luxembourg thus has a deficit of 4.1% for 2020, which is certainly historic, but which is the lowest in the entire eurozone. According to STATEC forecasts, the public balance is expected to move closer to balance this year (-0.7%) and become slightly positive next year.

Table 5.1
Household taxes and social security contributions cushioned the decline in public revenues last year

	2019	2020	2020/2019 development	
			In EUR Mio	In %
VAT	3,948	3,843	-105	-2.7
Taxes on households	5,865	6,235	370	6.3
Corporate taxes	3,921	3,036	-885	-22.6
Subscription tax	1,036	1,050	14	1.3
Excise duties	1,604	1,439	-165	-10.3
Other	1,640	1,604	-36	-2.2
Total tax revenues*	**18,015**	**17,208**	**-807**	**-4.5**
Social security contributions**	**7,715**	**8,116**	**401**	**5.2**

Sources: Administration des contributions directes (ACD) (Direct Tax Authority), Administration de l'enregistrement et des domaines (AED) (Luxembourg Registration Duties, Estates and VAT Authority), Administration des douanes et accises (ADA) (Customs and Excise Agency), Inspection générale de la sécurité sociale (IGSS) (General Inspectorate of Social Security)
* Data on a cash basis, different to data from national accounts.
** Quarterly data produced according to the ESA 2010 approach, national accounts.

Graph 5.1
Tax revenues rise above pre-crisis levels



Sources: Tax authorities, STATEC

Sharp increase in tax revenues in early 2021

Last year, tax collections fell by 4.5%, mainly due to a sharp decline in the 2nd quarter. On the one hand, this reflects the deterioration in tax bases during confinement, but also the extension of payment terms. Tax revenues then picked up again and are still very dynamic at the beginning of the year, exceeding their pre-crisis levels (see graph 5.1).

Household taxes held up best last year (+EUR 370 million w.r.t. 2019, see table 1), benefiting from government stabilisation measures. They fell comparatively little in spring 2020 and have been on a largely upward trajectory ever since. In contrast, corporate taxes weighed heavily on results in 2020 (-EUR 890 million year-on-year), which is explained in particular by the very high level of revenues in 2019 and the postponement of collections beyond 2020. Excise revenues also suffered significantly in 2020 and remain affected at the beginning of the year by the moderation in fuel sales.

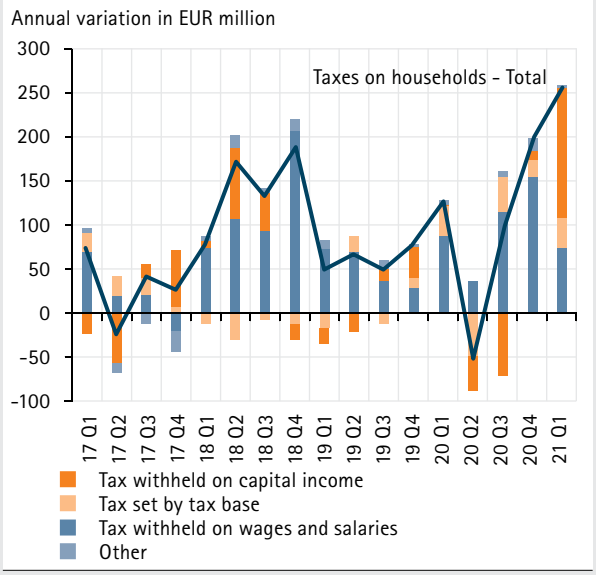
The increase in social security contributions remained high in 2020

Alongside taxes on household income, social security contributions[1] have been the second most stable factor for public revenues over the past year. These two types of revenue, accounting for almost half of the total over the past few years, were supported by replacement income paid by the public authorities (short-time working in particular) and subject to taxes and contributions.

The increase in social security contributions thus moderated only slightly, from just over 5.5% for 2018 and 2019 to 5.2% for 2020. This resilient dynamic also stems from the index bracket paid in January 2020 as well as the high resilience of employment, which continued to grow. According to STATEC forecasts, contributions will increase at the same pace again this year, before accelerating to almost 7% in 2022 under the impact, in particular, of the new index bracket planned for the end of 2021 (which would thus have more influence over next year's salary growth, see chapter 3).

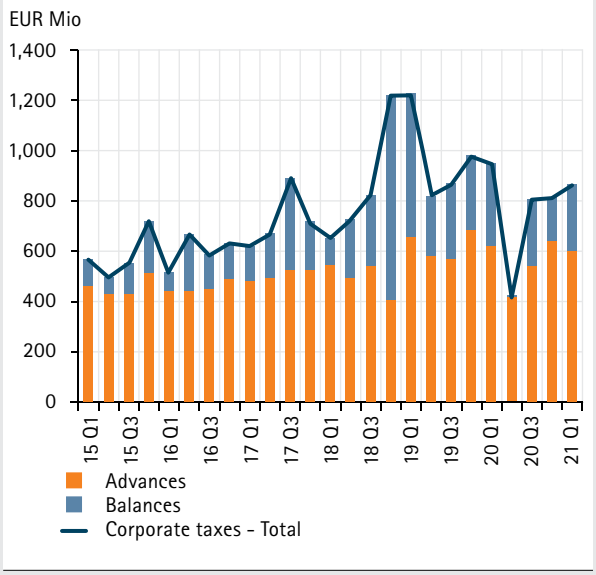
[1] For social security contributions, STATEC refers to the data produced according to the ESA 2010 approach, which records the contributions over the period to which they relate, regardless of when they are collected (no impact of the additional deadlines granted).

Graph 5.2
A rise in household taxes largely supported by capital income in the 1st quarter of 2021



Sources: ACD, STATEC

Graph 5.3
Corporate taxes far from previous highs



Sources: ACD, STATEC (raw data)

Taxes on households little affected by the crisis

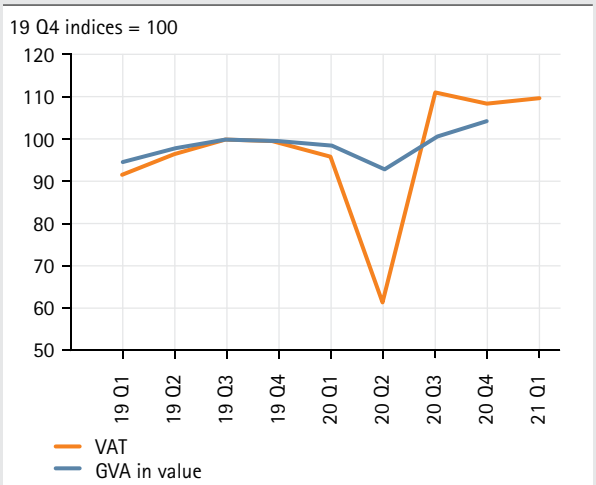
Household taxes are instrumental to last year's high resilience in tax collections and their momentum into early 2021. In 2020, their growth even increased compared to 2019, from 4.4% to 6.3%, supported by the last index bracket and replacement income paid to households. Their main component, the share retained on wages (RTS), therefore increased significantly by around 10% in 2020. After slowing down in the 2nd quarter of 2020, it regained momentum for the rest of the year.

At the end of the first 4 months of 2021, the increase in the RTS (+9% year-on-year) continued to support that of taxes on households (+17%). The latter was also driven by the surge in taxes on capital income (+140%, or EUR 115 million, following -19% in 2020), levied when companies pay dividends (this is a very volatile tax). The share set by tax base (based on tax returns) also increased significantly at the beginning of 2021 (+37%), reflecting both its recent momentum and its decline in spring 2020. The postponement of the deadlines for submitting returns (in 2020 and 2021) as well as the impact of the crisis on household income could continue to affect its trajectory. In total, growth in household taxes is expected to accelerate to +8-9% in 2021/2022 – according to STATEC forecasts – based on a revitalisation of household income.

Corporate taxes: a fall to be put into perspective

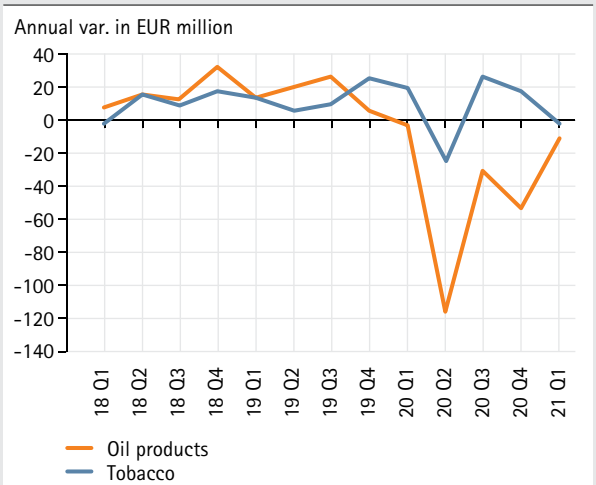
The collapse in corporate taxes of 23% in 2020 does not really reflect the impact of the crisis on corporate profits. Due to significantly inflated revenues over previous years, linked above all to the acceleration of collections thanks to automatic taxation and electronic reporting, STATEC had already anticipated their decline before the emergence of the crisis. This decline was reinforced by the payment deferrals granted (of more than EUR 200 million, see study 7.1). And even if companies still have the option of requesting the adjustment of their quarterly advances to their profit expectations, a shock on profits usually manifests itself with a delay (of one or more years) on the taxes collected.

Graph 5.4
Since their rebound, VAT revenues remain high



Sources: AED, STATEC (seasonally adjusted data)

Graph 5.5
Excise duties on oil products suffered significantly last year



Sources: ADA, STATEC

In the case of the recent crisis, the fiscal shock should be limited by the high degree of concentration of taxes in activities that have resisted the crisis relatively well. In 2019 and 2020, almost 80% of revenues came from the financial sector, compared with less than 1% from the hotel, restaurant and catering sector. According to STATEC, the rebound in financial sector profits in 2021 (supported by the rebound in stock markets) as well as the collection of deferred revenues should increase corporate taxes by around 6% in 2021 and 2022. However, they would no longer find their 2019 record level in this horizon[2].

VAT revenues are catching up

While VAT revenues usually change at a rate similar to their aggregated tax base, i.e. nominal added value, they suffered a much more pronounced deterioration in spring 2020 (see graph 5.4). This discrepancy is partly explained by the payment deferrals granted (and early repayments, see study 7.1), giving rise to a catch-up in subsequent collections. Since their marked rebound in the 3rd quarter of 2020, VAT revenues have thus stabilised at a high level, linked to activity in Luxembourg relatively little affected by the restrictions linked to the winter wave of infections. The high resilience of VAT should also be explained by the relatively small share, compared to other countries, of final household consumption in VAT revenues (around 40% in 2018). Following the slight fall in revenue recorded in 2020, STATEC expects a rebound of more than 7% for this year, in line with that forecast for the nominal GDP. Growth would be slightly lower in 2022.

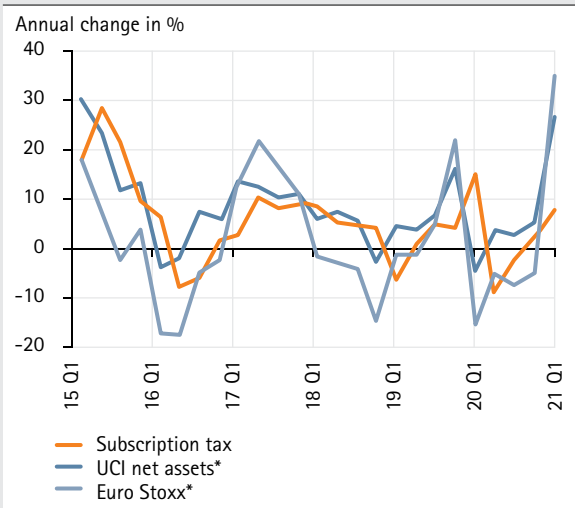
Excise duties on oil products struggle to recover

Excise revenues fell by 10% in 2020. This drift stems from the 20% fall in excise duties collected on sales of oil products, impacted by the economic downturn, the prolonged use of teleworking and reductions in travel (particularly cross-border, see chapter 6). In the 1st quarter of 2021, the related revenues remained below the levels of one year previously, despite (or even due to) an increase in excise duty following the introduction of the CO_2 tax. The latter would also weigh on fuel sales[3] so that the related excise duties would not fully reach the 2019 level this year. STATEC forecasts an increase of 20% for 2021 and a little more than 7% for 2022 (when the CO_2 tax will be increased from EUR 20 to EUR 25 per tonne)..

[2] These forecasts do not take into account a possible reform of corporate taxation at international level, currently under discussion, which could significantly influence future revenues in Luxembourg.

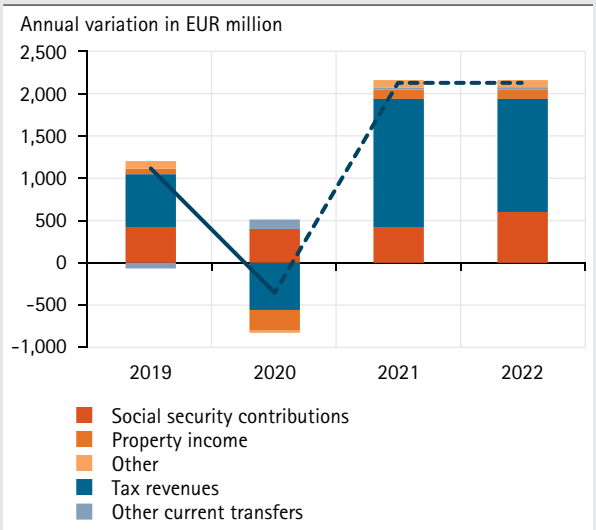
[3] At the beginning of the year, it is difficult to quantify this impact since the restrictions linked to the pandemic vary over time.

Graph 5.6
Subscription tax revenues are expected to rise sharply in the 2nd quarter of 2021



Sources: AED, CSSF, Macrobond, STATEC
* Values for the last month of the quarter

Graph 5.7
Total public revenues should increase by more than EUR 2 billion in 2021 and 2022



Source: STATEC (forecast for 2021-2022)

Tobacco excise duty has also been affected by cross-border travel restrictions. The possibility of storing the products in question has nevertheless made it possible to limit the overall impact. While cigarette sales stagnated last year, rolling tobacco sales increased by 13%, bringing the increase in related excise duties to 6% in 2020. STATEC forecasts an acceleration to +11% for 2021, then +8% in 2022.

Stock market rebound reinvigorates subscription tax

Revenues from the subscription tax are expected to benefit this year from the significant recovery in stock prices since their decline in the 1st quarter of 2020. The value of assets managed by investment funds (undertakings for collective investment - UCIs), the main tax base, fluctuates according to stock market developments. STATEC expects growth of 18% for this year (reflecting the observed and expected growth of the Euro Stoxx 50 stock index) following a near-stagnation last year.

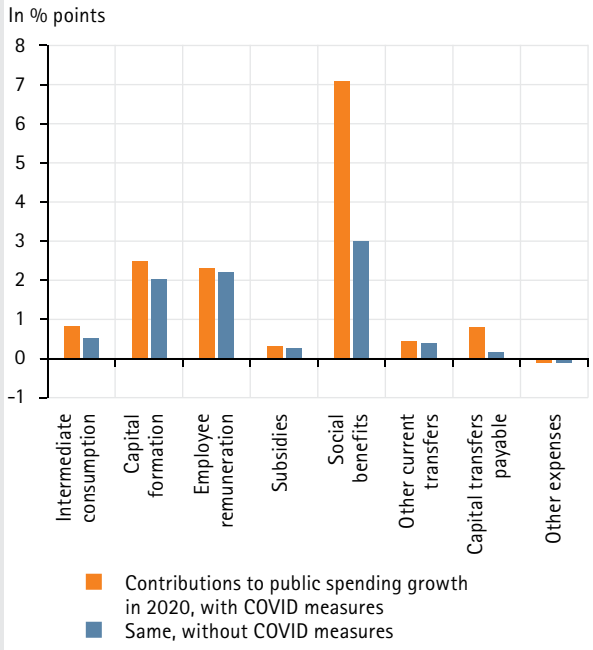
Limited decrease in public revenues in 2020, acceleration planned for 2021-2022

Total public revenues fell slightly, by 1.2%, in 2020. Like the GDP, this result is appreciable in comparison to Europe (-4.2% on average for the eurozone). It should be noted, however, that the braking effect (change in 2020 compared to the average variation in 2017-2019) is similar between Luxembourg and the eurozone (almost 8 percentage points). Luxembourg's public revenues increased by almost 6.5% per year on average over the pre-crisis years.

Among other revenues (excluding social contributions and tax revenues, i.e. 10% of public revenues), property revenues stand out with a substantial downward contribution in 2020 (- EUR 250 million, i.e. -30% compared to 2019). This decline should be linked to the reduced collection of dividends, particularly from the BCEE (temporary ban on the distribution of profits). On the other hand, other current transfers increased, mainly due to the EUR 80 million to be received from the EU under the REACT-EU programme (see study 7.1).

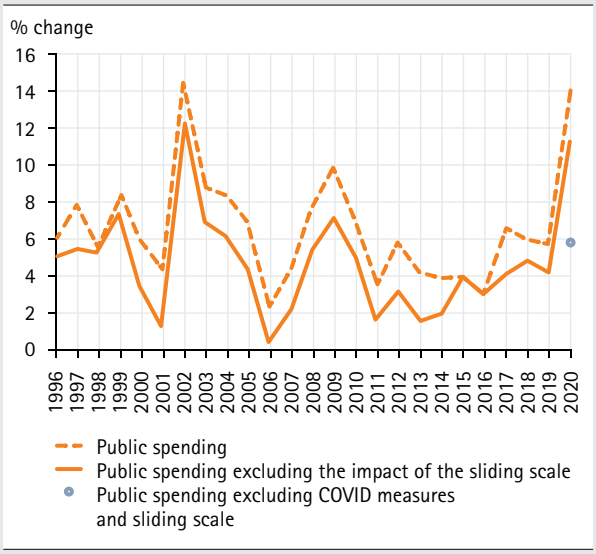
In its central scenario, STATEC expects the revived momentum of public revenues with increases of 7% to 8% per year in 2021 and 2022.

Graph 5.8
Social benefits added 3 percentage points to public spending growth in 2020 due to COVID measures



Source: STATEC

Graph 5.9
Marked growth in public spending even without COVID measures



Source: STATEC

Steady acceleration in public spending since 2011, culminating in 2020

Between 1995 and 2010, the average increase in actual public spending (excluding the impact of the sliding scale) was 5% per year. The 2011-2019 period saw a moderation of these same expenses, with an average increase of 3% per year, but characterised by a trend acceleration (see graph 5.9): from around +2% at the beginning to +4% in 2018/2019.

In 2020, even without the COVID-19 crisis, public spending would have continued to accelerate, with an actual increase of almost 6%. It should be noted that the expenses related to the acquisition of a military aircraft by Luxembourg contributed significantly to this, for EUR 200 million (without invalidating the linear acceleration observation previously made). Other major contributions (excluding COVID-19) come from public investment excluding military aircraft (1 percentage point) and payroll (2 percentage points, half of which is attributable to the sliding scale).

In nominal terms, public spending growth for 2020 stands at +14% above the European average (+9%). This difference is partly explained by its structurally higher growth in Luxembourg. However, the acceleration compared to the pace of recent years is also slightly higher.

Social benefits severely impacted public spending in 2020

The surge in public spending in 2020 must, of course, be put into perspective with public support measures designed to alleviate the economic and social consequences of the COVID-19 crisis. One particular study (7.1) is also included in this Note de conjoncture. In total, the measures in terms of actual expenditure (therefore, for example, excluding guarantees or tax deferrals) amount to EUR 1.5 billion. With a Keynesian multiplier of 0.5, these expenditures would have increased economic activity (real GDP) by 1.5 percentage points. It is therefore a significant and profound intervention in the economic matrix, which aimed to keep all of the workers in employment and maintain the support for many companies forced to completely or partially stop their activities.

Table 5.2
Evolution of public spending with and without COVID measures[1]

	2019	2020	2021	2022	2020	2021	2022	2020	2021
			With measures (1)			*Without measures (2)*		*Measures (1-2)*	
								EUR million	
Total expenses	**26,877**	**30,654**	**30,671**	**31,840**	**29,152**	**30,061**	**31,840**	**1,502**	**610**
Intermediate consumption	2,669	2,888	2,800	2,910	2,811	2,784	2,910	77	16
Capital formation	2,564	3,231	2,994	3,324	3,106	2,924	3,324	125	70
Employee remuneration	6,321	6,942	7,021	7,302	6,914	7,019	7,302	28	2
Social benefits	11,534	13,429	13,368	13,983	12,340	13,063	13,983	1,089	306
Other expenses	3,789	4,165	4,487	4,321	3,982	4,271	4,321	183	216
				% change	*Contributions to total growth excluding measures (percentage points)*				
Total without measures[1]		**8.5**	**3.1**	**3.8**	**8.5**	**3.1**	**3.8**		
Intermediate consumption		5.3	-1.0	3.9	0.5	-0.1	0.4		
Capital formation		21.1	-5.8	11.0	2.0	-0.6	1.1		
Employee remuneration		9.4	1.5	4.0	2.2	0.4	0.9		
Social benefits		7.0	5.9	4.6	3.0	2.5	2.0		
Other expenses		5.1	7.3	-3.7	0.7	1.0	-0.5		

Sources: STATEC, Ministry of Finance
[1] Total measures resulting in actual expenditure (see study 7.1)

The major contribution to the evolution of public expenditure thus comes from social benefits (in cash and in kind, see graph 5.8), i.e. approximately 4 points of the total increase of 14%. Other large contributions are divided around 0.5 percentage points each (capital formation, intermediate consumption and capital transfers). Of the additional 1.1 billion in cash benefits linked to the crisis, the majority (63%) go to short-time working, with the rest divided between family leave (26%) and sick pay (12%).

Necessary and far-reaching support measures

Budgetary support measures are the largest ever taken in the recent economic history of Luxembourg (i.e. since 1995) in a crisis phase, on the expenditure side. The only real benchmark is the 2008/2009 financial crisis. At the time, the Luxembourg State injected EUR 330 million (in terms of actual economic support expenditure) or just under 1 GDP point. As a reminder, the 1.5 billion in actual expenditure incurred in 2020 represents a little more than 2 GDP points.

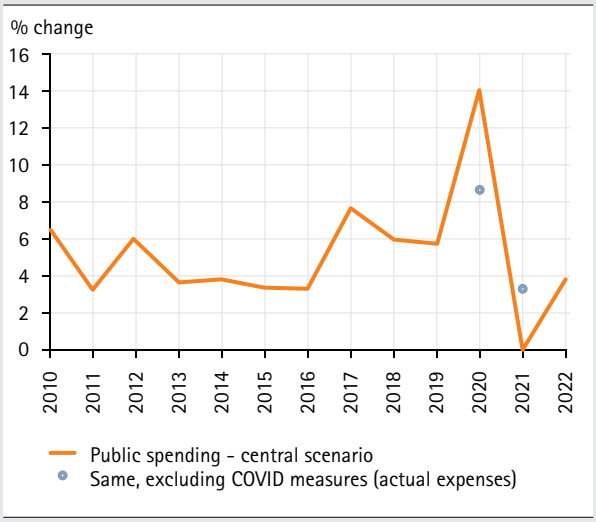
On the other hand, if we take into account revenue (taxes), the scale of recent actual spending measures no longer seems so exceptional. While in 2020, measures to support the economy primarily focused on the expenditure component, between 2008 and 2010, significant tax relief had also been implemented (EUR 800 million or around 2 GDP points). In another example, between 2001 and 2002, a significant tax relief was decided, for both companies and households, for approximately EUR 750 million or just over 3 GDP points.

Table 5.3
Public finance (central scenario)

	2020 levels	1995-2020	2020	2021	2022
	EUR Mio	% change unless otherwise specified			
Total expenses	**30,654**	**6.5**	**14.1**	**0.1**	**3.8**
Intermediate consumption	2,888	6.6	8.2	-3.0	3.9
Capital formation	3,231	7.1	26.0	-7.3	11.0
Employee remuneration	6,942	5.9	9.8	1.1	4.0
Social benefits	13,429	6.8	16.4	-0.4	4.6
Other expenses	4 165	6.4	9.9	7.7	-3.7
Total revenues	**28,034**	**5.9**	**-1.2**	**7.7**	**7.2**
Taxes on production and imports	7 070	5.7	-1.4	10.4	6.3
Current taxes on income, wealth, etc.	10,043	6.1	-4.5	7.7	7.9
Social security contributions	8,116	6.2	5.2	5.2	6.9
Other income	2,805	4.9	-6.1	8.1	7.3
Financing capacity/ requirement (% of GDP)	**-2,620**	**1.7**	**-4.1**	**-0.7**	**0.7**

Source: STATEC (2021-2022: forecast)

Graph 5.10
Increased public spending, even without actual crisis-related amounts



Source: STATEC (2021-2022: forecast)

An upward revision of public spending in 2021 due to an increased volume of aid

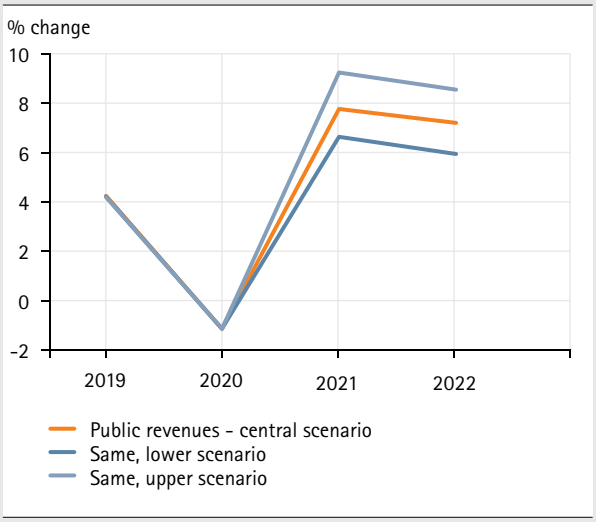
Public spending is expected to stagnate in 2021 and increase again in 2022 (+3.8%). In the previous forecast, STATEC still admitted a 4.5% drop in spending in 2021. However, due to the very large volume of expenditure incurred to combat the effects of the COVID-19 crisis, expenditure net of measures should be studied (see table 5.2 and study 7.1), in order to neutralise the base effects. Thus, in the previous forecast, expenditure for 2021 had been established under the assumption that the measures undertaken to combat the crisis would end at the end of 2020 (the volume of aid planned for 2021 was therefore zero).

Indeed, in autumn 2020, the extent of the winter wave could not be precisely anticipated, much like the corresponding expenditure. From the autumn and winter months, however, as the situation worsened, new measures came to fruition, resulting today in a total predictable expenditure for 2021 of EUR 600 million. *Ceteris paribus*, they add around 2 percentage points to the total expenditure for this year. Another factor accelerating spending is inflation, which has recently been revised upwards It adds 0.2 percentage points in 2021 (and even 0.4 in 2022).

Non-COVID spending should slow considerably in 2021

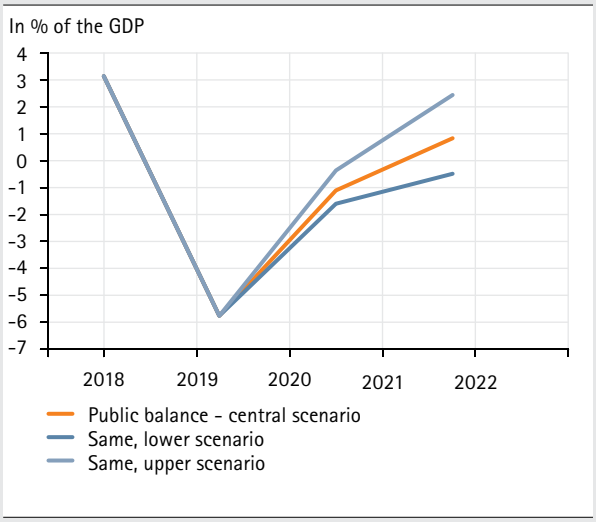
In 2020, the increase in spending net of measures was 8.8% (+14.5% including measures). In 2021, non-measure spending should be moderated, with the projected increase rising to 3.2%. The main positive contributions should come from social benefits (2.5 percentage points) and "other expenses" (transfers, subsidies, etc.: 1 point). While social benefits are traditionally one of the most dynamic elements of the state budget, it is not possible to isolate a particular factor that would generate the positive contribution of these "other expenses". Note only that the same quantities contributed 0.7 percentage points in 2020 (excluding measures).

Graph 5.11
Very dynamic public revenues in all scenarios



Source: STATEC (2021-2022: forecast)

Graph 5.12
At best, the public balance could reach +2% in 2022



Source: STATEC (2021-2022: forecast)

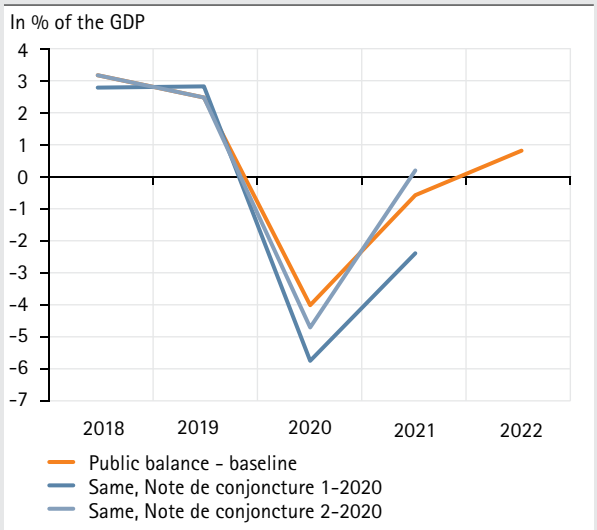
Payroll would add 0.4 percentage points, which is a contribution that can be described as historically low (+2.2 points still in 2020). This weakness is partly due to the assumption that the sharp increase in employment observed in public administrations in 2020 (+6.2%) would be followed by much weaker growth (+0.9%). The low impact resulting from the sliding wage scale (+0.2%) and the stagnation of the real value of the index point for public remuneration explain the rest.

The elements with a negative contribution to growth in public spending in 2021 would be capital formation (-0.6 point) and intermediate consumption (-0.1 point). It should be noted that capital formation is slowed by a base effect linked to the EUR 200 million accounted for in 2020 due to the acquisition of the military aircraft. But its share of total spending – or even the GDP – would remain high, even in 2022 (4.6% of the GDP forecast versus 3.5% in 2013, the last low point).

It should be noted that the growth in public spending forecast by STATEC is lower in 2021 (+0.1%) than in the Stability and Growth Programme (SGP, +1.3%). In absolute terms, the difference amounts to approximately EUR 450 million, of which EUR 200 million each go to the account for intermediate consumption and remuneration, the rest being related to capital formation (investments).

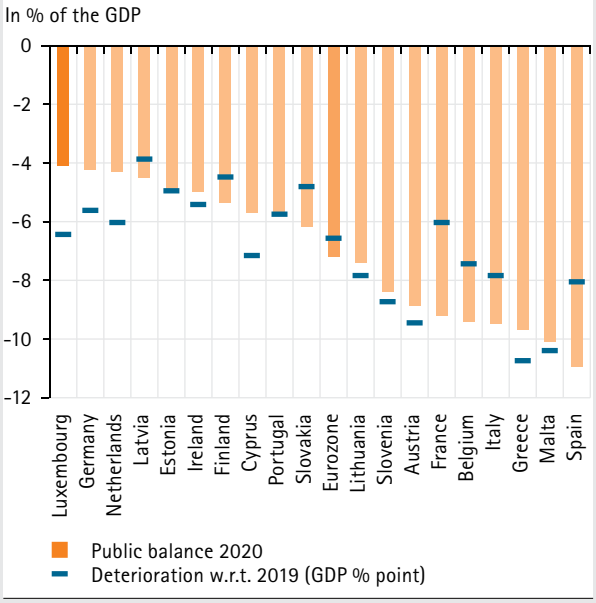
For 2022, STATEC expects public spending to rise by 3.8% (+1.5% in real terms). This downturn is largely due to the assumption that the COVID-19 crisis will no longer generate any direct expenditure next year, thus generating a new negative base effect. The move from EUR 600 million forecast for 2021 to zero in 2022 automatically removes 2 percentage points from the total increase in spending. Public employment, on the other hand, is expected to further increase (+1.7%); the sliding wage scale will play a fairly strong role (index bracket expected at the end of 2021, average annual increase at 2.3% in 2022) and, in general, the forecast is implemented "without a change in policy", therefore in the absence of consolidation measures. Thus, the public investment rate would remain one of the highest observed over the last ten years.

Graph 5.13
Given the high uncertainty, the forecast for the public balance has not changed much since last spring



Source: STATEC (2021-2022: forecast)

Graph 5.14
Luxembourg posts the lowest public deficit in the eurozone for 2020



Sources: Eurostat, STATEC

The public balance towards equilibrium in 2021 and 2022

The public balance posted a negative record in 2020 (-4.1% of the GDP), a result close to that forecast in autumn 2020 by STATEC (see graph 5.13). With this (temporary) deficit, Luxembourg is top of the eurozone leader board (-7.2% of the GDP on average, see graph 5.14). The deterioration in the balance compared with 2019 is still, at -6.5 percentage points, of an order of magnitude very similar to the European average. This is due to the considerable surplus (2.4% of the GDP) that Luxembourg recorded in 2019.

The slump in public finance primarily reflects the cyclical slump and – temporary – measures to counter the effects of the pandemic. Thus, the structural balance would only have fallen to -2.5% in 2020 and the two balances, nominal and structural, should recover quickly enough to show a slightly positive figure in 2022! This trajectory includes unchanged economic and budgetary policy measures.

In the most favourable scenario[4], a slightly more sustained increase in revenues for this year and next could bring the public balance to almost +2%. In the unfavourable scenario, the nominal public balance would remain slightly negative by 2022 (see graph 5.12).

[4] Alternative simulations are based on scenarios established by Oxford Economics and applied in Luxembourg using the STATEC macro-economic model (Modux, see table 2.5).

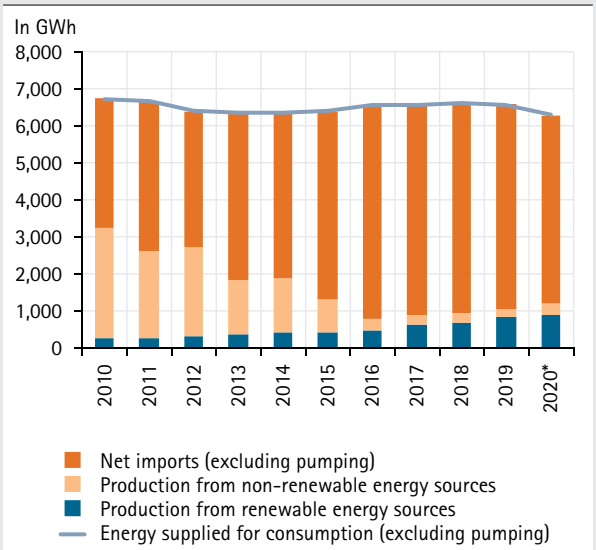
Energy and emissions 6

For the first time, STATEC includes the analysis of the energy situation and greenhouse gas emissions (GHG) in its Note de conjoncture. Decarbonisation of the economy is governed by climate objectives and the energy transition is its main pillar. In this new chapter, STATEC analyses the energy market in Luxembourg, the evolution of consumption and the corresponding direct GHG emissions. Since 2020, the latter have been an integral part of STATEC's short- and medium-term macroeconomic forecasts.

Limited by its territory, Luxembourg has always been among the most energy-dependent economies in Europe (95% of energy consumption is imported). However, domestic production – renewable electricity in particular – continued to grow in 2020 due to the increase in installed capacity.

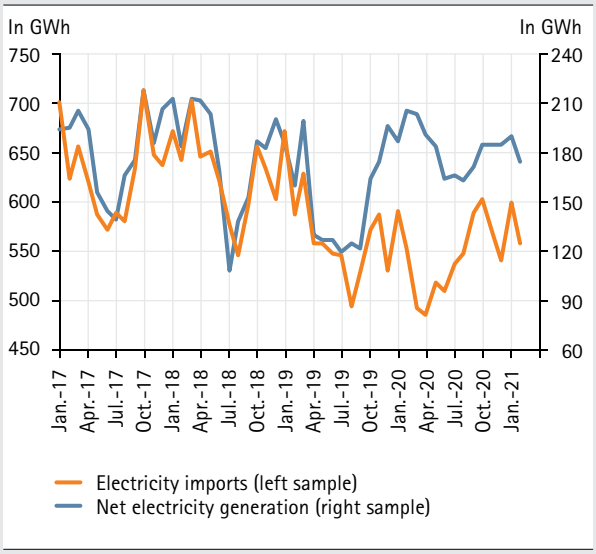
The downturn in economic activity linked to the pandemic crisis has resulted in a fall in energy imports (fuels, natural gas and electricity). With the lifting of restrictions and the resumption of activity, energy consumption and imports rebounded rapidly, nevertheless hampered by the introduction of the CO_2 tax on 1 January 2021. Following a 17% decrease in 2020, GHG emissions should increase by around 2.5% per year in 2021 and 2022.

Graph 6.1
Imports dominate electricity supply



Sources: ILR, STATEC (* estimate)

Graph 6.2
Increased production capacity



Source: STATEC

A largely imported electricity supply

As with most energy products, Luxembourg's electricity supply primarily consists of imports. Since 2010, non-renewable electricity production has gradually decreased[1] and net imports have increased accordingly. The latter account for 80% of the energy supplied in 2020, compared with just over 50% in 2010. At the same time, renewable electricity generation (wind, solar, biomass) is on the rise and now accounts for three quarters of national production. While in the national "labelling system"[2] renewable energies represent around 60% of the national mix of supplied electricity[3], the share of renewables in gross electricity consumption, as measured by Eurostat, remains relatively low in Luxembourg (11%, compared with 34% in the European Union[4]). Indeed, the European system determines this share as the ratio between national renewable energy generation and total electricity consumption (without taking into account renewable energy imports, which are relatively high in Luxembourg).

Continued increase in domestic renewable electricity generation

The evolution of electricity generation typically follows that of imports[5] (see graph 6.2), but 2020 shows a decoupling between the two. Unlike production, electricity demand fell as economic activity slowed. As Luxembourg imports the majority of its electricity, cyclical fluctuations in demand are predominantly reflected in imports, which fell by 23% year-on-year during confinement. These imports then returned to their pre-crisis levels in the last quarter of 2020, as did economic activity as a whole.

On the other hand, electricity production in Luxembourg remained at high levels throughout the year, benefiting from the increase in production capacity. While it fell in the European Union (-4% in 2020), it increased by 20% in Luxembourg (see graph 6.3). Thus, unlike imports, Luxembourg's electricity production does not appear to be subject to cyclical fluctuations in energy demand.

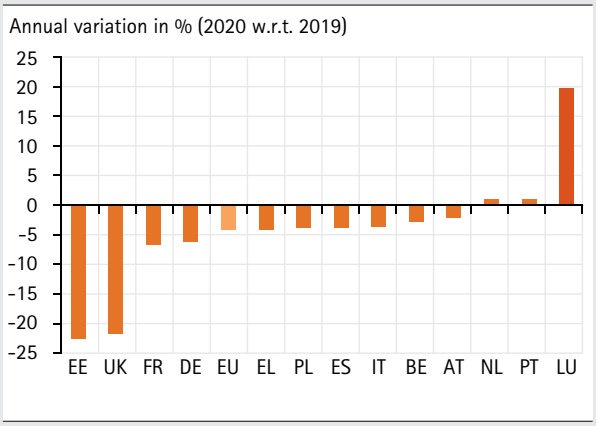
[1] The decline in electricity production until 2016 (in 2010 it represented 50% of the energy supplied, compared with 19% in 2020) is explained by the gradual closure of the largest gas plant.

[2] The labelling system is based on the Grand Ducal Regulation of 21 June 2010 and provides transparent information on suppliers' electricity offers (http://legilux.public.lu/eli/etat/leg/rilr/2020/07/10/a585/jo).

[3] Via the "guarantee of origin" market of the European Energy Certificate System, energy suppliers can sell 100% renewable products to residential customers.

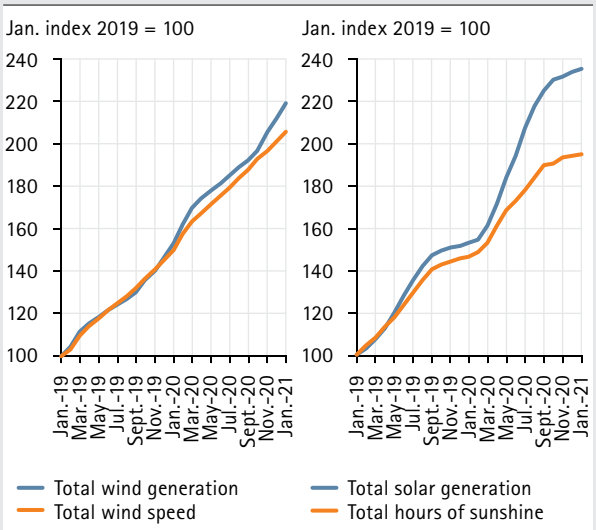
[4] 2019 data, published via EUROSTAT as part of SHARES (SHort Assessment of Renewable Energy Sources). The SHARES tool focuses on the harmonised calculation of the share of energy from renewable sources among EU Member States.

Graph 6.3
Electricity production in Luxembourg surged in 2020



Source: Eurostat

Graphs 6.4
Increased wind and solar energy capacity



Sources: STATEC, AgriMeteo (Merl station)

Renewables at the heart of rising electricity production

Given that Luxembourg imports more than 80% of its electricity, increasing its renewable energy generation capacity reduces its energy dependency. The increase in national electricity production in 2020 can be explained entirely by recent developments in renewable energy, with non-renewable energy falling by 9%. Solar and wind power, in particular, have experienced rapid growth in recent years via new installations, and now represent 3% and 6%, respectively, of the energy supplied for consumption.

With a total of 136 MW in 2019 (latest available data), the installed capacity of wind turbines is approximately four times higher than in 2005. The evolution of solar installations is even more impressive: their installed capacity increased sevenfold between 2005 and 2019, from 24 MW to 160 MW. In 2020, weather conditions were very favourable for wind and solar power generation[6], which increased by approximately 25% and 60%, respectively. While solar and wind power generation fluctuates according to weather conditions, the latter explain only part of the increase in generation in 2020, the remainder primarily being due to the increase in production capacity (see graphs 6.4)[7].

The rise in renewable energy comes, in particular, from the plummeting production costs linked to technological advances and economies of scale. The costs of solar panels have thus fallen by approximately 80% in 10 years[8], and by 25% for the price of wind turbines. The installation of new capacities is expected to accelerate further in the coming years: renewable electricity generation would increase by around 150 GWh per year according to the NECP[9] target scenario. The latter targets a 25% share of renewable energy in 2030 in Luxembourg's gross final energy consumption.

[5] The relationship between electricity imports and production is linked to changes in electricity consumption: when demand increases, production increases as much as production capacity allows and the lack of supply is then offset by an increase in imports.

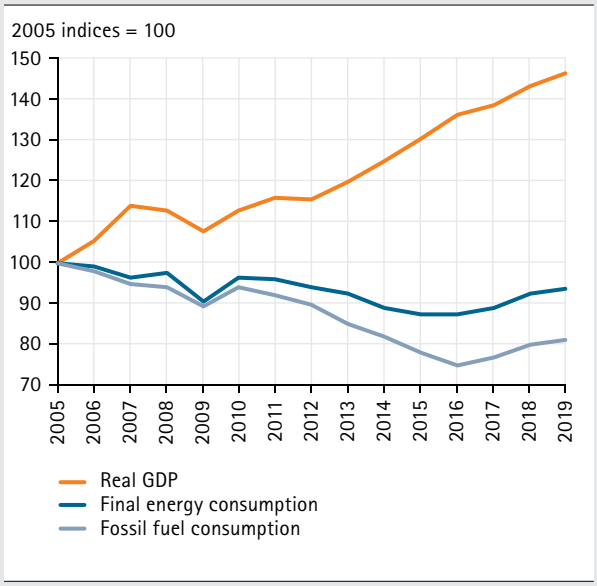
[6] In 2020, wind speed was higher (+11% w.r.t. 2019) and sunshine hours increased by 6% w.r.t. 2019 and 18% w.r.t. the average for the years 1981-2010.

[7] The cumulative (from January 2017) and indexed values for electricity generation and weather factors make it possible to highlight the role of the increase in production capacity in the evolution of wind and solar power generation.

[8] https://irena.org/publications/2020/Jun/Renewable-Power-Costs-in-2019

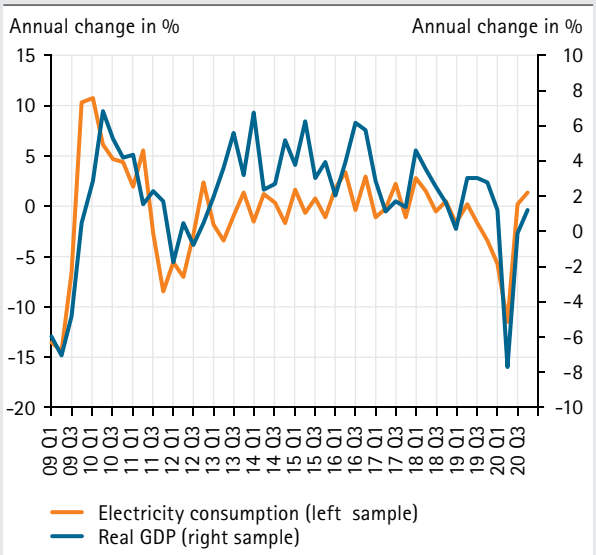
[9] Integrated National Energy and Climate Plan (NECP) for Luxembourg for the period 2021-2030.

Graph 6.5
Decoupling of economic growth and energy demand



Sources: STATEC, Eurostat (energy balance)

Graph 6.6
GDP in volume and electricity consumption



Source: STATEC

Energy demand decoupled from economic activity...

The evolution of economic activity (measured by the GDP) is historically correlated with that of energy consumption. However, this relationship has broken down in many countries, including Luxembourg, over the past fifteen years. This decoupling reflects the transition to a service economy[10], but also an improvement in energy efficiency. While the GDP grew almost continuously (+43% between 2005 and 2019), the final energy demand decreased slightly (-6% over the same period). Growth in activity therefore does not necessarily lead to an increase in energy demand.

Over the past ten years, this absolute decoupling has also been amplified by the decarbonisation of energy demand. Indeed, final consumption of fossil energy fell by approximately 20% between 2005 and 2019 (see graph 6.5). If the final energy demand fell by only 6% over the same period, this is explained by the steady and sustained growth of renewable energies (particularly biofuels).

... but other energy vectors respond well to cyclical fluctuations

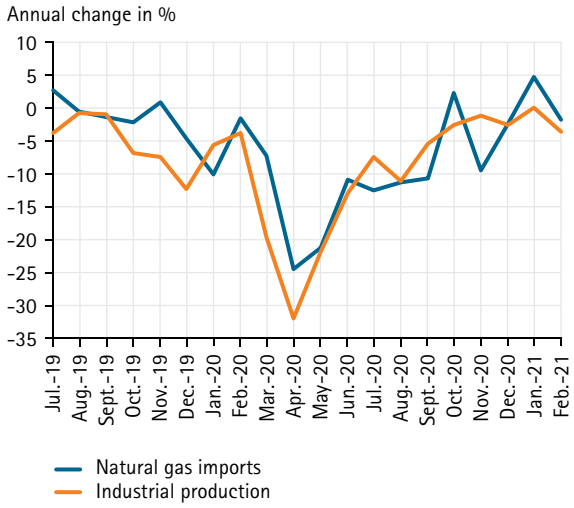
For some energy sources (such as electricity), consumption is a fairly reliable indicator of economic conditions. Health restrictions resulted in a severe shock to the GDP (almost 8% year-on-year in the 2nd quarter of 2020), which impacted electricity demand. With the restrictions put in place by the government, electricity demand thus fell by around 12% over the same period.

Although it can be assumed that households would have increased their electricity consumption during confinement (in particular with the generalization of teleworking or, more broadly, with the time spent at home), demand for residential electricity was almost unaffected[11]. In contrast, electricity demand of the tertiary sector declined by around 30% over the same period. Without more detailed data, however, it is not currently possible to determine the exact allocation of energy consumption to the various economic agents during the health crisis.

[10] Service-based economies tend to consume less energy than industry-intensive economies.

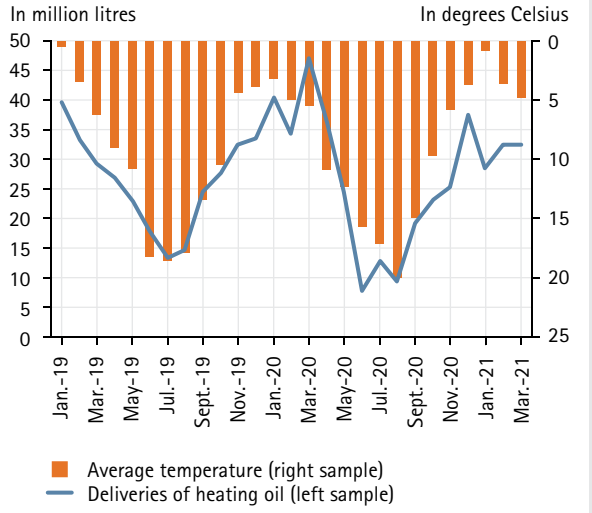
[11] Statement by the Ministry of Energy and Spatial Planning of 11/05/2020 (based on data from Creos Luxembourg).

Graph 6.7
Industry steps on the gas



Source: STATEC

Graph 6.8
Fuel oil consumption primarily influenced by temperature



Sources: STATEC, AgriMeteo (Merl station)

Rapid rebound in natural gas imports

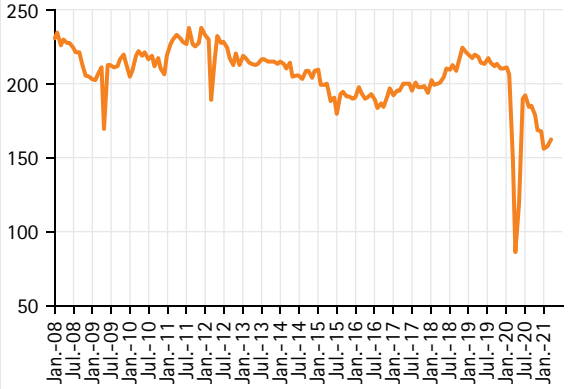
Natural gas imports are strongly correlated with industrial production (see graph 6.7), this sector being responsible for more than 50% of total gas consumption (the steel industry in particular). The start of the health crisis had severely hampered activity in industry. The latter experienced a marked decline in March and April 2020 (reduction in industrial production of more than 30% year-on-year), but it subsequently recovered significantly. As a result, gas imports fell by approximately 25% over the same period, but also recovered as industrial activity recovered. Entering into autumn, they almost reached their pre-crisis levels, but over the entire year they are down by approximately 10% compared to 2019.

Fuel oil changes with the seasons

Fuel oil, in turn, changes more with the seasons than with cyclical fluctuations. As more than three quarters[12] of consumed fuel oil is used for heating, deliveries increase in winter and decrease in summer. Unlike other oil products, fuel oil deliveries peaked in spring 2020 (+60% year-on-year), before falling to a fairly low level in June 2020 (decline of 60% year-on-year). The explanation for this development is twofold: on the one hand, fuel oil suppliers have probably strengthened their stocks to prepare for a possible supply shortage. On the other hand, lower crude oil prices may have boosted early orders, also explaining why deliveries fell further during the summer (with stocks already filled in the spring). Fuel oil deliveries rebounded in December 2020 (+12% year-on-year), but fell again in January 2021 (-24% compared to December), before stagnating in February and March 2021. This trend should be attributable to the anticipation of the CO_2 tax introduced on 1 January 2021 (+ 5 ct/litre).

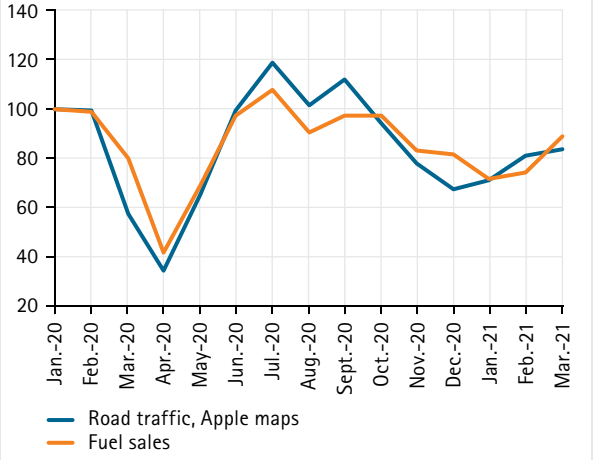
[12] 55% of annual fuel oil consumption is used for residential heating. In addition, service activities account for 60% of the remaining fuel oil consumption, mainly to heat offices, schools, sports halls and swimming pools. Thus, in total at least 80% of fuel consumption is devoted to heating.

Graph 6.9
Historical drop in fuel sales



Sources: Ministry of Energy, STATEC (seasonally adjusted data)

Graph 6.10
Less commuting, less fuel



Sources: Ministry of Energy, Apple Mobility Trends Reports

Rapid – but incomplete – rebound in fuel sales

COVID-19 confinement measures have limited domestic and cross-border movements, causing a collapse in fuel sales in Luxembourg (21% decline throughout 2020). At the height of the confinement, sales fell sharply by around 60% year-on-year (-82% and -56% for gasoline and diesel, respectively)[13], pushing sales to levels last seen before 2000. They then rebounded rapidly under the effect of gradual deconfinement, but did not return to 2019 levels, probably due to economic activity that has not yet returned to its pre-crisis level in many European countries. Travel restrictions, particularly the drop in road traffic, had a significant impact on fuel sales during the confinement. This observation is based on the close relationship between high-frequency road mobility indicators[14] and the volumes sold in service stations[15] (see graph 6.10).

Fuel sale recovery hampered by the CO_2 tax

Fuel sales fell again last winter (-19% and -28% year-on-year in December 2020 and January 2021, respectively). This decrease was partly due to new restrictions introduced in neighbouring countries and in Luxembourg, increasing, among other things, the use of teleworking. On the other hand, the introduction of the CO_2 tax (+5 ct/l and +6 ct/l including tax for gasoline and diesel, respectively) should have hindered fuel sale recovery coming into 2021. Indeed, a significant share of fuel sales is to non-residents (mainly professional road hauliers)[16], who react sensitively to prices. With the introduction of the CO_2 tax, the price differential at the pump in Luxembourg's favour has narrowed, while remaining substantial for individuals (between 15 and 28 cents per litre depending on the country and the product in the 1st quarter of 2021). Since the beginning of 2021, however, the prices of professional diesel[17] in Luxembourg have been around 5 cents above Belgian prices. According to STATEC forecasts, fuel sales should only rebound by 2% in 2021 and 4% in 2022, mainly as a result of a downward trend in diesel sales to professionals.

[13] The more marked decline in gasoline compared to diesel is due in particular to the fact that freight transport in the EU - despite having experienced a sharp decline - has not been as affected as individual travel.

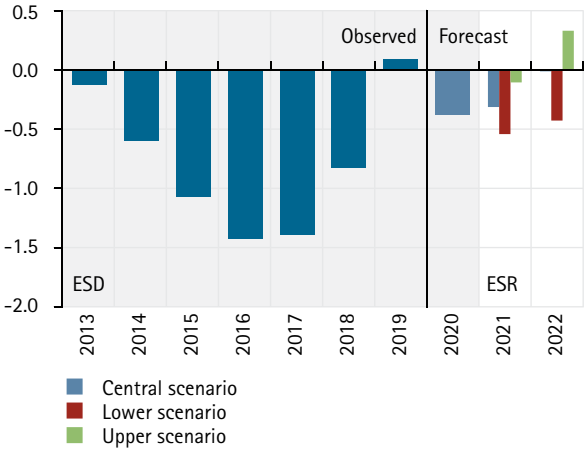
[14] Apple Mobility Trends Reports: https://covid19.apple.com/mobility

[15] The link between mobility indicators and economic activity is less obvious (see study 7.3).

[16] 80% of annual diesel consumption is attributable to non-residents (via transit and border traffic, in particular).

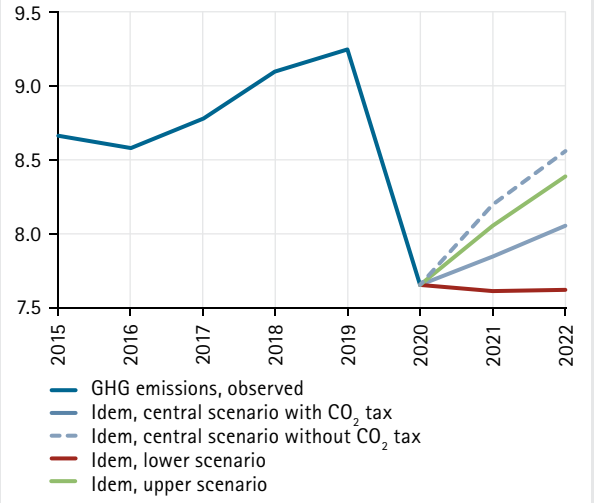
[17] Professionals can recover VAT and, in France and Belgium, part of excise duties.

Graph 6.11
2020 emissions target met, 'thanks' to the COVID-19 crisis



Sources: GHG emissions inventory, STATEC calculations (2020-2022: forecast)
Legislation on effort sharing: ESD (Effort Sharing Decision) from 2013 to 2020 and ESR (Effort Sharing Regulation) from 2021 to 2030.

Graph 6.12
GHG emissions declined in 2020, but a rebound is underway



Sources: GHG emissions inventory, STATEC (2020-2022: forecast)

Decline in greenhouse gas emissions in 2020...

Under the effort-sharing legislation[18], Luxembourg has committed to reducing its GHG emissions with intermediate stages set for 2020 and 2030. These targets are translated into annual emissions authorised for Luxembourg and it is the cumulative emissions balance at the end of the period (2013-2020 and 2021-2030, respectively) that counts[19]. Whereas, between 2013 and 2016, emissions were lower than allocated quotas (accumulation of -1.4 Mio tCO_2e), between 2017 and 2019 they were higher so that the level of the cumulative balance became positive in 2019 (+0.1 million tCO_2e, see graph 6.11). If emissions had continued to follow this upward trend, Luxembourg could only have met its objectives (-20% by 2020) by using emissions compensation certificates[20]. For 2020, STATEC expects GHG emissions to fall by around 17%, bringing the cumulative balance to -0.4 million tCO_2e[21].

... but rebound expected in 2021 and 2022

Although 2020 marked the biggest drop in GHG emissions on record, Luxembourg should expect a rebound in 2021. The rapid recovery in economic activity translates into a rebound in energy demand and therefore in GHG emissions. However, this rebound should be hampered by the introduction of the CO_2 tax: GHG emissions are expected to increase by 2.5% in 2021 compared with 2020, compared to +7% without the CO_2 tax (see graph 6.12). The CO_2 tax would therefore lead to a relative reduction in GHG emissions of 6% in 2022 (-11% in the lower scenario and -2% in the upper scenario[22]), without, however, leading to a sustainable decline in emissions.

With the start of the 2030 emission reduction period, the emissions balance is reset to zero in 2021. Luxembourg is thus facing a new emissions reduction trajectory leading to -55% by 2030. Compared to this trajectory, the balance would be negative in 2021 for all STATEC forecast scenarios. For 2022, the cumulative balance would remain negative in the lower scenario and would become zero in the central scenario. In the upper scenario, the cumulative emissions balance would become positive. It should be noted, however, that these projections are subject to a number of uncertainties, in particular on the evolution of freight transport and diesel sales to professional carriers.

[18] This legislation includes the Effort Sharing Decision (ESD), setting binding annual reductions from 2013 to 2020, and the Effort Sharing Regulation (ESR), setting binding annual reductions from 2021 to 2030. Pending the revision of the latter, a linear reduction leading to -55% was considered in accordance with the objective set out in the NECP.

[19] Total annual differences between authorised emissions and emissions observed by the GHG inventory.

[20] These compensation certificates are external credits that can be acquired from Member States giving off less emissions than those allocated to them.

[21] This thereby confirms the first STATEC forecast in this area (-0.47 million tCO_2e) which was made in the middle of the first confinement (NDC 1-2020).

[22] Compared to a central scenario without CO_2 tax. Alternative scenarios are described in table 2.5.

Thematic studies 7

7.1
Overview of aid granted in the context of the pandemic crisis

The measures taken by the Luxembourg State to manage the health crisis and limit economic damage resulted in an additional cost to public finances of around EUR 1.7 billion in 2020. While this amount is only a fraction of the budget envelope announced, the further deterioration of the health situation since last autumn has made it necessary to make greater use of and adapt the arsenal of measures. The STATEC thus expects additional expenditure of around EUR 600 million for 2021. Public support primarily involves social benefits and capital transfers. HORECA is the largest beneficiary.

To limit the spread of COVID-19, entire sectors of the economy had been temporarily immobilised and had to comply with the new health requirements while others suffered more indirectly from the downturn in economic activity. To prevent this episode from having a detrimental and lasting impact on the economic fabric – through mass unemployment and a wave of bankruptcies – governments around the world have put in place temporary measures to stabilise the economy. These measures are in addition to the systems already in place permanently called automatic stabilisers[1].

In Luxembourg, the first package of measures ("stabilisation programme") presented on 25 March 2020 constituted a lifeline shortly after the entry into force of the 1st confinement. It was mainly intended to ensure the survival of companies by supporting their liquidity, and to limit redundancies. The second large package ("Neistart Lëtzebuerg"), presented on 20 May 2020 in the context of progressive deconfinement, was aimed at relaunching and targeted support for branches whose activity remained affected as well as vulnerable households. Since last autumn, following the resurgence of infections and the tightening of health measures, the support measures system has been adapted and expanded, and certain periods of application extended.

Different implications on public finances depending on the type of aid

Commitments made by public authorities can be classified into 3 categories:

- Direct expenses;
- Tax deferrals;
- Loan guarantees.

According to national accounting rules (European System of National and Regional Accounts, ESA 2010), only expenditure in the first category would impact the public balance. Guarantees provided by the State, for a loan granted by a bank to a company for example, only give rise to disbursement in the event of non-payment and are therefore considered as a conditional commitment (and constitute a risk factor). As for tax payment deferrals, the European System of National and Regional and Accounts provides for the recording of revenue for the period in which the economic activity generating the tax obligation takes place. The public balance would therefore theoretically[2] not be affected by these additional payment terms. This does not mean that this measure would have no real impact: the deferrals can considerably relieve, temporarily, companies' cash flow and, on the other hand, encumber that of the State which may be forced to borrow more (impact on public debt). Added to this is the risk for the State that the company does not survive the crisis and is therefore ultimately no longer able to pay the taxes due.

[1] These include taxes and unemployment benefits, which stabilise the economy and affect the budget balance, even in the absence of intentional action by public authorities.

[2] This principle is not applied in practice for all tax categories (see direct taxes below).

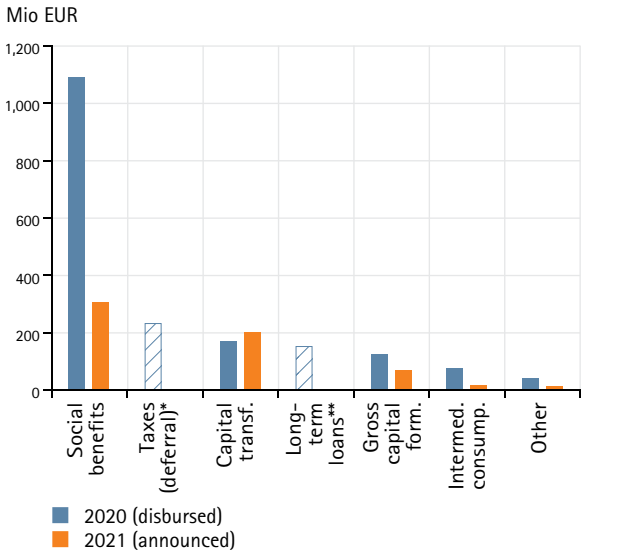
EUR 1.7 billion in aid in 2020

STATEC has included in its forecasts a total amount of aid of around EUR 1.7 billion for 2020 (i.e. 2.7% of the GDP) and EUR 610 million for 2021 (1.0% of the GDP). The gap between these amounts and the almost EUR 11 billion in aid announced for the "Stabilisation" and "Neistart" packages alone (see Draft Budget 2021) is explained on the one hand by the non-consideration of tax deferrals (apart from direct taxes) as well as loans (repayable advances) and guarantees[3] because they do not affect the public balance.

Secondly, STATEC is now based on the breakdown of the measures actually paid for 2020 when the amounts announced at the time constituted maximum disbursements, but not necessarily spent. In terms of direct expenditure, 57% of the dedicated funds were disbursed in 2020 (EUR 1.5 billion out of EUR 2.6 billion). For 2021, STATEC assumed that the budget allocated would be fully drawn and included in its forecasts a cost of measures of EUR 610 million. These assumptions are consistent with the central forecast scenario which assumes a gradual relaxation of measures from the 2nd quarter. In the event of a further deterioration of the health situation – as in the unfavourable scenario – the extension of existing measures and/or the introduction of new measures would be inevitable.

The State has supported economic players predominantly through social benefits (60% of the total in 2020, including more than half for short-time working) and capital transfers (9% of the total, see graph A and table A). In 2021, social benefits relating to COVID-19 measures are expected to fall sharply, while capital transfers could still increase compared to 2020. They are intended to stimulate and direct recovery by, in particular, supporting corporate investments. The deferral of corporate tax collection put public finances at around EUR 200 million in 2020. As for the EUR 150 million disbursed in respect of the repayable advance, this does not impact the public balance in view of ESA 2010. The fight against the health and economic crisis also goes hand in hand with additional expenditure on investment, intermediate consumption and remuneration over the two years.

Graph A
Social benefits have largely dominated the aid paid



Sources: Ministry of Finance, STATEC
* Deferrals of direct taxes affect, for the time being, the public balance in view of ESA 2010 (but could be reclassified later).
** Long-term loans do not affect the public balance in view of ESA 2010.

[3] EUR 4.6 billion was allocated to tax and social security deferrals and EUR 2.7 billion to guarantees.

Brief description of measures

Table A
Direct expenses – aid announced and paid until 31/3/2021 (EUR million)

	Category (ESA)	2020		2021	
		Announced	Disbursed	Announced	Disbursed
(1) Health and crisis management measures		240	221	86	10
of which:	GFCF		125	70	7
	Intermed. consump.		77	16	3
	Other current transf.		2		
	Remuneration		17		
(2) Measures in favour of education		30	47		2
of which:	Remuneration		11		2
	Social benefits		36		
(3) Measures in favour of employment (short-time working)*	Social benefits	1,310	629	275	52
(4) Extraord. leave for family reasons (COVID-19) and family support leave**	Social benefits	250	238	24	24
(5) Social assistance		50	41		0
of which:	Social benefits		40		
	Other current transf.		1		0
(6) Monetary compensation for illness**	Social benefits	160	146	7	7
(7) Direct aid to companies	Capital transf.	300	105	20	
(8) Recovery and solidarity fund	Capital transf.	200	52	145	37
(9) Measures to support investments	Capital transf.	30	2	35	
(10) Various sectoral aid		40	21	14	
of which:	Capital transf.		11		
	Subsidies		8	14	
	Other current transf.		2		
(11) Green and sustainable economic recovery	Capital transf./Subsid.	20	1		
TOTAL Direct expenses		**2,630**	**1,503**	**606**	**132**
(12) Repayable advances to businesses***	Long-term loans	400	152		1

Sources: Ministry of Finance, STATEC
* These are net amounts disbursed (disbursement recovery).
** Adjustment by STATEC of the amounts announced for 2021 by the Ministry of Finance to take into account disbursements until 31/3/21.
*** From an ESA perspective, the repayable advance does not directly impact public spending and the balance.

Expenses (direct)

1. **Health and crisis management measures:** these are expenses incurred by the State in direct connection with the fight against COVID-19 (acquisition of medical equipment, operating costs of emergency accommodation centres, use of the health reserve, monitoring of the population, vaccination campaign, communication costs, etc.).

2. **Measures in favour of education:** expenses related to the recruitment of additional supervisory staff and work-study programmes.

3. **Measures in favour of employment:** the measure of short-time working, which already existed before the health crisis for structural reasons, cyclical reasons (for certain eligible sectors) and cases of force majeure, has been extended to "short-time working due to force majeure linked to the COVID-19 crisis" in order to avoid any redundancies in companies affected by the pandemic (i.e. those that had to close following a government decision or that saw their activity fall sharply following the pandemic). Short-time workers received compensation capped at 80% of their salary (without being lower than the minimum social wage), which – at the start of the crisis – was put forward by the State, then paid by employers and reimbursed by the State. During the1st confinement, almost all branches and 100% of the workforce (excluding temporary workers) were eligible for short-time working (with the exception of the financial sector). Subsequently, the granting conditions became increasingly strict (eligible branches, permitted redundancies, recovery or retention plan, etc.) and the number of employees who could be placed on short-time working per company continued to fall. This special "COVID-19" aid should end at the end of the 2nd quarter, except for companies that have to close following a government decision. However, traditional short-time working will continue. In addition to short-time working, the measures in favour of employment extend unemployment benefits beyond the usual periods during the state of crisis (effective cost of EUR 7 million in 2020).

4. **Leave for special family reasons (COVID-19) and leave for family support:** this paid leave was introduced to help employees and self-employed workers who were forced to stop working following the closure of schools, care homes, establishments for people with disabilities or for the elderly.

5. **Social assistance:** doubling of the cost of living allowance for 2020 and extension of the maximum duration of support for higher education.

6. **Monetary compensation for illness:** to relieve companies, the CNS, from April to June 2020, directly covered every day of work incapacity due to illness or accident from the 1st day[4] thereof. Since July 2020, monetary compensation for illness has also been paid in the event of quarantine or isolation.

7. **Direct aid to companies:** since March 2020, several waves of direct aid (fixed or income-based, non-refundable) have been launched for self-employed people, micro and small enterprises as well as SMEs (max. 20 employees). This is supplemented by the "Neistart", a recovery aid for in-store retail (including personal care) for the months of June to August 2020 calculated on the basis of the number of employees (EUR 9 million paid for the latter aid).

[4] Additionally, a limit was frozen at 78 weeks of incapacity for work, see https://cns.public.lu/en/actualites/2020/indemnites-0107.html

8. **Recovery and Solidarity Fund (recovery aid) and aid for uncovered costs:** recovery aid is another direct aid, monthly, to the benefit of companies active in the areas severely affected by the crisis (HORECA, events, culture and entertainment, physical culture centres and – in a 2nd phase – in-store retail and similar and vocational training) having suffered a loss of their revenue of more than 25% over one year in a given month. Companies can apply for EUR 1,250 per month per active employee and EUR 250 per employee on short-time working. Announced as part of "Neistart" for 6 months (June to November 2020), this aid was then adjusted (in particular: increase in ceilings and inclusion of young companies) and extended twice to apply until June 2021. This aid must be considered in conjunction with the aid for uncovered costs, applicable between November and June 2021 and which may be requested by companies active in the same areas, provided that they have suffered a loss of revenue exceeding 40% over one year. Depending on their size, companies can be reimbursed by the State for 70% to 90% of uncovered costs[5]. These two forms of aid cannot be combined; eligible companies choose the most advantageous according to their situation.

9. **Measures to support investments:** companies in financial difficulty due to COVID-19 (reduction in revenue of at least 15%) may request a subsidy for development investments (max. 20-30% of eligible costs, plus a 20% increase if the project is part of the circular economy), process or organisation innovation (max. 50%) or energy efficiency (max. 50%). This aid was extended until the end of 2021. A second aid is aimed at investment or R&D projects for products contributing to combating the health crisis (max. 60%, plus a conditional increase of 15%).

10. **Various sectoral aid:** this groups together specific financial aid for tourism (in particular overnight vouchers), culture, sport and agriculture.

11. **Green and sustainable economic recovery:** this is a range of extensions and increases in purchasing premiums for energy renovation, heating systems based on renewable energies and soft mobility, both for the benefit of individuals and companies. Announced as part of "Neistart", the subsidy increases were due to expire in the 1st quarter of 2021, but were then extended (albeit with restrictions[6]) until the end of 2021 and the end of March 2022, respectively.

12. **Repayable advances:** announced as part of the stabilisation programme and subsequently adapted, the capital subsidy in the form of a repayable advance is granted, subject to conditions, to companies and self-employed people subject to temporary financial difficulties related to COVID-19. These funds lent by the State at an interest rate of 0.5% are intended to partially cover operating expenses. Aid cannot exceed 50% of eligible costs (staff costs and rent charges) and the ceiling of EUR 1.8 million per company (in total with other State aid). It applies for a period of 6 months (mid-March to mid-September 2020) and can still be requested until June 2021. The State will propose a repayment plan for the aid no earlier than one year after its granting[7]. While these funds have been disbursed for the benefit of companies, they do not affect public expenditure and the balance in the context of national accounts (ESA 2010) since they will, in principle, be recovered later by the State.

[5] Even, from February 2021, 100% if the loss of turnover exceeds 75%. At that time, the applicable ceilings were also raised and take-away immunisation made possible. See also:
https://paperjam.lu/article/gouvernement-precise-nouvelles
https://guichet.public.lu/en/entreprises/financement-aides/coronavirus/demande-aide-couts-non-couverts-nouveau-regime.html

[6] See Förderprämie für Hybridautos wird eingestellt (wort.lu)

[7] See Repayable financial aid to compensate for temporary financial difficulties caused by the COVID-19 crisis — Companies — Guichet.lu – Administrative guide – Luxembourg (public.lu)

Payment deferrals

- **Direct taxes:** as part of the stabilisation package, companies (including individual companies) were able to request the cancellation of direct tax advances for the first two quarters of 2020. For HORECA companies, this option was then extended to 4 subsequent quarters. Companies were also able to request the deferral of payment deadlines.[8] These measures would have resulted in lower revenues of around EUR 230 million in 2020 (-3 million forecast for 2021, according to the Ministry of Finance).

Following the registration, with a view to ESA 2010, of VAT and social security contributions for the period when the economic activity generating the tax obligation takes place, the two measures below do not have an effect on the public balance.

- **Indirect taxes:** with regard to indirect taxation (essentially VAT), companies were able to request, in spring 2020, a payment deferral or to benefit from the early repayment of VAT paid in advance.

- **Social security contributions:** the payment of social security contributions could also be deferred without giving rise to default interest. This measure was included in the stabilisation package of March 2020 and was renewed in early 2021[9].

Loan guarantees

- **State guarantee scheme:** in order to facilitate access to corporate bank credit, the State announced, as part of the stabilisation package, that it would guarantee 85% of new loans (maximum duration of 6 years). This measure was extended until the end of June 2021. As of 23 April 2021, the State guarantees granted represented a total loan amount of around EUR 190 million (of which EUR 160 million would therefore be guaranteed by the State).

- **Strengthening of export and international development assistance measures:** extension of guarantees granted to Luxembourg exporting companies (Office du Ducroire)[10]. According to the Ministry of Finance, guarantees granted in response to the COVID-19 crisis represent a total loan amount of more than EUR 100 million.

There are other guarantees and loans granted in the context of the health crisis but which could impact Luxembourg's public finances in the future in the event of default by the borrower. In addition to the aid for access to credit from the SNCI, the Société Nationale de Crédit et d'Investissement ("special anti-crisis financing", "special anti-crisis SME guarantee", max. EUR 600 million)[11], these are Luxembourg contributions, in the form of guarantees, to loans issued under the European Guarantee Fund of the EIB group and the "SURE" instrument of the European Commission (max. EUR 110 million)[12].

Without being exhaustive, the descriptions and tables above provide an overview of the main measures. In this context, the measures of lesser importance in terms of budgetary cost, or even without direct cost for the State (e.g. moratorium granted by some banks on loan repayment, rent freeze) are not detailed.

The main beneficiary sectors according to the type of aid

Industries can be affected in different ways by the crisis: forced stoppages, disruption of production due to lack of input or labour, costs of adaptation to health measures, fall in demand, etc. Thus, their needs diverge and therefore also their use of state aid. While it may be instructive to analyse the aid granted by type of activity, it should be remembered that the distribution depends on the request for aid, but also on the offer (measures proposed by the State and conditions of access).[13]

[8] For individuals as well as companies, the tax return deadlines for 2019 and 2020 have also been extended.

[9] Nouvelles mesures COVID-19 en matière de sécurité sociale destinées aux employeurs et aux travailleurs indépendants – Actualités – CCSS (Centre commun de la sécurité sociale) – Luxembourg (public.lu)

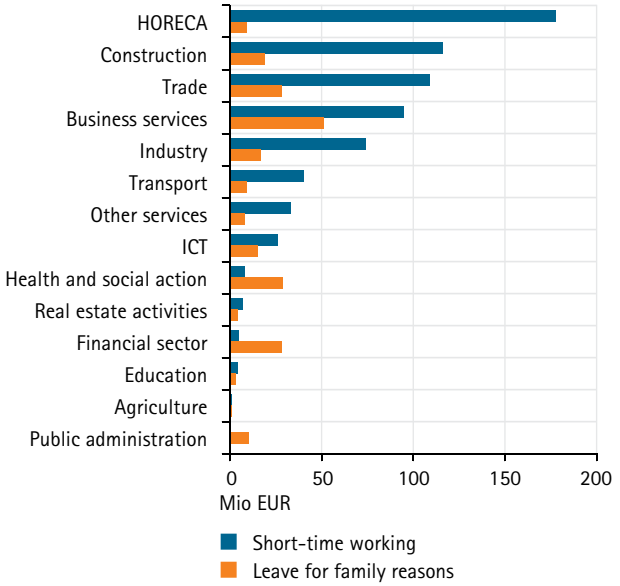
[10] See https://guichet.public.lu/en/entreprises/financement-aides/coronavirus/renforcement-aides-exportation.html

[11] See https://www.snci.lu/newsfeed/publications/covid-19-extension-anti-crisis-instruments/

[12] See https://www.bcl.lu/fr/publications/bulletins_bcl/Bulletin-BCL-2021_1/225773_BCL_Bulletin_1-2021_02_Chap2_6.pdf

[13] In this section, we focus on assistance to companies (including the state guarantee on loans) for which the breakdown by industry is available. While table A provides information on the amounts forecast and *disbursed* until 31/3/2021, here we consider the amounts *granted* (different deadlines). The amounts are therefore not directly comparable.

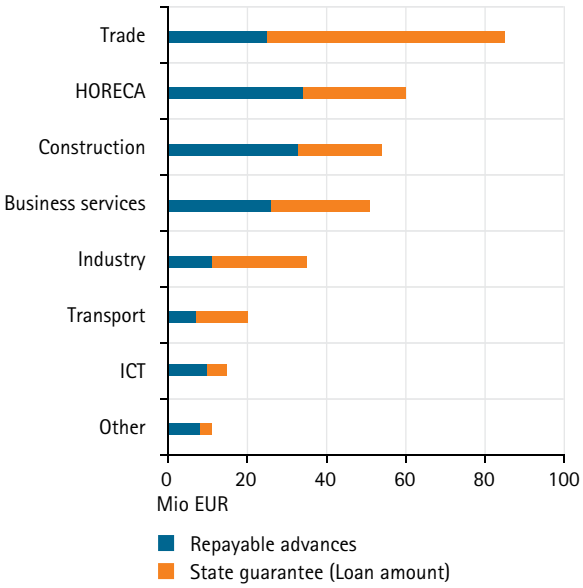
Graph B
HORECA, the main beneficiary of short-time working, business services leading for family leave



Sources: IGSS, STATEC
Note: Amounts paid until 30 April 2021 and for a period from 1 January 2020 to 28 February 2021. Amounts advanced by companies and reimbursed by the State.

Following forced closures and a lack of customers (reduced capacity following social distancing measures, but also reluctance on the part of some customers), HORECA made the most use of short-time working. The amounts paid until 30/4/2021 represent approximately 20% of the payroll for this sector in 2019 (compared with a maximum of 6% for the other sectors). HORECA, construction, trade, business services and industry account for 80% of paid short-time working, whereas they only represented around 40% of the payroll before the crisis (this difference is partly explained by the absence of short-time working in the public administration). With EUR 50 million, business services received the most compensation for absences of their employees for family reasons, followed by healthcare, trade and the financial sector (approximately EUR 30 million).

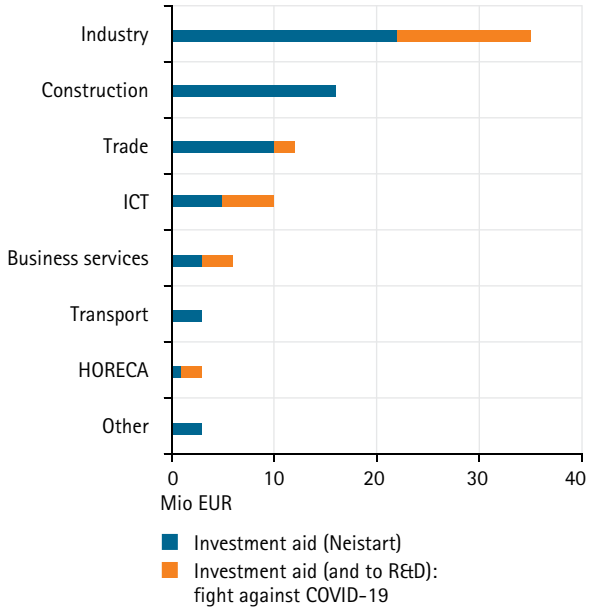
Graph C
Trade in need of liquidity



Sources: Ministry of Finance, Ministry of the Economy
Note: Amounts granted until 7/4/2021.

Even if the state guarantee does not directly affect public finances (see above), the loans granted accordingly can be combined with the repayable advance to reveal the increased need for liquidity following the COVID-19 crisis. This seems to have been the most pressing need for trade, which has acquired more than EUR 80 million from the State and from credit institutions by taking advantage of the State guarantee. If we compare these loans with the sectors' credit outstanding at the end of 2019, this new debt is most heavily weighted for the hotel, restaurant and catering sector (HORECA) (7%, compared to around 2% for trade, ICT and construction).

Graph D
Industry is the main beneficiary of investment aid

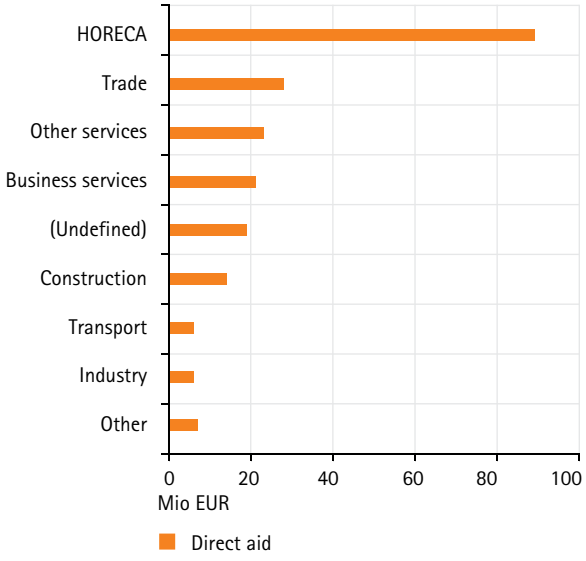


Sources: Ministry of the Economy, STATEC
Note: Amounts granted respectively until 7/4/2021 (COVID-19) and until 14/4/21 (Neistart).

As for measures to support investment, it is predominantly industry that uses these aids (40% of the total). As with trade and HORECA, these subsidies represent around 3% of the 2018 investment level, whereas this rate is twice as high for construction.

HORECA is by far the largest beneficiary of direct transfers. These include aid for companies (differing according to their size) and self-employed persons as well as the Recovery and Solidarity Fund (points (7) and (8) of table A). Aid to the HORECA sector represents more than 9% of the added value of this sector in 2019.

Graph E
Direct transfers, to HORECA in particular

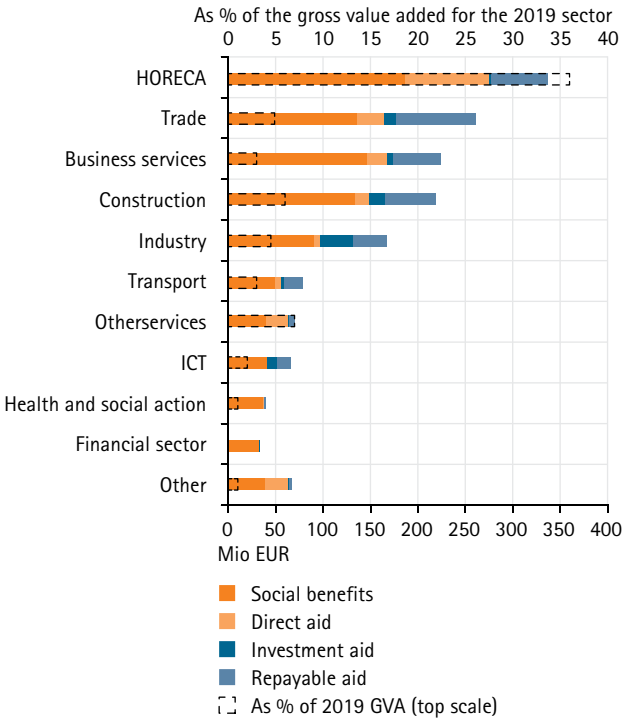


Sources: General Directorate for Small and Medium-Sized Enterprises, Ministry of the Economy, STATEC
Note: Amounts granted until 23/4/2021 for direct aid to companies (7) and the Recovery and Solidarity Fund (8).

In total, HORECA and trade benefit the most from the aid presented above. The top 5 sectors (see graph F) account for almost 80% of this aid and represented 35% of gross value added before the crisis. Relative support is the most significant for HORECA; it represents more than 35% of the value added for 2019. It is also the activity worst hit by the crisis, falling by 30% last year (according to initial estimates, see graph G).

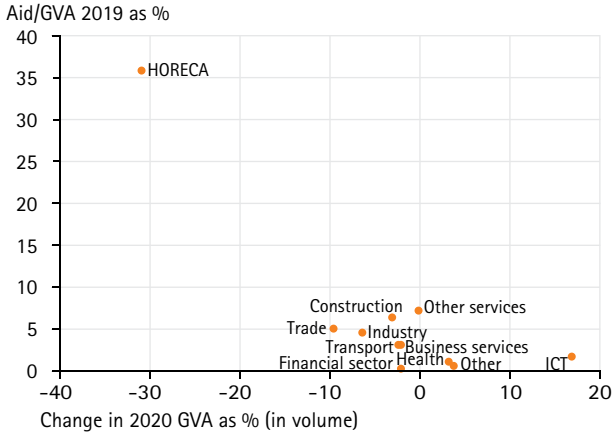
Other services (including arts, entertainment and recreational activities as well as activities for households) and construction were granted 6-7% of their value added for 2019. According to initial estimates, their activity suffered less last year than that of trade and industry (receiving aid for just under 5% of their 2019 GVA, see graph G).

Graph F
HORECA is the largest beneficiary of the main types of aid...



Sources: Ministry of the Economy, General Directorate for Small and Medium-Sized Enterprises, Ministry of Finance, IGSS, STATEC
Note: Non-exhaustive overview of aid granted to companies until spring 2021 (see previous sections for further explanations and respective deadlines).

Graph G
... and the sector having suffered by far the most major collapse last year



Sources: Ministry of the Economy, General Directorate for Small and Medium-Sized Enterprises, Ministry of Finance, STATEC
Note: The amount of aid considered corresponds to the total in graph F.

However, it should be remembered that this distribution by sector only concerns part of the State aid, for which the allocation is direct and for which the information is available. In addition, it is a mix of measures that support companies in a very varied way (e.g. direct transfers vs aid to access repayable liquidity). We could add to this the various sectoral aid, the amount of which is however relatively low.

Furthermore, an industry may indirectly benefit from assistance measures when they support other partner sectors. Or if the measures strengthen household disposable income, either overall (short-time working, cost of living allowance) or via subsidies for certain purchases (green and sustainable economic recovery, see table A).

Conclusion: impacts of temporary (on public finances) but persistent (on activity) measures

Discretionary government measures taken in Luxembourg (and elsewhere) have helped to avoid persistent damage to the economic fabric, supporting activities hit by pandemic-related restrictions. These measures significantly reduced the public balance in 2020 by EUR 1.7 billion (or 2.7 GDP percentage points), mainly through the increase in public spending, in particular social benefits. Although this overall amount is significantly lower than the amounts announced (which is partly explained by the non-consideration of certain transitional or hypothetical costs in the context of ESA 2010), it nevertheless represents, with 2.7% of the GDP, a significant budgetary boost, significantly higher than that given during the 2009 financial crisis on the expenditure side (forecast at 0.7% of the GDP)[14]. Around EUR 600 million would be added to this in 2021 (i.e. 1.0% of the GDP), as the crisis and its immediate effects are not over.

[14] See "Note de conjoncture 1-2009", STATEC, p. 39.

Like automatic stabilisers, counter-cyclical measures taken in Luxembourg in response to the health crisis are acting temporarily[15], which prevents them weighing on the budgetary trajectory in the medium or even long term. This is a desirable feature of an expansionary policy in times of crisis[16]. But too early fiscal tightening should be avoided. After the 2008/2009 crisis, the shift to austerity in Europe and a too-short recovery had stifled the nascent recovery, and led, unlike the United States, to a new recession from 2011 ("eurozone crisis").

In addition, the ex post budget cost is expected to be lower than the ex ante cost as a result of positive feedback effects (e.g. because the surplus activity – compared to a non-measures scenario – generates additional tax revenues). Given the historical magnitude of the recessive shock and its particular nature, it seems difficult or even impossible to establish a counterfactual scenario (shock without discretionary measures). Nevertheless, it seems obvious that the shock would have left the productive potential deeply scarred. This would have severely dampened the capacity for economic rebound in the medium term, undoubtedly causing further deterioration of public finances.

Box

Measures at European level

It is worth mentioning here the responses given to the COVID-19 crisis at European level. Not only do EU rules regulate the reactions of Member States, but Community initiatives also directly support actors in European countries (including Member States themselves). On the other hand, the financing of certain initiatives could impact the future public finances of the Member States.

- The European Commission's use of the **general escape clause** of the Stability and Growth Pact for the years 2020 and 2021 (and potentially 2022) gives Member States more flexibility in their responses to the crisis by suspending the rules governing levels of national deficit and debt.
- Competition rules within the EU severely limit the possibilities for Member States to support companies. In response to the crisis, the European Commission has adapted the **State aid rules** giving States more room for manoeuvre. Since the measures decided in Luxembourg are part of the European framework, an adaptation of the conditions and ceilings at Community level can be passed on to the aid in Luxembourg[17].
- While the **monetary policy** was already very accommodating before the emergence of the crisis, the European Central Bank introduced the unconventional instrument called the "pandemic emergency purchase programme" (PEPP). The aim is to allow economic players access to credit under relatively advantageous financing conditions (including the Luxembourg state, which currently borrows at negative interest rates).

[15] The measures are not entirely temporary in all countries: see "Report on Public Finances in EMU - 2020", European Commission, Institutional Paper 147, 2021, Graph I.2.3, p. 17.

[16] The IMF indicated in the context of the 2008/2009 crisis that an effective stimulus must be "timely, targeted and temporary".

[17] Cf. This was particularly the case when the European Commission announced at the end of January 2021 that it would raise the ceiling for aid per company from EUR 800,000 to EUR 1.8 billion.

Box continued

- After mobilising and redirecting available liquidity through structural funds (to the "Corona Response Investment Initiative"), the European Union created the "**SURE**" instrument (EUR 100 billion) under which it provides low-rate loans to Member States to help them finance their short-time working (and similar) schemes. The money comes from issuing social bonds in the name of the EU, guaranteed jointly by Member States (even if some, like Luxembourg, do not lend via SURE because they can finance themselves on the markets at even lower interest rates).

- With a budget of EUR 25 billion guaranteed by the Member States, the **European Guarantee Fund** of the EIB Group (European Bank and Investment Fund) mobilises additional liquidity for the benefit of European companies in temporary difficulty due to the COVID-19 crisis (up to EUR 200 billion, including EUR 130 billion for SMEs).

- The existing precautionary credit line with the European Stability Mechanism (ESM) has been adapted to the needs of the COVID-19 crisis ("**Pandemic Crisis Support**"). Eurozone states can borrow up to 2% of their GDP (i.e. a maximum of EUR 240 billion in total) to cover health costs (direct or indirect).

- The European Recovery Fund, named "**NextGenerationEU**" (EUR 750 billion for 2021-2023), has been established with the EU Multiannual Financial Framework (EUR 1,074 billion for 2021-2027) but still needs to be ratified by the parliaments of the Member States. Until the end of April 2021, 19 of the 27 Member States have carried out this ratification. The European Commission intends to borrow this EUR 750 billion from the financial markets from the summer of 2021 and will distribute them in the form of loans (EUR 360 billion) and subsidies (EUR 390 billion) to the Member States in order to create a green, digital and resilient post-pandemic Europe. This Recovery Fund contains the "Recovery and Resilience Facility" (RRF, EUR 672.5 billion) and REACT-EU as well as five other programmes also financed by the multiannual financial framework.

  To benefit from RRF funds, Member States must develop national recovery and resilience plans. These plans lay out reform and investment projects for the period 2021-2023 in line with the recommendations expressed in the past within the framework of the European Semester. Based on the allocation criteria, Luxembourg should receive EUR 93 million under the RRF over the period 2021-2023. Added to this is EUR 140 million as part of REACT-EU, which helps to finance, in particular, "large scale testing", the vaccination campaign and short-time working[18]. The European Commission should repay the borrowed funds over the period 2028-2058, either by creating new sources of income[19] or by increasing national contributions to the EU budget.

Finally, it should be remembered that the national recovery policies implemented by the Luxembourg trading partners will also have a knock-on effect on the Luxembourg economy ("spillover effects").

[18] See https://gouvernement.lu/fr/actualites/toutes_actualites/communiques/2021/01-janvier/22-react-eu.html

[19] Alongside a levy on plastic waste (introduced in January 2021), a digital tax, a carbon border adjustment mechanism and a tax on financial transactions are potential resources mentioned. See https://ec.europa.eu/info/strategy/eu-budget/long-term-eu-budget/2021-2027/revenue/potential-new-sources-revenue_en

7.2
Towards a slower increase in housing prices?

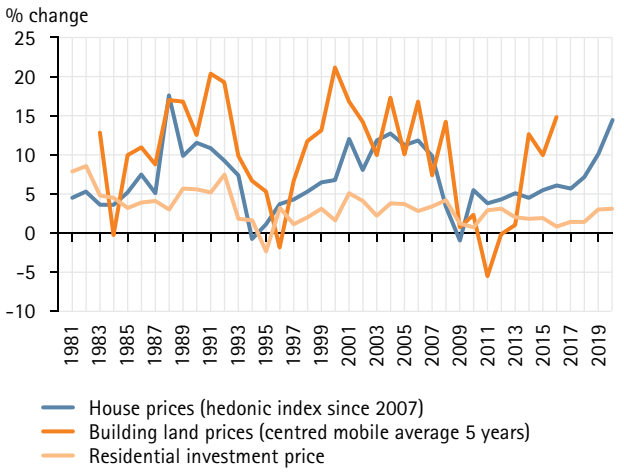
Property is at the centre of many studies, in Luxembourg and abroad, and is one of the major concerns of citizens and economic and social policy. Indeed, excessive price increases are likely to drive low-income households away from home ownership. Prices in Luxembourg are arguably among the highest in Europe, and since the Great Recession of 2008/2009, their rise has almost constantly accelerated. In 2020, record growth of 14.5% was observed, close to that of previous peaks (1988-1991 and 2003-2006).

The purpose of this study is the economic and statistical explanation of house prices by identifying determinants through econometric regressions. This approach is based on the few studies carried out by the Banque centrale du Luxembourg and uses similar methods (see appendix and Glocker 2020). Finding an equation that can explain a large part of price fluctuations using judiciously chosen determinants should, in particular, make it possible to judge whether or not there is a speculative bubble[1].

The equation will be estimated until 2020, which distinguishes this assessment from most other studies carried out for Luxembourg, which generally ended in the year (or quarter) with a complete and comprehensive set of observed data (and could therefore in a more difficult way judge the speculative or non-speculative nature of the respective recent phase of price growth). To address this gap, some explanatory variables had to be estimated or extrapolated, as their observations end in 2018 or 2019. The correct functioning of the equation (or not) for 2019/2020 will allow us to see if the sharp increase in transaction prices is determined by fundamental factors or results from speculative actions or other exceptional factors. Incidentally, simulations beyond the data observation period ("out-of-sample") will also be carried out. Of course, the results will need to be re-examined in the light of more definitive statistical data observed in the near future.

Using recent medium-term projections, STATEC will also forecast house prices until 2022[2]. The equation presented in this study is innovative and will make it possible to take into account factors (explanatory variables) which have not been used until now.

Graph A
House, construction and building land prices



Source: STATEC

[1] Blot (2016): "The notion of a speculative bubble generally refers to the idea of an excessive and "abnormal" change in the price of an asset. As a result, the observation of a sharp increase in prices is far from being a sufficient condition for the identification of a bubble and any analysis cannot therefore be made independently of the definition of what can be covered by the "normal" evolution of prices. "Normal" change means that which is dictated by fundamentals, i.e. a set of economic and financial variables that are likely to have a significant influence on supply and demand and therefore on house prices. Thus, identifying a bubble means highlighting a change in prices that is incompatible with that of fundamentals."

[2] Owing to time constraints, it was not possible to take into account the latest version of macroeconomic forecasts, which are included in this Note de conjoncture.

Data

The aim is to therefore econometrically explain house prices, i.e. those of new or old housing and apartment transactions. Since 2007, STATEC has published a quarterly "hedonic" house price index that corrects observed prices (source: land registry) depending in particular on the surface area or location[3]. Before 2007, based on the same statistical source, the price used simply divided the total amount of transactions by the number of transactions. Such an index is biased if, for example, in a given year an exceptionally high number of apartments are sold in Luxembourg city, based on higher prices per m^2. In which case, without a "hedonic" correction, the statistical increase recorded results from higher prices per m^2 in Luxembourg city than elsewhere in the country, and not necessarily from an intrinsic upward movement in prices. In general, at gross index level (before 2007), such fluctuations are corrected the following year, which is why the gross index presents a more shocked movement than the hedonic index (graph B).

Observations on most variables start in 1980, so there are almost forty years of observations, which should be considered satisfactory from the point of view of the quality of statistical adjustment.

Firstly, house prices are explained by two other price variables:

- The prices of building land, and
- The prices of residential investment (or new construction), excluding land.

An increase in these "input" prices leads, *ceteris paribus*, to an increase in transaction prices.

The housing market is governed by supply and demand; four major variables are involved at this level:

- The ratio between the population aged 20 to 64 and the stock of residential capital;
- The number of households;
- The number of buildings completed;
- The real cost of credit (mortgage interest rate deflated by consumer prices).

Residential capital stock accumulates annual investments made less depreciation (destruction). With respect to the working-age population, which better reflects labour market migration (and the resulting demand) than the total population, it illustrates one of the pressures that can be exerted on the housing market.

The number of households is used in addition to the working-age population (or the total population) because the average size of households tends to be decreasing, which means that the number of households is growing faster than the population (see divorces), which generates, *ceteris paribus*, pressures on the residential market.

The number of buildings completed plays the same role as the capital stock (the first in the short term, the second in the long term). The faster the number of buildings completed increases, the lower the price increase.

The real cost of credit reflects the enthusiasm for construction demand: the cheaper the credit, the more households will want to buy or build. The variable must therefore have a negative coefficient in the equation.

Finally, two financial variables reflect an investor's choice: buying a home and renting it out, for yield purposes, or acquiring financial products:

- The Euro Stoxx 50 stock market index includes the fifty largest listed companies in Europe: a relatively rapid rise in stock market values acts is a hindrance to residential investment (and conversely, if stocks tend to depreciate, this should favour residential investment);
- The same applies to the difference between long rates and short rates (interest margin, risk premium): the higher this metric is, the higher the interest for a financial investment (bond, forward monetary investment) should be.

[3] Économie et statistiques n° 44/2010, Un indice des prix hédonique des appartements, STATEC, September 2010.

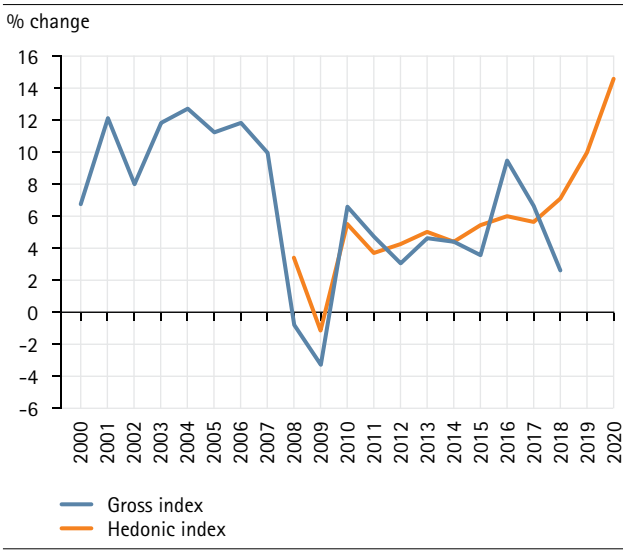
Table A
Summary of variables (observations, estimates and forecasts)

	House prices[1]	Residential investment prices[2]	Building land prices[3]	Completed residential buildings (m^2)[4]	Pop. 20-64 years / residential stock[5]	Number of households[6]	Euro Stoxx 50[7]	Real mortgage interest rate (%)[8]	Interest rate spread (%)[9]
1. Observed or estimated data (estimated data on a grey background)								% change unless otherwise specified	
1980-2018	6.6	3.1	8.1	1.5	-0.6	1.9	6.9	2.5	1.0
2010-2018	5.2	1.8	0.6	5.5	-0.2	2.8	2.5	0.7	2.0
2018	7.1	1.3	14.6	7.1	-0.9	2.4	-3.1	-0.3	1.4
2019	10.1	2.9	8.1	-1.9	-0.2	1.9	1.4	-0.1	0.8
2020	14.5	3.0	8.1	-5.8	-0.5	1.9	-4.7	0.7	0.5
2. Forecasts (based on the latest medium-term forecasts)									
2021	8.9	2.2	8.1	-3.7	-0.7	1.9	8.9	0.0	0.4
2022	4.8	1.9	8.1	-1.2	-0.5	1.9	0.8	-0.2	0.8
3. Forecasts (based on the latest medium-term forecasts, **land prices at +16%**[10])									
2021	**9.9**	2.2	**16.0**	-3.7	-0.7	1.9	8.9	0.0	0.4
2022	**6.4**	1.9	**16.0**	-1.2	-0.5	1.9	0.8	-0.2	0.8

Source: STATEC (except 7-9: Oxford Economics)
[1] 1980-2006: simple index; 2007-2020: hedonic index
[2] Observed data 1980-2020; 2021-2022: medium-term forecast February 2021
[3] Observed data 1980-2018; 2019-2022: extrapolations based on historical trends
[4] Estimates then forecasts 2018-2022 based on an estimated equation (explanatory variable: residential investment in volume)
[5, 7-9] 2018-2022: medium-term forecast February 2021
[6] 2019-2022: extrapolations based on historical trends
[10] Over the entire period 2016-2022, forecast house prices from 2021

It should be noted that one of the assumptions often put forward to explain the surge in house prices, not only in Luxembourg but in most European countries, is precisely the recent lack of appeal of traditional financial products, be they bonds, equity or financial investments. The housing market has undoubtedly suffered a liquidity outflow, of varying magnitude, put into circulation by central banks seeking returns that they no longer find in the strict financial sphere.

Graph B
House price indices, gross and hedonic



Source: STATEC

Estimated equation

The purpose of this study is not to discuss the technical details of econometric regression. The focus is on economic links between variables, as well as forecasting. The reader is referred to a more comprehensive working document that will be published at a later date.

Nevertheless, it should be emphasised that the results are robust, that the statistical tests are generally conclusive and that the proposed specification is more exhaustive than those, by way of comparison, proposed so far in the context of similar work (see appendix).

The equation, an error-corrected model, explains almost 80% of the fluctuations of the dependent variable, based on the adjusted determination coefficient R^2. The long-term relationship denotes a co-integration relationship (DFGLS test[4]) and all variables have the expected sign and "reasonable" elasticities, given the economic theory.

Elasticities are shown in table B and will not be commented on in detail here in the text. Only the following highlights are mentioned:

- The fluctuations in house prices are marked by great inertia, as evidenced by the short-term delayed variable (the first difference being 0.5): for example, a 10% increase in year t is followed, all other things being equal, by a 10/2=5% increase in year t+1; if the market has been dynamic, this dynamism is therefore likely to continue for a certain time;
- The link between the underlying trends, in the long term, and fluctuations in the short term is characterised by an error-corrected coefficient of -0.31: i.e. approximately one third of the error (difference to the underlying trend) for year t is corrected in year t+1; this is consistent with the strong autoregressive coefficient highlighted in the previous point: the housing market is marked by a certain inertia and is only slowly recovering from external shocks (imbalances);
- The prices of residential investment present the coefficient at its highest absolute value, i.e. in the long term, an elasticity of 1.6; associated with building land, which has a reduced elasticity (0.2 in the long term) yet with stronger fluctuations, the price of investment thus explains a large proportion of the movement in house prices; this can be easily seen in graph A, where the three variables in price display the common cycles;
- This strong elasticity, considerably greater than 1, between the construction cost and price of transactions (old and new) is an indication to a relatively inelastic supply and the ability to pass on too many costs to the final prices; alternatively, sales prices have become largely disconnected from production costs over time; this results in a potential source for establishing profit margins (for entrepreneurs and developers);
- The factor behind this disconnection is essentially a demand that chronically exceeds supply; this factor is reflected by the ratio "working-age population / capital stock" in the equation; in other equations, STATEC has started to work with the total building area ("perimeter of potential plots"); these elements will be further explored in a later extension of this work.

The equation is estimated until 2018. But extrapolating the missing series for 2019 and 2020 will extend it to years of strong price growth, testing the compatibility between the determinants (variables in the equation) and the observed prices. This will be done in the next part.

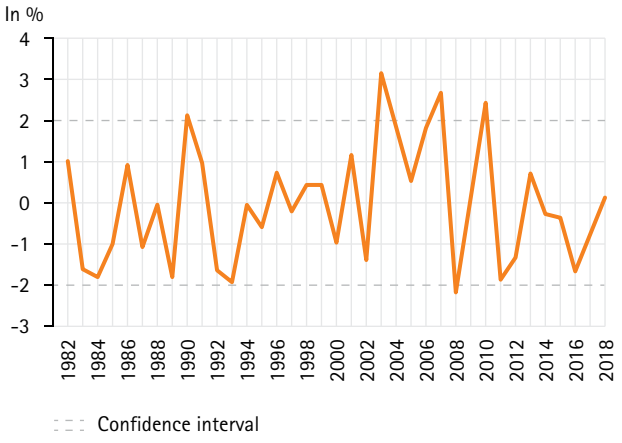
[4] The DFGLS test ("Dickey-Fuller generalized least squares") performs a unit root test on the levels' regression residuals, including the series whose co-integration is to be tested.

Table B
Estimated house price equation

		Elasticities[1]	
Variable name	**Short term**	**Long term**	**Explanations**
House prices delayed	0.49	/	Autoregressive coefficient
Residential construction price	0.52	1.56	Investment in national accounts
Price of building land	0.05	0.18	Based on the land registry
Real mortgage interest rate[2]	-0.0022	-0.013	Deflator: consumer price
Rate spread (long rates - short rates)	-0.0069	-0.012	Lower bond profitability leads to higher prices
Completed buildings (surface area)	-0.05	/	Based on a survey by STATEC
Pop. 20-64 years / residential stock	/	0.39	Pressure indicator
Number of households	/	0.74	Captures the reduction in average household size
Euro Stoxx 50	/	-0.032	Lower stock market profitability leads to higher prices
ECM coefficient	-0.31		
Adjusted R^2	0.78		

Source: STATEC (estimation period 1982-2018)
[1] A 1% increase in the explanatory variable leads to a y% increase in the dependent variable (house prices).
[2] Semi-elasticity: in the long term, an increase in the real mortgage interest rate leads to a (permanent) decrease in the price level of 1.3%.

Graph C
Regression residues and confidence interval



Source: STATEC

"Excessive" rise in house prices in 2019 and/or 2020?

Based on the equation described in the previous section, there are three ways to test the compatibility of prices in 2019/2020 with their fundamentals:

1. An out-of-sample forecast, i.e. a forecast with the equation estimated until t, then a forecast for years t+1, t+2, etc.;

2. An estimate up to 2020 and a stability analysis of estimated coefficients and regression residuals;

3. An estimate up to 2020 with added indicator variables ("dummies") (for 2019 and/or 2020), the possible significance of which will attest to the existence of an "excessive" increase, given the factors present in the equation, and whose estimated coefficient will make it possible to measure its magnitude.

The out-of-sample forecast starts from 2016, i.e. the equation was estimated until 2015, then used to establish a forecast until 2020, which was compared to the prices actually observed. The same process was carried out from 2017, 2018 and 2019. Starting earlier (than 2019) may be interesting in order to reduce the importance given to certain isolated points, potentially aberrant, on the variable explained. Then, an average of these forecasts will be calculated. This then results in an average forecast error (see table C). The latter became positive from 2018 and became relatively high in 2020 (6.4%).

In other words, based on the only equation and the explanatory factors historically observed, an increase of 14.5-6.4=8.1% could have been considered "normal" (in line with the fundamentals) in 2020.

By estimating the equation until 2020, without any other change compared to that estimated until 2018, we can see that the adjusted R^2 falls from 0.78 to 0.72, that certain Student statistics fall, but that above all, it releases a significant residue for 2020 (0.049) but not for 2019. A positive residue denotes that the observed variable is greater than the value predicted by the equation. Here, the term 0.049 comes from the fact that the dependent variable is expressed in d(log) – it must be multiplied by 100 to have a rough idea of the equivalent as a %. Interestingly, unlike in 2020, the residue for 2019 (0.017) does not appear to be higher than those, also positive, observed for some of the years between 2003-2010. The year 2019 must therefore be declared in general terms, in line with the fundamentals.

Last check: we consider the same equation with an indicative variable for 2019 and another for 2020. That of 2019 appears insignificant (value: 0.02), while that of 2020 is highly significant (value: 0.055; t-Stat: 2.9). The observation remains unchanged: the overvaluation, compared to the fundamentals, is limited to 2020 and rises to around 5%.

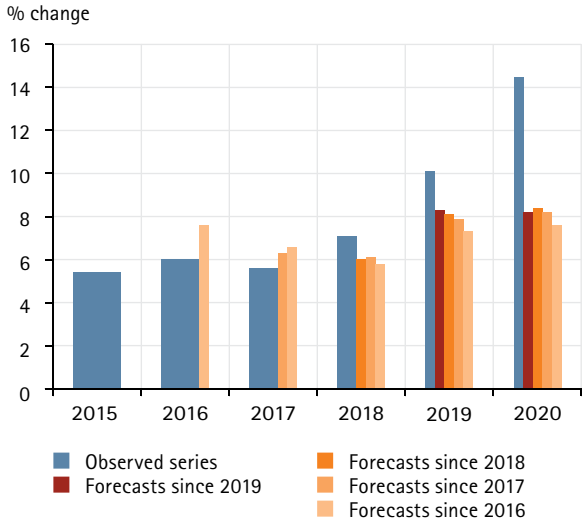
The great drawback in this method is the fact that certain variables are not observed for the period 2019-2020. They are estimated and more details are given in table A (estimated variables on grey background, see also the notes below the table). The prices of building land are identified, in particular, as one of the main explanatory factors for the recent increase in house prices, but the series observed stops in 2018. To carry out the simulations/forecasts, their growth has been set at +8.1% per year over the period 2019-2021, i.e. the historical average. But as it is likely that in a period of high property conditions, land prices are also soaring, the increase has been raised (arbitrarily) to 16% p.a., other variables remaining unchanged. In that case, the increase in the price of property transactions would be incremented by 0.5 percentage points every year or so in 2019 and 2020. A potential underestimation of land prices in the years 2018 and 2019 (following the extrapolation of the historical trend of 8.1% in these years) should therefore not be the only explanatory factor for the sales prices of those transactions, unless the actual increases were substantially higher than +16% of the selected alternatives. Only the future will tell.

Table C
Observed and expected house prices

	Observed series	Forecasts since 2019	Forecasts since 2018	Forecasts since 2017	Forecasts since 2016	Average forecast
						% change
2015	5.4	5.4	5.4	5.4	5.4	.
2016	6.0	6.0	6.0	6.0	7.6	7.6
2017	5.6	5.6	5.6	6.3	6.6	6.5
2018	7.1	7.1	6.0	6.1	5.8	5.9
2019	10.1	8.3	8.1	7.9	7.3	7.9
2020	14.5	8.2	8.4	8.2	7.6	8.1
						Forecast errors (percentage points)
2016	.	.	.	.	-1.6	-1.6
2017	.	.	.	-0.7	-1.0	-0.8
2018	.	.	1.1	0.9	1.3	1.1
2019	.	1.8	2.1	2.2	2.8	2.2
2020	.	6.3	6.1	6.3	7.0	6.4

Source: STATEC (on grey background: out-of-sample forecasts: equation estimated up to t, then forecast from t+1)

Graph D
Forecast errors on house prices



Source: STATEC

Forecasts for 2021 and 2022

House prices are an integral part of the STATEC "Modux" macroeconomic model used for short- and medium-term forecasts[5]. This work aims to improve the corresponding equation and to extend the field of variables, like Glocker (2020). The equation developed here can thus be used to forecast house prices in 2021 and 2022 (it is more complete than that currently shown in Modux).

To make this forecast, it is necessary to have numerical values for all explanatory variables over the two years, 2021 and 2022. As can be seen in table A, some variables do not meet this requirement (those on a grey background, for 2019 and 2020). They are therefore estimated (extrapolated)

- with historical trends (building land prices, number of households);
- with the published macroeconomic forecast (working-age population, capital stock);
- or using another equation, not presented here (buildings completed).

It should be noted that for 2021 and 2022, other variables must be provided, such as the Euro Stoxx, residential investment prices or interest rates. Again, medium-term forecasting is used to fuel these trajectories.

Ultimately, the equation can be used to forecast house prices for this year and the next. It is clear that the market does not seem ready to settle down, even though the price increase is expected to lose intensity. Thus, for 2021, we should expect an increase of around 9%, and another +5% in 2022.

A breakdown of the forces driving the prices in 2021 and 2022 leads to the following conclusions (see table D):

- The equation developed shows strong inertia (based on the historical behaviour of observed prices, marked by this same inertia); consequently, the increase observed of more than 14% in 2020 generates, *ceteris paribus*, an increase of approximately 7.5% in 2021 (and again almost 4.5% in 2022, see line "b1");
- Other prices (building land, residential investment price) would add a good growth point each year
- ... while the constant and the remaining factors (interest rates in particular) would add even more than one percentage point in 2021 and 2022 (the constant can be assimilated to all factors not specifically taken into account in the equation).

Thus, based solely on short-term factors, the price increase should be 10.8% in 2021 and 7.6% in 2022. However, short-term factors are not the only ones that play a role; we must (obviously) also take into account those included in the long-term part of the equation (some of which are absent in the short term or even exhibit different elasticities). The link between the short term and the medium/long term is made through the error correction mechanism. The idea is as follows: the background trajectory is always determined by long-term factors, but there may be deviations from this trajectory (for example, through the variables appearing in the short term but not in the long term, shocks not represented by any explanatory factor as in 2019 and/or 2020). The long term is therefore crucial, but only slowly; this essentially coincides with the short term and to shocks suffered. Thus demonstrated by the latter.

So how does the long term (or long-term imbalance) play out in the short term? A long-term imbalance is always corrected following a certain fraction, year on year. Therefore, it is possible to calculate a price trajectory which is solely dictated by the long-term factors (line "e" in table D). The difference between this trajectory and the provision then plays the opposite role in the short term (concept of correction); the prices dictated by the long-term factors superior (*inferior*) to those observed (or produced by the equation as a whole) generate a downward correction (*increase*) (i.e. a negative (*positive*) factor, see line "c") which is then added to the short-term factors. This mechanism is called "error correction" and is at the centre of equations developed for Modux.

[5] House prices influence migration in particular, but they (obviously) also affect residential investment.

The fact that the prices observed in 2019 and especially in 2020 are higher that the underlying trend, produced by the long-term factors, thus generates a negative contribution of more than 2 percentage points in both 2021 and 2022. Over time, the trajectory of the dependent variable – resulting from the simulation with the equation as a whole – always converges with that dictated by the long term, i.e. in 2022, an average increase of almost 6% per year. It is worth noting that in practice, as is evident, additional or new shocks may occur at any time, moving the prices away from their long-term trajectory, as in 2020. This argument illustrates the uncertainty surrounding these forecasts. Over the 1980-2018 estimation period, the equation explains prices very well, on average, but 20% of fluctuations remain unexplained (generated by shocks which are not inherent to the equation or its explanatory factors). The STATEC forecast of +8.9%/+4.8% (2021/2022) is used with no additional shocks and is conditional on the realisation of underlying assumptions relating to the explanatory variables.

To illustrate this statistical uncertainty, we have carried out so-called "stochastic" simulations with the equation developed, which generates lower and upper limits (for the increase in house prices). These limits must be considered as the maximum statistical deviation based on past observations, summarised in the estimated equation. There is a confidence interval around the central forecast of $\pm$ 2 standard deviations or 95%. The range – fairly large – thus derived is [5.2%; 12.5%] for 2021 and [1.0%; 8.3%] for 2022. Even if the central forecast from STATEC therefore indicates a (slow) convergence towards long-term fundamental trends, a further increase in house prices of more than 10% in 2021 would, statistically speaking, be compatible with this downturn (since it falls within the confidence interval). In any event, the convergence risks being slow...

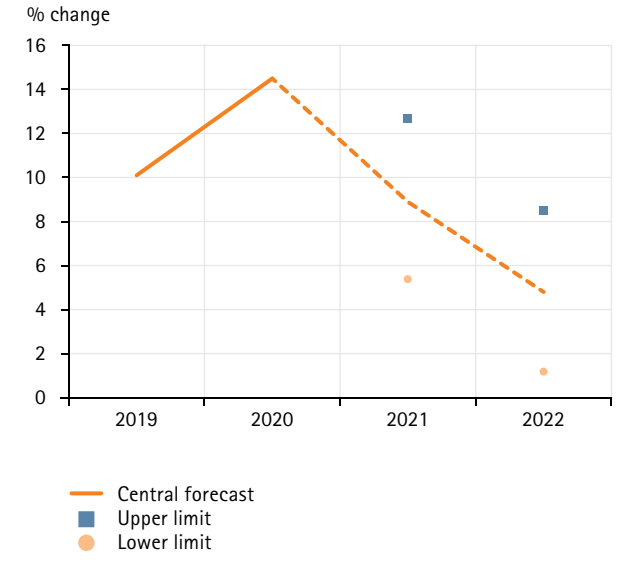
Another uncertainty factor concerns the price of building land. As a reminder, STATEC has acknowledged an increase of +8% a year in the period 2019-2022, which corresponds to the historic average. Land prices, while fluctuating considerably, have tended to increase in recent years. STATEC has therefore redesigned its forecast (but also the simulation for the years 2019 and 2020) with an assumption of an increase in land prices of 16% per year between 2019 and 2022, thus being double the historic average. In any case, the forecast for house prices would reach 10% in 2021 (instead of 8.9%) and 6.1% again in 2022 (4.8% in the "basic" scenario). We can see that land prices, despite their low elasticity (0.2 in the long term), in light of their significant fluctuations, could lay the foundations for variables able to explain past sharp increases in house prices. This is pending the publication of definitive observed data on this variable and the others that had to be estimated for 2019 and 2020.

Tableau D
Contributions to the 2021 and 2022 forecast

		2019	2020	2021	2022
				% change or specified otherwise	
House prices (observed data and STATEC forecast)	(a)=(b)+(c)+(d)	10.1	14.5	8.9	4.8
PM: contribution of unidentified exceptional factors (in % points)[1]		*2.5*	*4.9*	...	...
Stochastic simulations, lower limit[2]		...	...	5.2	1.0
Same, upper limit[2]		...	...	12.5	8.3
Main contributions to the 2021 and 2022 forecast (in percentage points):					
Total short-term factors	(b)	...	...	10.8	7.6
of which: delayed prices year t-1	*(b1)*	...	...	*7.7*	*4.7*
completed buildings	*(b2)*	...	...	*0.9*	*0.7*
other prices (construction, land)	*(b3)*	...	...	*1.2*	*1.1*
other factors (interest rate, constant)	*(b4)*	...	...	*1.1*	*1.1*
Correction of the imbalance in 2019 and 2020[3]	(c)	...	...	-2.0	-2.5
Other unspecified factors[4]	(d)	...	...	0.1	-0.3
PM: central forecast based on long-term factors only	*(e)*	...	...	*6.5*	*5.7*

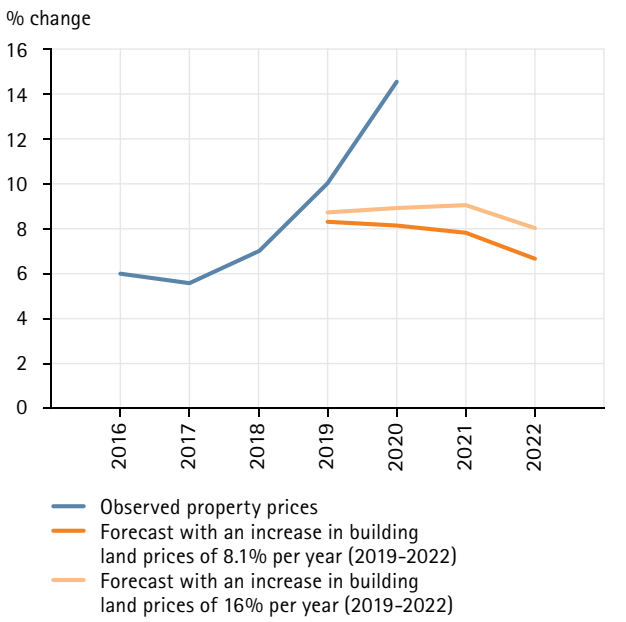
Source: STATEC
[1] Based on the indicative variables (dummies) in the estimated equation (table B)
[2] Based on stochastic simulations with the estimated equation, taking into account the statistical uncertainty observed in the past
[3] Based on the historical difference between the fundamental factors of the long-term part and the data actually observed and the forecast (this is the "error" correction within the meaning of the error-corrected models)
[4] Rounding errors, approximations due to writing the equation in d(log) instead of variations in %

Graph E
Impact of statistical uncertainty on house price forecasting



Source: STATEC

Graph F
Alternative simulations with building land prices



Source: STATEC

Conclusions

In conclusion, the following points should be noted.

- New analysis and research have helped to develop an equation describing the trajectory of house prices over the last 40 years and to explain 4/5 of the fluctuations.
- This error-corrected equation includes both "real" and financial variables; it seems richer in terms of specifications than what has been published so far in Luxembourg, but is estimated on the basis of annual (rather than quarterly) data.
- Another difference with previous work is that by estimating and/or extrapolating some explanatory variables, the equation could be estimated until 2020, which allows a judgement to be made on the very recent degree of overvaluation (or not) of house prices.
- "Overvaluation" means a trajectory of house prices above what would be dictated on the basis of the past relationship (equation) between short- and long-term (fundamental) factors and given the statistical uncertainty inherent in econometric estimates.
- According to the results found by STATEC, prices would actually be higher in 2019 than what is dictated by explanatory factors, but this difference would not be greater than in other phases of overvaluation (it is not statistically significant).
- On the other hand, 2020 would be marked by a substantial and significant difference, which can be estimated at around 5%.
- These assessments remain provisional and subject to revision because they are partially based on estimates of explanatory variables, for 2019 and 2020, for which there are currently no published figures (e.g. for building land prices or completed buildings).
- In order to produce a forecast for 2021 and 2022, STATEC relied on recently published medium-term projections or even simpler methods of extrapolation or estimation to predict all economically significant explanatory variables.
- Using the estimated equation, STATEC ended up with a forecasted increase in house prices of almost 9% in 2021 and another 5% in 2022.
- The statistical uncertainty observed in the past – and formalised in the estimated equation – makes it possible to define a scope of uncertainty (confidence interval) around these "point forecasts"; this is a range between (rounded figures) +5% to +12.5% in 2021 and +1% to +8.5% in 2022.
- In an extension of this work, STATEC would like to combine the price equation with other equations, having as explained variables those that are exogenous here, thus describing in a much more complete way the residential property market in Luxembourg (see Glocker 2020).

Appendix: literature review

In Luxembourg, the Banque centrale (BCL) published the most extensively on work leading to the detection of speculative bubbles on the residential property market.

The work of the BCL is divided into two parts:

- Research papers that present models based on innovative methods (Blot 2006 and Ferreira Filipe 2018);
- Contributions to regular publications, most often to the Financial Stability Review (FSR), updating the models with the most recent data and making a judgement on whether house prices are overvalued.

Blot (2006) adopts a structural approach or one in terms of co-integration, the aim of which is to detect long-term determinants between house prices and potential explanatory variables (fundamentals). It distinguishes between overvaluation, which may result from anticipation errors (upwards or downwards), leading to a momentary deviation of prices from their long-term equilibrium value, and speculative bubbles.

When these appear, prices rise because investors expect even higher prices in the future and therefore enter the market (to make capital gains). Price dynamics then become self-sustaining, explosive or exponential, and increasingly disconnected from fundamentals. Blot notes that in the event of the existence of a bubble, the difference to the fundamental value is persistent, and it will not be possible to highlight co-integration between the price and the fundamental variables (pp. 18-19).

On the other hand, the detection of fundamental or co-integration relationships depends on the correct specification of the error models (to be corrected): the omission of one or more fundamental variables could result in the non-existence of a co-integration relationship, and hence the possible (but erroneous) existence of a bubble.

Blot selected the following fundamental determinants: real GDP, home loans, construction costs, long-term and short-term rates (all four deflated by consumer prices) as well as the residential population. He carried out co-integration tests using two methods (Engle & Granger (in two stages) and Johansen) and finds that both methods reach the same conclusion that rejects the assumption of the presence of a bubble and therefore admits the existence of a co-integration relationship, determined by the fundamentals that prove significant.

For this work, we have also adopted the search for a co-integration relationship determining house prices in Luxembourg.

Ferreira Filipe (2018) adopts a so-called "VECM" (vector error correction model) approach to study the bidirectional link between residential property prices and mortgage loans (both variables being expressed in real terms). As additional explanatory variables, she opted for values similar to Blot (2006), namely a proxy for construction activity, the real interest rate on mortgages, real GDP and a set of demographic variables. The econometric analysis confirms the fundamental nature of the structural factors for the Luxembourg property market (hence the absence of a speculative bubble) which does not exclude, as revealed by the author, that the Luxembourg residential property market has been characterised for years by a moderate but persistent overvaluation of prices relative to their fundamentals. Note that the data underlying this study ends in the first quarter of 2017.

In successive editions of the Financial Stability Review (FSR), the BCL uses these two approaches as well as a third (and recently even a fourth) to judge whether or not prices on the residential property market deviate from their fundamentals.

- The third approach is based on the existence of different regimes for changes in residential property prices. It is based on so-called "Markovian regime change" techniques, assuming the existence of two states: an initial regime of strong price growth and a second of more moderate growth.

- The fourth is based on quantile regressions. The latter defines separate equilibrium price values for the sub-sample delimited by the 50% percentile of the conditional distribution of residential property prices in Luxembourg. Thus, when the difference between the observed value of the level of residential property prices and the fundamental value, as predicted by the model at the 50th quantile, is positive (negative), an episode of overvaluation (undervaluation) is detected.

In the latest FSR, published in July 2020, the BCL, on the basis of quarterly data stopping at the end of 2019, concluded that it had a "moderate overvaluation compared to fundamentals" of around 3.6%. This is the average of the range media of the four methods indicated by the BCL (calculated by us).

The work of Christian Glocker, published in 2020 by STATEC (Économie et statistiques n° 113) does not address as such the possible detection of a speculative bubble on the Luxembourg residential property market. On the other hand, by proposing a set of econometric equations describing the main variables in question, including house prices, he lays the foundations, within the meaning of Blot (2006), by identifying the fundamentals. The variables that are endogenously modelled are: house prices, completed buildings, rent, mortgage credit, building permits, construction prices, value added in the construction sector and the capital stock of residential buildings (which allows the investment to be derived).

BCL (2016): Marché immobilier; in: Revue de Stabilité Financière 2016

BCL (2018): Les interventions de l'État sur le marché immobilier au Luxembourg; in: Bulletin n° 1-2018

BCL (2020): Caractérisation de la dynamique des prix de l'immobilier résidentiel à partir de modèles économétriques; in: Revue de Stabilité Financière 2020

Blot Christophe (2006): Peut-on parler de bulle sur le marché immobilier au Luxembourg?; Cahier d'études n° 20, BCL

Di Filippo Gabriele (2015): An assessment of Luxembourg's residential real estate market; in: BCL, Revue de Stabilité Financière 2015

Ferreira Filipe Sara (2018): Housing prices and mortgage credit in Luxembourg; Cahier d'études n° 117, BCL

Glocker Christian (2020): Modelling the housing market in Luxembourg; Économie et statistiques n° 113/2020, STATEC

Author	Date of publication	Last data point
Blot (2006)	May 2006	2003
Di Filippo Gabriele (2015)	May 2015	2014 Q1
Revue de Stabilité Financière 2016	June 2016	2015 Q3
Ferreira Filipe Sara (2018)	February 2018	2017 Q1
Revue de Stabilité Financière 2020	July 2020	2019 Q4

7.3
Increased use of high-frequency indicators to monitor activity

The decline in activity was particularly severe in spring 2020, following the restrictions decided to limit the health impact of the pandemic. Traditional monthly cyclical indicators require a time frame that does not allow for a fairly rapid overview of the activity in an emergency context. Analysts have also turned to alternative data sources, particularly high-frequency indicators. The latter are also not free of flaws, but they can help to quickly estimate certain changes when the activity suddenly returns. Still barely used in Luxembourg, particularly for availability reasons, they potentially represent complementarity with traditional statistical indicators.

The measures implemented to combat the COVID-19 pandemic have had very rapid and significant effects on economic activity, particularly during spring 2020[1]. This can be seen today in activity figures published a posteriori, such as GDP, turnover or production data. However, these data require a longer or shorter lead time, while decisions must be made in an emergency situation that requires near real-time encrypted information.

During this 1st period of confinement, even before observing data, it was clear that the nature of the decisions taken would have a very significant impact on certain areas of activity. This impact was more or less obvious to anticipate.

For the construction sector, for example, the shutdown of construction sites from 26 March to 20 April 2020 involved almost zero activity over this period, easy to extrapolate in terms of monthly data for the months of March and April (in proportion to the corresponding closing days).

For catering (closure from 16 March to 27 May), the impact estimate a priori was less obvious as it was necessary to make an assumption on the possibilities of takeaway sales (which remained possible).

For the retail sector, with the opening of retailers classified as essential only, an estimate could certainly be developed, but again on the basis of assumptions, because many parameters remained unknown: the effect of reduced cross-border mobility (and the associated demand), the shift in demand linked to the closure of other activities (HORECA, personal services, non-essential shops), the voluntary limitation of purchases in traditional points of sale for fear of exposure to contamination risk, the expenses incurred or deducted by the development of teleworking, etc.

The COVID-19 crisis has challenged traditional statistical indicators measuring activity

In traditional economic analysis, the results of economic surveys (company and consumer surveys) are among the fastest available. Statistical processing of these qualitative responses is relatively simple and can be used to develop indicators from the end of the month to which the survey relates. The opinions expressed by companies relate to different areas and primarily to the evolution of their activity (observed and anticipated). The corresponding indicators generally show a good correlation with so-called "hard" quantitative data (e.g. production or value added), which require more complex statistical processing and are therefore produced with a longer delay (but which are more precise). As a result, these indicators are carefully scrutinised by economists as they allow rapid detection of reversals in activity trends.

[1] In Luxembourg, the constraints linked to these measures were particularly high between 23 March and 20 April, see Study 6.1 Impact of the COVID-19 crisis on economic activity in Luxembourg, Note de conjoncture n° 1-2020.

However, the results of company surveys show some flaws when exceptional events – such as this pandemic, with all the activity restrictions it has involved – occur. The March 2020 company surveys thus showed a decline in confidence indicators, but not as impressive as the March monthly activity data later showed. This is based on the fact that most respondents to these surveys do so between the 1st and 10th of the month, while the first restriction measures started in mid-March[2]. By the end of April 2020, however, business confidence indicators fell sharply, but it is not easy to extrapolate these developments to the expected results. Indeed, many companies indicated a decline in their activity, but this was not directly quantified (which is specific to qualitative variables[3]). And in periods where shocks to activity are very significant and very fast, the usually linear relationship observed between qualitative and quantitative data can become non-linear[4]. For example, the composite PMI indicator for the eurozone, usually very well correlated with the quarterly variation in the eurozone GDP, showed a fall of around 0.5% for the 1st quarter of 2020 (compared with -3.8% actually recorded) and a fall of around 2% for the 2% environ pour le 2nd quarter (very far from the -11.6% recorded).

Another disruptive element during this crisis, particularly during the 1st confinement, was that the response rate to economic surveys significantly decreased, whether in Luxembourg or in other European countries. And other surveys have also suffered from collection conditions made more difficult (because companies were closed, because the response to statistical surveys was falling short of other priorities, etc.). In Luxembourg, while the response rate to economic surveys was close to 95% in January and February 2020, it fell to approximately 70% on average over the following three months.

Data from alternative sources to address the emergency during the COVID crisis

In this acute phase of the crisis, the monthly indicators of traditional activity therefore found themselves inconsistent with the – urgent – needs of the time (in particular, estimating the impact of the restrictive measures and formulating forecasts accordingly). Either because they required too long a time to obtain, or because their behaviour was altered by the uniqueness of this crisis.

Many forecasters then turned to so-called "alternative" indicators, such as data available on a daily or weekly basis. These high-frequency data are outside the scope of official statistics and often come from private companies. Among the most common in terms of use are:

- Electricity consumption;
- Credit card transactions;
- Mobility indicators;
- The use of specific terms in search engines.

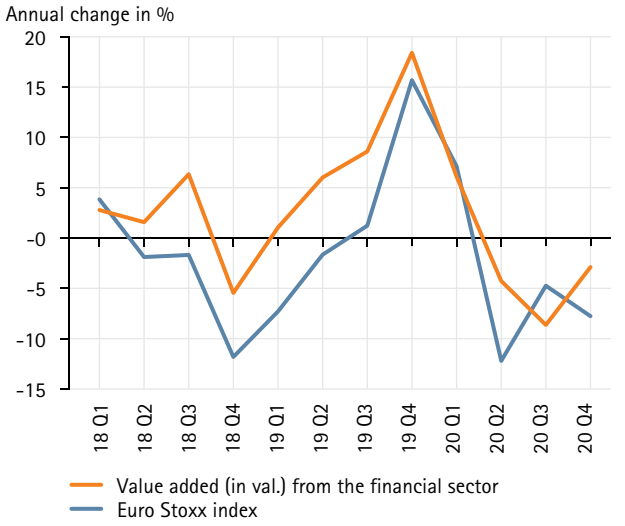
High-frequency indicators (daily or weekly) had so far rarely been used at STATEC for cyclical analysis and forecasts. Only financial variables such as stock market indices or interest rates, available daily and instantaneously, were regularly monitored to anticipate certain movements in monthly or quarterly data. For example, changes in the net assets of investment funds (and the corresponding subscription tax), banking commissions or even the value added of the financial sector are usually well correlated with those of stock market indices (the Euro Stoxx 50 is often used as a reference, see graph A).

[2] Schools, restaurants and cafes, retail (unless deemed essential) and personal services (hairdressers, beauty salons, fitness, etc.) closed on 16 March and construction sites closed on 23 March.

[3] The response methods include only three possibilities (increase, stagnation or decrease).

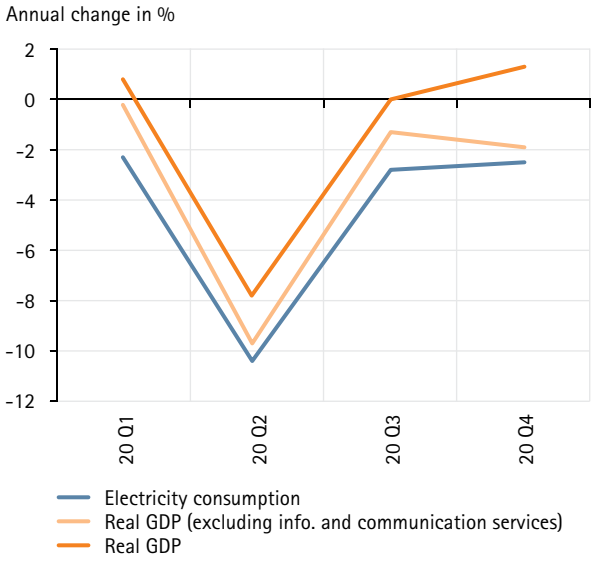
[4] Vermeulen, P. (2012), "Quantifying the Qualitative Responses of the Output Purchasing Managers Index in the US and the Euro Area", ECB Working Paper, n° 1417

Graph A
Value added for the financial sector and the Euro Stoxx 50 stock market index



Sources: STATEC, Macrobond

Graph B
Electricity consumption vs gross domestic product



Sources: Creos, STATEC

Electricity consumption

Data on electricity consumption (or imports) are also quite well correlated with GDP developments in Luxembourg. During the spring 2020 confinement, daily data provided on request by Creos[5] were used as a framework for the development of the activity, and they also trace fairly well the GDP trajectory over the second half of last year (see graph B). Given that the GDP was quite strongly and positively influenced by the unusual performance of the information and communication services sector in 2020[6], the relationship with the GDP is more significant when it is not taken into account.

In other countries, high-frequency electricity consumption data are often used to anticipate changes in industrial production, but only taking into account business consumption. In Luxembourg, however, the high-frequency data obtained by STATEC include all consumption and do not make it possible to target the industrial sector more specifically.

Credit card transactions

To estimate the impact of the closure of many businesses on household consumption during the spring 2020 confinement, many analysts turned to credit card transaction data. These are available with varying degrees of detail and frequency depending on the country. At STATEC, these data are collected by the balance of payments unit, but only on a quarterly basis. STATEC was able to obtain weekly series on request, but only for the number and amount of transactions for all cards issued in the Grand Duchy (whether or not they are intended for residents). Unfortunately, these data are only available from 1 March 2020.

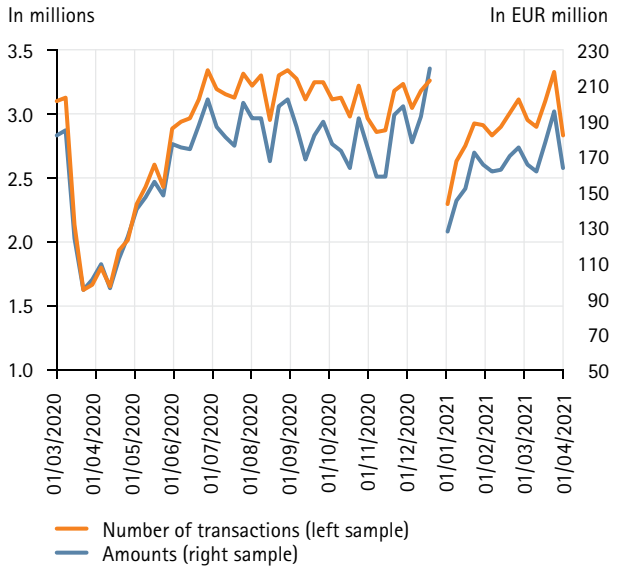
[5] These data are provided with a period of approximately 15 days compared to the last available data.

[6] +17% for the value added in volume for this sector, a counter-current development against the overall trend observed for most other sectors of activity.

They show a marked decline between mid-March and the end of April 2020 (with a decrease of around half compared to the beginning of March 2020), then a recovery at the start of the 3rd quarter of the same year (see graph C).

These elements were considered to calibrate the expected evolution of the results of certain components of the trade and private consumption sector, but in a relatively rough manner. The absence of corresponding data for the first two months of 2020 and for the previous year in particular makes it impossible to identify what would be purely seasonal phenomena or calendar effects[7]. This is a criticism of the use of other high-frequency indicators that were only made available to the public in early 2020.

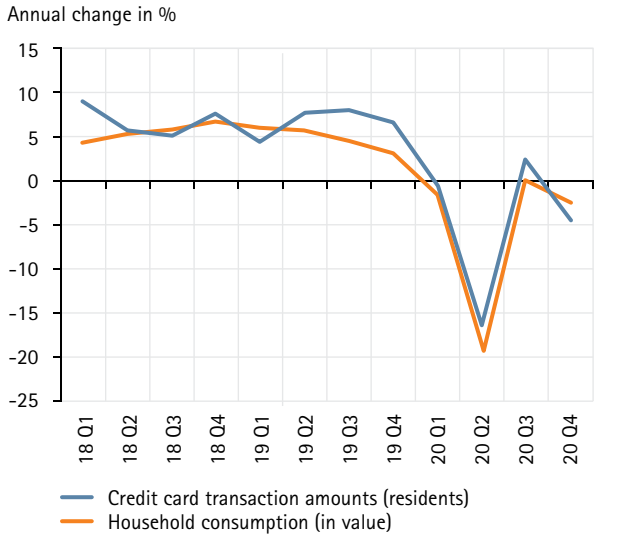
Graph C
Weekly credit card transactions*



Source: SIX Payment Services
* No data for the week of 27 Dec 2020 to 2 Jan 2021

However, these data deserve to be refined and better exploited. In their quarterly form (with a possible distinction between residents and non-residents), they show a significant relationship with household consumption derived from national accounts data (see graph D).

Graph D
Credit card transactions and household consumption



Source: STATEC (Balance of payments and national accounts)

Scanner data

In other countries, changes in trade and certain components of household consumption during this crisis were also reflected in the cash register data of major retailers ("data scanner"). In Luxembourg, STATEC has such data at its disposal (from 2015): they are first used to calculate the consumer price index by making it possible to monitor the prices of a large number of goods without having to carry out statistical surveys in the traditional sense of the term[8].

However, their use for cyclical monitoring is limited by three factors. On the one hand, the number of retailers or points of sale that provide these data is currently very low in Luxembourg. On the other hand, the corresponding turnover data includes only certain product categories (and these differ according to the points of sale). Finally, the data only corresponds to the first 14 days of the month in question. In the end, the trends emerging from this data largely differ from those observed in the final retail sales figures in non-specialist stores (which are available with an additional period of approximately two months).

[7] For a good seasonal adjustment, it normally takes long runs of at least 5 years in monthly data.

[8] Économie et statistiques n° 97/2018, The use of Supermarket Scanner data in the Luxembourg Consumer Price Index, Vanda Guerreiro, Marie Walzer, Claude Lamboray, STATEC, February 2018

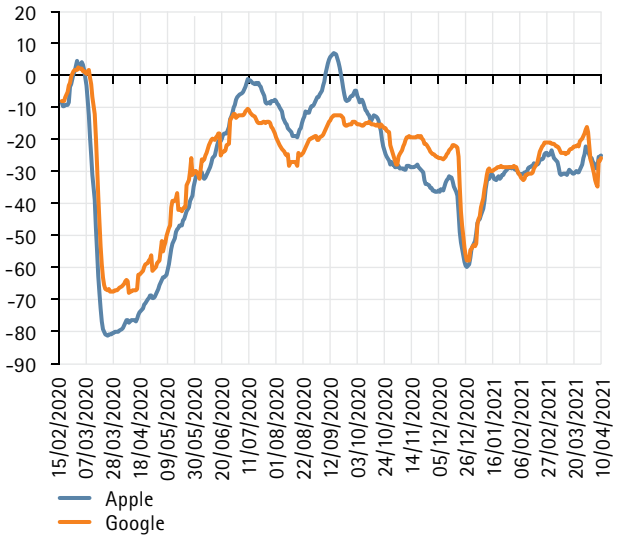
This does not diminish the usefulness of these "data scanners" for monitoring consumer prices, but the way in which they are developed does not currently allow them to be used for monitoring trade activity or household consumption.

Mobility/footfall data

Personal mobility has been profoundly affected by the preventive measures put in place. Home confinement, curfews, the promotion of teleworking, the closure of private or public places (such as schools), border or travel restrictions have naturally limited human travel. To try to quantify these effects, economists focused on data made available by private companies such as Google (COVID-19 Community Mobility Reports[9]) and Apple (Mobility Trends Reports[10]). These indicators are based, in particular, on the geolocation data of users and the requests made on navigation applications. They represent several categories of travel or places visited. Luxembourg-related data are summarised in graph E[11].

Graph E
Mobility indicators for Luxembourg

Deviation from January 2020



Sources: Apple, Google, STATEC calculations (data smoothed over 7 days)

The two series generally evolve in line and show a major collapse during the 1st confinement, then a sharp rebound from May 2020. However, they indicate at the end of 2020 and the first months of 2021 mobility that is 20% to 30% lower than pre-crisis mobility (i.e. January 2020).

It is not easy to link this data directly to economic activity, for several reasons. On the one hand, they have not existed for a very long time (since 13 January 2020 for those of Apple, since 15 February 2020 for those of Google). This gives too little perspective to carry out econometric regressions on time series (with the comparison of other monthly or quarterly indicators) and does not make it possible to distinguish what actually relates to cyclical trends and not purely seasonal phenomena (school holidays, etc.). On the other hand, linking mobility and activity directly while the use of teleworking has developed strongly during this crisis (particularly in Luxembourg) does not necessarily make much sense. Alongside this, these data are produced using methods that are not transparent and whose dissemination is accompanied by several warnings as to their interpretability.

However, some individual mobility indicators showed good correlations with traditional indicators in several European countries during 2020, particularly over the first three quarters. This is particularly the case for the Google residential index (time spent at home) with the GDP, and the Google retail index with retail sales in volume[12]. Nevertheless, these relations, which were very significant during the 1st confinement/1st deconfinement, have deteriorated since the second half of 2020. Tested on the corresponding Luxembourg data, they did not yield conclusive results. Nevertheless, for Luxembourg, the drop observed in road fuel sales at the beginning of 2021 (January and February) corresponds fairly well to that of the mobility indices in graph E – of around 25% over one year.

Moreover, these data from Apple and Google are currently available free of charge, but this provision is likely to end once the health crisis is behind us.

[9] https://www.google.com/covid19/mobility/

[10] https://covid19.apple.com/mobility

[11] The two series represent a simple arithmetic average of several sub-indicators (driving and transit series for Apple data, retail and recreation series, grocery and pharmacy series, transit stations and workplaces for Google data).

[12] See "Google en sait-il plus que l'Insee sur les Français?"(Does Google know more about the French than INSEE?), Insee blog, 18 December 2020.

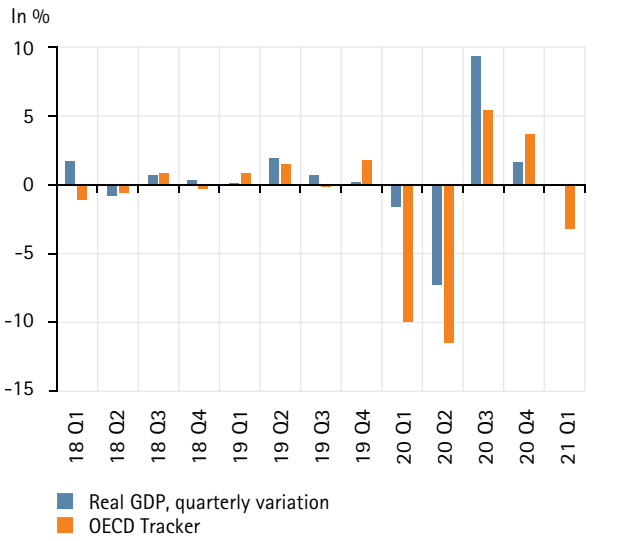
Regarding road mobility, Luxembourg also has data compiled by the National Roads Administration[13], which tracks car and lorry traffic using automatic counters on the country's roads and motorways. These are high-frequency data, available on a daily basis (and even hour by hour!). Unfortunately, these data are not currently updated regularly enough and quickly enough to be used for cyclical monitoring.

Google trends data

This data corresponds to the frequency of specific searches on the Google search engine. They indicate the popularity of certain search terms or subjects based on the number of requests. Compared to other high-frequency indicators, they have the advantage of being available over a relatively long period (since 2004 in monthly series, since 2006 in weekly frequency), which allows them to be used in econometric approaches. The first economic research on popular search terms in Google dates back to 2009, but it was predominantly from the second half of the 2010s that they developed. And in 2020, with the health crisis, they were widely used by forecasting institutes whereas the usual cyclical indicators (monthly and available with a relatively long lead time) did not allow for the suddenness and virulence of the shock to be grasped.

One of the largest uses of these Google trends data for monitoring economic activity was carried out by the OECD[14], for 46 countries, including Luxembourg. For all of the countries studied, the "trackers" developed by the OECD trace the evolution of the economic cycle rather well (over the period 2006-2020) as well as the strong fluctuations observed a posteriori during the pandemic crisis of 2020. For Luxembourg, however, the quality of the "tracker" in terms of performance for the forecast appears relatively low compared to the other countries. In the first two quarters of 2020, during the acute phase of the crisis, we can see in particular that the "tracker" overestimates the fall in the Luxembourg GDP (see graph F). However, it should be borne in mind that GDP data will be subject to future revisions.

Graph F
GDP growth in Luxembourg vs OECD tracker



Sources: OECD (data as at 21 April 2021), STATEC

It is important to note that the data from these "trackers" are revised, sometimes significantly, with each new version. This stems in particular from the fact that the results of Google trends are also similar. This is one of the major flaws of these indicators: each extraction shows different results (for the same keyword, geographical location and period) because it is based on a random sub-sample of data[15] (in order to reduce the calculation load). Techniques make it possible to minimise this problem – in particular by carrying out multiple extractions and then taking the average values of these requests – but not to avoid it.

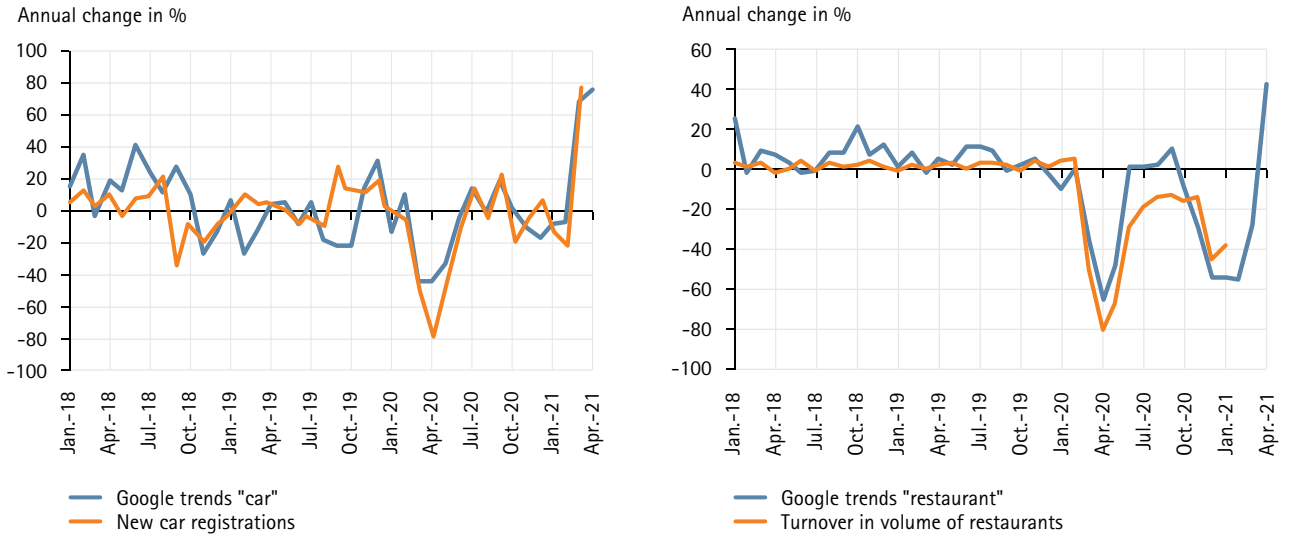
Therefore, it is not easy to link the results from a request to a conventional indicator. For some search terms, however, there are interesting similarities. In Luxembourg, for example, the term "car" from Google trends shows a rather close relationship with car registrations (see graphs G). The keyword "restaurant" also indicates a relatively common trend with the change in turnover of restaurants in Luxembourg during 2020. In several countries, the term "unemployment" shows a high correlation with the unemployment rate, but this is not the case in Luxembourg.

[13] https://travaux.public.lu/fr/infos-trafic/comptage.html

[14] Tracking activity in real time with Google Trends, Nicolas Woloszko, OECD Economic Departement Working Papers n° 1634.

[15] See in particular "The Proper Use of Google Trends in Forecasting Models", Marcelo C. Medeiros, Henrique F. Pires (Pontificial Catholic University of Rio de Janeiro), March 2021.

Graphs G
"Car" and "restaurant" requests in Google trends vs cyclical indicators



Sources: Google trends, STATEC

It should also be noted that in the case of Luxembourg, there are sometimes no results for terms searched in Google trends because the number of corresponding searches carried out by Internet users is considered insufficient (a disadvantage potentially linked to an insufficient "size" or "critical mass" effect for Luxembourg).

However, it should be noted that despite the inadequacies associated with the design of these indicators, they can certainly make it possible to anticipate trend reversals on certain traditional economic data, even if they cannot provide a forecast to the nearest decimal.

Work in progress at STATEC

Research has been carried out by STATEC in collaboration with Bocconi University of Milan, which, in order to estimate the evolution of activity in real time, integrates data from alternative sources alongside traditional short-term indicators, including high-frequency indicators (including data from Google trends)[16].

In this context, several modelling approaches for processing datasets were explored with multiple series and observations at a mixed frequency.

They include single-series models (autoregressive model with an explanatory series and univariate mixed data sampling model), models that extract information from multiple series simultaneously (dynamic factor model, mixed frequency dynamic factor model and three-pass regression filter) and two machine learning approaches designed to accommodate a large number of series (neural networks and random forests).

This work concludes that in times of normal economic conditions[17], a simple autoregressive model operates in a manner comparable to more complex models. In times of turbulence, however, complex models far outperform the autoregressive model in terms of forecast accuracy. Among the complex models, the three-pass regression filter, neural networks and the mixed frequency dynamic factor model are the most efficient (they significantly reduce the forecasting error).

These new areas of development are still recent and it remains to be seen how they can be used by STATEC as part of the preparation of macroeconomic forecasts, in addition to the existing models.

[16] Nowcasting GDP Growth in a Small Open Economy, Massimiliano Marcellino (Bocconi University), Vasja Sivec (STATEC), to be published soon.

[17] In this case outside of the 2008-09 financial crisis, the 2011-2012 sovereign debt crisis and the COVID-19 crisis.

Specific indicators linked to the health crisis

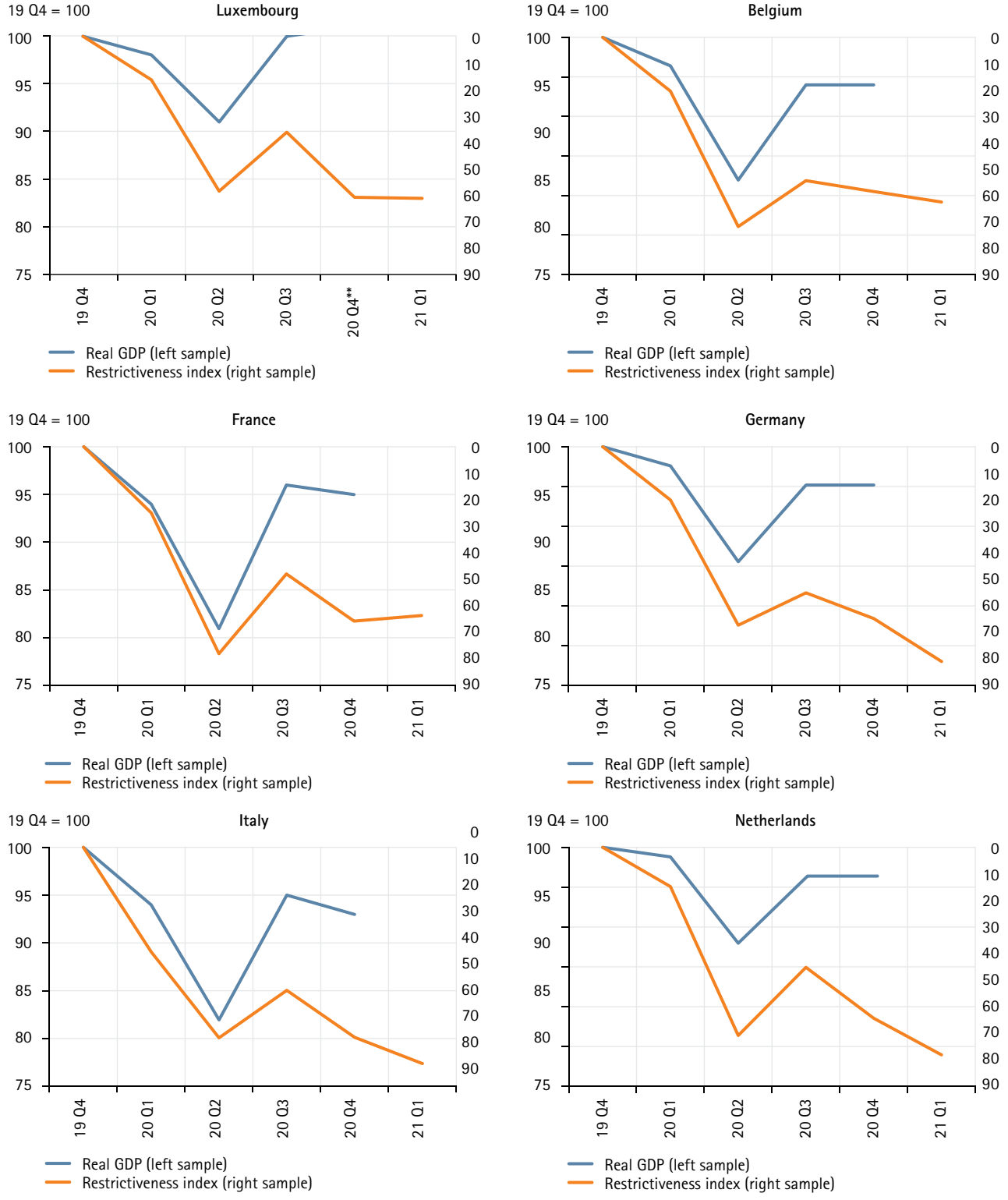
In this crisis, a large amount of data relating to the evolution of the health situation have been produced and disseminated. Everyone was able to monitor, among other things, the evolution of the number of infections and deaths linked to the coronavirus, people tested, hospitalisations, the rate of reproduction of the virus and now the progression of vaccinations. These are also high-frequency data, as they are available on a daily basis. They are used by several organisations for epidemiological modelling work. This is the case with LISER, which STATEC collaborated with in 2020 to ensure consistency between macroeconomic and pandemic developments within the forecast framework[18].

Other data, specifically developed in the context of the pandemic, have been used extensively by economists to quantify the impact of restriction measures: those produced by researchers from the Blavatnik School of Government and the University of Oxford and grouped under the name "Oxford COVID-19 Government Response Tracker"[19]. In particular, they include a "severity of confinement" index or a "stringency index" established for approximately 180 countries according to a common methodology, with daily data. This index includes the level of rigour of the restrictive measures on the basis of nine parameters: closure of schools and universities, closure of workplaces, cancellation of public events, limitation of private gatherings, closure of public transport, obligation to confine onsite or at home, restrictions on travel in national and international territory and the presence of public information campaigns on COVID-19. For many countries, this restrictiveness index has evolved inversely to economic activity, with a very significant direct relationship between these two variables, especially over the first two quarters of 2020. On the other hand, this relationship deteriorated in the second half of the year for the European economies (the change in GDP was better than the restrictiveness indices allowed us to envisage), probably allowing us to perceive a certain phenomenon of adaptation of the economic apparatus to the constraints imposed (see graphs H).

[18] See Note de conjoncture n° 2-2020, pp. 26-27.

[19] https://www.bsg.ox.ac.uk/research/research-projects/covid-19-government-response-tracker#data

Graphs H
Evolution of economic activity vs restrictiveness index*



* The restrictiveness index is shown on an inverted scale for each country.
** GDP data for Luxembourg is out of scale on the graph for the 4TH quarter of 2020 (value 101).
Sources: Oxford COVID-19 Government Response Tracker, Eurostat, STATEC calculations

Conclusions

This COVID crisis has generated particular interest in alternative indicators and, in particular, high-frequency indicators (daily or weekly). In fact, traditional cyclical indicators (monthly or quarterly) require a lead time that may be too long to monitor activity in near real-time when it has been very suddenly impacted. On the other hand, and this is particularly the case with economic surveys, their informative content can be damaged in the event of severe turbulence such as those caused by prophylactic measures during the past year.

These alternative indicators are not without flaws. They fall outside the scope of official statistics and do not comply with such a strict, transparent and consensual methodological framework. Many of these data are collected from users of Internet and mobile services in particular, which raises questions about their representativeness. And for some, they have only recently become available (their sustainability is not guaranteed either) and do not offer enough perspective to judge their potential for monitoring activity and preparing economic forecasts.

But these indicators must be seen as something complementary to the usual statistics. If they ultimately improve the quality of forecasts or the cyclical experience, they must have their place in economists' toolkits.

This crisis has also shown that their availability (and therefore their use) is not as extensive in Luxembourg as in other European countries. An effort is therefore also to be made at this point in terms of collection. Advances in digitisation are making it possible to generate more and more data ("big data" phenomenon), including high-frequency data from private or public players. But what matters most is that these are disseminated and updated on a very regular basis, with sufficient granularity to be able to best match the variables that are ultimately sought to be estimated. These considerations are at the heart of the "Data Science Initiative" project on which STATEC is currently working and whose ambition is to build a thematic hub including training, scientific monitoring and applied projects. It aims in particular to position STATEC in national and international networks dedicated to data science, artificial intelligence/machine learning/deep learning, big data and data mining.

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