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Employment impact of Covid-19 crisis: from short term effects to long terms prospects

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Abstract
We contribute to the assessment of the employment implications of the COVID crisis by classifying economic sectors according to the confinement decrees of three European countries (Germany, Spain and Italy). The analysis of these decrees can be used to make a first assessment of the implications of the COVID crisis on labour markets, and also to speculate on mid and long-term developments, since the most and least affected sectors are probably going to continue to operate differently until a vaccine or other long-term solution is found. Using an ad-hoc extraction of EU-LFS data, we apply this classification to the analysis of employment in Germany, Italy and Spain but also UK, Poland and Sweden, in order to cover the whole spectrum of institutional labour market settings within Europe. Our results, in line with recent literature, show that the employment impact is asymmetric within and between countries. In particular, the countries that are being hardest hit by the pandemic itself (Spain and Italy, and also the UK) are the countries more likely to suffer the worst employment implications of the confinement, because of their productive specialisation and labour market institutions. Indeed, these were also the labour markets that were more vulnerable before the crisis: characterised by high unemployment and precarious work (especially temporary contracts).

Keywords Labour market · Employment structure · Covid-19 employment impact · European economy

JEL classification J01 · J08

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1 Introduction to the debate

The COVID-19 crisis hit Europe in the first quarter of 2020. Since January, when the first cases were notified, the number of contagions and deaths has been continuously increasing, and confinement measures and restrictions on economic activities have been implemented in most countries from late February to halt the spread of the virus. After periods of several weeks in which the most restrictive measures were implemented (from late February to April), these measures started to be softened progressively in most countries in May. Although the pandemic is still present and continues evolving, the first available studies on its economic and employment impact seem to converge around similar conclusions: the impact of the crisis is being clearly asymmetric, with the most vulnerable countries and segments of the workforce being hardest hit by the pandemic.

Beland et al. (2020) examine the short-term consequences of COVID-19 on employment and wages in the US. Their findings suggest that COVID-19 increased the unemployment rate, decreased hours of work and labour force participation and had no significant impacts on wages. The negative impacts on labour market outcomes are larger for men, younger workers, Hispanics and less educated workers, indicating that the COVID-19 crisis increases labour market inequalities. They also construct three indices (using ACS and O*NET data) in order to classify jobs according to their exposure to disease, proximity to co-workers and the ability to do remote work, and find that the occupations that depend on physical proximity to others are the ones that are being more affected economically, in contrast to occupations that can be performed remotely. Similar results have been found for the case of Europe. According to Pouliakas and Branka (2020) and Fana et al. (2020), the segments of the workforce most likely to be impacted by social distancing measures and practices due to the COVID-19 pandemic are the most vulnerable groups, such as women, non-natives, those with non-standard contracts (self-employed and temporary workers), the lower educated, those employed in micro-sized workplaces and low-wage workers. In line with these findings, Palomino et al. (2020) find that the crisis is producing in all European countries increases in the levels of inequality and poverty. However, these differences among workers with different employment status and conditions are related to some degree to the segregation of different types of workers across economic sectors. In particular, precarious and vulnerable workers are over-represented in activities related to entertainment, hospitality and tourism, and more generally low productivity services which are facing the hardest short-term impact in the COVID crisis due to both the economic lockdown and the confinement measures (Fana et al. 2020). Barrot et al. (2020), using data from France, show that the decrease in employment caused by social distancing measures is the highest in hotel and restaurants; arts and leisure; agriculture; service activities; food; wholesale and retail and construction, and the lowest in computer services; telecommunications and consulting and scientific and technical activities. They also analyse the effects of social distancing on value added growth for each sector, and find that the sectors experiencing greater losses are mining; arts and leisure; technical activities; food, hotel and restaurants. At the bottom of the figure, with the smallest

losses on value added growth, are real estate activities; computer services; scientific research and service activities.

In line with the previous findings, data from the US suggest that entertainment, restaurants and tourism face large supply and demand shocks (del Rio-Chanona et al. 2020). At the occupation level, the same authors show that high-wage occupations are relatively immune from adverse supply and demand side shocks, while low-wage occupations are much more vulnerable.

The intensity of the economic effect strongly depends on country specialisation. Countries relying more on low productive service activities and with a low share of public employment are the most hardly hit. A recent survey conducted by Eurofound (2020) shows that the share of people reporting that their working time during the COVID-19 pandemic decreased (a lot or a little) is above the EU average in all Mediterranean countries. These results are in line with the estimates of Fana et al. (2020), showing that the share of employment in sectors that are forcefully closed by confinement measures and therefore inactive during the COVID crisis is highest in some Mediterranean countries (Malta, Cyprus, Spain, Greece, Italy) and Ireland, while the proportion is below the average in most Nordic, Easter and central European regions. In summary, in Europe the Mediterranean countries are the ones that are being hardest hit by employment implications of the pandemic.

An important point to emphasize is that the employment and economic impact of the COVID crisis in each country will in the medium-long term be much less determined by the strictness of the confinement than by structural and institutional differences such as economic specialisation, social protection and labour market regulation. In fact, the economic effect of the pandemic occurs regardless of whether governments mandate an economic lock-down or not, as a recent experiment suggests (Andersen et al. 2020).

Additionally, the position of each country in the international division of labour as it results from the integration in complex value chains will play a pivotal role in the medium term. This is particularly important for European countries whose productive structures evolved asymmetrically in the last decades, with both Southern and Eastern periphery being more dependent on the Center, led by the German productive model (Simonazzi et al. 2013).

In this context, Barrot et al. 2020 suggest that a more severe contraction of GDP can be expected in both Eastern European countries (Bulgaria, Romania, Hungary and Lithuania) as well as some Mediterranean ones, although different confinement measures have been applied in both cases. The Nordic countries, on the other hand, appear as the ones facing the best scenario. Doerr and Gambacorta (2020) find that, in general, employment in regions in Southern Europe and France is more exposed to the negative effects of the pandemic than regions in northern Europe, with Eastern and central European regions in between.

In the context of the current crisis, telework has allowed to mitigate part of the negative consequences caused by social distancing and restrictions on activities. Working from home requires important changes in the lifestyle of workers and, as a consequence, creates new challenges for work-life balance, mental health issues and work organisation practices. But in terms of employment, it is a practice that allows people to maintain their activity (and income) even when the strictest restrictions are

imposed, at least for those with standard employment arrangements. In this sense, telework helps those that are able to perform their professional activity remotely to dodge the economic impact of the crisis. But not all workers can benefit from this form of work.

According to Dingel and Neiman (2020), the share of jobs that can be done at home exceeds 40% in Sweden and the UK, while the proportion decreases in the cases of France (38%), Italy (35%) or Spain (32%). A similar divide between the north and the south of Europe has been documented by Palomino et al. (2020). Thus, the potential for telework seems to be lower in the countries that are being hardest hit by the COVID crisis. As a result, the Mediterranean countries are not only severely affected by the crisis, but also worse prepared than other EU countries for the large-scale transition to telework triggered by the crisis. Also, we have to consider that the expansion of telework has consequences in terms of inequality not only across countries, but also within countries and across groups of workers. The jobs that can more easily shift to telework have, on average, higher wages and qualifications. According to Dingel and Neiman (2020) estimates, among high-paid activities 83% of jobs can be done at home for educational services; 80% for professional, scientific and technical services; 79% for management of companies and enterprises, etc.; conversely, among low-paid activities only 14% for retail trade; 8% for agriculture, forestry, fishing and hunting and 4% for accommodation and food services can be performed remotely.

In this paper, we contribute to the assessment of the employment implications of the COVID crisis by classifying economic sectors according to the confinement decrees of three European countries (Germany, Spain and Italy). The analysis of these decrees, which explicitly classify economic sectors as essential or non-essential, and in some cases specify sectors that must be forcefully closed, can be used to make a first assessment of the implications of the COVID crisis on labour markets, and also to speculate on mid and long-term developments, since the most and least affected sectors are probably going to continue to operate differently until a vaccine or other long-term solution is found.

2 Methodology

The present study is based on a detailed comparative analysis of the sector lockdowns in three European countries: Germany, Spain and Italy, as they result from national confinement decrees approved in March 2020. The three countries analysed have regulated the productive lockdown by identifying essential and not essential activities, broadly related to the satisfaction of fundamental needs: health, food, security, education and administrative services. Moreover, in the three countries as well as in most other countries, the firms that are allowed to operate are instructed to meet stringent health and safety requirements for their employees.[1]

[1] In particular, the comparative analysis is based on the *Recommendations from the Minister of Health* and *the Agreement between the Chancellor and the heads of state* for Germany, approved respectively on March 16th and 22nd. For the Italian case, we use the decree approved on March 10th containing urgent measures at the national level, and the one approved on March 25th, *Urgent Measured to tackle*

After a detailed qualitative analysis of the confinement decrees summarized in Table 3 of the "Appendix", for each specific sector (NACE at the 2-digit level) and country we provide an indicator that ranges from 0 to 1. A value of 1 indicates that the sector is explicitly defined as essential, and thus can continue to operate even in the strictest confinement. A value of 0 indicates that the sector is considered non-essential, which may mean that it is forcefully closed or that it can operate only under certain conditions. Values between 0 and 1 indicate that some sub-sectors (NACE 3 or even 4 digit codes) within a given sector (NACE at 2 digits, which is our baseline) are considered essential and some not: in these cases, the value of the indicator reflects the share of sub-sectors considered essential, when possible adjusted for relative employment shares using EU-LFS data. Then, for each NACE 2-digit sector the values of the three countries are averaged into an overall indicator, which can be interpreted as the average degree to which a given sector is considered essential in the three countries analysed. Then, this indicator has been used to rank the sectors, providing a first criterion to classify them according to the impact of the COVID confinement decrees. The values of the three country-specific indicators, and the aggregate index, can be found in Table 4 in the "Appendix".

Two additional criteria have been established to complete the classification of economic activities according to the decrees. First, whether a given sector can operate via telework, which mostly depends on the nature of economic activity in the sector: in general, activities and services that do not involve direct physical interaction (either with things or with people) can be remotely provided making use of ICT equipment. All the confinement decrees analysed state explicitly that independently of whether a given sector is considered essential or not, whenever possible it should operate via telework. Second, there is also an implicit or explicit differentiation in the decrees of those (non-essential) activities that are forcefully closed because they require direct face-to-face interaction with clients and therefore, they are particularly risky in the context of the COVID pandemic. Thus, the activities which are fully or mostly non-essential (values below 0.3 in the indicator) are classified in two different categories: those that are forcefully closed (5), and those that are mostly non-essential but not forcefully closed (and thus at least partly active, code 4). These two additional criteria are indicated in the column "Notes" of Table 3 in the "Appendix".

Following this procedure (and as shown in the column "Clasif." of Table 4 in the "Appendix"), the five categories in which we classified economic sectors according to the impact of the COVID confinement measures are summarised in Table 1.

Using an ad-hoc extraction of EU-LFS data,[2] we applied this classification to the analysis of employment in Germany, Italy and Spain but also UK, Poland

Footnote 1 (continued)

the epidemiological emergency related to Covid-19. Finally, the Spanish analysis is based on two main Royal decrees: the first one was approved on March 14th (Royal Decree 463/2020) and declared the State of Alarm in the country, while the second one (Royal Decree 10/2020) was approved on March 29th) and identified the activities considered essential. More info on the content of the main decrees regulating activities can be found in Table 3.

[2] The ad-hoc extraction is based on 2018 annual data and uses Nace rev.2 classification for economic sectors, therefore the analysis provided do not need any reclassification over time and across countries.

Table 1 Sectors categories, description

1. Essential and fully active sectors	Mostly include food production, utilities, health and all the other sectors identified as essential in the three decrees analysed. In these sectors, most employment continues operating with normality
2. Active but via telework	Include education, most of public administration, finance, insurance and telecommunications. Most employment in this sector is also maintained even in strict confinement, but with telework. We also include here professional, scientific and technical activities, even though they are explicitly considered as non-essential in the three countries (but can continue to operate remotely)
3. Mostly essential and partly active, not teleworkable	Includes a significant part of retail and manufacturing of chemicals and paper, which remain to some extent active even in the strict confinement situation
4. Mostly non-essential and inactive, not teleworkable	Includes the majority of manufacturing not previously mentioned, as well as some machine and computer repair activities and construction. These activities are not essential nor teleworkable; but since they generally do not involve direct interaction with clients, in regular confinement situations they are normally allowed to function (under strict conditions)
5. Closed	Includes hotels, restaurants and accommodation, estate and travel agencies, plus leisure and recreation services. These are not essential and explicitly closed by the confinement decrees analysed, and they cannot continue to function via telework

and Sweden trying to cover a wide spectrum of institutional labour market settings within Europe (Esping-Andersen 1990; Gallie 2009; Hall and Soskice 2001). The analysis of the employment structure across the previously defined sector categories allows to discuss the potential socio-economic effects of the confinement measures in the short-run, but also to speculate on the medium-term prospects (from the end of the confinement to the return to full normality). In the following section we will briefly document the employment distribution across categories in each of the European countries analysed, as well as the age and gender profiles of workers in the sectors classified by the impact of the COVID crisis. Then, we will highlight the differences in terms of employment characteristics, focusing on employment status and duration of contracts, and in terms of average wage levels.

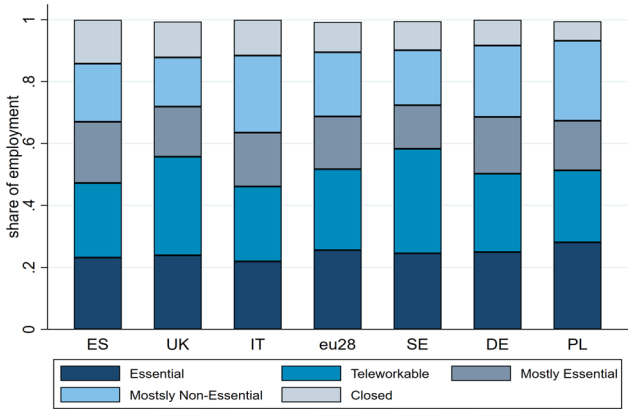

Fig. 1 Employment distribution across sector categories and country, (%)

3 Results

A first impression of the differences across countries is provided by Fig. 1 summarising employment shares in each category. As discussed in the previous section, the categories are sector specific and therefore these patterns are entirely the result of structural differences. In particular, Poland is characterized by the biggest share of employment in *essential activities*—even higher than the EU-28 average—reflecting the importance in Poland of the primary sector (considered essential in the three confinement decrees analysed) compared to other countries. Indeed, as shown in the European Jobs Monitor 2019 (Hurley et al. 2019), the Polish economy while shifting its productive system toward core manufacturing sectors mainly related to European value chains (anchored to German manufacture industries, Danninger and Joutz 2007), is still characterized by a strong primary sector. On the other hand, employment in sectors *active via telework* is higher than the EU28 average in Sweden and the UK, but for different reasons: the predominance of the Public Sector in Sweden contrasts with the higher share of financial and professional services in the UK. More heterogeneity emerges between countries when dealing with the manufacturing sector which is split between the categories of *mostly essential* or *mostly non-essential* (but in both cases partly active and "not teleworkable"). Spain, Germany and Italy are characterized by an employment share above average in the *mostly essential* sectors, driven by a relative specialisation in chemical manufacturing, wholesale and retail trade. Furthermore, employment in the *mostly non-essential* activities (which includes the rest of manufacturing and construction) ranges between 25% for Poland to 15% for the UK. However, the three countries with a strongest manufacturing sector, Germany, Poland and Italy, specialize in different industries and occupy different positions in the European value chain, which will probably lead to different outcomes in the economic crisis ahead (Simonazzi et al. 2013).

Finally, Southern European countries and the UK emerge as those with the highest share of employment in the forcefully closed sectors. These mainly involve

Table 2 Employment distribution by gender and age across countries and sector categories, (%). Source: Authors' elaboration on EU-LFS data

	Essential	Teleworkable	Mostly essential	Mostly non-essential	Closed
Women					
DE	56.0	54.2	48.7	22.3	57.6
ES	44.2	49.9	50.0	29.6	55.2
IT	42.1	50.1	41.8	28.9	54.0
PL	44.2	58.6	55.4	22.0	65.9
SE	58.5	55.5	41.5	19.4	53.8
UK	55.8	52.4	45.7	18.8	54.6
eu28	51.0	53.0	48.0	24.4	56.3
Young workers					
DE	18.3	18.1	20.3	18.8	24.0
ES	12.6	10.5	15.9	10.5	22.6
IT	10.7	6.6	14.3	11.6	23.4
PL	15.0	13.7	24.1	20.8	29.3
SE	19.4	16.4	27.1	21.9	36.8
UK	18.5	18.4	29.1	20.6	38.8
eu28	16.0	14.9	22.0	17.3	28.3

accommodation, leisure and tourism as well as personal care activities, all belonging to the category of Less Knowledge Intensive (LTI) services activities. As highlighted by Esping-Andersen (1990), this form of specialisation, especially in the private provision of care services, can be linked to the liberalization of the health sector reinforced by an increase in the demand due to an aging population. At the same time, the high share of employment in tourism and related activities in Italy and Spain is part of a deindustrialization process strengthened by the structural reforms of recent years and the labour market reforms approved after the 2008 crisis, which may have shifted investment towards less innovative and more labour intensive sectors. This last evidence is consistent with the regional polarization analysis presented in the 2019 European Jobs Monitor report, according to which Italy and Spain suffered a downgrading dynamic of their employment structure, compared to the average European trend in the last two decades (Hurley et al. 2019).

Differences in institutional settings and labour market regulations not only result in different employment structures across economic activities but they may have a differential impact on different segments of the population. In other words, the impact of the COVID lockdown decrees (and the COVID-induced economic crisis) vary across population groups, as we will discuss now.

According to Table 2, the two categories that are more gender-segregated (dominated by one gender) are the *closed* sectors and the *mostly non-essential* sectors. In the *closed* sectors, the proportion of women for the EU28 as a whole is 56%, with even higher values in Poland and Germany. On the other hand, the *mostly non-essential* sectors are very heavily dominated by men, with only 24% of women for

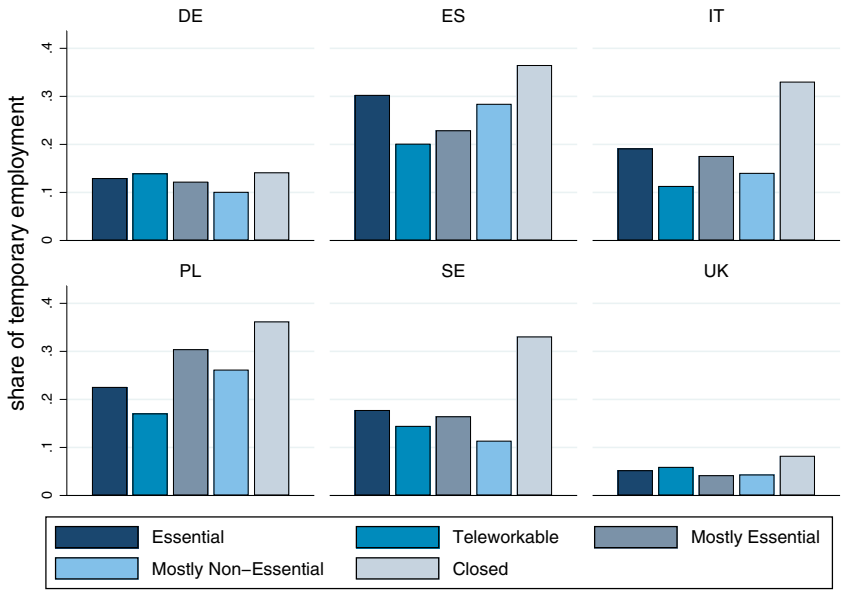

Fig. 2 Share of temporary employment by sector category and country

the EU28 as a whole. This latter result can be explained by the sectoral composition of the category, mainly driven by manufacturing and construction, which are very male-dominated. The other categories (*essential*, *teleworkable* and *partly active*) are not characterised by a clear gender segregation at the European level, but show a lot of variation by country. For instance, in Germany, Sweden and the UK, women are significantly more prevalent in the *essential* and *teleworkable* sectors (Poland also has more women in the latter category). Conversely, for the *mostly essential* sectors, the share of women is above the EU average in Spain and Poland.

Overall, the asymmetry in the impact of the COVID lockdowns by gender is quite evident for the forcefully closed sectors, which are likely to suffer more also in the mid-long term because of the lockdown and a more than probable decline in final demand for this type of services. However, changes in aggregate demand will shape the overall economic crisis ahead and may particularly hit the most internationally integrated manufacturing sectors, with a potential stronger effect on male workers who dominate those economic activities. However, the differences by gender at the EU level do not seem particularly strong, but they are stronger in some countries such as Poland.

Turning to differences by age, we can observe that higher shares of young workers (those aged 15–29) are found in the *closed* and to a lesser extent in the *mostly essential* sectors. But again, differences across countries need to be highlighted. First, Italy and Spain are characterised by a generally low level of youth employment which results in a share below average in all categories. Still, in these two countries young workers are relatively underrepresented in *essential*, *teleworkable*

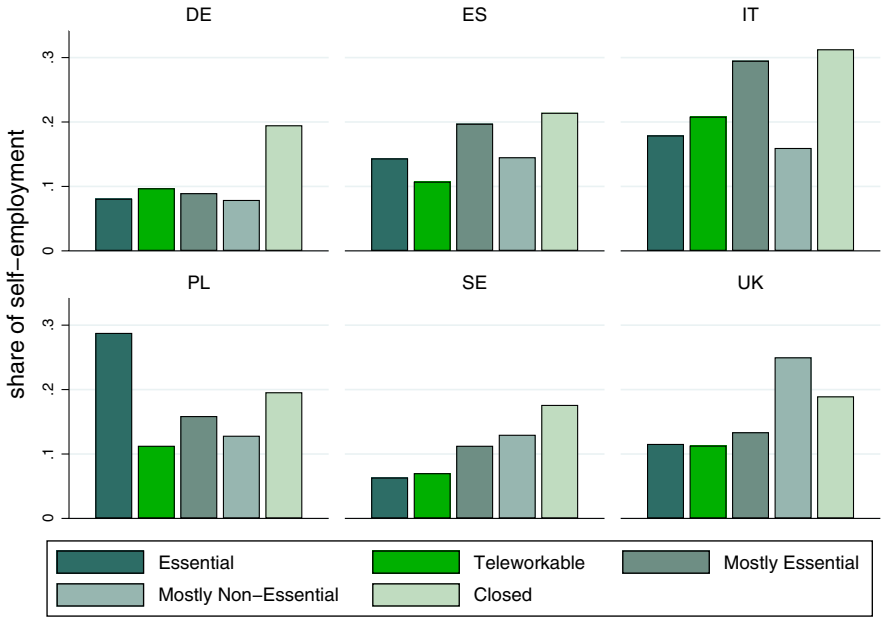

Fig. 3 Share of self-employment by sector category and country

and *mostly non-essential* sectors. This can be explained by the very high average age of public employees, but also the low level of employment in financial and professional activities.

More evident are the differences in labour market regulations, which are related to significant differences in terms of share of temporary (Fig. 2) and self-employed (Fig. 3) workers across categories and countries. For the EU28, temporary employees represent 14% of total employment, but in the forcefully *closed* sectors the share of temps increases up to 21.6%. As a result of labour market flexibilisation processes occurred in recent decades, in Southern and Eastern countries the proportion of workers with fixed term contracts is higher than elsewhere across all sector categories compared to the other selected countries. The only exception is Sweden, where temporary workers are overrepresented in the closed sectors converging to the Southern countries level. Spain even doubles the average share of temporary employment in all categories but the closed ones. A similar pattern applies to Poland for the most essential and partly active sectors, drawing attention to the precarious character of the impressive employment growth of Poland in the last two decades. A second proxy for precariousness in the labour market is the share of self-employed (without employees) in the total economy. While the self-employed are over-represented in *closed* activities almost everywhere – 21.6% compared to the 14% across all economic activities at the EU-28 level, suggesting that the self-employed have been hit particularly hard by the Covid-19 crisis (see also Blundell and Machin 2020)—, there exists a remarkable variation across countries. As Fig. 3 underlines, the proportion of self-employed in Poland almost doubles the EU average, followed

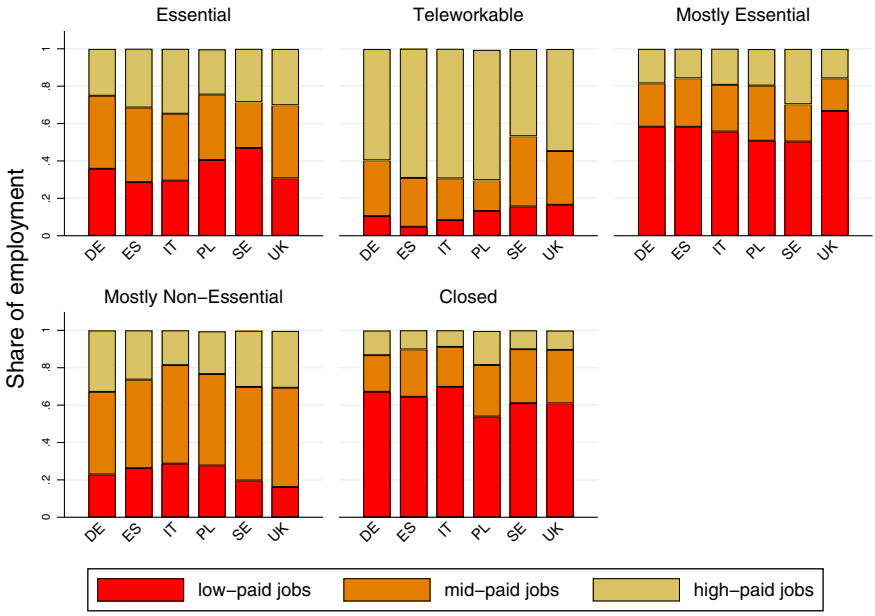

Fig. 4 Jobs-wage terciles by country and sector category

by Italy. The above figure also suggests that in the two Southern countries, self-employment is over-represented in the *mostly essential* sectors, where wholesale and retail trade dominate.

To conclude our analysis of the different employment impact of the COVID confinements by country and sector category, we explore the job-wage distribution in each country-category pair. More precisely, following the approach adopted by Hurley et al. (2019) we rank each occupation-sector combination (jobs) by their average wages in each country, and then assign those jobs to the corresponding job-wage tercile. In other words, the employment structure is partitioned into three terciles—low, mid and high paid jobs—generated by the weighted wage ranking built as an ordinal measure. This way, we are able to compute the share of employment in each tercile by category and country. As underlined by Fig. 4, the *closed* and *mostly essential* sectors are not only the more precarious but also those with the highest share of low-paid jobs (60% on average). This evidence thus reflects the vicious nexus between atypical employment and low wages (Raitano and Fana 2019), as well as the relationship between Less Knowledge Intensive Services and low wages. Although in most manufacturing activities mid-paid jobs dominate the wage distribution, the share of low-paid jobs reaches more than the 20% in the countries with a stronger manufacturing base (Germany, Italy and Poland), probably reflecting the effect of wage moderation policies adopted during the last decades.

4 Conclusion and discussion

As expected, the previous analysis reveals very asymmetric effects of the COVID lockdown measures across different groups of workers within and between the selected European countries. In particular, it reveals that the most negative effects tend to concentrate on the most vulnerable and disadvantaged workers in low productivity services. It seems reasonable to assume that the workers more likely to lose their jobs because of the lockdown in the short run, and face a particularly high uncertainty in the mid-term, are the same categories identified in our analysis as the most negatively affected by the COVID confinement measures. These workers are overrepresented in countries where a downgrading dynamic of the economic structure toward low productive services has been recently observed (Hurley et al. 2019). At the same time, medium term effects may extend these negative effects also to countries with a higher share of manufacturing activities mainly dependent on European "core" value chains, as in the case of the automotive sector.

Thus, the negative consequences, unfortunately, tend to pile up. The countries that are being hardest hit by the pandemic itself (Spain and Italy, and also the UK) are the countries more likely to suffer the worst employment implications of the confinement, because of their specialisation in sectors which are more likely to be forcefully closed. In fact, these were also the countries that were most vulnerable before the crisis: characterised by high unemployment, precarious work (especially temporary contracts), inequality and relative poverty compared to the rest of the EU. Unfortunately, Spain and Italy were also the countries most affected by the financial crisis and both fiscal consolidation and structural reform packages. The current crisis, therefore, is likely to exacerbate ongoing economic asymmetries in Europe, as well as pre-existing inequalities in general, unless very drastic policy measures are implemented very quickly, with a decisive redistributive component also at the EU level.

A recent ad-hoc survey carried out by Eurofound (2020) paints a stark picture of people across the 27 EU Member States who have seen their economic situation worsen and are deeply concerned about their financial future. The same survey also showed a dramatic fall in trust in the EU and their national governments, an observation that warns about the possible political consequences of the crisis at all levels in the short and the mid-term. All these concerns and problems are likely to be intensified in the countries that are being hardest hit by the current crisis.

The COVID crisis is so deep that it will not only radically affect labour markets in the short and medium run, but it can also change substantially the way the work is organised. Telework may be here to stay, as recent data suggest, but this is not the only transformation. Early evidence from Italy suggests that industries employing more robots per worker in production tend to exhibit a lower risk of contagion due to Covid-19 (Caselli et al. 2020). As has already happened with telework, automation could be accelerated in the aftermath of the crisis since it can be used as a strategy to minimize risks for health while preserving production and economic activity.

The possibilities for economic recovery are very uncertain to say the least and strongly depend on the economic policies adopted both at the national and European level. As in any deep crisis, we will have to face sharp economic restructuring within and between countries as operating margins, income and demand fall sharply in the following months and years. Ten years after the last crisis, we are now aware that a narrow focus on fiscal consolidation and exports as the main exit strategy resulted in asymmetric weaknesses and vulnerabilities that are again surfacing in the last few months.

While it is imperative that European economies provide income support to the most affected groups as soon as possible, a longer term vision should be put in place for confronting the still severe effects of deindustrialisation in many European countries and for reversing the recent narrowing of social welfare: for instance, by fostering alternative sources of economic growth at a properly large scale (i.e. EU Green Deal) and by setting the foundations a future European Welfare State.

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Compliance with ethical standards

Conflict of interest The paper reflects authors' own opinions and does not involve the Institution they belong.

Code availability Upon request.

Availability of data and material Upon request.

Appendix

See Tables 3 and 4.

Table 3 Basic information about the national decrees regulating economic activities. Source: Author's elaboration

Country	Date	Content of measure	Link
Italy	31st January	Italian Government declared the State of emergency, and allocated the first funds to deal with the emergency	https://www.salute.gov.it/portale/nuovocoronavirus/dettaglioContenutiNuovoCoronavirus.jsp?area=nuovoCoronavirus&id=5351&lingua=italiano&menu=vuoto
	23rd February	First containment measures and creation of the so called "Red zone" including the entire Lombardy region and several provinces in Veneto, Piedmont, Emilia Romagna and Marche	https://www.gazzettaufficiale.it/eli/id/2020/02/23/20G00020/sg
	11th March	Decree of the President of the Council of Ministries. National lockdown and initial suspension of economic activities The government decided to extend the lockdown measures, introduced to the so called Red Zone in the North of the country, to the whole country: schools and all cultural activities, including cinemas, museums, gyms, swimming pools, and SPAs were suspended; sport events and public gatherings were banned. The decree also provided a first detailed list of essential activities, by economic sector (NACE codes). In particular, the decree suspended all retail commercial activities, catering services and personal activities with the exception of those identified as essential. It also established that public administrations would continue to operate, but in- home working mode; similarly, the decree encouraged all production and professional activities to switch to remote or home working whenever possible, or alternatively to use worker's holidays and paid leave. All activities of company departments that were not indispensable for production were suspended, even though the vague definition allowed for a large degree of arbitrariness	https://static.gedidigital.it/repubblica/pdf/2020/cronaca/DPCM11marzo2020pdf

Table 3 (continued)

Country	Date	Content of measure	Link
	22nd March (modified on the 25th)	Legislative Decree 19/2020. Decree suspending all non-essential economic activities The decree provides narrowed the list with all economic sectors that are considered essential and therefore allowed to continue their activity. However, firms operating in essential sectors may still have to close if they cannot guarantee basic hygiene and social distancing standards. By contrast, firms operating in sectors considered "non essential" may continue their activity if they can organise their work remotely through telework—which in Italy has been renamed "smart work". Similarly, manufacturing firms that produce non-essential goods may still be allowed to continue their activity if what they production is "functional" to the production of essential items (comma d of the Decree)	https://www.gazzettaufficiale.it/eli/id/2020/03/25/20G00035/sg
	10th April	Decree proroguing the suspension of already defined non-essential economic activities, but reinstating a few (bookshops, childcare facilities)	https://www.gazzettaufficiale.it/eli/gu/2020/04/11/97/sg/pdf
Spain	14th March	Royal Decree 463/2020, declaring the State of Alarm and announcing the first containment measures. This decree includes a first list of activities closed for the public, focused on cultural and artistical activities, sports, public events, games and leisure, food and beverage services, etc.	https://www.boe.es/diario_boe/txt.php?id=BOE-A-2020-3692

Table 3 (continued)

Country	Date	Content of measure	Link
	29th March	Royal Decree 10/2020. The decree imposeds new restrictions on economic activities, publishing a simplified list of essential activities that are allowed to continue with their activity: food production and the manufacture and distribution of basic products, health and social care activities, etc. Moreover, it does not consider explicitly any manufacturing industry as essential. Instead, it uses a broad criterion: essential activities are those necessary to ensure the maintenance, production and development of the basic activities and products. Following these main criterion, activities classified as essential are only those manufactures related with food and beverage production, medicines and sanitary products, hygienic products, fuel and gas, etc. Activities belonging wholesale and retail trade are allowed for stores or people selling basic products: agricultural machinery and equipment, food and beverages, fuels, newspapers, medical goods, pharmaceutical goods, cosmetics, pet food, etc. Online shopping/home delivery is allowed for all type of products. Therefore, food and beverage service activities while not essential, they can prepare home deliveries, so they are still employing people	https://www.boe.es/buscar/doc.php?id=BOE-A-2020-4166
	13th April	Previous decrees no longer valid and restrictions respond again to the original confinement measures	https://www.boe.es/buscar/doc.php?id=BOE-A-2020-4166
Germany	16th March	Recommendations from the Minister of Health. According to the decree, every federal state closed restaurants, non-essential stores, leisure and cultural facilities	https://www.bundesgesundheitsministerium.de/presse/reden/regierungsbefragung-coronavirus.html#c17563
	17th March	Regulation Baden Wurttemberg (regular updates)	https://www.baden-wuerttemberg.de/de/service/aktuelle-infos-zu-corona/aktuelle-corona-verordnung-des-landes-baden-wuerttemberg /

Table 3 (continued)

Country	Date	Content of measure	Link
	22nd March	Agreement between the Chancellor and the heads of state. The government imposes binding guidelines for all federal states against the spread of Covid-19. In particular, the guidelines imposed a contact ban for meetings of more than two individuals in public with exemption for household members; closure of schools, day care centres and universities as well as of restaurants and other gastronomic facilities, except for delivery or takeaway; ban of personal medically non-essential services in the area of body care. Moreover, the guidelines impose all companies and especially those with public traffic, to comply with the hygiene regulations and to implement effective protective measures for employees and visitors	https://www.bundesregierung.de/breg-de/themen/coronavirus/besprechung-der-bundeskanzlerin-mit-den-regierungschefinnen-und-regierungschefs-der-laender-1733248
	17th March	List of essential occupations Berlin	https://www.berlin.de/sen/bjf/coronavirus/aktuelles/notbetreuung/
	22nd March	Regulation North-Rhine-Westphalia	https://recht.nrw.de/lmi/owa/br_vbl_detail_text?anw_nr=6&vd_id=18354

Table 4 A summary of the COVID sector lockdowns in three European countries as of early April 2020

	Essential sect	DE	ES	IT	Index	Notes	Classif.
1	Crop and Anir	1	1	1	1.00	Fully active	1
3	Fishing and A	1	1	1	1.00	Fully active	1
6	Extraction of	1	1	1	1.00	Fully active	1
10	Manufacture	1	1	1	1.00	Fully active	1
11	Manufacture	1	1	1	1.00	Fully active	1
18	Printing and R	1	1	1	1.00	Fully active	1
21	Manufacture	1	1	1	1.00	Fully active	1
36	Water Collect	1	1	1	1.00	Fully active	1
37	Sewerage	1	1	1	1.00	Fully active	1
38	Waste Collect	1	1	1	1.00	Fully active	1
39	Remediation	1	1	1	1.00	Fully active	1
49	Land Transpo	1	1	1	1.00	Fully active	1
50	Water Transp	1	1	1	1.00	Fully active	1
52	Warehousing	1	1	1	1.00	Fully active	1
53	Postal and Co	1	1	1	1.00	Fully active	1
60	Programming	1	1	1	1.00	Fully active	1
61	Telecommuni	1	1	1	1.00	Fully active	1
75	Veterinary Ac	1	1	1	1.00	Fully active	1
86	Human Healtl	1	1	1	1.00	Fully active	1
87	Residential Ca	1	1	1	1.00	Fully active	1
88	Social Work A	1	1	1	1.00	Fully active	1
63	Information S	1	1	1	1.00	Teleworkable	2
64	Financial Serv	1	1	1	1.00	Teleworkable	2
65	Insurance and	1	1	1	1.00	Teleworkable	2
66	Activities Aux	1	1	1	1.00	Teleworkable	2
84	Public Admini	1	1	1	1.00	Teleworkable	2
19	Manufacture	1	0.9	1	0.97	Fully active	1
35	Electricity, Ga	1	0.9	1	0.97	Fully active	1
58	Publishing Act	1	0.75	1	0.92	Fully active	1
51	Air Transport	1	0.66	1	0.89	ng restrictions	3
59	Motion Pictur	1	0.5	1	0.83	Partly active	3
85	Education	1	0	1	0.67	Teleworkable	2
69	Legal and Acc	0	1	1	0.67	Teleworkable	2
80	Security and I	1	0.33	0.67	0.67	Teleworkable	2
45	Wholesale an	0.67	0.5	0.75	0.64	Partly active	3
17	Manufacture	0.5	1	0.29	0.60	Partly active	3
20	Manufacture	0.7	0.17	0.87	0.58	Partly active	3
46	Wholesale Tra	1	0.4	0.33	0.58	Partly active	3
62	Computer Pro	0.5	0	1	0.50	Teleworkable	2
9	Mining Suppo	0.5	0.5	0.5	0.50	Partly active	4
47	Retail Trade,	0.51	0.49	0.5	0.50	Partly active	3
81	Services to Bu	0.5	0.33	0.67	0.50	Partly active	3
5	Mining of Coa	0	0	1	0.33	lostly inactive	4
12	Manufacture	1	0	0	0.33	lostly inactive	4
94	Activities of M	0	0	1	0.33	Teleworkable	2
70	Activities of H	0	0	1	0.33	Teleworkable	2

Table 4 (continued)

71	Architectural	0	0	1	0.33	Teleworkable	2
72	Scientific Rese	0	0	1	0.33	Teleworkable	2
74	Other Profess	0	0	1	0.33	Teleworkable	2
97	Activities of H	0	0	1	0.33	lostly inactive	4
22	Manufacture	0.5	0	0.33	0.28	lostly inactive	4
78	Employment	0.5	0	0.33	0.28	lostly inactive	4
42	Civil Engineer	0	0	0.67	0.22	lostly inactive	4
96	Other Persona	0	0.6	0	0.20	Closed	5
33	Repair and In:	0	0	0.44	0.15	lostly inactive	4
82	Office Admini	0	0	0.43	0.14	Closed	5
32	Other Manufa	0	0.17	0.22	0.13	lostly inactive	4
95	Repair of Com	0	0	0.37	0.12	lostly inactive	4
43	Specialised Cc	0	0	0.25	0.08	lostly inactive	4
77	Rental and Le	0	0.25	0	0.08	lostly inactive	4
55	Accommodati	0	0	0.25	0.08	Closed	5
28	Manufacture	0	0	0.24	0.08	lostly inactive	4
13	Manufacture	0	0	0.2	0.07	lostly inactive	4
14	Manufacture	0	0	0.2	0.07	lostly inactive	4
27	Manufacture	0	0	0.2	0.07	lostly inactive	4
16	Manufacture	0	0	0.17	0.06	lostly inactive	4
26	Manufacture	0	0	0.1	0.03	lostly inactive	4
23	Manufacture	0	0	0.04	0.01	lostly inactive	4
2	Forestry and l	0	0	0	0.00	lostly inactive	4
7	Mining of Me	0	0	0	0.00	lostly inactive	4
8	Other Mining	0	0	0	0.00	lostly inactive	4
15	Manufacture	0	0	0	0.00	lostly inactive	4
24	Manufacture	0	0	0	0.00	lostly inactive	4
25	Manufacture	0	0	0	0.00	lostly inactive	4
29	Manufacture	0	0	0	0.00	lostly inactive	4
30	Manufacture	0	0	0	0.00	lostly inactive	4
31	Manufacture	0	0	0	0.00	lostly inactive	4
41	Construction	0	0	0	0.00	lostly inactive	4
73	Advertising ar	0	0	0	0.00	Teleworkable	2
68	Real Estate Ac	0	0	0	0.00	Closed	5
79	Travel Agency	0	0	0	0.00	Closed	5
99	Activities of E	0	0	0	0.00	Closed	4
98	Undifferentiat	0	0	0	0.00	Closed	5
56	Food and Bev	0	0	0	0.00	Closed	5
90	Creative, Arts	0	0	0	0.00	Closed	5
91	Libraries, Arcl	0	0	0	0.00	Closed	5
92	Gambling and	0	0	0	0.00	Closed	5
93	Sports Activiti	0	0	0	0.00	Closed	5

Key: 1 means essential in the respective national decree; 0 non-essential, and fractions the share considered essential in each sector. The index is a simple average of the four values by country

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