Youth Labor Market during Covid-19

First Release of the CES Youth Labor Market Index

Report

Author(s):
Zubovic, Amela; Caves, Katherine Marie; Bolli-Kemper, Johanna Mirka

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Authors:
Zubovic Amela
Caves Katherine M.
Kemper Johanna

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Chair of Education Systems

CES

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First Release of the CES Youth Labor Market Index[†]

January 20, 2022

Amela Zubovic, Katherine M. Caves & Johanna Kemper[‡]

† A project of the Chair of Education Systems (D-MTEC), ETH Zurich

‡ Chair of Education Systems, ETH Zurich, Leonhardstrasse 21, 8092 Zurich, Switzerland. E-mails: amela.zubovic@mtec.ethz.ch, katie.caves@mtec.ethz.ch and johanna.kemper@mtec.ethz.ch

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1 Introduction

This report is the first release of the CES Youth Labor Market Index (CES YLMI), a multi-dimensional index that enables comparison of young people's labor market situations globally across countries and over time. The index consists of 12 indicators that describe the youth labor market situation based on four dimensions. The first dimension, *Activity State*, describes the participation of youth in the labor market. The second dimension, *Working Conditions*, focuses on job quality among employed youth. The third dimension, *Education*, captures young people's participation in education and training and its relevance. Finally, the fourth dimension, *Transition Smoothness*, describes the transition from education into the labor market. The CES YLMI uses the ILO definition of youth, which specifies individuals between 15 and 24 years old[1].

The CES YLMI is the same conceptually as the KOF Youth Labor Market Index (KOF YLMI) developed by Renold et al. (2014). It has been renamed due to the creation of the Chair of Education Systems (CES; website: https://ces.ethz.ch) at the Department of Management, Technology, and Economics (D-MTEC), ETH Zurich. This is the same team that developed the KOF YLMI. The CES YLMI is a technical update over the KOF YLMI. The raw data for calculating the CES YLMI is now taken directly from the servers of the statistical offices via application programming interfaces (APIs). This makes data updating less time consuming. Second, a new web tool (link: https://apps.ces.ethz.ch/ylmi/) allows users to visualize and analyze the CES YLMI in various ways and to download the data in different file formats.

The main data sources for the CES YLMI are the International Labor Organization (ILO), the European Statistical Office (Eurostat), the Statistical Office of the Organization for Economic Co-operation and Development (OECD), and the Swiss Federal Statistical Office (SFSO). The CES YLMI is available from 1991 onwards; as of January 2022, until 2019 or 2020. Depending on the data source, the number of countries with available data as of January 2022 ranges from 34 to 181 countries. In general, data availability for the CES YLMI is best for the set of European countries. Therefore, we focus on the set of European countries in this report, including members of the European Union plus associated countries, 34 in total[2]. More detailed information on data sources, calculation of the index, the data updating process and the web tool can be found in Kemper (2021).

In this report, we put a special focus on 2020 and investigate the development of the CES YLMI in European Countries during a worldwide pandemic. The Covid-19 virus disrupted all regions of the world in many ways. By the end of 2020, there were more than 83 million confirmed Covid-19 cases and almost 1.9 million confirmed deaths globally (Ritchie et al., 2020). To reduce the spread of the virus, countries implemented measures like social-distancing, mandatory mask

[1] This age interval is most often used by the international organizations providing the raw data. It may not be optimal because some people might still be in education after age 24. The indicator *Relative Unemployment Rate* is a comparison of youth and older adults, so this indicator is the only one not restricted to the 15-24 age group.

[2] Data for 2020 and sometimes for 2019 was not available from Eurostat for the United Kingdom (UK), so we dropped the UK from the set of European countries.

wearing, closure of schools and workplaces, travel bans, or complete lockdowns. Most countries were very strict about protective measures, while some took comparatively modest strategies with limited intervention. The pandemic and related measures inevitably led to a global recession with rapid increases in unemployment (The World Bank, 2020). Many governments responded with economic policies and fiscal support to reduce the impact on individuals and the economy.

To shed more light on the labor market situation for young individuals during Covid-19 between 2019 and 2020, we analyze the development of the four dimensions of the CES YLMI across European countries. We focus on European countries because of data availability. To better understand the effects and factors, we compare CES YLMI developments with countries' Covid-19 case numbers, regulatory stringency, and economic support measures.

2 Previous Economic Disruptions and the Youth Labor Market

We know that the youth labor market situation was immensely affected by the Great Recession in 2008 from the third report of the KOF YLMI (Pusterla, 2016). Not only did the youth unemployment rate increase drastically in most of the countries, but other dimensions experienced changes as well. Pusterla (2016) looked at the evolution of the twelve indicators from 2008 to 2014 and found on average large deteriorations for the *Activity State* and the *Working Conditions* dimensions. Importantly, there was a high level of heterogeneity in the five indicators for *Working Conditions* across countries, showing that the way countries were affected by the crisis differed. The dimension describing *Transition Smoothness* suffered as well, though to a lesser extent. Generally, the countries that had low values at the beginning of the great recession were the ones that faced an even less smooth transition by 2014. Furthermore, the dimension on *Education* improved over the period 2008-2014 for most countries.

Pusterla (2017) addresses the question of whether young individuals acquire more education in periods with economic downturns, or whether they just become inactive. While he finds that, on average, high unemployment rates correlate with higher enrollment in school and training, there is significant variation on the country level. The *NEET Rate* (share of youth neither in employment nor in education or training) might also be a driver for higher education and training enrollment rates. Pusterla therefore concludes that an exhaustive analysis by considering all conditions simultaneously is necessary to understand changes in the *Education* dimension and unpick the interdependencies there.

Although the origins of the Great Recession and the Covid-19 Recession are completely different, both resulted in increased unemployment rates among young people. While we assume that there will be some similarities in the outcomes for the young people, the Covid-19 pandemic affected specific industries and occupations disproportionately, so it is interesting to see where the differences are.

This report continues as follows: In Section 3 we recall the definitions of the twelve indicators and track the changes in the CES YLMI and its components between 2019 and 2020. Next, in Section 4, we introduce three Covid- related variables (Covid-19 Case Numbers, Stringency

Index, Economic Support Index) in our analysis and check for correlations with the four dimensions of the CES YLMI. Finally, we summarize our findings and provide an outlook for the next release.

3 Indicators for the Youth Labor Market Situation in 2020

The aim of this section is to provide a general overview of the developments on the Youth Labor Market between 2019 and 2020. We begin by briefly reminding readers of the definitions and mathematical formulas for the twelve indicators that are part of the index. We then turn to Table 1, which reports the score values for each indicator in 2019 and 2020 and the respective percentage changes.

To make all 12 indicators comparable, the CES YLMI standardizes each one of them to a common scale that ranges from 1 to 7, with higher scores being more desirable outcomes. Therefore, we describe developments in each indicator in terms of scores, not raw indicator values. Increases are therefore consistently positive, even though raw indicator values sometimes improve by moving in opposite directions.

Each of the twelve indicators can be attributed to one of four dimensions: *Activity State*, *Working Conditions*, *Education*, and *Transition Smoothness*. For more information on the selection of indicators, the motivation for grouping them in four dimensions, and the limitations in creating a composite index, please refer to Renold et al. (2014).

3.1 CES YLMI Results 2019 - 2020

The last column in Table 1 reports the changes from 2019 to 2020 in the aggregated CES YLMI. In 12 out of 34 countries, CES YLMI scores are higher in 2020 than they were in 2019. The other countries experience a drop in their scores, although movements are small. Only Montenegro (-12.2%), Lithuania (-5.5%), and North Macedonia (-5.19%) have deterioration exceeding the 5% range.

We also observe dramatic changes in the CES YLMI rankings for 2020 compared to 2019. While Switzerland's index score is in 2020 still ranked first, Latvia overtakes other top-ranking countries and improves from rank 6 in 2019 to rank 2 in 2020. The Czech Republic also experienced a large improvement and is ranked fourth in 2020. We also see notable positive developments for countries like Belgium, Hungary, Romania, Slovakia, and Iceland. While Germany is still in the top ten, it experienced a drop of 4 ranking positions. Lithuania drops from rank 3 in 2019 to rank 11 in 2020. Furthermore, Estonia loses 8 ranking positions from 2019 to 2020. Most of the remaining countries experienced small movements in their rankings.

Importantly, as we have seen when analyzing the individual indicators, improved index scores do not necessarily reflect that a country is doing better. The year 2020 was unique with high unemployment rates due to Covid-19, so that we must be careful with the interpretation of indicators' movement.

Table 1: Evolution of the CES YLMI between 2019 and 2020

Country	Activity State			Working Conditions			Education			Transition Smoothness			YLM Index				
	2019	2020	Direction*	2019	2020	Direction*	2019	2020	Direction*	2019	2020	Direction*	2019	2020	Rank	Change	
Switzerland	6.10	6.02	→	5.76	5.80	→	5.60	5.49	→	5.67	5.70	→	5.78	5.75	1	=	0
Latvia	5.80	5.69	→	5.61	5.68	→	5.24	5.57	↗	5.74	5.84	→	5.60†	5.70†	2	▲	4
Netherlands	6.32	6.15	→	5.41	5.17	→	5.24	5.47	→	5.91	5.68	→	5.72	5.62†	3	▼	1
Czech Republic	6.39	6.21	→	5.59	5.72	→	4.37	5.20	↑	5.06	5.24	→	5.35	5.59	4	▲	6
Austria	6.06	5.88	→	5.90	6.04	→	4.39	4.53	→	5.59	5.83	→	5.49	5.57	5	▲	3
Denmark	5.94	5.85	→	5.04	4.79	↘	5.41	5.45	→	6.04	6.08	→	5.61	5.54†	6	▼	1
Poland	5.97	5.88	→	4.99	5.13	→	5.29	5.56	↗	5.30	5.11	→	5.39	5.42	7	▲	2
Germany	6.35	6.08	→	5.88	4.97	↓	4.76	4.78	→	5.52	5.79	→	5.63	5.40†	8	▼	4
Iceland	6.20	6.03	→	4.97	4.36	↓	5.05	5.33	↗	4.96	5.72	↑	5.30†	5.36∓	9	▲	4
Slovenia	6.10	5.71	↘	4.70	4.88	→	5.87	5.75	→	5.48	4.96	↘	5.54	5.33	10	▼	3
Lithuania	5.91	5.39	↘	5.97	5.73	→	4.88	4.37	↓	5.78	5.82	→	5.64†	5.33†	11	▼	8
Belgium	5.61	5.48	→	5.26	5.46	→	4.85	5.17	↗	5.10	5.11	→	5.21	5.31	12	▲	5
Hungary	5.71	5.57	→	6.00	5.97	→	4.09	4.58	↑	4.77	4.99	→	5.14	5.28†	13	▲	6
Cyprus	5.40	5.26	→	5.37	5.27	→	4.94	5.00	→	5.53	5.50	→	5.31	5.26†	14	▼	2
Norway	6.06	5.90	→	5.21	4.87	↘	5.01	5.24	→	4.84	5.01	→	5.28†	5.26†	15	▼	1
Portugal	5.38	4.98	↘	4.80	4.82	→	5.58	5.89	↗	5.11	5.16	→	5.22	5.22†	16	=	0
Croatia	5.24	4.88	↘	5.09	5.21	→	5.59	5.84	→	5.06	4.84	→	5.24	5.19	17	▼	2
Ireland	5.60	5.11	↘	5.07	5.08	→	4.77	5.14	↗	5.24	5.44	→	5.17	5.19†	18	=	0
Estonia	5.84	5.31	↘	5.33	5.02	↘	4.77	5.16	↗	5.29	5.18	→	5.31†	5.17†	19	▼	8
Malta	6.12	5.90	→	5.78	5.75	→	3.31	3.80	↑	5.08	5.10	→	5.07	5.14†	20	▲	1
Bulgaria	5.59	5.23	↘	5.52	5.29	→	4.61	5.34	↑	4.40	4.61	→	5.03†	5.12†	21	▲	2
Luxembourg	5.50	5.09	↘	4.93	4.69	→	5.07	5.08	→	4.79	5.21	↗	5.07†	5.02	22	=	0
France	5.34	5.18	→	5.19	4.82	↘	4.70	4.96	↗	5.13	5.13	→	5.09	5.02†	23	▼	3
Slovakia	5.49	5.30	→	5.30	5.31	→	3.90	4.93	↑	4.27	4.36	→	4.74	4.97†	24	▲	4
Finland	5.48	5.14	↘	4.80	4.74	→	4.56	4.68	→	5.05	4.86	→	4.98†	4.86†	25	▼	1
Turkey	4.21	3.83	↘	4.95	5.18	→	4.50	4.72	↗	5.61	5.53	→	4.82	4.82†	26	=	0
Sweden	5.43	5.06	↘	4.88	4.34	↓	3.53	3.88	↗	5.71	5.74	→	4.88	4.75†	27	▼	2
Romania	5.30	5.23	→	4.03	4.16	→	5.06	5.17	→	3.81	4.36	↑	4.55	4.73	28	▲	5
Spain	4.50	3.95	↓	3.95	4.41	↑	5.09	5.12	→	5.45	5.44	→	4.75	4.73	29	▼	2
Greece	4.41	4.35	→	4.07	4.23	→	6.26	6.65	↗	4.04	3.97	→	4.64	4.72	30	▼	1
Serbia	4.52	4.33	→	3.64	3.83	↗	5.78	5.85	→	4.39	4.41	→	4.58†	4.61†	31	▼	1
North Macedonia	3.96	3.82	→	4.84	4.68	→	5.87	5.59	→	3.63	3.27	↘	4.58	4.34†	32	▼	1
Italy	3.91	3.72	→	3.85	3.93	→	5.14	5.37	→	4.04	4.07	→	4.24	4.27†	33	▲	1
Montenegro	4.30	3.29	↓	4.38	3.15	↓	5.57	5.47	→	4.00	4.12	→	4.56†	4.00∓	34	▼	2

* The directions describe the changes in the dimensions' score in 2019 relative to 2020. The key of lecture is the following: ↑ score changes > +10%; ↗ score changes by > +5% to +10%; → score remains stable between +5% and −5%; ↘ score changes by > −5% to −10%; ↓ score changes > −10%
† Only 10 or 11 indicators out of 12 available. ∓ Only 8 or 9 indicators out of 12 available.
Notes: The table shows countries ranked according to their YLM index value in 2020. The index value is an unweighted average of the scores in the four dimensions Activity State, Working Conditions, Education and Transition Smoothness. The scores in turn are standardized country values on a scale from one to seven, where a higher score indicates a more desirable outcome. For more information on the construction of the index and the scores please consult Renold et al. (2014). The second to fifth column show the score value in 2019, the score value in 2020 and the direction of the change for the four dimensions Activity State, Working Conditions, Education and Transition Smoothness. The sixth column displays the YLMI value of 2019 as reference and the actual value of 2020, followed by the rank in 2020 and the change from 2019 to 2020. The data used for the table are the newest available.

3.2 Activity State

The first dimension, *Activity State*, captures the participation of the youth in the labor market and consists of three indicators: the *Unemployment Rate*, the *Relaxed Unemployment Rate*, and the *NEET Rate*.

3.2.1 Unemployment Rate

The unemployment rate captures the annual unutilized labor supply in an economy (ILO, 2013). We use the unemployment rate for people between 15 and 24 years old as:

$$\textbf{Unemployment Rate} = \frac{Unemployed}{Labor\ Force} * 100$$

where the labor force captures employed and unemployed individuals but not those out of the labor force.

As shown in Table 2 in the Appendix, the index scores for the *Unemployment Rate* in 2020 decreased in almost all 34 countries relative to 2019. For around two-thirds of the countries, the score stayed within a 5% range of the previous year and is therefore considered stable. The

countries that experienced the largest drop in 2020 compared to 2019 were Lithuania (-11.1%), Spain (-11.6%), and Montenegro (-19.1%).

As mentioned in the introduction, 2020 is marked by the Covid-19 pandemic, followed by a global recession. We expect that individuals changing their behavior to avoid contagion as well as regulatory measures like remote work, travel bans, or entire shutdowns all negatively affected economic activity, resulting in a decrease in the demand for labor in particular sectors.

3.2.2 Relaxed Unemployment Rate

The *Unemployment Rate* fails to fully capture the unemployment issue since it ignores unemployed workers that are no longer actively looking for a job but would like to work - called discouraged workers (Hussmanns et al., 1990). Hussmanns et al. (1990) mention that discouraged workers are especially pronounced among the younger population. We expect the *Unemployment Rate* to underestimate the youth unemployment situation substantially, so the CES YLMI includes the *Relaxed Unemployment Rate*. The rate is calculated as:

$$\textbf{Relaxed Unemployment Rate} = \frac{Unemployed + Discouraged\ Workers}{Labor\ Force} * 100$$

Since the *Relaxed Unemployment Rate* is tightly linked to the *Unemployment Rate*, most index scores for this indicator also decreased in 2020 relative to 2019. For more than half of the countries we analyze, the decrease was more than 5% compared to the previous year, and around one-third of countries experienced a drop larger than 10% relative to 2019. The largest effects were experienced by Montenegro (-42.5%), Spain (-21.9%), Ireland (17.6%), and Turkey (-16.7%).

For almost all countries, the drop in the *Relaxed Unemployment Rate* is more noticeable than that of the *Unemployment Rate*. This demonstrates that the share of discouraged workers increased during the pandemic.

3.2.3 Rate of Young People Neither in Employment nor in Education and Training (NEET Rate)

The third indicator in the *Activity State* dimension aims to capture inactivity among young individuals. While the usual category of economically inactive people includes individuals that are still in education, inactivity might be overstated. The *NEET Rate* captures only those that are neither in employment (either unemployed or inactive) nor in education or training in the last four weeks (Eurostat, 2013a). It is described as:

$$\textbf{NEET Rate} = \frac{Youth\ neither\ in\ Employment\ nor\ in\ Education\ and\ Training}{Young\ Population} * 100$$

Importantly, the *NEET Rate* provides a more accurate picture of the inactive youth that are particularly at risk of labor market and social exclusion, obtaining neither work experience nor additional skills through education to improve future employability (ILO, 2013).

Again, the index scores for the *NEET Rate* decreased for almost all countries in 2020 compared to 2019, but only a few countries experienced drops that exceeded the 5% range. The most affected countries were Montenegro (-12.9%) and Turkey (-11%), followed by Ireland, Lithuania, North Macedonia, and Spain, all experiencing decreases of slightly more than 5% in their scores.

A higher *NEET Rate* could be linked to an increase in the number of unemployed or inactive youth, lower enrollment of youth in education and training, or both. While more dismissals or quits than new hires during the pandemic could lead to more unemployed or inactive individuals, the impact of the crisis on the number of those in education or training could go in both directions. Previous economic crises drove youth to enroll in (further) education and training instead of entering the labor market, leading to lower NEET rates (Pusterla, 2017). The Covid-19 pandemic may be similar - especially given that remote learning enabled studying from home. On the other hand, some schools, higher education institutions, and training facilities shut down or froze enrollments instead of or in addition to offering distance learning (OECD, 2021b). This could have prevented the usual increase in enrollment associated with economic crises, leading to a higher *NEET Rate*.

Unlike previous crises, education enrollment appears relatively stable from 2019 to 2020 (see *Formal Education and Training Rate* below). This implies that we do not observe the shift to education and training we would expect based on previous crises, or that remote learning drove enough dropout to balance out any increased enrollment. It also implies that very high unemployment or inactivity among youth drove the 2019-2020 decrease in index scores for the *NEET Rate* indicator, not increased enrollment in education and training. The interplay between the *NEET Rate* and enrollment in education and training is not straightforward and needs further analysis, but the indicator behaves differently during the Covid-19 crisis than it did during the Great Recession.

3.3 Working Conditions

While the first three indicators focus on how many young people are unemployed or inactive, the following set take a closer look at employed young people and their working conditions. For the dimension on *Working Conditions*, we use five indicators: The *Temporary Worker Rate*, the *Involuntary Part-time Worker Rate*, the *Atypical Working Hours Rate*, the *In-Work at-Risk-of-Poverty Rate*, and the *Vulnerable Employment Rate*. An overview of the evolution of these five indicators from 2019 to 2020 is given in Table 3 in the Appendix.

3.3.1 Temporary Worker Rate

The *Temporary Worker Rate* illustrates how many young individuals have temporary work contracts. In general, permanent jobs tend to be more favorable as they more likely provide security, better working conditions and higher job satisfaction. Furthermore, younger and less

educated people are more likely to have temporary contracts (Booth et al., 2002; OECD, 2002).

For this indicator we only use short-term temporary contracts that have a duration of less than 18 months. The calculation of the indicator is given by:

$$\textbf{Temporary Worker Rate} = \frac{Workers\ with\ a\ contract\ < 18}{Total\ number\ of\ employees} * 100$$

Interestingly, for most countries, index scores on the *Temporary Worker Rate* indicator increased, suggesting an improvement in the working conditions for employed individuals as proportionally less people have temporary jobs. The movement stayed within the 5% bound for the majority. Countries that experienced large improvements relative to 2019 were Slovenia (+30.5%), Portugal (+25.2%), Poland (16.3%), and Spain (+13%).

When interpreting the *Temporary Worker Rate* indicator, we must be careful. There is a high chance that the increase in the indicators' score results from the fact that proportionally more workers with temporary contracts were dismissed during the pandemic. Indeed, a report from Eurofound and European Commission Joint Research Centre (2021) finds disproportional dismissal of temporary workers. This implies that, although the share of workers with a temporary contract decreased, working conditions with respect to temporary work probably did not change for people that remained employed.

Some countries like North Macedonia (-4.5%), Iceland (-3.8), and Germany (-2.1%) experienced a slight drop in this score, suggesting that the share of workers with a temporary contract increased from 2019 to 2020. When looking into the single components making up the indicator for these countries, we notice that the total number of workers decreased while the number of temporary contracts increased. One explanation could be that even though lots of people got dismissed during the pandemic in these countries, others were newly hired but only in temporary positions. This might be because of uncertainty during the pandemic, or because demand for temporary personnel explicitly for the pandemic (e.g., staff for testing, vaccination, or for checking certificates) increased.

3.3.2 Involuntary Part-Time Worker Rate

Our fifth indicator is the *Involuntary Part-Time Worker Rate* that captures all part-time workers that would prefer to work more and therefore represent a waste of human resources and one type of underemployment for individuals.

The rate is defined as:

$$\textbf{Involuntary Part-Time Workers Rate} = \frac{Involuntary\ part-time\ employment}{Total\ employment} * 100$$

For most countries, the index score for this dimension did not change substantially from 2020 to 2019, remaining within the 5% range. However, that movement was not consistent in

direction: for some countries the score increased while it decreased for others.

Ireland (+18.3%) and Spain (+10%) experienced notable improvements in this indicator, implying that the share of involuntary part-time workers decreased. However, the same argument as for the indicator of temporary contract workers applies here: this improvement is likely due to people working involuntarily part-time were disproportionately affected by dismissals during the pandemic. This results in an overall lower share of involuntary part-time workers despite no improvement in working conditions for those who retained their jobs.

On the contrary, other countries like Luxembourg (-11%) and Denmark (-5.3%) recorded a drop in this indicator's score. In these cases, it is more likely that full-time workers, instead of getting dismissed, were forced to shift to working part-time, resulting in a higher share of involuntary part-time workers. Findings from Eurostat (2020) support this argument, showing a rise in workers working reduced hours across the whole working population.

3.3.3 Atypical Working Hours Rate

Another indicator in the category of *Working Conditions* is the *Atypical Working Hours Rate*. As working atypical hours can negatively affect one's personal well-being and is perceived as a burden by many people, less atypical working hours are desirable (Arthur et al., 2002; Rouch et al., 2005).

We calculate the Atypical Working Hours Rate as follows:

$$\textbf{A.W.H. Rate} = \left(\frac{Working\ on\ Sunday}{Tot.\ employees} + \frac{Working\ at\ night}{Tot.\ employees.} + \frac{Working\ Shift}{Tot.\ employees.}\right) * \frac{1}{3} * 100$$

For most countries where data is available, we can identify a notable movement in the index scores from 2019 to 2020 that exceeds the 5% range. Scores for this indicator increased for most countries, with Montenegro (+138.6%), Serbia (+37.9%), Slovakia (+31.1%), Spain (+28%), and Cyprus (26.8%) experiencing the largest positive developments.

Again, the reason for this development might be that the dismissals during the pandemic hit atypical-hours workers proportionally harder than others. This is very likely the case given that sectors where atypical hours are very common (e.g., hospitality) experienced large reductions in activity due to social distancing and shutdowns.

There are also countries that have gotten worse in their score, like Finland (-8.9%), Latvia (-8.3%), Bulgaria (-6.5%), and Turkey (-6.2%), implying that the share of workers with atypical hours increased. It might be the case that the pandemic and the resulting measures (like social distancing) enhanced shift working and working on Sundays or at night.

3.3.4 In-work-at-Risk-of-Poverty Rate

We also include an indicator for the share of employed young people who do not get paid enough to have a decent standard of living. This variable indicates whether a person with a job is at

risk of poverty, where the threshold is set at 60% of the national median equalized disposable income (Eurostat, 2013b).

The indicator is calculated as:

$$\textbf{In-work-at-Risk-of-Poverty Rate} = \frac{In\ work\ at\ risk\ of\ poverty\ employees}{Total\ number\ of\ employees} * 100$$

We notice movements above 5% relative to the previous year in this indicator for 25 out of the 34 countries where we have data. Countries with particular high index scores on their *In-work-at-Risk-of-Poverty Rate* indicator relative to the previous year were Denmark (42.7%), Spain (+21.8%), Portugal (+18.2%), and Belgium (+15.6%). In these cases, it is possible that workers that were at risk of poverty were more likely to be dismissed during the pandemic. This would have resulted in a decrease of the rate, as fewer people are at risk of poverty among the employed population.

On the contrary, there are countries like Germany (-19.7%), Lithuania (-15.2%), Estonia (-9.4%), and Cyprus (-9.1%) where index scores for this indicator decreased, implying a higher share of workers being at risk of poverty. As some young workers had to reduce their working hours, their earnings dropped as well. This might have resulted in more people being at risk of poverty among those still employed. Income losses due to Covid-19 have been observed for workers of all ages, partly due to working fewer hours (Eurostat, 2020).

3.3.5 Vulnerable Employment Rate

To track the development of economic risk in employment that workers face, we add another indicator representing vulnerable employment. For this indicator two employment status categories, self-employed workers and unpaid family workers, are considered. According to Elder (2009) and ILO (2011), workers in these two categories are more likely to be exposed to economic risk as they often lack formal work arrangements and protection by law.

The indicator, *Vulnerable Employment Rate*, is defined as:

$$\textbf{Vulnerable Employment Rate} = \frac{Own\ account\ workers\ +\ Unpaid\ family\ workers}{Total\ Employment} * 100$$

We only have data for 15 out of 34 countries, where almost all movements on this indicator's index scores are slightly negative but considered stable as they are within the 5% range. The proportion of vulnerable workers has probably slightly increased in these countries, as dismissals for other workers were relatively high during the pandemic.

The only country that experiences an increase in the index score for the vulnerable employment rate above 5% from 2019 to 2020 is North Macedonia (+5.5%). In this case, vulnerable workers were probably dismissed disproportionately, driving the positive movement of the indicator.

3.4 Education

The third dimension aims at capturing the share of youth involved in the education and training process. Thus, the dimension on *Education* consists of two indicators, the *Formal Education and Training Rate* and the *Skills Mismatch Rate*. Table 4 in the Appendix shows the changes for the index scores from 2019 to 2020.

3.4.1 Formal Education and Training Rate

The first indicator for education and training is the *Formal Education and Training Rate* which measures how many young people are getting further education or training after completing compulsory education. Continuing education and the acquisition of skills after mandatory school is important as it increases the chances for getting a job. Hence, higher values of this rate are more desirable, like the index scores

The indicator is calculated as:

$$\textbf{Formal Education and Training Rate} = \frac{Youth\ in\ formal\ education\ \&\ training}{Young\ Population} * 100$$

Almost all countries experience slight increases on the index score for the *Formal Education and Training Rate*. However, most of these improvements stayed in the 5% range and are therefore considered stable. Only countries like Luxembourg (+11.9%), Iceland (+8.7%), and Portugal (+5.7%) showed more pronounced movement.

These findings are coherent with was already discussed in Pusterla (2017), namely that there is some evidence for higher enrollment rates in education and training during periods of weak economic conditions. In addition to the other education-related considerations already discussed under the *NEET Rate* indicator, we must also consider the direct effect of Covid-19 on education and training. Specifically, the shift to distance learning and other changes may have contributed to learning loss or lower-quality education and training for some young people even though they remained enrolled.

3.4.2 Skills Mismatch Rate

With the *Skills Mismatch Rate* indicator, we measure whether the skills provided by workers align with the skills required on the labor market. More specifically, we investigate whether some education courses are more or less affected by unemployment by examining the occurrence of unemployment at different ISCED levels.

The *Skills Mismatch Rate* is calculated as:

$$\textbf{Skills Mismatch Rate} = \frac{1}{2} * \sum_{k=1}^{3} \left| \left(\frac{Employed\ with\ edu.\ k}{Total\ employment} - \frac{Unemployed\ with\ edu.\ k}{Total\ unemployment} \right) \right|$$

where k is the level of education (i.e., primary or less, secondary and tertiary).

Since this indicator is an index of aggregated dissimilarities, we cannot directly tell whether changes in the *Skills Mismatch Rate* result from overdemand or oversupply of workers with certain education levels (Pusterla et al., 2018). However, we assume that, since acquired skills cannot be changed quickly, the supply of workers with certain skills will be mostly constant from 2019-2020. Therefore, changes in the *Skills Mismatch Rate* are most probably driven by changes in demand. The complexity of this indicator is elaborated in the fifth report of the KOF YLMI *Disentangling Skills Mismatch: Fifth Release of the KOF Youth Labor Market Index* (Pusterla et al., 2018) in more detail.

For almost 60% of countries, we observe more than 5% improvement from 2019 to 2020 on the index score of the skills mismatch rate's indicator. The largest positive movements can be observed for Slovakia (+74.2%), Czech Republic (52.8%), Bulgaria (+35%), and Spain (+34%). This suggests that during the pandemic the demand for well-supplied skills increased, resulting in a lower skills mismatch. Put another way, this indicates that the skills young people have attained through education and training are the ones that remained in demand through the pandemic. Skill levels and types not provided through education and training may have experienced a reduction in demand.

The opposite is true for some countries, like Lithuania (-24.6%), Slovenia (-9.1%), and North Macedonia (-8%), that experienced a deterioration in their index score and therefore a higher mismatch rate. In these countries, the skills in sectors and occupations that were hit harder by the economic shock seem to be relatively better supplied than the skills still demanded after the pandemic began. The skills still needed may be harder to find.

3.5 Transition Smoothness

The fourth dimension *Transition Smoothness* focuses on the difficulty of young peoples' transition from education to workplace. The two indicators included here are the *Relative Unemployment Rate* and the *Long-term Unemployment Rate*.

3.5.1 Relative Unemployment Rate

This indicator compares the youth unemployment rate to the adult unemployment rate to show whether young individuals are more affected by bad labor outcomes than adults.

The indicator is defined as:

$$\textbf{Relative Unemployment Rate} = \frac{Young\ unemployment\ rate\ (15-24)}{Adult\ unemployment\ rate\ (25+)}$$

As shown in Table 5 in the Appendix, the *Relative Unemployment Rate* has increased for most of the countries, causing the indicator's score to drop. However, the majority experienced only movement within the 5% range of the previous year. In countries like Slovenia (-13.1%),

Netherlands (-8.7%), and Bulgaria (-8.5%) we see larger declines indicating that youth labor outcomes suffered more during the pandemic than employment for workers older than 25 years. We observed a similar phenomenon after the Great Recession, where the employment situation for young workers deteriorated more than it did for older workers. Not only is entering the labor market after finishing education very difficult when the economy is experiencing a downturn, but Covid-19 affected sectors with high concentrations of young workers (OECD, 2021a).

A small group of countries like Romania (+23.4%) and Iceland (15.3%) had better relative unemployment index scores in 2020 relative to 2019, implying that the employment of young people was less badly hit during the pandemic than adult unemployment.

3.5.2 Long-term Unemployment Rate

The *Long-Term Unemployment Rate* captures the share of young individuals that have been unemployed for a year or longer(ILO, 2011) and is calculated as:

$$\textbf{Incidence of Long-term Unemployment} = \frac{Unemployed\ longer\ than\ one\ year}{Total\ unemployed} * 100$$

This indicator score improved for many countries. Almost half of the countries we analyze show an improvement of more than 5% in 2020 relative to 2019, with Bulgaria (+29.1%), Montenegro (+24.8%, and Germany (+11.9%) achieving the highest increases. This may, however, be a mathematical phenomenon: apparent improvement in long-term unemployment can occur because the share of people that became unemployed during the pandemic is so large relative to share of long-term unemployed. Even with no movement or a slight increase in long-term unemployed people, the rate relative to the total unemployed population would go down.

Only in North Macedonia (-38.8%) and Slovenia (-5.2%) do we observe considerable drops in this indicator score, suggesting that the share of long-term unemployed individuals increased during the pandemic more than the total unemployed population. This would be especially possible if the share of unemployed youth pre-pandemic was already high, pushing many young people into the long-term category as they continued to not find employment.

4 Exploring the Effects of Covid-19 on Youth Labor Markets

As seen in Section 3, the individual indicators comprising the CES YLMI have experienced some notable movement from 2019 to 2020. The Covid-19 pandemic affected not only the health of individuals but also broader economic conditions. However, it is not completely clear how much the spread of the virus or government responses were each responsible for changes in youth labor market conditions. Therefore, we correlate CES YLMI scores with three Covid-19 variables that might capture the different channels for Covid-19 effects on youth labor markets: the number of Covid-19 cases per million people, the degree of regulation or lockdown in each country as

measured by the Covid-19 Stringency Index[3], and the degree of income support or other relief as measured by the Economic Support Index[4].

The number of cases, defined as the total number of Covid-19 cases per million people by the end of December 2020 (Ritchie et al., 2020), shows how intense the pandemic was in that country. In addition to the direct effect of illness, regulatory measures like lockdowns are another channel through which the pandemic affects youth labor market outcomes. The Covid-19 Stringency Index from the Oxford Covid-19 Government Response Tracker consists of nine indicators including school closures, workplace closures, and travel bans, giving each country a score from 0 to 100 (Ritchie et al., 2020). Finally, the Economic Support Index -also from Oxford- tries to capture the economic policies that emerged to blunt the effects of the pandemic. Specifically, the index measures income support (e.g., direct cash payments to people who were dismissed or cannot work) and debt/contract relief (e.g., the freezing of financial obligations for households; Hale et al., 2021).

Following the approach of previous reports, we use the four dimensions of *Activity State*, *Working Conditions*, *Education*, and *Transition Smoothness* to summarize young peoples' situation on the labor market. As usual, all indicators are equally weighted within dimensions. We show plots correlating the 2019-2020 change in CES YLMI dimensions against each Covid-19 related variable to investigate potential patterns. To overcome potential bias driven by limited data, we also correlate changes in each of the twelve individual indicators against each Covid-19 related variable. While this analysis is descriptive rather than causal, it does provide initial insight into whether any of these three channels for the pandemic's effects on the youth labor market is dominant.

4.1 Activity State

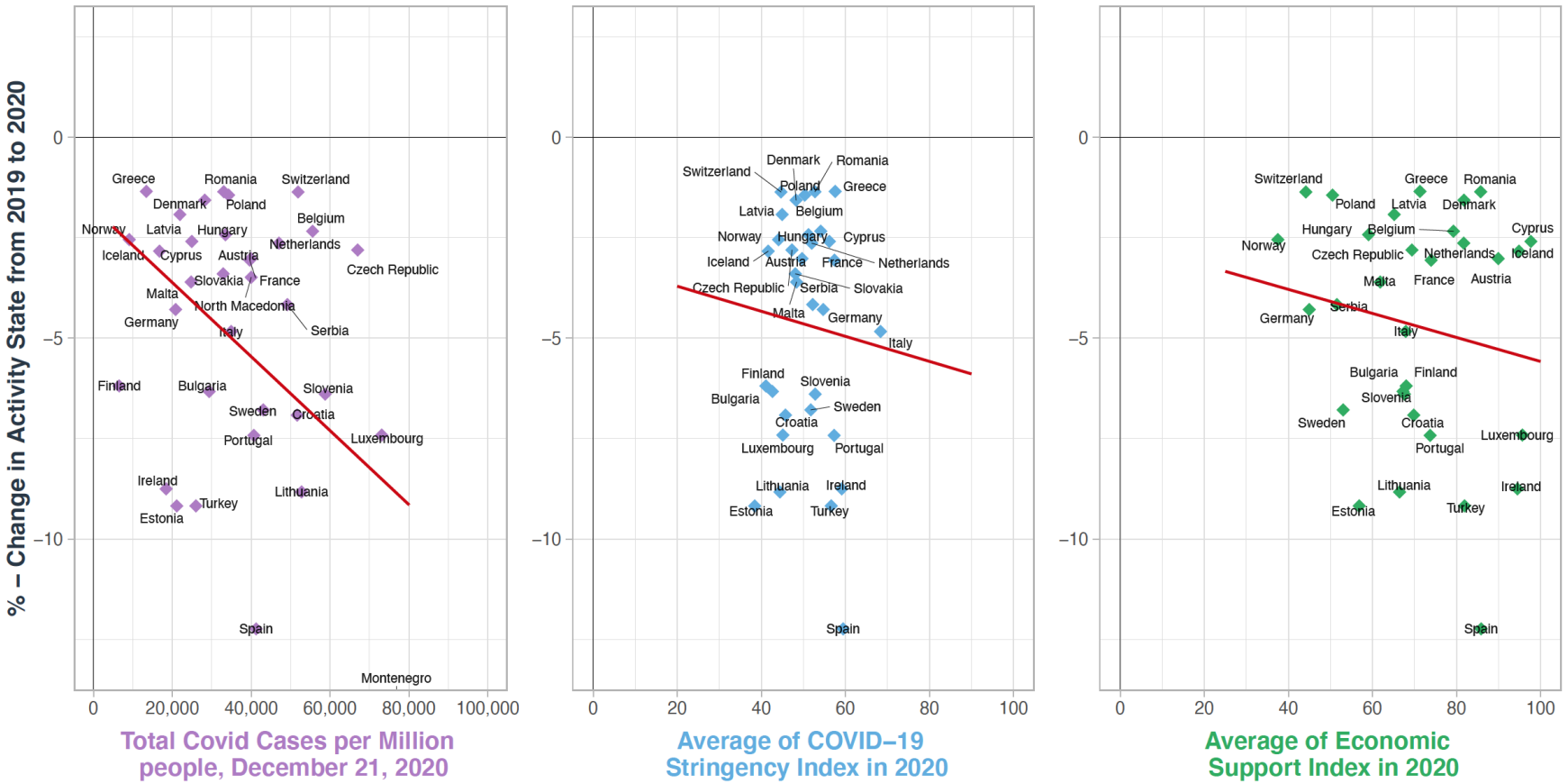
In Figure 1 we focus on the aggregate index score for the dimension *Activity State* and plot it against all three Covid-19 variables. There is a negative relationship between Covid-19 cases and the index score for the *Activity State* dimension. We find that the more Covid-19 cases a country experienced, the more its *Activity State* score decreased from 2019 to 2020. We find a similar negative relationship between the Stringency Index and the *Activity State* score. This implies that the stricter the country's measures were, the more its *Activity State* score decreased from 2019 to 2020. Intuitively this makes sense, as strict Covid-19 measures like lockdowns and restaurant closures are associated with less activity in the labor market. Ang and Dong (2021) find that higher Covid-19 cases lead to stricter measures, which might bias these findings. However, when we correlate Covid-19 cases against stringency, we find no relationship.

Finally, we plot the Economic Support Index against *Activity State* and find a negative relationship like the other variables. In countries with higher levels of economic support, we also observe higher drops in the *Activity State* score from 2019 to 2020. In this case, we fully expect reverse or mixed causality where the drop in the *Activity State* score could be the reason

[3]https://www.ourworldindata.org/covid-stringency-index

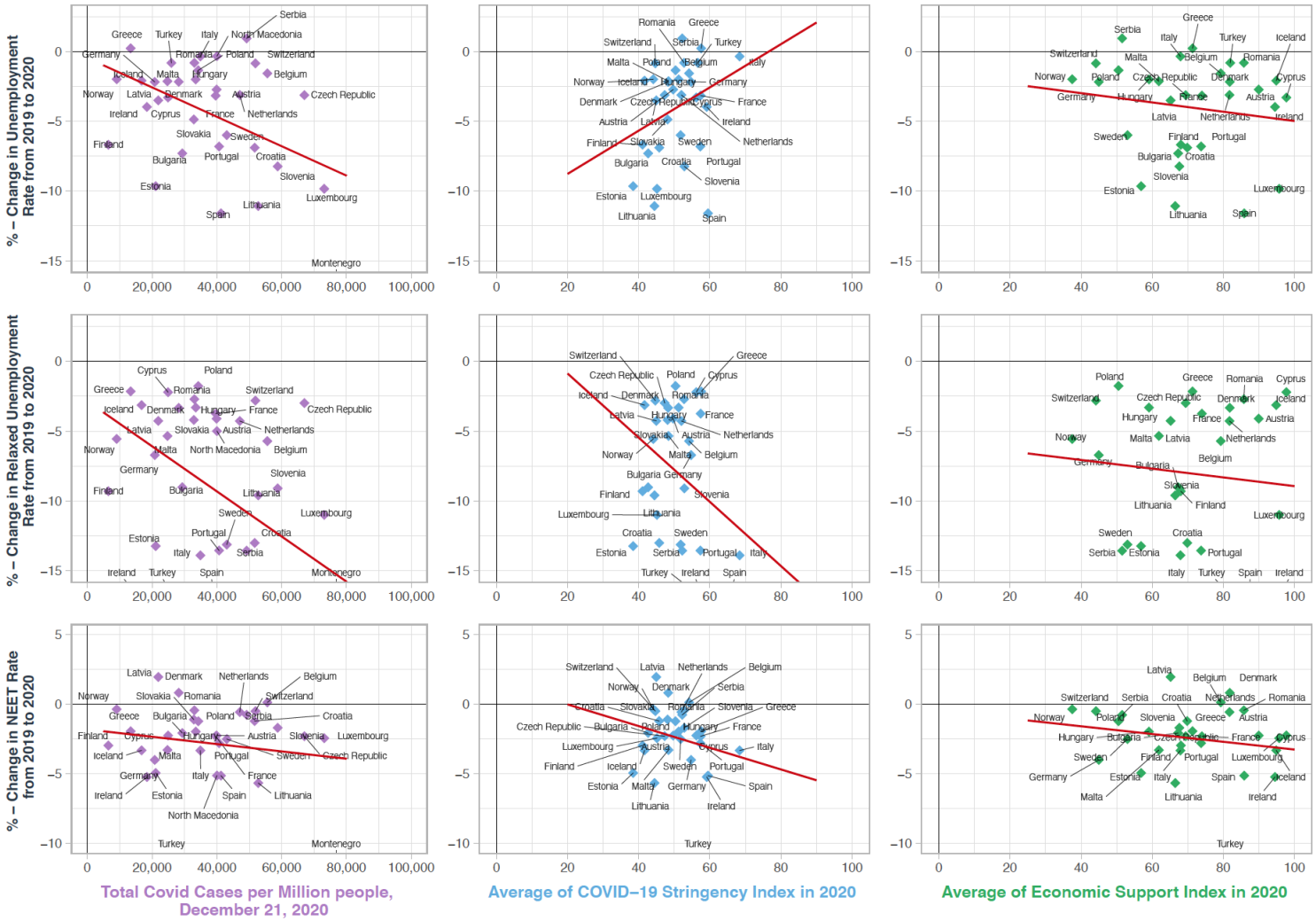
[4]https://www.bsg.ox.ac.uk/research/research-projects/covid-19-government-response-tracker

Figure 1: Correlations of the %-Change in Activity State with three Covid-19 related variables



Notes: The scatterplots show correlations between the %-change in the Activity State from 2019 to 2020 (y-axis) and the three Covid-19 related variables (x-Axis). The left graph plots the Activity State of each country againt the country's Total Number of Covid Cases per Million people at the end of 2020 (purple graph). The middle graph uses the Average Covid-19 Stringency Index in 2020 as Covid-19 variable (blue graph), and the right graph presents a plot between the Activtiy State and the Average Economic Support Index in 2020 (green graph).

Figure 2: Correlations of the %-Change in Activity State's Indicators with three Covid-19 related variables



Notes: The scatterplots show correlations between the %-change in the Activity State's indicator scores from 2019 to 2020 (y-axis) and the three Covid-19 related variables (x-Axis). The indicators on the y-axis are the Unemployment Rate, the Relaxed Unemployment Rate, and the NEET Rate. The Covid-19 variables are the Total Case Numbers per Million people by the end of 2020 (purple graphs), the Average Stringency Index in 2020 (blue graphs), and the Average Economic Support Index in 2020 (green graphs).

for extra economic support. In addition, the Economic Support Index positively correlates with the Covid-19 Stringency Index and slightly with Covid-19 case numbers. Thus, it is somewhat likely that Economic Support was not only provided as a response to worsening *Activity State* scores, but also to compensate for strict measures and high Covid-19 case numbers.

When looking at the individual indicator scores within *Activity State*, we see similar negative relationships with all three Covid-19 related variables in almost all cases (See Figure 2). Only the indicator score for the *Unemployment Rate* shows a positive correlation with the Stringency Index, implying that youth unemployment increased less in countries with stricter measures. However, when including discouraged workers for the *Relaxed Unemployment Rate*, the negative relationship reappears.

4.2 Working Conditions

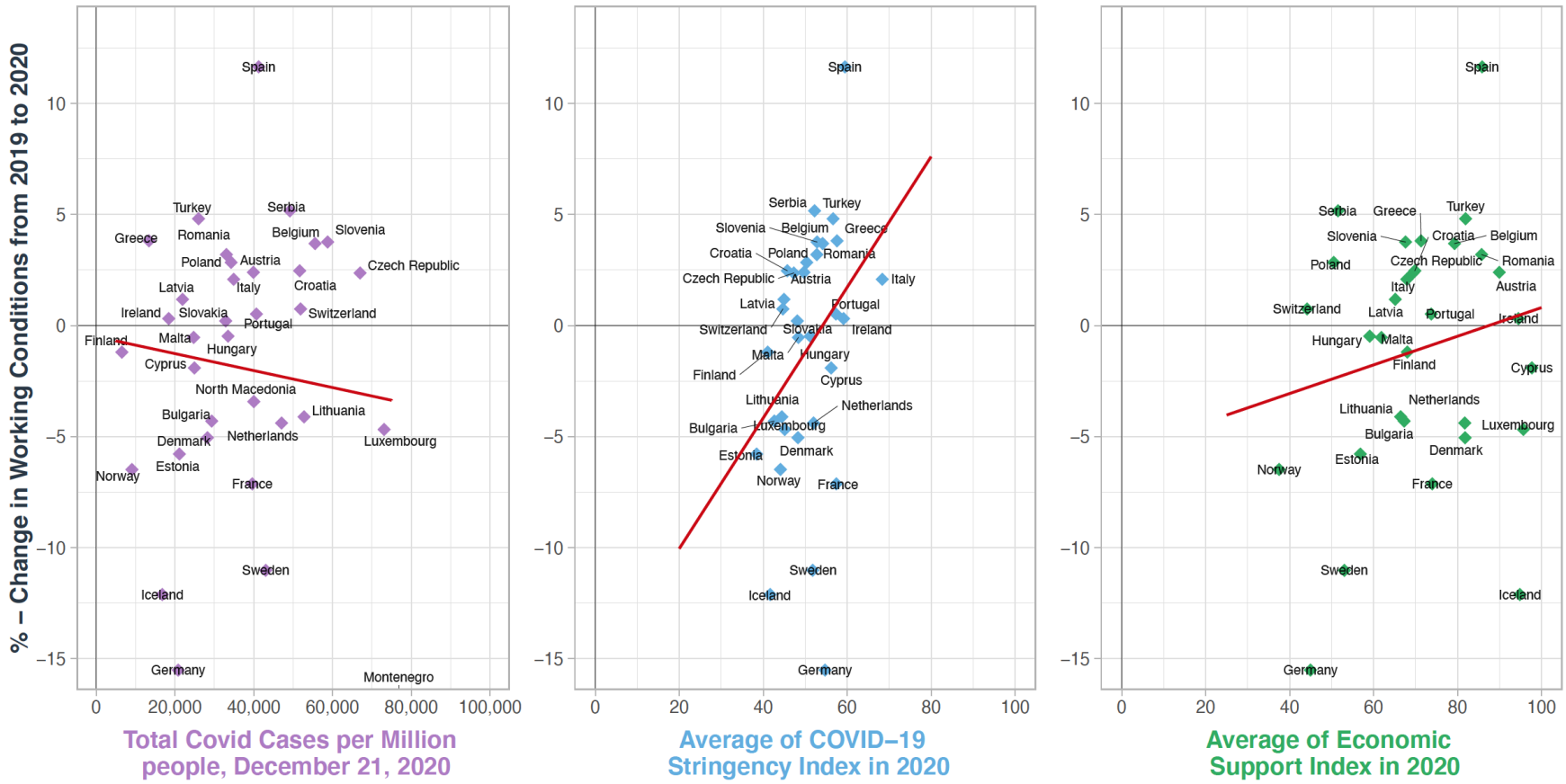
As shown in Figure 3, the aggregate index score for the dimension *Working Conditions* seems to negatively correlate with Covid-19 cases. We see less improvement in *Working Conditions* scores in countries with a higher number of Covid-19 cases. On the other hand, the index scores on *Working Conditions* positively correlate with the other two Covid-19 related variables. Concretely, we observe larger improvements in *Working Conditions* scores in countries with stricter measures, and with higher economic support. As discussed in Section 3.3, the improvement of the *Working Conditions* scores probably stems from disproportionate dismissals among workers with worse working conditions. This makes the relative share of workers with good working conditions increase, resulting in an improvement of the indicator. The evidence just presented that countries with stricter measures, and higher economic support have larger deteriorations in *Activity State* scores reinforces the idea that improvements in *Working Conditions* scores are mostly driven by high dismissals.

As many countries do not have data on all five indicators of the *Working Conditions* dimension, this dimension is especially vulnerable to bias from individual indicators. Therefore, Figure 4 and Figure 5 plots each individual *Working Conditions* indicator against all three Covid-19 variables.

In countries with more Covid-19 cases, we also notice a higher improvement in the index scores for the *Temporary Worker Rate* and the *Atypical Working Hours Rate*. Most likely, temporary workers and those with atypical working hours were disproportionately dismissed during the pandemic. Interestingly, countries with more Covid-19 cases saw higher deterioration in their index score for the *Involuntary Part-Time Workers Rate*, suggesting that increased cases are related to proportionally more involuntary part-time workers. The index scores of the remaining two indicators, the *In-Work-at-Risk of Poverty Rate* and *the Vulnerable Employment Rate*, seem to have a slightly positive to no correlation with the number of Covid-19 cases. Unfortunately, we lack data on these two indicators for a number of countries.

The situation for the Stringency Index looks very similar to case numbers for the index scores of the indicators *Temporary Worker Rate* and *Atypical Working Hours Rate*. Additionally, countries with stricter measures have larger improvements in their *In-Work-at-Risk-of-Poverty*

Figure 3: Correlations of the %-Change in Working Conditions with three Covid-19 related variables

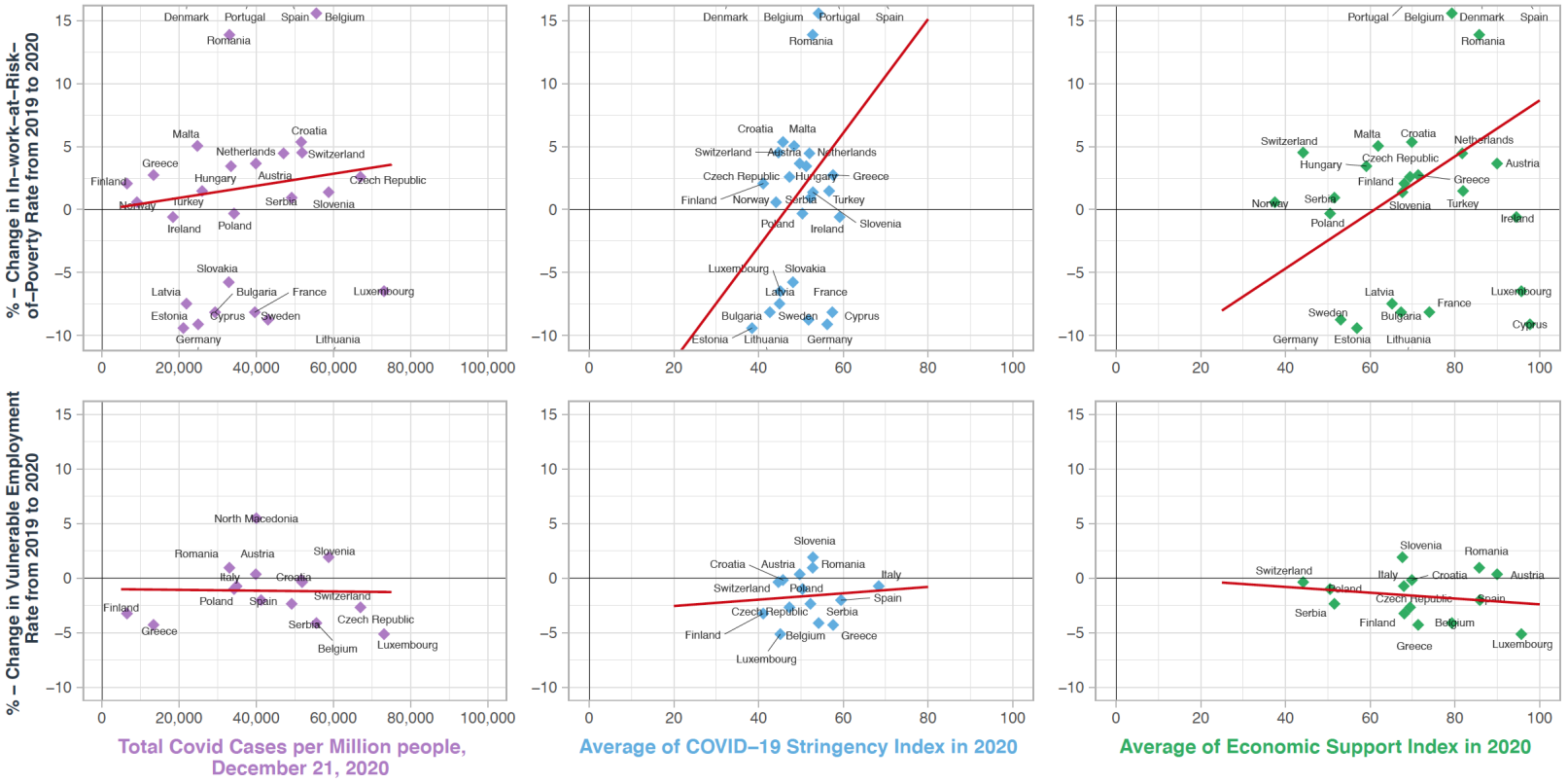


Notes: The scatterplots show correlations between the %-change in the Working Conditions from 2019 to 2020 (y-axis) and the three Covid-19 related variables (x-Axis). The left graph plots the Working Conditions of each country againt the country's Total Number of Covid Cases per Million people at the end of 2020 (purple graph). The middle graph uses the Average Covid-19 Stringency Index in 2020 as Covid-19 variable (blue graph), and the right graph presents a plot between the Working Conditions and the Average Economic Support Index in 2020 (green graph).

Figure 4: Correlations of the %-Change in Working Conditions' Indicators with three Covid-19 related variables

Notes: The scatterplots show correlations between the %-change in the Working Conditions' indicator scores from 2019 to 2020 (y-axis) and the three Covid-19 related variables (x-Axis). The indicators on the y-axis are the Temporary Worker Rate, the Involuntary Part-Time Worker Rate, and the Atypical Working Hours Rate. The Covid-19 variables are the Total Case Numbers per Million people by the end of 2020 (purple graphs), the Average Stringency Index in 2020 (blue graphs), and the Average Economic Support Index in 2020 (green graphs).

Figure 5: Correlations of the %-Change in Working Conditions' Indicators with three Covid-19 related variables



Notes: The scatterplots show correlations between the %-change in the Working Conditions' indicator scores from 2019 to 2020 (y-axis) and the three Covid-19 related variables (x-Axis). The indicators on the y-axis are the In-work-at-Risk-of-Poverty Rate and the Vulnerable Employment Rate. The Covid-19 variables are the Total Case Numbers per Million people by the end of 2020 (purple graphs), the Average Stringency Index in 2020 (blue graphs), and the Average Economic Support Index in 2020 (green graphs).

Rate scores. Opposing the pattern we just saw for case numbers, the scores for the *Involuntary Part-Time Workers Rate* show more improvement in countries with stricter measures. Again, there is no correlation for the *Vulnerable Employment Rate*.

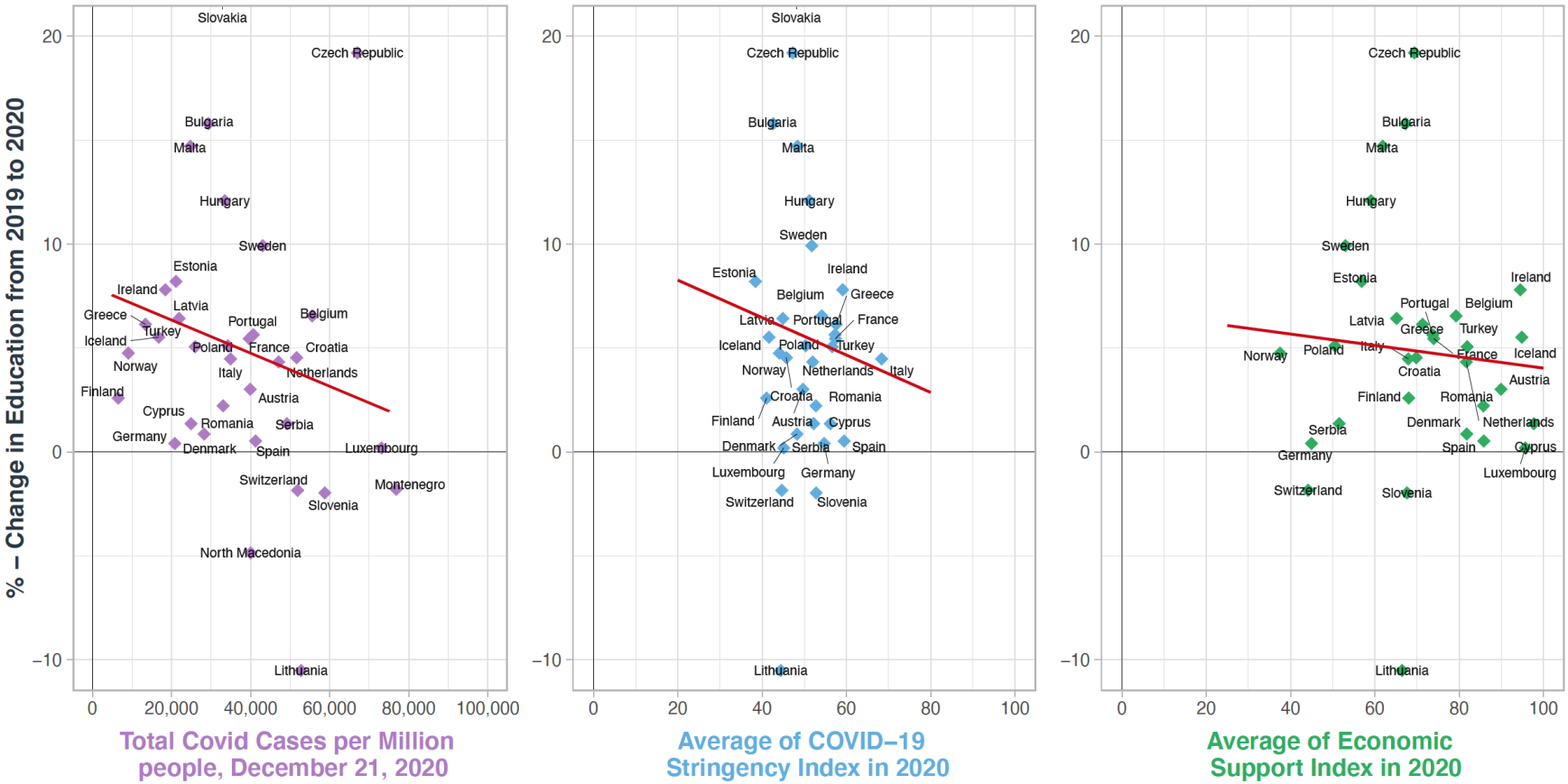
The Economic Support Index seems not to correlate with the index scores of the *Temporary Worker Rate* and the *Involuntary Part-time Workers Rate*. The indicators driving the overall positive relationship between economic support and this dimension are the *Atypical Working Hours Rate* and especially the *In-work-at-risk of Poverty Rate*. Countries with higher improvements in their *Atypical Working Hours Rate* scores also have higher Economic Support Index scores, probably driven by the disproportionate dismissal of these workers, who tend to be in sectors that are hit hard by the pandemic. Countries with higher public support measures for the economy also show higher improvements in their scores for the *In-Work-at-Risk of Poverty Rate*. Again, it is very likely that workers that were at risk of poverty were disproportionately dismissed and were more likely to be targeted by economic support as a result.

4.3 Education

The dimension on *Education* entails two indicators: the *Formal Education and Training Rate* and the *Skills Mismatch Rate*. In Figure 6, we see a slightly negative overall correlation between the score of the *Education* dimension of the CES YLMI and all three Covid-19 variables. This implies that countries with more cases, stricter measures, or higher financial support also experienced lower improvements in the *Education* dimension.

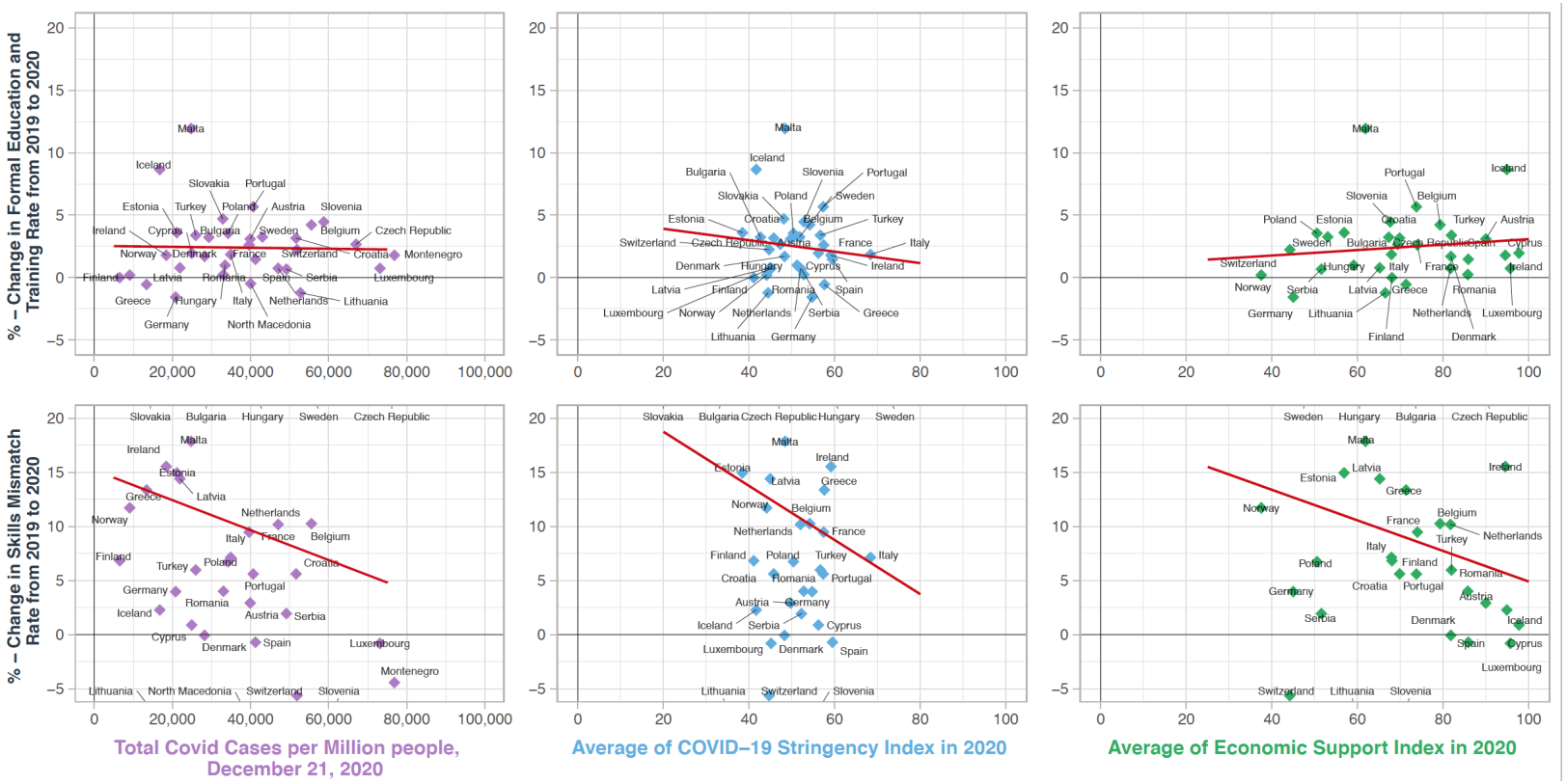
Since the two indicators within the *Education* dimension measure very different things, it is worth looking into them individually. Figure 7 plots the Covid-19 related variables against the index scores of the *Formal Education and Training Rate* and the *Skills Mismatch Rate*. Since there is almost no correlation between the *Formal Education and Training Rate* scores and the three Covid-19 variables, the patterns we see in the *Education* dimension in Figure 3 are mostly driven by the scores of the *Skills Mismatch Rate*. As discussed in Section 3.4, the *Skills Mismatch Rate* scores improved in most countries, meaning that the demand for skills matched the supply in 2020 better than it did in 2019. However, in countries with more Covid-19 cases, stricter measures, or higher economic support, we see less improvement in the *Skills Mismatch Rate* scores.

Figure 6: Correlations of the %-Change in Education with three Covid-19 related variables



Notes: The scatterplots show correlations between the %-change in Education from 2019 to 2020 (y-axis) and the three Covid-19 related variables (x-Axis). The left graph plots the Education Dimension of each country againt the country's Total Number of Covid Cases per Million people at the end of 2020 (purple graph). The middle graph uses the Average Covid-19 Stringency Index in 2020 as Covid-19 variable (blue graph), and the right graph presents a plot between Education and the Average Economic Support Index in 2020 (green graph).

Figure 7: Correlations of the %-Change in the Education Indicators with three Covid-19 related variables



Notes: The scatterplots show correlations between the %-change in the Education indicator scores from 2019 to 2020 (y-axis) and the three Covid-19 related variables (x-Axis). The indicators on the y-axis are the Formal Education and Training Rate and the Skills Mismatch Rate. The Covid-19 variables are the Total Case Numbers per Million people by the end of 2020 (purple graphs), the Average Stringency Index in 2020 (blue graphs), and the Average Economic Support Index in 2020 (green graphs).

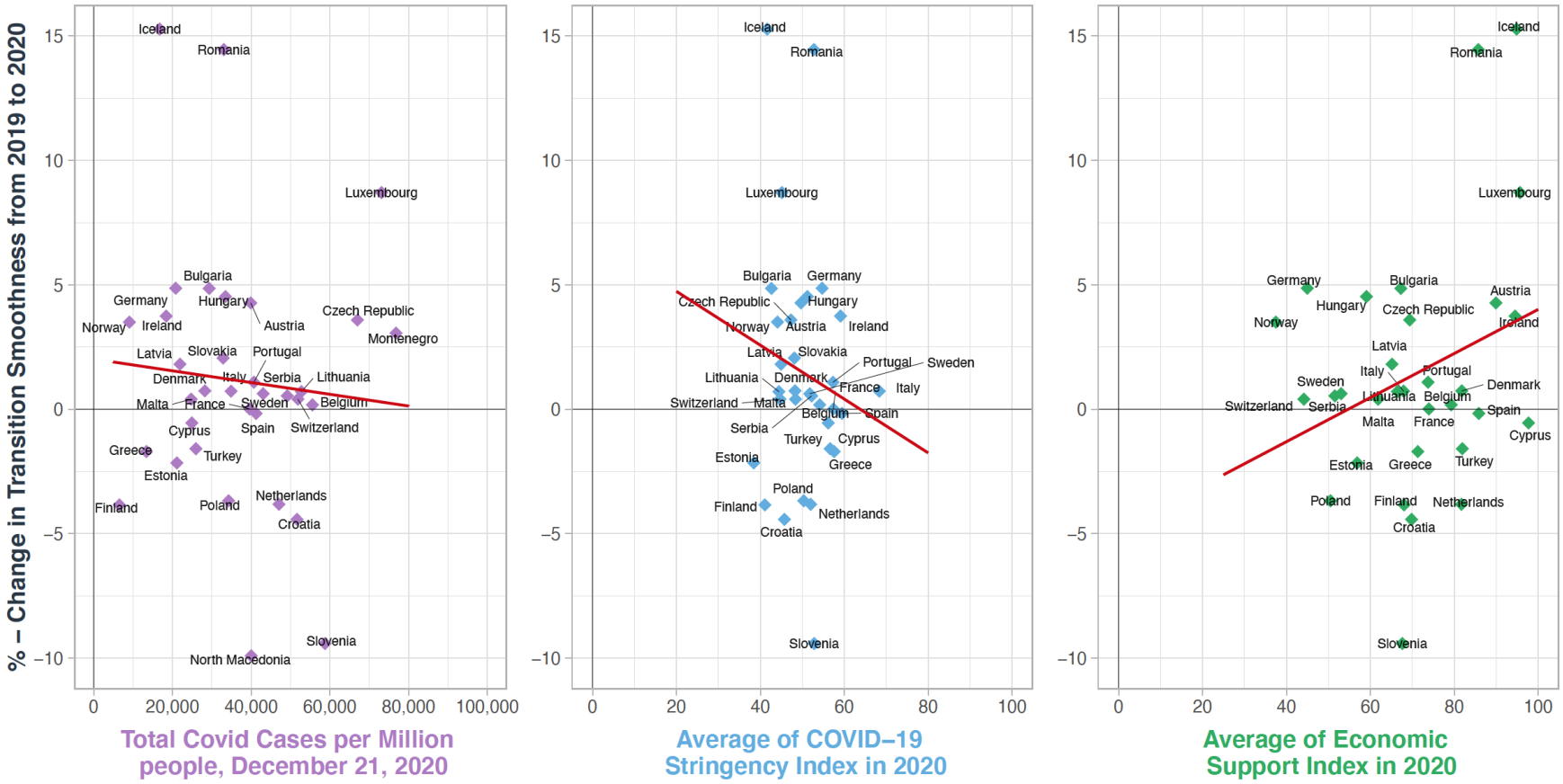
4.4 Transition Smoothness

The last dimension of the CES YLMI is *Transition Smoothness*, which addresses the transition between school and work through the indicators *Relative Unemployment Rate*, and the *Long-Term Unemployment Rate*. In Figure 8, we see that there is almost no correlation between the *Transition Smoothness* scores and the three Covid- 19 related variables.

However, when looking at the individual indicator scores in Figure 9, the picture is very mixed. In countries with more Covid-19 cases or stricter measures, the *Relative Unemployment Rate* scores are worse, indicating that young people suffered more than older workers. However, when we look at the Economic Support Index, we see a slight positive relationship with the *Relative Unemployment Rate* scores. This suggests that in countries where more financial support was provided, the discrepancy in unemployment between the young and old was somewhat smaller.

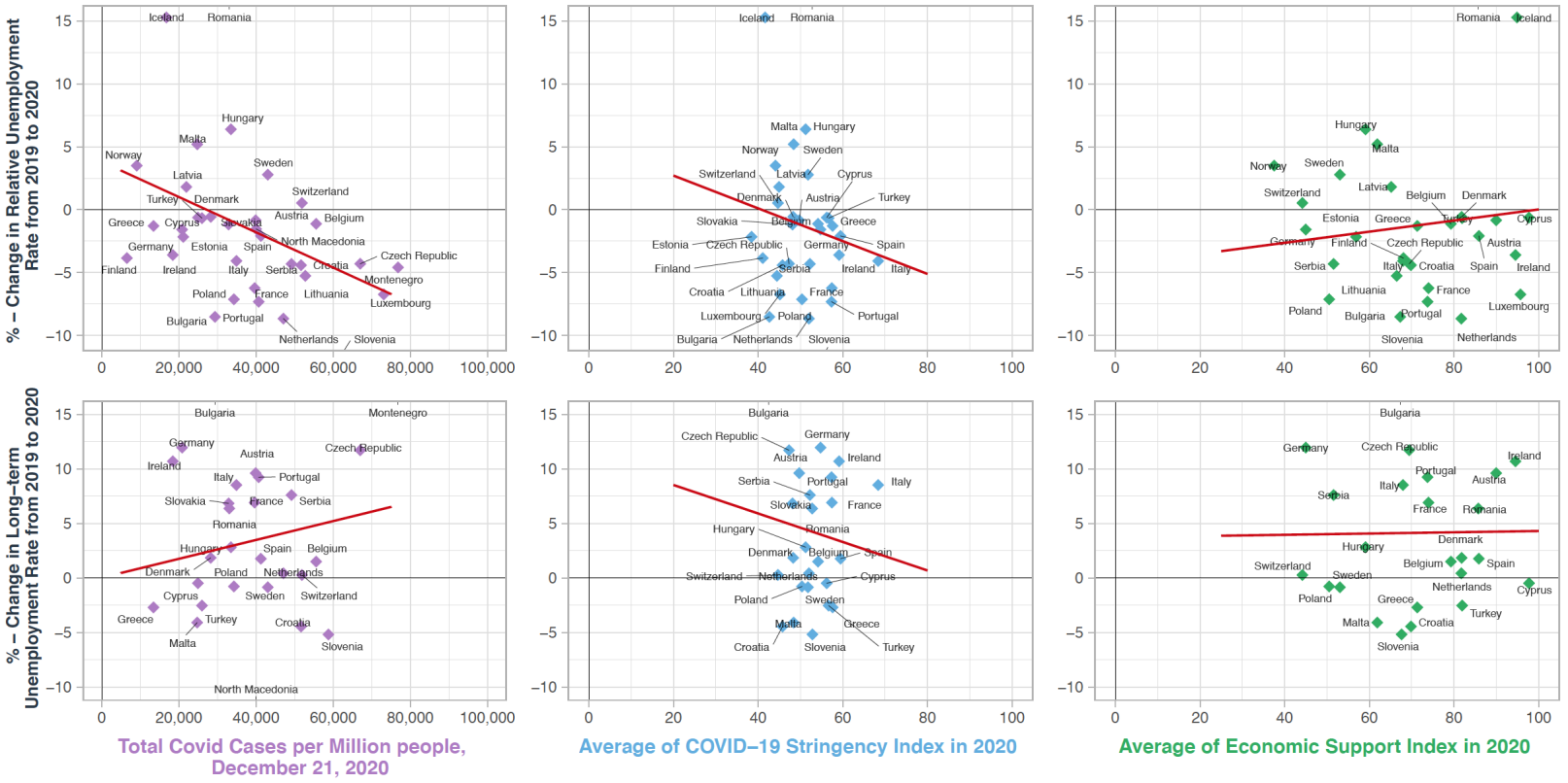
We observe that the index scores for the *Long-term Unemployment Rate* experienced a larger improvement from 2019 to 2020 in countries with more Covid-19 cases. Based on the composition of the *Long-term Unemployment Rate*, this trend probably stems from the fact that the share of long-term unemployed relative to all unemployed individuals decreased as overall unemployment rose during the pandemic. Interestingly, the opposite is true for the relationship between the Stringency Index and scores for the *Long-term Unemployment Rate*. Countries with stricter measures experienced less improvement in their *Long-term Unemployment Rate* scores, indicating that the share of long-term unemployed relative to all unemployed individuals decreased less. This is somewhat coherent with the positive relationship between the Stringency Index and the *Unemployment Rate* scores discussed in Section 4.1, where stricter countries experience less deterioration in their unemployment rate. Lastly, there is no correlation between the Economic Support Index and the *Long-Term Unemployment Rate* scores.

Figure 8: Correlations of the %-Change in Transition Smoothness with three Covid-19 related variables



Notes: The scatterplots show correlations between the %-change in Transition Smoothness from 2019 to 2020 (y-axis) and the three Covid-19 related variables (x-Axis). The left graph plots the Transition Smoothness dimension of each country againt the country's Total Number of Covid Cases per Million people at the end of 2020 (purple graph). The middle graph uses the Average Covid-19 Stringency Index in 2020 as Covid-19 variable (blue graph), and the right graph presents a plot between the Transition Smoothness and the Average Economic Support Index in 2020 (green graph).

Figure 9: Correlations of the %-Change in Transition Smoothness' Indicators with three Covid-19 related variables



Notes: The scatterplots show correlations between the %-change in the Transition Smoothness' indicator scores from 2019 to 2020 (y-axis) and the three Covid-19 related variables (x-Axis). The indicators on the y-axis are the Relative Unemployment Rate and the Long-term Unemployment Rate. The Covid-19 variables are the Total Case Numbers per Million people by the end of 2020 (purple graphs), the Average Stringency Index in 2020 (blue graphs), and the Average Economic Support Index in 2020 (green graphs).

5 Summary and Outlook

This first release of the CES YLMI focuses on the youth labor market situation during the Covid-19 pandemic by analyzing changes in index values from 2019 to 2020. At the same time, we also update the index's database through 2020. The updated values are available in the interactive web tool, which allows users to visualize, analyze, access, and download CES YLMI data CES YLMI across countries and time it[5].

According to the overall CES YLMI index score, Switzerland still holds the leading position in 2020. Latvia is ranked second, followed by the Netherlands, the Czech Republic, and Austria. In the bottom of the rankings for European countries we find Greece, Serbia, North Macedonia, Italy, and Montenegro. 2020 is marked by a worldwide pandemic that seriously disrupted all economies. It is therefore crucial to use the CES YLMI's multidimensional approach to investigate the development of all twelve indicators.

The dimension that has experienced the largest changes in 2020 is the *Activity State*. All countries show at least some deterioration, which is no surprise as the Covid-19 pandemic, like the Great Recession in 2008, led to many dismissals and increased the *Unemployment* and *NEET Rates* especially. Although the dimension on *Working Conditions* appears mixed, most countries experienced improvements. At first glance this seems like the opposite of the Great Recession's notable and lasting deterioration in the *Working Conditions* dimension, until we recall that all indicators on the *Working Conditions* describe the situation for employed youth only. Workers with worse conditions were probably disproportionately affected by pandemic-related job loss, making the proportion of still-employed workers with good conditions relatively higher and apparently raising scores despite no real improvement.

Pusterla (2016) found increased enrollment rates in education and training from 2008-2014 related to the Great Recession, but enrollment from 2019-2020 is relatively stable. It will be interesting to see whether this changes in the future. Also in the *Education* dimension, many countries experience large improvements in their *Skills Mismatch Rates*, indicating that the supply of skills in 2020 matched demand better than it did in 2019- again probably because of disproportionate effects on job availability by occupation and industry. **Overall, like the Great Recession, we observe that Covid-19 hit young workers harder than their older counterparts and especially disrupted the transition from education to the workplace.**

The Covid-19 pandemic affected youth labor markets not just through the spread of the virus but also via regulatory measures and policy efforts to reduce economic hardship caused by the pandemic. When we examine the relationship between three Covid-19 related variables (infection numbers, stringency, and economic support) and CES YLMI indicators, we uncover evidence that hints at some of the mechanisms for the pandemic's impact on youth labor market outcomes.

We notice larger deteriorations in the *Activity State* for countries where Covid-19 case num-

[5]The web tool is available at https://apps.ces.ethz.ch/ylmi/

bers, the Stringency Index, or the Economic Support Index were higher. On the contrary, *Working Conditions* improved more in countries where the two Covid-19 related variables- Stringency and Economic Support Index- were higher. Taking those two points together, we argue that workers with worse working conditions were disproportionately dismissed from their jobs. However, there is some heterogeneity within the five indicators of the *Working Conditions* dimension and their relationship to the Covid-19 variables. While scores for the *Formal Education and Training Rate* are stable and shows no correlation with any Covid-19 variables, higher values on all of the Covid-19 variables are related to less improvement in the *Skills Mismatch Rate*. Scores for the *Relative Unemployment Rate* suffered more in stricter countries and in countries with higher infection numbers. Lastly, index scores for the *Long-Term Unemployment Rate* seem to have improved more in countries with more Covid-19 cases, but less in countries with stricter measures.

In the future, we aim to update the CES YLMI annually and continuously evaluate its methodological aspects. Furthermore, we plan to conduct deeper analyses on the evolution of the single indicators and provide more comparisons across countries.

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A Appendix

Table 2: Evolution of the Activity State Indicators' Scores between 2019 and 2020

Country	Unemployment Rate			Relaxed Unemployment Rate			NEET Rate		
	2019	2020	Direction*	2019	2020	Direction*	2019	2020	Direction*
Switzerland	6.32	6.26	→	5.92	5.75	→	6.07	6.04	→
Latvia	5.93	5.72	→	5.66	5.42	→	5.82	5.93	→
Netherlands	6.42	6.22	→	6.17	5.91	→	6.36	6.32	→
Czech Republic	6.52	6.31	→	6.50	6.31	→	6.15	6.01	→
Austria	6.27	6.10	→	5.98	5.74	→	5.93	5.80	→
Denmark	6.14	6.01	→	5.84	5.65	→	5.84	5.89	→
Poland	6.16	6.07	→	5.97	5.87	→	5.78	5.71	→
Germany	6.51	6.37	→	6.40	5.97	↘	6.15	5.90	→
Iceland	6.27	6.14	→	6.04	5.85	→	6.29	6.08	→
Slovenia	6.30	5.78	↘	6.06	5.51	↘	5.95	5.84	→
Lithuania	5.98	5.32	↓	6.04	5.46	↘	5.70	5.38	↘
Belgium	5.78	5.69	→	5.45	5.14	↘	5.61	5.62	→
Hungary	6.02	5.90	→	5.75	5.56	→	5.35	5.24	→
Cyprus	5.63	5.44	→	5.62	5.49	→	4.95	4.84	→
Norway	6.15	6.03	→	5.74	5.42	↘	6.29	6.26	→
Portugal	5.43	5.06	↘	4.92	4.25	↓	5.80	5.64	→
Croatia	5.58	5.19	↘	4.93	4.28	↓	5.23	5.17	→
Ireland	5.92	5.69	→	5.38	4.43	↓	5.49	5.20	↘
Estonia	6.05	5.47	↘	5.52	4.79	↓	5.96	5.66	→
Malta	6.21	6.08	→	6.34	6.00	↘	5.80	5.61	→
Bulgaria	6.24	5.78	↘	5.58	5.07	↘	4.94	4.84	→
Luxembourg	5.56	5.01	↘	4.78	4.26	↓	6.16	6.01	→
France	5.33	5.16	→	5.28	5.08	→	5.41	5.29	→
Slovakia	5.62	5.35	→	5.38	5.16	→	5.46	5.39	→
Finland	5.54	5.17	↘	5.13	4.65	↘	5.78	5.61	→
Turkey	4.89	4.85	→	4.66	3.88	↓	3.10	2.76	↓
Sweden	5.27	4.95	↘	4.84	4.20	↓	6.18	6.03	→
Romania	5.56	5.52	→	5.55	5.40	→	4.80	4.78	→
Spain	4.20	3.72	↓	4.11	3.21	↓	5.18	4.92	↘
Greece	3.99	4	→	4.13	4.04	→	5.12	5.02	→
Serbia	4.68	4.72	→	4.22	3.65	↓	4.65	4.62	→
North Macedonia	3.95	3.94	→	3.65	3.47	→	4.28	4.06	↘
Italy	4.50	4.48	→	2.94	2.53	↓	4.29	4.15	→
Montenegro	4.84	3.91	↓	3.66	2.11	↓	4.40	3.84	↓

* The directions describe the changes in the indicators' score in 2019 relative to 2020. The key of lecture is the following: ↑ score changes $> +10\%$; ↗ score changes by $> +5\%$ to $+10\%$; → score remains stable between $+5\%$ and -5%; ↘ score changes by $> -5\%$ to -10%; ↓ score changes $> -10\%$

Notes: The table shows countries ranked according to their YLM index value in 2020. The second to fourth column show the score value for the indicators in the Activity State Dimension in 2019, in 2020 and the direction of the change. The data used for the table are the newest available.

Table 3: Evolution of the Working Condition Indicators' Scores between 2019 and 2020

Country	Temporary Worker			Involuntary Part-Time Worker			Atypical Working Hours			In-work-at-Risk-of-Poverty			Vulnerable Employment		
	2019	2020	Direction*	2019	2020	Direction*	2019	2020	Direction*	2019	2020	Direction*	2019	2020	Direction*
Switzerland	5.62	5.66	→	6.72	6.63	→	4.98	5.05	→	4.93	5.15	→	6.56	6.53	→
Latvia	6.01	6.53	↗	*NA*	6.72	*NA*	4.07	3.74	↘	6.19	5.73	↘	6.18	*NA*	*NA*
Netherlands	5.32	5.35	→	6.47	6.19	→	3.97	3.92	→	4.99	5.22	→	6.28	*NA*	*NA*
Czech Republic	5.01	5.25	→	6.82	6.91	→	3.48	3.81	↗	6.61	6.78	→	6.03	5.87	→
Austria	6.00	6.15	→	6.39	6.44	→	4.94	5.22	↗	5.63	5.83	→	6.55	6.57	→
Denmark	5.50	5.52	→	5.71	5.41	↘	4.77	4.67	→	2.49	3.55	↑	6.74	*NA*	*NA*
Poland	2.79	3.24	↑	6.60	6.69	→	4.33	4.57	↗	5.42	5.41	→	5.79	5.73	→
Germany	5.57	5.45	→	6.64	*NA*	*NA*	5.19	5.27	→	5.22	4.19	↓	6.80	*NA*	*NA*
Iceland	5.13	4.93	→	6.14	5.89	→	2.13	2.27	↗	*NA*	*NA*	*NA*	6.46	*NA*	*NA*
Slovenia	1.97	2.57	↑	6.82	6.81	→	2.53	2.62	→	6.23	6.31	→	5.96	6.07	→
Lithuania	6.28	6.38	→	6.70	6.61	→	4.72	4.85	→	5.99	5.08	↓	6.18	*NA*	*NA*
Belgium	2.84	3.02	↗	6.40	6.32	→	5.17	5.42	→	5.61	6.49	↑	6.30	6.05	→
Hungary	5.87	5.90	→	6.75	6.60	→	4.79	5.20	↗	5.97	6.18	→	6.60	*NA*	*NA*
Cyprus	5.67	5.81	→	5.54	5.47	→	3.67	4.66	↑	5.65	5.13	↘	6.30	*NA*	*NA*
Norway	6.28	6.24	→	6.62	6.65	→	3.51	3.61	→	2.95	2.97	→	6.68	*NA*	*NA*
Portugal	2.31	2.89	↑	5.46	5.75	↗	4.70	4.63	→	5.10	6.02	↑	6.43	*NA*	*NA*
Croatia	2.85	2.97	→	6.81	6.63	→	3.32	3.69	↑	6.07	6.40	↗	6.38	6.37	→
Ireland	4.91	5.11	→	5.42	6.41	↑	2.65	3.09	↑	5.75	5.71	→	6.60	*NA*	*NA*
Estonia	5.80	5.95	→	6.84	6.86	→	3.26	3.47	↗	4.19	3.79	↘	6.55	*NA*	*NA*
Malta	5.61	5.75	→	6.63	6.53	→	3.95	4.30	↗	6.11	6.42	↗	6.60	*NA*	*NA*
Bulgaria	*NA*	6.13	*NA*	6.61	6.46	→	4.20	3.93	↘	5.05	4.63	↘	6.24	*NA*	*NA*
Luxembourg	4.56	4.73	→	6.69	5.96	↓	3.55	3.53	→	3.97	3.71	↘	5.85	5.55	↘
France	3.38	3.49	→	4.94	4.96	→	5.30	5.60	↗	5.68	5.22	↘	6.63	*NA*	*NA*
Slovakia	5.36	5.30	→	6.29	6.36	→	2.61	3.42	↑	6.54	6.16	↘	5.70	*NA*	*NA*
Finland	3.29	3.47	↗	5.16	5.08	→	3.28	2.99	↘	5.82	5.94	→	6.46	6.25	→
Turkey	5.17	5.31	→	6.66	6.56	→	4.42	4.15	↘	4.65	4.72	→	3.83	*NA*	*NA*
Sweden	3.49	3.54	→	6.23	6.18	→	3.29	3.34	→	4.70	4.29	↘	6.67	*NA*	*NA*
Romania	6.66	6.70	→	5.32	5.38	→	4.08	4.25	→	2.59	2.95	↑	1.50	1.51	→
Spain	3.40	3.84	↑	3.51	3.86	↑	3.08	3.94	↑	3.54	4.31	↑	6.23	6.10	→
Greece	5.05	5.48	↗	3.90	4.17	↗	2.27	2.42	↗	4.38	4.50	→	4.78	4.57	→
Serbia	2.96	3.19	↗	*NA*	*NA*	*NA*	1.54	2.12	↑	5.44	5.49	→	4.64	4.53	→
North Macedonia	4.52	4.32	→	6.35	6.75	↗	2.43	2.53	→	6.07	*NA*	*NA*	4.83	5.09	↗
Italy	3.31	3.57	↗	2.59	2.58	→	3.37	3.99	↑	4.36	*NA*	*NA*	5.63	5.58	→
Montenegro	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	1.32	3.15	↑	6.13	*NA*	*NA*	5.70	*NA*	*NA*

* The directions describe the changes in the dimensions' score in 2019 relative to 2020. The key of lecture is the following: ↑ score changes $> +10\%$; ↗ score changes by $> +5\%$ to $+10\%$; → score remains stable between $+5\%$ and -5%; ↘ score changes by $> -5\%$ to -10%; ↓ score changes $> -10\%$

Notes: The table shows countries ranked according to their YLM index value in 2020. The second to sixth column show the score value for the indicators in the Working Conditions Dimension in 2019, in 2020 and the direction of the change. The data used for the table are the newest available.

Table 4: Evolution of the Education Indicators' Scores between 2019 and 2020

Country	Formal Education and Training			Skills Mismatch		
	2019	2020	Direction*	2019	2020	Direction*
Switzerland	5.37	5.49	→	5.83	5.50	↘
Latvia	6.14	6.18	→	4.34	4.96	↑
Netherlands	6.50	6.54	→	3.98	4.39	↑
Czech Republic	5.85	6.00	→	2.88	4.40	↑
Austria	4.66	4.80	→	4.13	4.25	→
Denmark	5.66	5.75	→	5.16	5.16	→
Poland	5.42	5.61	→	5.16	5.51	↗
Germany	6.14	6.04	→	3.38	3.51	→
Iceland	5.13	5.57	↗	4.98	5.09	→
Slovenia	6.18	6.46	→	5.56	5.05	↘
Lithuania	5.88	5.81	→	3.88	2.93	↓
Belgium	5.97	6.22	→	3.74	4.12	↑
Hungary	4.85	4.90	→	3.32	4.26	↑
Cyprus	4.30	4.38	→	5.58	5.63	→
Norway	6.05	6.06	→	3.96	4.42	↑
Portugal	5.50	5.81	↗	5.66	5.98	↗
Croatia	4.94	5.09	→	6.24	6.59	↗
Ireland	5.37	5.46	→	4.17	4.82	↑
Estonia	5.67	5.87	→	3.87	4.45	↑
Malta	3.52	3.94	↑	3.11	3.66	↑
Bulgaria	5.57	5.75	→	3.65	4.93	↑
Luxembourg	6.51	6.56	→	3.64	3.61	→
France	5.51	5.66	→	3.89	4.26	↗
Slovakia	5.36	5.61	→	2.44	4.25	↑
Finland	5.67	5.67	↓	3.46	3.70	↗
Turkey	3.18	3.29	→	5.81	6.15	↗
Sweden	5.52	5.70	→	1.53	2.05	↑
Romania	4.84	4.85	→	5.28	5.49	→
Spain	5.72	5.80	→	4.47	4.44	→
Greece	6.51	6.47	→	6.02	6.82	↑
Serbia	5.34	5.38	→	6.21	6.33	→
North Macedonia	4.95	4.92	→	6.80	6.25	↘
Italy	5.19	5.28	→	5.10	5.46	↗
Montenegro	4.68	4.77	→	6.45	6.17	→

* The directions describe the changes in the indicators' score in 2019 relative to 2020. The key of lecture is the following: ↑ score changes $> +10\%$; ↗ score changes by $> +5\%$ to $+10\%$; → score remains stable between $+5\%$ and -5%; ↘ score changes by $> -5\%$ to -10%; ↓ score changes $> -10\%$

Notes: The table shows countries ranked according to their YLM index value in 2020. The second and third column show the score value for the indicators in the Education Dimension in 2019, in 2020 and the direction of the change. The data used for the table are the newest available.

Table 5: Evolution of the Transition Smoothness Indicators' Scores between 2019 and 2020

Country	Relative Unemployment			Long-term Unemployment		
	2019	2020	Direction*	2019	2020	Direction*
Switzerland	5.77	5.80	→	5.58	5.59	→
Latvia	5.74	5.84	→	NA	NA	NA
Netherlands	5.53	5.05	↘	6.28	6.31	→
Czech Republic	5.13	4.91	→	4.99	5.57	↑
Austria	5.71	5.66	→	5.47	5.99	↗
Denmark	5.55	5.52	→	6.52	6.65	→
Poland	4.85	4.51	↘	5.75	5.70	→
Germany	5.79	5.69	→	5.26	5.89	↑
Iceland	4.96	5.72	↑	NA	NA	NA
Slovenia	5.83	5.06	↓	5.13	4.86	↘
Lithuania	5.78	5.47	↘	NA	6.16	↓
Belgium	5.15	5.09	→	5.06	5.14	→
Hungary	4.57	4.87	↗	4.97	5.11	→
Cyprus	5.40	5.37	→	5.65	5.63	→
Norway	4.84	5.01	→	NA	NA	NA
Portugal	5.03	4.66	↘	5.18	5.66	↗
Croatia	5.25	5.02	→	4.87	4.65	→
Ireland	5.10	4.91	→	5.39	5.96	↑
Estonia	5.29	5.18	→	NA	NA	NA
Malta	4.91	5.17	↗	5.25	5.04	→
Bulgaria	5.67	5.19	↘	3.13	4.04	↑
Luxembourg	4.79	4.47	↘	NA	5.95	NA
France	5.38	5.05	↘	4.87	5.21	↗
Slovakia	5.10	5.04	→	3.45	3.69	↗
Finland	5.05	4.86	→	NA	NA	NA
Turkey	5.68	5.64	→	5.55	5.41	→
Sweden	4.63	4.76	→	6.78	6.72	→
Romania	3.62	4.47	↑	4.00	4.25	↗
Spain	5.47	5.36	→	5.42	5.52	→
Greece	5.71	5.64	→	2.37	2.30	→
Serbia	5.20	4.98	→	3.57	3.84	↗
North Macedonia	5.63	5.54	→	1.63	1	↓
Italy	5.00	4.80	→	3.08	3.34	↗
Montenegro	5.91	5.64	→	2.08	2.59	↑

* The directions describe the changes in the indicators' score in 2019 relative to 2020. The key of lecture is the following: ↑ score changes $>$ $+10\%$; ↗ score changes by $>$ $+5\%$ to $+10\%$; → score remains stable between $+5\%$ and -5%; ↘ score changes by $>$ -5% to -10%; ↓ score changes $>$ -10%

Notes: The table shows countries ranked according to their YLM index value in 2020. The second and third column show the score value for the indicators in the Transition Smoothness Dimension in 2019, in 2020 and the direction of the change. The data used for the table are the newest available.

Author information

Zubovic, Amela
Chair of Education Systems, ETH
Zürich Leonhardstrasse 21
8092 Zürich
amela.zubovic@mtec.ethz.ch

Caves, Katherine Dr.
Chair of Education Systems, ETH
Zürich Leonhardstrasse 21
8092 Zürich
katie.caves@mtec.ethz.ch

Kemper, Johanna Dr.
Chair of Education Systems, ETH
Zürich Leonhardstrasse 21
8092 Zürich
joahnna.kemper@mtec.ethz.ch

Contact

ETH Zürich
Department MTEC
Chair of Education Systems
Leonhardstrasse 21
8092 Zürich

www.ces.ethz.ch →

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