

The Medium-Term Economic Impact of COVID-19 in Luxembourg

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The economy of Luxembourg has been drastically affected by the COVID-19 pandemic in 2020. STATEC reports a slump in gross domestic product (GDP) by more than 7% in the second quarter of 2020 (2Q2020), while the unemployment rate is expected to increase from 5.6% to 6.5% by the end of 2020. As the spread of COVID-19 continues, hundreds of new cases are reported every day in Luxembourg, and infections skyrocket in all European Union (EU) member states. The chances of improving the economic prospects in the coming months are slim, as authorities in many countries implement mild lockdowns. In this policy brief, we quantify the medium-term economic implications of the COVID-19 crisis, with a focus on the economy of Luxembourg.¹

With a help of a macroeconomic model that replicates the output and employment structure of the national economy of Luxembourg, we investigate the economic consequences of the COVID-19 shock. We study COVID-19-induced changes in final demand, firms' bankruptcy rates and costs of running business, and their implications for the labor market, wage rates, the supply and selection of active firms, and the prices of final goods. Below, we summarize the results of simulating the **worst-case scenario of COVID-19 economic recession** envisaged for Luxembourg, which assumes that the COVID-19 shock observed in 2Q2020 is

permanent. The aim of this experiment is to cast light on the most vulnerable parts of the Luxembourgish economy, and stress test them by freeing workers' mobility across sectors and occupations, by enabling firms to decide whether to enter or exit the market, and by incorporating peoples' consumption patterns. Note that our analysis includes a *laissez-faire* equilibrium without fiscal interventions, stimulus packages nor extraordinary transfers neither to consumers, nor to firms.

Our **main findings** can be summarized as follows:

- (i) Two sectors that are the most vulnerable to the demand shock induced by the COVID-19, that is *sales and low-skill services*, can lose approximately **20% of value added** produced, with more than a **quarter of firms leaving the market**.
- (ii) *Transportation and professional services* **expand** in the aftermath of COVID-19, and attract more productive workers, thus wages increase for the high-earning individuals.
- (iii) The equilibrium **GDP plunges by 4.7%** in Luxembourg, whereas the **unemployment rate increases by one-third from 5.6% to 7.4%**.
- (iv) **Wage inequality increases** as workers who are heavily affected by the COVID-19 crises tend to work in lower-wage occupations,



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¹ Medium term can be understood as a time period necessary for (i) prices and wages to adjust, (ii) workers to reallocate across jobs, (iii) firms to decide about entering or exiting the market. One can coarsely estimate it at 6-12 months.

less-paid sectors, and are of lower productivity level.

In what follows, we provide a brief description of the constructed theoretical model, its calibration (data sources), and the applied shocks. We then comment and explain the economic mechanisms internalized by the model. We finish with a discussion of the policy implications of our findings.

Theory and Numerics²

Assume that the economy comprises of eight sectors. Each sector includes firms that operate on a monopolistically competitive market, as in Melitz (2003).³ The production process in every sector requires an input of capital and tasks that are fulfilled by employees in various occupations. Workers possess multidimensional skills that determine their choice of occupations, while the sorting across sectors results from unobserved shocks

correlated with skill rankings. The medium-term general equilibrium (GE) includes four conditions: (1) workers sort across occupations and sectors by maximizing their expected wages; (2) firms minimize costs and rationally enter/exit the market in each sector; (3) people spend all their income on consumption; (4) labor market clears, as wages equalize marginal productivities of sector-occupational tasks inputs, while people with wage rates below their outside option (equal to the unemployment benefit) join unemployment.

To calibrate the model, we use data on: wage distributions by five occupations and eight sectors from the Structure of Earnings Survey 2014 by Eurostat, the degree of transferability of skills across occupations imputed from the O*NET database, and macroeconomic aggregates for 2018 (GDPs, factor endowments, default probabilities, and unemployment), all from Eurostat.

Figure 1:
Macroeconomic and Labor Market Aggregates

Note: **Variables:** gross domestic product (**Y**), price level (**P**), labor demand (**L**), number of firms (**M**), average firm productivity (ϕ)

Occupations: managers (**MAN**), professionals (**PRO**), clerical workers (**CLC**), service workers (**SER**), elementary occ's. (**ELE**), unemployed (**UNE**).

Sectors: manufacturing (**MANU**), construction (**CONS**), sales (**SALE**), transport services (**TRAN**), low-skill services (**LSER**), financial services (**FSER**), professional services (**PSER**), public sectors (**PUBL**).

Source: own calculations

(i) Macro indicators						(ii) Total Efficient Composite					
	Y	P	L	M	ϕ	MAN	PRO	CLC	SER	ELE	UNE
MANU	-15,80%	-0,46%	-2,70%	-19,4%	-2,56%	0,47%	-1,83%	-2,47%	-6,95%	-3,60%	
CONS	-12,05%	-1,34%	-1,73%	-16,7%	-2,73%	2,34%	0,49%	-0,66%	-5,94%	-2,97%	
SALE	-22,40%	-3,40%	-2,46%	-26,3%	-5,83%	0,12%	-0,45%	-1,86%	-6,96%	-2,96%	
TRAN	12,77%	4,00%	-1,25%	1,92%	5,31%	5,56%	0,09%	-1,38%	-6,58%	-2,15%	
LSER	-18,43%	-2,88%	-2,92%	-25,4%	-0,96%	1,04%	-0,04%	-0,96%	-6,43%	-2,96%	
FSER	-4,80%	-1,78%	-0,13%	-8,60%	0,35%	0,11%	0,00%	-1,36%	-9,70%	-1,12%	
PSER	7,51%	-0,40%	0,87%	-0,24%	4,57%	2,24%	0,71%	-0,86%	-6,97%	-2,97%	
PUBL	-3,19%	1,05%	-0,94%	-10,2%	0,58%	2,75%	0,00%	-1,35%	-6,65%	-2,40%	
Aggr.	-4,74%	-	-1,03%	-12,8%	-	2,17%	0,83%	-0,68%	-7,36%	-4,37%	32,5%

(iii) Average Skill Level						(iv) Number of Employees				
	MAN	PRO	CLC	SER	ELE	MAN	PRO	CLC	SER	ELE
MANU	-6,78%	-18,5%	-12,0%	-3,06%	-5,48%	10,8%	22,03%	13,51%	-2,03%	4,45%
CONS	8,41%	3,99%	6,62%	-0,80%	1,41%	-2,96%	-2,11%	-4,63%	-3,22%	-2,01%
SALE	-10,42%	-5,19%	-5,71%	-2,95%	1,47%	14,90%	6,36%	6,53%	-2,15%	-2,06%
TRAN	46,50%	-0,66%	-0,8%	1,88%	10,30%	-25,9%	2,06%	1,7%	-6,41%	-9,15%
LSER	-1,38%	-1,16%	3,53%	4,22%	1,52%	5,32%	2,45%	-2,08%	-8,36%	-2,11%
FSER	-10,39%	-0,7%	-0,54%	-28,0%	3,03%	14,84%	2,0%	1,51%	28,05%	-1,72%
PSER	10,45%	6,17%	4,61%	-2,73%	1,33%	-4,84%	-3,92%	-2,99%	-2,39%	-1,94%
PUBL	12,20%	-0,6%	-0,48%	1,12%	7,96%	-5,86%	1,95%	1,46%	-5,78%	-7,41%

² A detailed exposition of the theoretical and numerical developments is available in Burzyński, M., (2020). Labor Market Sorting: The Medium-Term Economic Impact of COVID-19, Working papers No. 2020-13, LISER.

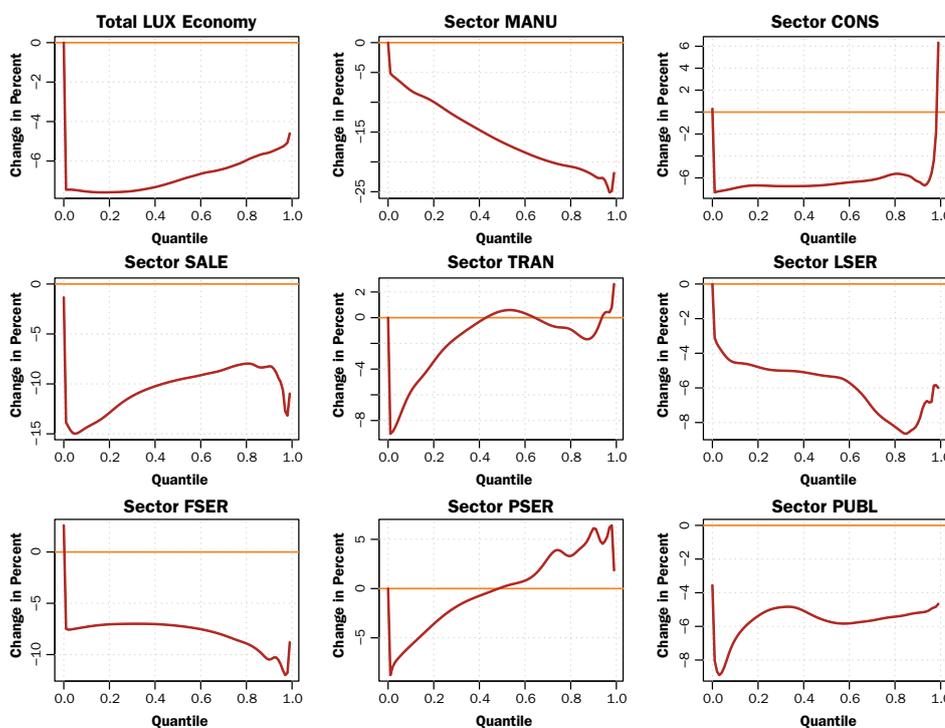
³ Melitz, M. (2003). The Impact of Trade on Aggregate Industry Productivity and Intra-Industry Reallocations. *Econometrica*, 71(6):1695-1725.

Figure 2:
Changes in Aggregated Wage Distributions

Note: The figures depict changes in wage rates per quantiles of sectoral wage distributions (unemployed and inactive workers are not included).

Sectors: manufacturing (**MANU**), construction (**CONS**), sales (**SALE**), transport services (**TRAN**), low-skill services (**LSER**), financial services (**FSER**), professional services (**PSER**), public sectors (**PUBL**).

Source: own calculations



The COVID-19 medium-term shock is composed of three elements. First, we assume that the final demand in Luxembourg falls according to sectoral data reported by the Eurostat for the 2Q2020. Second, we assume that COVID-19 induces liquidity problems for firms. Thanks to Maxime Delahaut and Sara Bouchon from LuxInnovation, who conducted the necessary computations using the Editus data on detailed financial characteristics of Luxembourgish firms, we calibrate the expected increase in sectoral probabilities of bankruptcy. Third, using the Chambre de Commerce survey, we estimate sector-specific increases in firms' running costs due to additional COVID-19 related expenditures. Overall, we are interested in simulating the economic consequences of the worst-case scenario: an equilibrium in which the economy settles, if the COVID-19 shock from 2Q2020 was of a permanent type.

Results

Introducing the COVID-19 shock into the economic system has a strongly diversified impact across production sectors. In general, the less-skill intensive sectors (e.g. SALE, LSER, CONS, and MANU sectors) lose substantially, while more back-office, service-oriented sectors (e.g. TRAN, FSER, PSER, PUBL sectors) are in a relatively better shape, as depicted in Figure 1 panel (i). Prices are only slightly affected in the new GE, which means that the main change in GDP comes from the real output. Labor is not severely affected due to substitution with capital (losing sectors are more capital intensive) and because of workers' mobility across occupations and sector. Finally, 13% of firms exit the market, although the standard selection pattern (less firms implying higher average productivity) is disturbed due to changes in fixed costs of production and bankruptcy probability.

Importantly, the shock forces people to change their allocation across labor market cells, see Figure 1 panels (ii)-(iv). First, we conclude that workers leave the occupations that are intensively used in losing sectors (e.g. SER, ELE), flowing mainly to unemployment. Second, the occupations predominantly used in winning sectors (e.g. MAN, PRO) gain new employees, who switch mainly from CLC. Third, growing sectors experience an improved selection of workers and vice versa – a higher number of people employed in a cell compensates a worse selection in terms of average skill level.

The sorting patterns translate directly into changes in wage distributions by sector, as depicted in Figure 2. Outflows of more productive workers from CONS, LSER and FSER sectors dampen the right tails of these wage distributions. These workers choose growing sectors: TRAN or PSER, where inequality strongly increases. Less productive workers face poorer outside options on the labor market and either choose unemployment, or accept significant wage reductions, as in SALE or CONS sectors. Overall, inequality strongly increases in the Luxembourgish labor market, as the bottom 40% of workers lose nearly 8% of their real wages, while top 20% lose less than 6%.

Policy Recommendations

According to our results, the COVID-19 crisis hurts predominantly blue-collar workers, while some of the white-collar workers can execute their outside options and escape significant wage losses. These stark projections for wage inequality should be accounted for by policymakers when proposing stimulus packages. Uniform provisions of grants and economic supports across sectors might deepen the distance between workers on the opposite ends of wage distribution. Moreover, workers in certain occupations face a higher risk of unemployment or skill downgrading. This calls for broadening of their skill sets through subsidized training packages to increase their occupational mobility. Finally, firms in capital (and technology) intensive sectors are more prone to substituting workers with robotic or digital means of production. In further research and future policy discussions, it is necessary to look into the long-term effects of the COVID-19 crisis for accelerated automation and digitization, as these processes are bound to permanently reduce sector- and occupation-specific demand for specific skills.

This policy brief is based on Burzyński, M., (2020). Labor Market Sorting: The Medium-Term Economic Impact of COVID-19, Working papers No. 2020-13, LISER.