Oceans apart: the labour market impacts of the COVID-19 pandemic

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Abstract

The distributional impacts of pre-pandemic salient labour market trends were amplified by the labour market effects of the COVID-19 pandemic. By comparing the output and labour market impacts of the global financial crisis and the COVID-19 pandemic crisis, we find that the United States recovered much faster from both recessions than European countries and Japan, but labour market outcomes were more benign in the latter group of countries, partly related to specific employment protection measures. Our estimates suggest large sensitivity of employment to output changes in the US and Latin American countries, but limited sensitivity in Europe and Japan. By scrutinising European labour market developments during the pandemic, we find that while there does not seem to be a gender difference when considering aggregate employment data, but when we control for education, occupation and country effects, we find that women were significantly more impacted than men. This finding, along with the adverse pandemic impact on poorer less-educated people than on richer better-educated people, suggests that income inequality has also widened in Europe during the pandemic. These findings call for enhanced social policies.

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1. Introduction

Labour markets were subject to profound changes due to globalization, technological, demographic and environmental changes even before the pandemic. For example, globalization and the expansion of global value chains resulted in outsourcing of manufacturing production and the provision of various services, with profound implications for the labour market of both source and host countries. Technological changes, including automation, first concerned manual and cognitive tasks requiring routine skills, but a second wave of automation was already underway in which artificial intelligence (AI) and intelligent robots are more and more capable of carrying out non-routinised tasks, including jobs with high skill levels (Brynjolfsson and Mitchell, 2017).

Meanwhile, the same forces that potentially eliminate some existing jobs, also create new jobs, and can fundamentally transform other existing jobs. For example, Gregory *et al* (2021) conclude that routine-replacing technologies destroyed 9 million jobs in Europe in 1999-2010, but created about 14-19 million jobs over the same period. The new jobs resulted from lower product prices, which improve regions' terms of trade, raising their tradable output and employment, as well as from growing local incomes and positive demand spillovers to the non-tradable sector. Furthermore, they show that employment would have grown substantially more had firm mark-ups not increased, in line with the argument and evidence put forward by Autor *et al* (2020). Autor *et al* (2020) analyse the rise in "superstar firms", which typically show lower labour shares of value-added, operate in industries with higher market concentration and drive an increase in firms and sectors markups.

The COVID-19 pandemic shocked labour markets. Social distancing and lockdown measures disadvantaged occupations and tasks which cannot be done remotely, while teleworkable-occupations suffered less. Meanwhile, the economic shock that resulted from the pandemic has forced firms to become more efficient. Maqui and Morris (2020) showed that 75 percent of firms surveyed agreed that the pandemic had helped make their business more efficient and resilient. Nine out 10 firms had sped up the adoption of digital technology and automation.

The pandemic also resulted in structural shifts within the economy, whereby sectors requiring close contact suffered more, while the information and communication sector has boomed. Beyond short-term losses, some sectors might face permanent losses as well once the pandemic is over. For example, teleworking might become more widespread compared to the pre-pandemic era, reducing the demand for office space and all sectors supporting offices. Business travel might be reduced compared to the pre-pandemic level in favour of tele-meetings, reducing the demand for travel, accommodation and supporting industries.

The extraordinary public health and economic shock-induced extraordinary policy support measures by governments, including specific measures for the labour market. However, while in European countries the labour market measures supported employment via various short-time work schemes, in the US the focus was on the generosity of unemployment benefit systems and lump-sum payments for all individuals below a certain income threshold. As a consequence, employment was hit harder in the US than in the EU, Japan and the UK, as this paper demonstrates.

Both the longer-term structural changes of the labour market, and the pandemic-induced labour-market shock, have generally impacted income inequality adversely, despite government interventions. From a survey of about 90 papers published in 2020-2021 on various aspects of inequality, Stantcheva (2021) concluded that COVID-19 has exacerbated existing inequalities across income groups, sectors, regions, gender, and between children from different backgrounds. Almeida *et al* (2020) showed that in the absence of a policy response, disposable income inequality would have increased more.

A number of reasons suggest that the COVID-19 recession increased inequalities sharper than earlier recessions (Darvas, 2021). First, there is adverse feedback via health. Compared to richer people, poorer people suffer more from worse health conditions and live in smaller dwellings in more densely populated areas, where self-isolation and respecting social distancing rules is more difficult and thus, they are more vulnerable to the pandemic. Second, poor people are less in a position to telework and there is evidence showing that this was a major factor in job losses (Dey *et al*, 2020). Third, the 2020 recession harshly hit sectors dominated by low-income workers, such as restaurants and bars, travel and transportation, entertainment, hairdressers, retail stores. Thus, the pandemic has likely widened inequalities within countries.

Against this background, this paper first compares the overall labour market impacts of the two recent major economic crises, the global financial crisis and the COVID-19 pandemic crisis, focusing on four major advanced economies: the EU, Japan, the United Kingdom and the United States. The United States has recovered the fastest from both recessions, but labour market outcomes were more benign in the other three main economies. While the US labour market has always been characterised by greater flexibility and fluctuations than European economies, we argue that specific labour market measures adopted in response to the COVID-19 pandemic dampened the adverse impacts in Europe and Japan, but not in the US. In order to offer a global perspective, we study the sensitivity of employment to fluctuations in output in several advanced and emerging countries and find that the EU, UK and Japan are characterised by low sensitivity, while the US, Canada and several Latin-American countries are characterised by a high level of sensitivity. In the concluding section of this paper, we relate these differences to overall social policies as also reflected in income inequality indicators.

The second goal of this paper is to scrutinise the drivers of labour market changes in the European Union during the pandemic by using a rich dataset. Aggregate indicators might mask important patterns due to compositional changes. We find that while there does not seem to be a gender gap in European employment response to the pandemic when considering aggregate employment data, but when we control for education, occupation and country effects, we find that women were significantly more impacted than men.

The final section of the paper offers some concluding remarks.

2. Two crises – alternative outcomes

The global economy was hit by two once-in-a-lifetime crises: the global financial crisis which began on US financial markets in summer 2007 and intensified after the collapse of Lehman Brothers in September 2008, and the economic crises resulted from the COVID-19 pandemic, which has sunk the global economy in 2020. The two crises played out differently.

Economic contraction was speedy after the collapse of Lehman Brothers in 2008, but not as sharp as in 2020 when widespread lockdown measures resulted in more than 10% output drops in several countries in the second quarter of 2020 (Figure 1). A partial rebound was also rapid in the subsequent quarter. The drop in employment was also faster in 2020 than in 2008 in the EU, Japan and the United States.

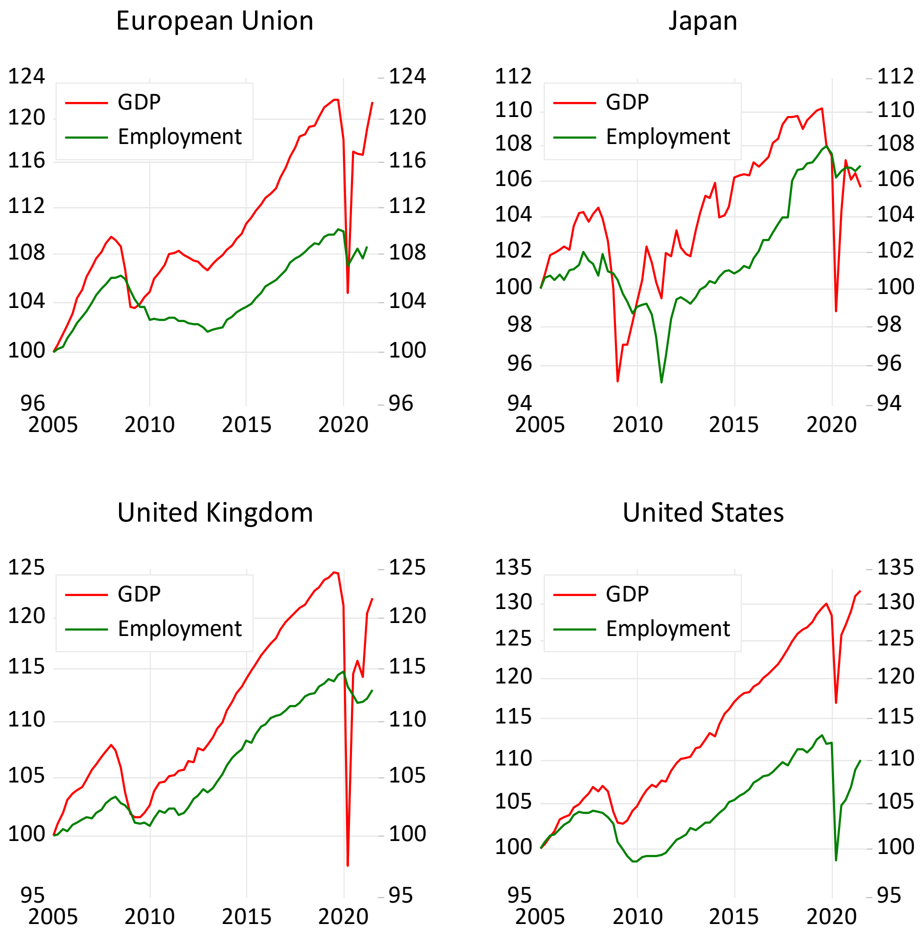
The US economy recovered the fastest from both crises among the four economies displayed in Figure 1. The volume of US GDP reached its pre-crisis level in 2010Q4 after the global financial crisis, while the UK recovered by 2013Q1, Japan by 2013Q3 and the EU only by 2014Q4. In the EU, a second-dip recession caused by a combined sovereign debt, banking and balance of payments crises of several member states in 2012 prolonged economic troubles. Recovery was also the fastest in the US after the pandemic recession with GDP exceeding its pre-pandemic level already in 2021Q2. In contrast, the other three main economies have not yet reached their pre-pandemic level of income by 2021Q3, the most recent available data at the time of writing.

After the global financial crisis, the recovery of employment took much more time than the recovery of output in three main advanced economic areas, with the exception of the United Kingdom. US employment recovered to its pre-pandemic level only by 2014Q3, almost four years later than the recovery of output. In Japan, employment recovery lagged output recovery by three years (by

2016Q2), while in the EU by two years (by 2016Q4). These tendencies indicate that economic recessions can result in lasting social hardship. The exception was the UK, where employment recovered to its pre-crisis peak half a year earlier (by 2012Q3) than output.

In contrast, employment developments were more benign in the pandemic recession than in the aftermath of the global financial crisis – except in the United States. In the EU, Japan and the United Kingdom, employment fell much less than output and it was closer to its pre-pandemic peak in 2021Q2/2021Q3 than output. In contrast, the percent decline in employment was larger than the percent decline in output in the United States in the pandemic recession of 2020, and the recovery of employment is slower than the recovery of output. While US GDP exceeded its pre-pandemic peak by 1.4% in 2021Q3, employment was 2.7% lower. Thus, the recovery from the pandemic recession has similarities to the recovery from the global financial crisis-induced recession in the United States, but it’s rather different in the EU and Japan.

Figure 1: GDP and employment developments in major advanced economies, 2005Q1=100



Sources: OECD Quarterly National Accounts database for GDP; Eurostat for EU employment; International Labour Organization for Japanese and US employment; Office for National Statistics for UK employment. Chain-linked volumes for GDP, number of people for employment. All indicators are seasonally adjusted.

Note: the last observation is 2021Q3 for indicators except EU employment, for which the most recent data is for 2021Q2.

In order to formally analyse the association between output and employment changes, we estimate the regression:

(1) $$\Delta \ln(e_t) = \alpha + \beta_1 \Delta \ln(y_t) + \beta_2 \Delta \ln(y_{t-1}) + \beta_3 \Delta \ln(y_{t-2}) + \varepsilon_t \ ,$$

where e_t is employment (number of people),y_t is GDP (chain-linked volume or at constant prices), α, β_1, β_2 and β_3 are parameters to estimate,Δ is the first-difference operator, $\ln(.)$ is the natural logarithmic transformation and ε_t is the error term. We estimate the model in differenced form, because employment and GDP levels have trends and modelling the long-run relationship between them would require a complex model, also controlling for the impact of technology, social policy, and other factors. The differenced form in equation (1) can capture the short-run dynamics between the variables. Causality is always an issue with any regression, yet especially in times of economic crisis caused by an external factor, such as financial system breakdown in 2008 and the CODIV-19 pandemic in 2020, it is more plausible that the resulting GDP contraction was the driver of employment losses and the other way around.

In order to broaden the scope of our analysis, we estimate model (1) for a large number of advanced and emerging countries. For each country, we select the number of lagged GDP growth indicators based on the statistical significance of the estimated parameters. For most of the countries model (1) results in estimates that can be rationalised by economic arguments, while for a few countries, the parameter estimates are not significant. For these countries, we report the result for the model that includes only the contemporaneous value of GDP growth (Table 1).

Table 1: Estimated employment response to GDP changes

	β_1	σ_{β_1}	p	β_2	σ_{β_2}	p	β_3	σ_{β_3}	p	R2	DW	$\beta_1+\beta_2+\beta_3$
Germany	0.11	0.08	0.192							0.01	2.33	0.11
Croatia	0.13	0.09	0.152							0.02	1.97	0.13
United Kingdom	0.06	0.01	0.000	0.07	0.01	0.000	0.06	0.01	0.000	0.35	1.76	0.19
Poland	0.22	0.04	0.000							0.28	1.50	0.22
Austria	0.23	0.02	0.000							0.71	2.47	0.23
Japan	0.14	0.05	0.004	0.09	0.05	0.048				0.13	1.71	0.23

Ireland	0.15	0.05	0.002	0.08	0.05	0.077				0.12	1.48	0.23
Korea South	0.24	0.04	0.000							0.32	1.81	0.24
France	0.13	0.02	0.000	0.07	0.02	0.001	0.06	0.03	0.058	0.39	2.23	0.26
Czech Republic	0.11	0.02	0.000	0.06	0.02	0.014	0.09	0.03	0.000	0.40	1.93	0.26
Netherlands	0.15	0.05	0.004	0.11	0.05	0.030				0.13	1.04	0.27
Hungary	0.15	0.03	0.000	0.05	0.03	0.173	0.07	0.04	0.060	0.24	1.72	0.27
Romania	0.28	0.07	0.000							0.20	2.63	0.28
Belgium	0.11	0.05	0.035	0.06	0.05	0.250	0.12	0.06	0.058	0.05	2.91	0.29
Colombia	0.29	0.19	0.120							0.03	1.92	0.29
EU27	0.20	0.02	0.000	0.10	0.02	0.000				0.66	1.21	0.30
Slovenia	0.20	0.05	0.000	0.13	0.05	0.010				0.24	2.25	0.33
Slovakia	0.16	0.03	0.000	0.12	0.03	0.001	0.07	0.04	0.068	0.34	1.69	0.35
Italy	0.18	0.02	0.000	0.11	0.02	0.000	0.06	0.03	0.020	0.59	1.77	0.35
Montenegro	0.29	0.07	0.000	0.28	0.07	0.000	-0.22	0.11	0.055	0.55	2.27	0.36
Malta	0.13	0.04	0.004	0.15	0.04	0.001	0.10	0.05	0.031	0.24	2.10	0.38
Switzerland	0.27	0.05	0.000	0.12	0.05	0.012				0.42	2.49	0.39
Lithuania	0.27	0.06	0.000	0.13	0.06	0.035				0.32	1.89	0.40
Sweden	0.17	0.02	0.000	0.15	0.02	0.000	0.10	0.03	0.001	0.56	2.17	0.42
Portugal	0.23	0.03	0.000	0.15	0.03	0.000	0.07	0.04	0.062	0.53	1.38	0.45
North Macedonia	0.45	0.20	0.025	0.00	0.00	0.000	0.00	0.00	0.000	0.07	3.34	0.45
Finland	0.28	0.04	0.000	0.10	0.04	0.014	0.11	0.04	0.017	0.49	2.36	0.49
Moldova	0.50	0.29	0.089							0.05	2.04	0.50
Greece	0.28	0.04	0.000	0.09	0.04	0.027	0.13	0.04	0.003	0.51	1.06	0.50
Norway	0.23	0.05	0.000	0.18	0.05	0.000	0.12	0.06	0.038	0.30	1.84	0.53
Turkey	0.36	0.04	0.000	0.08	0.05	0.090	0.12	0.05	0.030	0.54	1.75	0.56
Bulgaria	0.34	0.07	0.000	0.10	0.07	0.153	0.14	0.07	0.058	0.29	1.34	0.58
Denmark	0.29	0.05	0.000	0.19	0.05	0.000	0.13	0.06	0.025	0.48	1.68	0.60
Estonia	0.17	0.08	0.031	0.27	0.08	0.001	0.16	0.08	0.047	0.36	2.62	0.60
Spain	0.36	0.03	0.000	0.16	0.03	0.000	0.12	0.03	0.001	0.74	0.65	0.63
Latvia	0.23	0.06	0.000	0.27	0.06	0.000	0.16	0.06	0.013	0.55	1.61	0.65
Canada	0.84	0.03	0.000	-0.06	0.03	0.093				0.91	2.22	0.78
Mexico	0.92	0.05	0.000							0.84	2.00	0.92
South Africa	0.70	0.05	0.000	0.32	0.06	0.000	0.28	0.06	0.000	0.89	1.83	1.31
United States	1.09	0.05	0.000	0.14	0.05	0.008	0.09	0.05	0.078	0.87	2.36	1.32
Brazil	0.77	0.09	0.000	0.47	0.09	0.000	0.24	0.11	0.039	0.74	1.37	1.48
Chile	1.49	0.09	0.000							0.87	1.63	1.49
Peru	1.38	0.04	0.000	0.21	0.04	0.000	0.00	0.00	0.000	0.97	1.86	1.58
Costa Rica	2.00	0.26	0.000							0.60	2.38	2.00

Source: author's calculations.

Note: least squares estimation results for model (1) over the period 2005-2021 (whenever available). σ_{β_i} indicates the standard error of the estimated β_i parameter; p is the p value of testing the null hypothesis that the parameter is zero; R2 is the adjusted coefficient of determination; DW is the Durbin-Watson statistics. Countries are ordered according to the sum of $\beta_1 + \beta_2 + \beta_3$, which is included in the last column.

Table 1 indicates that in most European countries, Japan and South Korea, GDP changes have relatively small impacts on employment changes and the regression explains a rather limited share of the variation in employment. On the contrary, in the United States, Canada, a number of Latin American countries (Mexico, Brazil, Chile, Peru, Costa Rica) and South Africa, employment is very sensitive to fluctuations in GDP and our simple regression (1) explains quite a large share of the variation in employment.

Differences in employment protection measures (which are much tighter in Europe than in the Americas) could be a general explanation of these findings. A specific explanation could be the introduction of some forms of employment support measures in all EU countries during the COVID-19 pandemic[1]. According to Eurofound (2020), approximately 20% of the EU workforce benefited from a short-time work scheme during the first wave of the pandemic. The income replacement rate received by employees for hours not worked ranged from 60% to 100%, though most countries applied a cap to maximum payments and thus higher-earners received lower percentages of their original salary. Duration of access varied from 2 to 21 months in the first wave of the pandemic, though countries that initially offered this benefit only for a few months extended the duration. These policy interventions have reduced lay-offs in Europe. In contrast, Cohen-Setton and Pisani-Ferry (2020) concluded that the US job support programmes, including the Paycheck Protection Program, was much less effective than the French package.

The United Kingdom adopted measures similar to the short-time work schemes in Europe: a Coronavirus Job Retention Scheme furloughed employees and a Self-Employed Income Support Scheme to support earning of the self-employed workers[2]. These measures dampened the adverse employment impact of the economic fallout from the pandemic.

The Japanese government also adopted widespread employment protection measures, which can explain the muted employment response. According to the summary prepared by the IMF[3], the first April 2020 supplementary fiscal package in response to COVID-19 included a massive amount, 15.8 percent of 2019 GDP, to protect employment and businesses. A month later, a second

[1] These short-time work benefit schemes were inspired by the German “Kurzarbeit”, which was already successful after the global financial crisis, see IMF (2020).

[2] See Bruegel’s ’ The fiscal response to the economic fallout from the coronavirus’ dataset at https://www.bruegel.org/publications/datasets/covid-national-dataset/#uk

[3] https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19#J

supplementary budget was adopted, which included an expansion of the work subsidies. In December 2020, a package included new instruments and extended several ongoing COVID-19 responses.

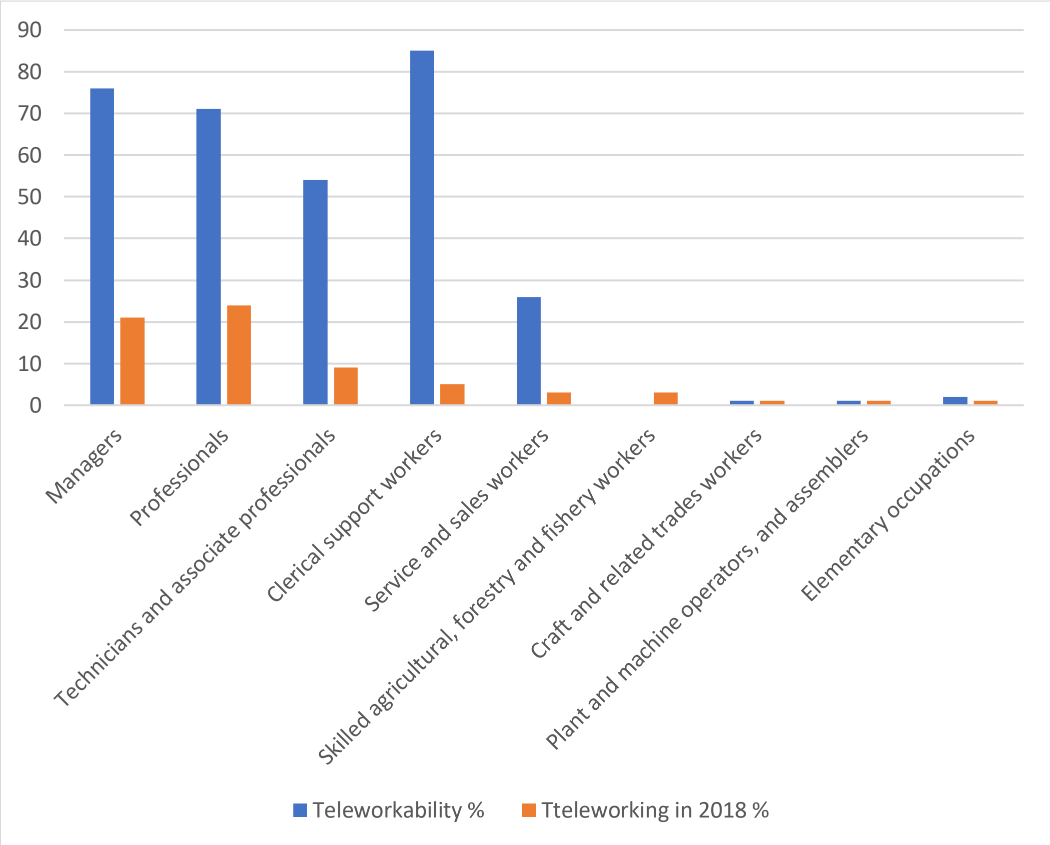
3. An anatomy of the European labour market response to the pandemic

Evidence for both the European Union (Sostero *et al*, 2020) and the United States (Dey *et al*, 2020) suggests that before the COVID-19 pandemic, a relatively small share of workers in teleworkable occupations actually worked from home. The take-up rate (the percentage of workers who were in occupations in which telework is technologically feasible and who actually worked at home) was estimated at about one-quarter prior to the pandemic both in the European Union and in the United States. The ability to telework greatly differs between high- and low-paid workers, between white- and blue-collar workers, as well as between women and men, with a larger share of women than men working in teleworkable occupations (Figure 25 of Sostero *et al*, 2020)[4]. Figure 2 shows the potential for teleworking and actual teleworking by occupation[5] in the European Union in 2018.

[4] Yet before the pandemic, there was no significant difference in the actual share of women and men working from home in the European Union.

[5] Occupations are defined according to the International Standard Classification of Occupations (ISCO-08). See at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2009.292.01.0031.01.ENG

Figure 2: Teleworkability and actual teleworking in 2018 among employees by broad occupation group, EU

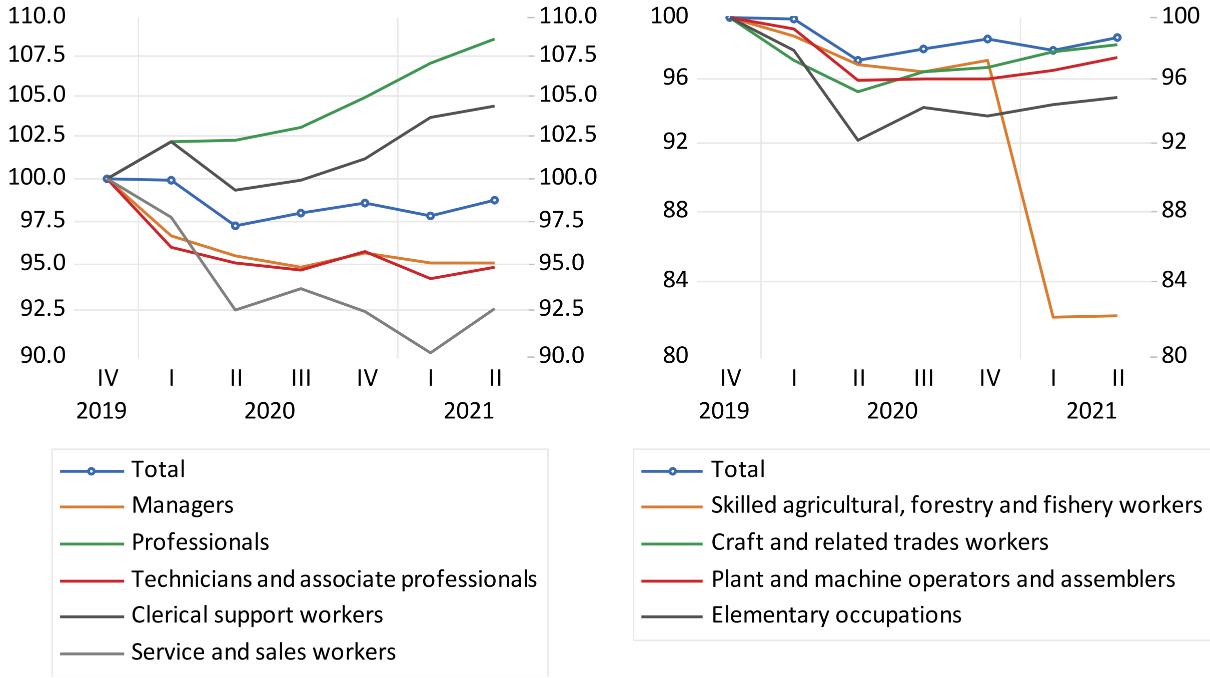


Source: Figure 22 of Sostero et al (2020).

Note: 'Teleworkability': proportion of employees who could telework; 'Teleworking in 2018': the share of employment working from home usually or sometimes according to the 2018 EU Labour Force Survey.

Teleworking surged during the pandemic and thus one would expect that occupations with limited potential for teleworking suffered more. The right panel of Figure 3 shows that indeed there were job losses in four occupations with the lowest potential to telework. Service and sales workers also suffered more than the four occupations with the greater potential to telework (left panel of Figure 3). There was even significant job creation for professionals and clerical support workers during the pandemic, two occupations that have large potential for teleworking. However, managers and technicians (two occupations also having relatively large potential for teleworking) suffered from job losses, which could possibly be explained by the lower demand for such occupations at a time of deep economic contraction.

Figure 3: Employment by occupation in the European Union, 2019Q1 = 100



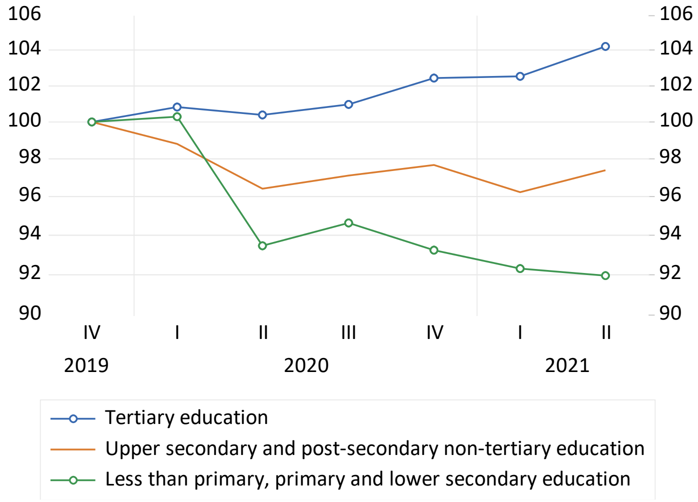
Source: calculations based on Eurostat's 'Employment by sex, age, occupation and educational attainment level (1 000) [lfsq_egised]' dataset.

Note: we have sensually adjusted the data using the X12 method.

The occupation was just one of the important characteristics contributing to job developments. Another important characteristic was the level of education, as highlighted by Darvas (2020) by analysing the impact of the pandemic by the second quarter of 2020. Data extended by one year indicates that the same tendency continued: workers with a high level of education continued to gain jobs, workers with middle-level education did not see much change from the second quarter of 2020 to the second quarter of 2021, while workers with low levels of education lost jobs both at the initial phase of the pandemic and in the subsequent year as well (Figure 4).

Workers with lower education levels tend to have lower incomes and wealth. A larger share of income is obtained from wages for lower-educated people than for tertiary-educated people, implying that a job loss is a bigger income shock for the lower-educated. Consequently, the COVID-19 pandemic has increased income inequality between the rich and the poor even in Europe, where governments put in place massive employment protection programmes.

Figure 4: Employment by educational level in the European Union, 2019Q1 = 100

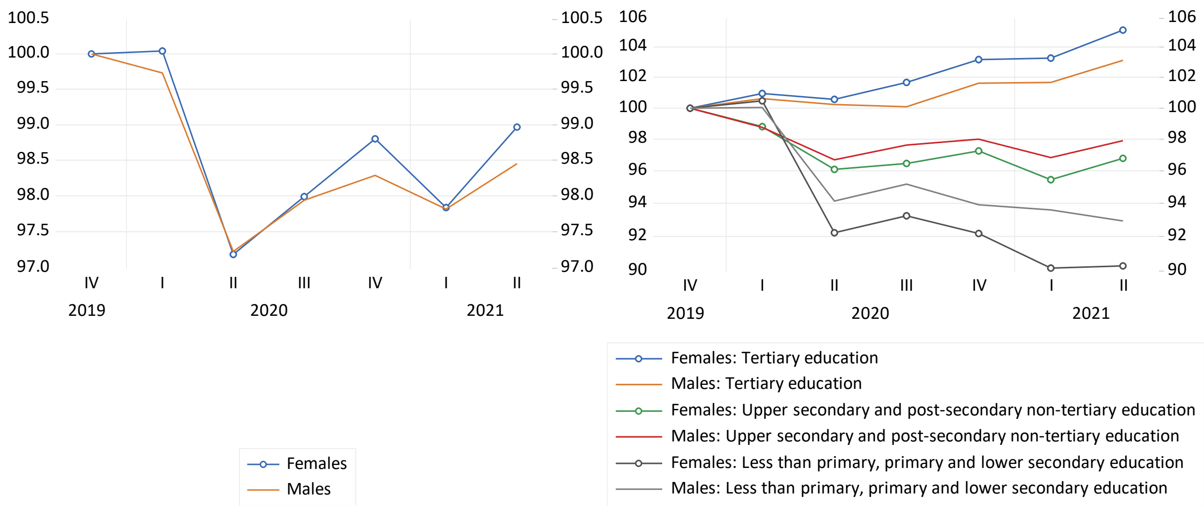


Source: calculations based on Eurostat's 'Employment by sex, age, occupation and educational attainment level (1 000) [lfsq_egised]' dataset.

Note: we have sensually adjusted the data using the X12 method.

Gender differences were small on average (left panel of Figure 5). By differentiating between levels of education between women and men, tertiary-educated female workers benefitted from more new jobs than tertiary-educated male workers, but the opposite holds for middle- and low levels of education (right panel of Figure 5).

Figure 5: Employment by gender and by educational level in the European Union, 2019Q1 = 100



Source: calculations based on Eurostat's 'Employment by sex, age, occupation and educational attainment level (1 000) [lfsq_egised]' dataset.

Note: we have sensually adjusted the data using the X12 method.

The above findings suggest that possible gender differences in pandemic-related employment response depend on various factors. One such factor is education. Occupation is another factor: for example, it is conceivable that a tertiary-educated female worker faced different labour market conditions depending on whether she was working as a professional or a manager (Figure 3). Country differences have also played a role. For example, jobs for tertiary-educated female professionals increased by 16% from 2019Q4 to 2021Q2 in Germany, but only by 4% in Spain, which outcome is in line with the deeper economic contraction that Spain faced compared to Germany. Therefore, different compositions of the labour force in terms of education and occupations, as well as different country-specific impacts, might blur the interpretation of aggregate employment indicators, such as the overall small differences between women and men in terms of jobs losses.

A proper identification of gender, educational level, occupation and country effects requires the estimation of a model that jointly controls for these factors. It would be even better to control for the sector of employment and output contraction at the sectoral level, but unfortunately, such data is not available in conjunction with education, occupation and gender, and therefore we are confined to control for aggregate country-effects. We therefore set up the following model:

$$(2) \qquad \Delta e_{c,o,s,g,t} = \alpha + \sum_{c=1}^{26} \beta_c \cdot country_c + \sum_{o=1}^{8} \gamma_o \cdot occupation_o + \sum_{s=1}^{2} \delta_s \cdot education_s + \\ + \kappa \cdot females + \varepsilon_{c,o,s,g,t}$$

where $\Delta e_{c,o,s,g,t}$ is a measure of the change in employment in country *c* for occupations *o* with levels of education *s* for a particular gender *g* at time *t*. In such regressions, a control group should be set, for which we select German elementary occupations with a low-level of education for men. Thus, among the controls, we have 26 countries (one less than the 27 EU member states), 8 occupations (one less than the 9 occupations we consider), 2 education levels (one less than the three levels of education we consider) and whether the job is for females. α, β_c, γ_o, δ_s and κ are parameters to estimate and $\varepsilon_{c,o,s,g,t}$ is the error term.

An important data constraint is that German employment data is not available for any quarter of 2020, but is available for the first two quarters of 2021 and as well as up to 2019. This implies we cannot study employment dynamics in 2020 for Germany and cannot even do a seasonal adjustment of German data because seasonal adjustment methods require a continuous data sample. We, therefore, calculate employment changes for all countries between the second quarter of 2019 and the second quarter of 2021 (measured as percent change), which procedure eliminates seasonal effects, and we estimate equation (2) as a cross-section regression.

Given that we consider 27 EU countries, 9 occupations, 3 education levels and 2 genders, the maximum number of observations is 1458 (=27*9*3*2). However, data for certain combinations of employment characteristics does not exist. For example, no data is reported for low-educated professionals in Malta, probably because their number is so small. In the EU as a whole, only 0.3% of jobs are for low-educated professionals, while the share of middle-educated professionals is 2.9% and the share of high-educated professionals is 18.4%. This highlights that the bulk of professionals are high-educated, a few of them have middle-level education, and there are hardly any of them who have a low level of education. Similarly, the share of tertiary-educated people doing elementary occupations is very low. While aggregate data for the EU is available for all combinations of the considered job characteristics, missing data at the country level reduces the theoretical maximum sample size from 1458 to 1186. Still, some of the available data might refer to a rather small group of workers. In order to avoid that certain small segment of the labour market driving our results, and also to assess the robustness of our regression estimates, we estimate the regression using alternative samples. In addition to using all available data, we also consider samples from which we exclude those segments of national labour markets that takes less than 0.25%, or less than 0.5%, or less than 0.75% or less than 1% of total national employment, respectively.

Table 2 allows drawing a number of conclusions.

First, by excluding the smallest segments of the labour market, the fit of the regression improves. The coefficient of determination (R2) is 0.09 when we include all observations, and 0.17 when we exclude segments of the labour market less than 0.75% or 1%.

Second, the estimates reveal statistically significant gender differences when we exclude the smallest segments of the labour market: when controlling for education levels, occupation and country, female workers lost about 2.5%-3%-points more jobs than male workers. The p-value of this parameter estimate is statistically significant at the 5% level for all four versions of the regression which considers an employment threshold. This result highlights that the minor difference between women and men in the aggregate employment change (Figure 5) can mask potentially significant gender differences due to different labour market compositions. When we consider all available observations for our regression, as indicated in the first data column of Table 2, the parameter estimate is -1.8 and its p-value is 0.23. The lack of statistical significance of this estimate is related to certain small segments of the labour market, since this estimate is significant for the other four samples used for Table 2.

Third, compared to the benchmark low-level of education, middle-level education, and especially high-level education dampened job losses. These findings are statistically significant for all five versions of the regression. The comparison of parameter estimates suggests that education is a much more important driver of labour market outcome than gender.

Fourth, among the occupations, professionals and clerks benefitted from better labour market outcomes than the benchmark elementary workers, while agricultural workers suffered greater job losses. The estimated parameter for managers is mostly negative but is statistically significant only in one of the five regression estimates. The point estimates for technicians are mostly positive, while for plant and machine operators and assemblers are negative, but these estimates are not statistically significant.

Finally, the country effects are mostly insignificant. The key exceptions are Bulgaria (3 of the 5 estimates are significant) and Luxembourg (4 of the 5 estimates are significant). Therefore, for most countries, gender, education and occupation can capture the characteristics of job changes without country-wide effects.

Table 2: Characteristics of employment change during the COVID-19 pandemic across European countries

	Full sample	Employment threshold			
		0.25%	0.50%	0.75%	1.00%
Females	-1.8	**-2.5**	**-2.6**	**-2.8**	**-3.0**
	(0.23)	(0.05)	(0.05)	(0.04)	(0.04)
Middle-level education	**3.2**	**6.1**	**5.9**	**8.0**	**8.0**
	(0.08)	(0.00)	(0.00)	(0.00)	(0.00)
High-level education	**11.5**	**9.8**	**9.8**	**12.8**	**13.3**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Managers	-2.6	1.0	-1.0	-3.6	**-5.3**
	(0.40)	(0.71)	(0.73)	(0.23)	(0.1)
Professionals	**7.9**	**8.9**	**8.1**	**6.8**	4.8
	(0.01)	(0.00)	(0.01)	(0.02)	(0.11)
Technicians and associate professionals	-2.2	1.9	2.2	1.6	1.1
	(0.48)	(0.46)	(0.41)	(0.55)	(0.69)
Clerical support workers	1.8	**5.4**	**5.2**	**4.9**	**4.7**
	(0.55)	(0.04)	(0.05)	(0.06)	(0.09)
Service and sales workers	**-8.7**	-3.5	-3.4	**-4.0**	**-4.5**
	(0.00)	(0.16)	(0.18)	(0.10)	(0.08)
Skilled agricultural, forestry, fishery workers	-4.7	**-5.1**	**-6.3**	**-8.6**	**-9.7**
	(0.15)	(0.08)	(0.06)	(0.02)	(0.01)
Craft and related trades workers	-1.4	1.8	1.7	0.1	-2.1
	(0.66)	(0.5)	(0.54)	(0.97)	(0.48)
Plant and machine operators and assemblers	-1.5	-0.5	-2.6	-3.2	-4.7
	(0.63)	(0.86)	(0.37)	(0.27)	(0.12)
Austria	-8.1	-1.2	-2.1	0.4	0.7
	(0.11)	(0.78)	(0.64)	(0.94)	(0.88)
Belgium	-7.5	-3.8	-3.0	1.2	0.5
	(0.14)	(0.40)	(0.52)	(0.81)	(0.93)
Bulgaria	**-14.7**	**-8.4**	**-10.3**	-6.7	-5.8
	(0.01)	(0.06)	(0.03)	(0.15)	(0.24)
Croatia	-2.1	4.1	1.3	-1.8	-2.9
	(0.71)	(0.38)	(0.77)	(0.72)	(0.58)
Cyprus	-2.4	3.8	2.2	1.6	1.9
	(0.66)	(0.41)	(0.64)	(0.74)	(0.69)
Czech Republic	-3.4	-3.9	-3.6	-1.3	-2.6
	(0.50)	(0.40)	(0.45)	(0.79)	(0.62)
Denmark	-2.3	0.6	1.4	3.0	4.7
	(0.65)	(0.89)	(0.76)	(0.52)	(0.35)
Estonia	**-10.3**	-4.3	-3.9	-2.2	-2.0
	(0.07)	(0.37)	(0.41)	(0.63)	(0.68)
Finland	4.3	0.7	3.0	4.3	3.5
	(0.39)	(0.88)	(0.52)	(0.37)	(0.49)
France	-6.4	-1.3	-3.2	-1.5	-3.2

	(0.20)	(0.77)	(0.5)	(0.74)	(0.52)
Greece	-5.4	-0.3	-0.7	1.4	1.6
	(0.29)	(0.95)	(0.89)	(0.76)	(0.74)
Hungary	2.5	5.1	4.8	5.0	4.9
	(0.62)	(0.27)	(0.32)	(0.29)	(0.32)
Ireland	-6.5	-0.1	1.1	2.2	3.9
	(0.21)	(0.99)	(0.81)	(0.63)	(0.42)
Italy	-3.3	-1.3	-1.4	1.0	1.4
	(0.51)	(0.77)	(0.76)	(0.83)	(0.78)
Latvia	**-10.6**	-4.5	-4.1	-3.1	-3.8
	(0.06)	(0.34)	(0.38)	(0.5)	(0.44)
Lithuania	**-11.4**	-4.8	-5.6	-4.5	-2.5
	(0.04)	(0.29)	(0.22)	(0.34)	(0.62)
Luxembourg	4.8	**10.7**	**10.9**	**13.1**	**11.1**
	(0.43)	(0.04)	(0.03)	(0.01)	(0.03)
Malta	1.6	7.4	7.7	5.8	5.0
	(0.77)	(0.12)	(0.10)	(0.21)	(0.3)
Netherlands	-3.2	2.5	2.5	5.2	5.0
	(0.52)	(0.57)	(0.59)	(0.25)	(0.3)
Poland	0.1	-0.1	0.1	2.5	3.2
	(0.99)	(0.98)	(0.99)	(0.60)	(0.53)
Portugal	-5.0	2.3	-0.3	3.1	3.4
	(0.34)	(0.6)	(0.95)	(0.5)	(0.47)
Romania	-6.0	-6.0	-6.8	-7.3	-7.5
	(0.27)	(0.20)	(0.16)	(0.13)	(0.14)
Slovakia	-5.3	0.4	0.9	4.5	5.2
	(0.37)	(0.93)	(0.86)	(0.35)	(0.3)
Slovenia	4.1	-2.8	-2.7	-4.3	-1.5
	(0.44)	(0.54)	(0.56)	(0.36)	(0.76)
Spain	-7.9	-0.1	0.0	1.7	1.8
	(0.11)	(0.98)	(1.00)	(0.72)	(0.71)
Sweden	-6.8	-0.3	-2.3	-1.6	-1.1
	(0.18)	(0.95)	(0.62)	(0.74)	(0.82)
R-squared	0.09	0.11	0.12	0.17	0.17
Observations	1186	1052	909	798	700

Source: author's calculations.

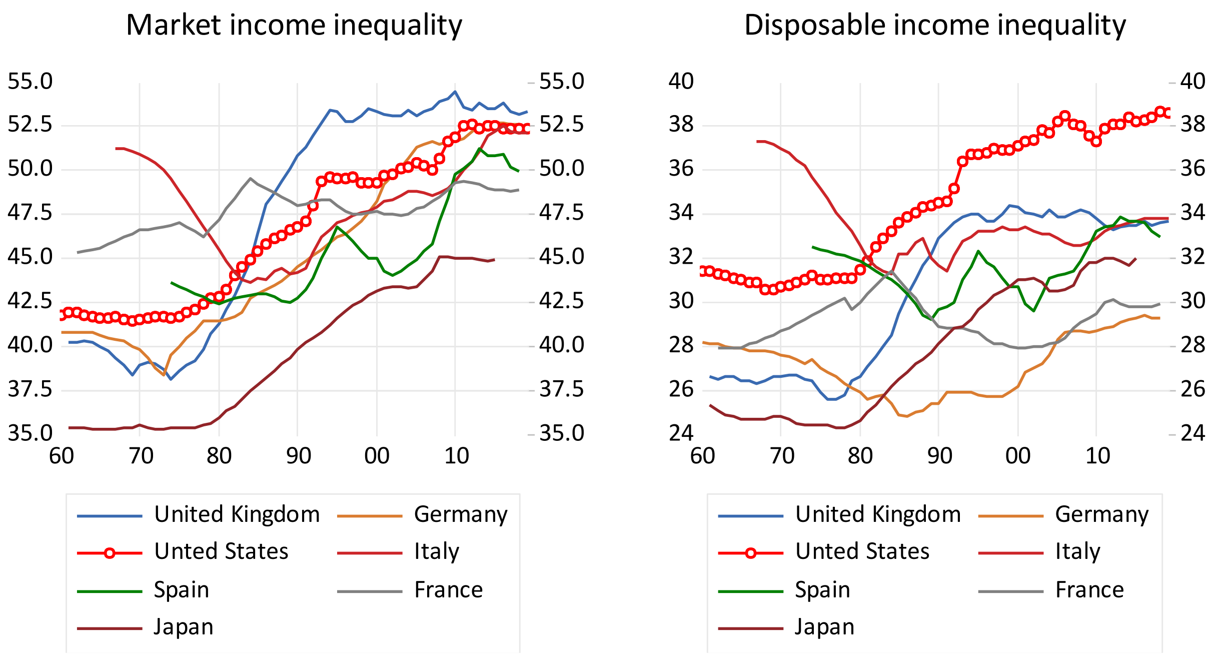
Note: regression (2) is estimated, dependent variable: percent change of employment from 2019Q2 to 2021Q2 in the particular segment of the European labour market (defined by the country, occupation, education and gender). The p-value of testing the null hypothesis of zero parameter is reported below each parameter estimate. P-values less than 10% are in bold. The benchmark for the estimation is German low-educated elementary male workers.

4. Concluding remarks

Labour markets have been subject to profound changes due to globalization, technological, demographic and environmental changes, which resulted in, among others, increased income inequality in advanced countries. These effects were magnified by the labour market impacts of the COVID-19 pandemic. However, both long-run trends and pandemic impacts differ widely across the Atlantic and the Pacific, with European countries and Japan sharing similar developments, which are different from developments in the United States.

Income inequality has been on the rise since the 1970s in several advanced countries (Figure 6). Yet even though market inequality reached similar levels in some European countries and the United States, disposable income inequality is much lower in Europe. In Japan, market income inequality remains the lowest among the countries considered even after a significant increase since 1980, while disposable income inequality is close to the average of the values in European countries. Thus, market forces led to similar outcomes across the Atlantic and the gap is not large across the Pacific, but national social policies are more effective in reducing income disparities in Europe and Japan than in the United States.

Figure 6: Gini coefficient of income inequality



Source: the Standardized World Income Inequality Database of Solt (2020).

Note: market income inequality measures inequality before taxes and transfers, disposable income inequality measures inequality after taxes and transfers. Countries are ordered according to their market income inequality at the most recent observation.

More equity in Europe and Japan might come at a cost of less dynamism and resilience. Neither advanced EU countries, nor Japan, were able to close the per capita income gaps to the United States since the 1990s. The US economy is also more resilient: we showed that the US economy has recovered much faster both from the global financial crisis of 2007 (even though the US financial system was the epicentre of that crisis) and the pandemic-induced 2020 recession. Jobs were hit harder in the US after the global financial crisis than in Europe and Japan, yet even the recovery of jobs was faster in the US.

Policy measures adopted in the EU, Japan and the United Kingdom improved labour market outcomes in the pandemic crisis compared to the global financial crisis. The various employment protection measures have dampened the adverse labour market impacts of the pandemic recession, benefitting citizens and businesses alike. Yet we found that even in Europe, despite the wide-ranging employment protection schemes, poorer low-educated workers were hit much harder than richer high-educated workers. Moreover, while aggregate labour market numbers do not suggest a significant gender gap, when we properly control for education, occupation and country effects, we do find a significant gender gap in the pandemic impact, disadvantaging women. This development widens gender inequality and also income inequality, given that on average women have lower wealth and income than men[6]. These findings call for enhanced social policies even in Europe.

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[6] See pages 35-38 of Darvas and Midões (2021).

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