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# The COVID-19 shock on the labour market: Poverty and inequality effects across Spanish regions

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# The COVID-19 shock on the labour market: Poverty and inequality effects across Spanish regions[1]

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## Abstract

We evaluate the distributional consequences of social distancing for the case of Spanish regions. Under 2 months of lockdown plus 10 months of partial functioning our study consistently finds potential wage losses that are sizeable and uneven across the wage distribution all around Spain, but with different intensity depending on the region's productive structure. The increase of the headcount poverty index oscillates between 8.2 (Navarre) and 19.2 (the Balearic Islands) percentage points, while the Gini coefficient rises between 2.3 (Navarre) and 5.3 (the Balearic Islands) Gini points. We also find that inequality between regions increases, eroding regional cohesion in Spain.

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## 1. Introduction

The outbreak of COVID-19 has brought an unprecedented negative economic shock to all the economies of the world. Although the direst consequences of COVID-19 are health-related, its impact on the economy is being enormous. Thus, real GDP growth in the world is expected to fall by 4.4% in 2020, and by 5.8% in the advanced economies (IMF, 2020). For Spain, the forecast is much worse: a fall of 12.8%, one of the biggest setbacks of all the countries in the world. Unfortunately, distributional microsimulations predict that these effects at the aggregate level will be accompanied by significant distributional changes (Brunori et al., 2020; Palomino et al., 2020b). In fact, some of these effects are already being observed in some real-time economic indicators that have been put in place during the pandemic (Chetty et al., 2020; BBVA Research, 2020). Within countries, the heterogenous productive structure of regions may imply a different impact of the pandemic restrictions. To investigate this, in this paper we estimate the potential economic effects of COVID-19 on poverty and wage inequality across the diverse set of Spanish regions (Autonomous Communities).

The social distancing imposed by governments to limit the spread of the pandemic is generating an asymmetric effect on the labour market. On the one hand, essential occupations like health services, freight transport and food industry have kept functioning or even been reinforced, given the depth and duration that the pandemic is taking. On the other hand, many activities like entertainment, restoration, accommodation and passenger transport have been closed down or significantly limited. The rest of the activities can be carried out, but only if they can be done from home ('teleworkable'). This unequal effect on the labour market means that the wage loss caused by the pandemic is uneven among workers. At one end there are those employees able to continue to work and maintain their monthly earnings and, at the other end, those who cannot work and −in the absence of compensatory measures by governments− can only draw on their eventual savings to get by. This different impact across workers could cause important changes in national poverty and inequality levels.

Within countries, however, wage losses caused by the pandemic may affect regions differently. In the case of Spain, the economic sectors in which Autonomous Communities are specialised present different productive structures. For example, south-eastern and insular regions of Spain are relatively more specialised in tourism, while northern Spain is relatively more focused on the industrial sector. These differences imply

that the economic activity might not be equally affected by social distancing across regions. Depending on the type of economic activities more prevalent in a given region −essential, closed or teleworkable−, the territory could suffer at a smaller or at a larger extent the economic effects of the pandemic. In addition, the increase in inequality between regions could harm the internal cohesion of the country.

To estimate the economic impact of COVID-19 on poverty and wage inequality across Autonomous Communities, we follow the events observed in Spain during the pandemic and assume two months of lockdown plus ten months of partial functioning of the closed occupations, during which they operate at only 70% of their total capacity (30% closure). This scenario is consistent with the measures taken by the various governments involved −central and regional− which have not allowed the full functioning of the closed occupations after lockdown to avoid a new outbreak of the virus, and with the individuals' voluntary change in consumption habits to prevent contagion (Goolsbee and Syverson, 2021). We do not consider additional indirect effects like shortages in the supply chains or reductions in consumption due to the loss of labour income for some workers. These effects are, at this early stage, difficult to estimate. The legal and voluntary restrictions imposed to avoid contagion already provide a clear framework to understand the effects that a given structure of production has on poverty and wage inequality.

Here we focus on the Autonomous Communities of Spain for three reasons. First, Spain is one of the earliest and most affected countries by the pandemic in the world. In fact, as said above, the drop in real GDP growth for Spain will be one of the largest in the world (IMF, 2020). Second, the wide set of regions in Spain, with a variety of productive structures, will allow us to test if different productive structures imply different potential effects on poverty and inequality under social distancing. Third, given its territorial tensions, Spain is a good case to study whether the COVID-19 pandemic can exacerbate the problem of internal cohesion. In this respect, note that we simulate the same scenario for all Spanish regions to ensure that differences across Autonomous Communities are mainly due to their productive structure. Regions in Spain have followed slightly different de-escalation strategies, but the period of stringent lockdown has been the same and the core of the social distancing enforcing policies has been similar.

The first step to measure the changes in poverty and wage inequality caused by the pandemic across Spain is to calculate the Lockdown Working Ability (LWA) index, an individual measure that summarizes the capacity of each worker to keep active under

social distancing (Palomino et al., 2020). For this task, we need first to adjust an index of teleworking (Dingel and Neiman, 2020) for the workers whose occupation is essential or closed. Workers at essential occupations will be not affected by social distance regardless of their capacity to work from home, while for individuals at closed economic activities, like hospitality, working will not be possible at all. For the remaining economic activities, only teleworking will be allowed.

Applying the LWA index, we can compute next the wage loss due to the lockdown and the de-escalation period. Given that not all workers are able to work from home and some activities are closed, limited or less demanded to avoid contagion, there are potential wage reductions for a significant part of the labour force. After simulating these wage losses, we measure the changes in poverty and wage inequality across regions. For poverty, we compute the Lockdown Incidence Curve (LIC), which represents the relative change in the wage of individuals ordered by centiles and the headcount poverty index. For inequality measurement we employ the Gini coefficient throughout, except when decomposing total inequality into the between- and within-region components. There, we consider the MLD (Mean Logarithmic Deviation) because it is the only additively decomposable inequality index (Bourguignon, 1979; Shorrocks, 1980) that has a path-independent decomposition (Foster and Shneyerov, 2000).

We find that during the COVID-19 pandemic the percentage of workers whose incomes are below the poverty line at the national level goes from 25.6% to 36.2%, an increase of 10.6 percent points (hereinafter p.p.). In addition, the individuals who were already poor before COVID-19 suffer the largest wage losses, standing at 20.8% nationally. It is observed that poverty and wage inequality changes are positive and sizeable in all regions. However, to understand regional differences, a separate analysis of the three LWA index components −essentiality, closure and teleworking− is required, being each component determined by the productive structure of each territory.

The percentage of poor people increases in all Autonomous Communities, oscillating between the minimum change of Navarre (8.2 p.p.) and Extremadura (8.3 p.p.), and the maximum values of the Balearic Islands (19.2 p.p.) and the Canary Islands (14.6 p.p.). These regions present medium-low levels of teleworking but it is their differences on essentiality and closed activities that are crucial: the much affected Balearic Islands and Canary Islands show medium-low essentiality and the highest level of closure (due to its high specialization in the touristic sector). At the other end, Extremadura and, especially,

4

Navarre, have a very low level of closed occupations. Extremadura, despite having the lowest level of teleworking, has the highest level of essentiality.

At the national level, the Gini index increases 3.7 p.p. during the COVID-19 pandemic. At the regional level, the variation in wage inequality observed shows significant differences between Autonomous Communities. The Balearic Islands and the Canary Islands are the most affected regions, with an estimated increase in inequality equal to 5.3 and 4.6 Gini points (x100 scale), respectively. At the other extreme, with more moderate increases in inequality, we find Navarre (2.3), Asturias (2.7) and La Rioja (3.0).

When we decompose total inequality in Spain using the MLD index, inequality between regions grows by 5.6%, while inequality within regions increases by 17.1%. Inter-territorial cohesion in Spain is damaged by social distance restrictions, although the greatest increases in inequality take place within regions. In this respect, notice that some of the regions most affected by the pandemic (the Balearic Islands, Valencia) are relatively rich, while some of those less affected by social distance (Extremadura, Andalusia) are relatively poor, which prevents the erosion of territorial cohesion from being even greater.

The rest of the paper is structured as follows. In Section 2 we describe the productive structure of the Spanish regions. The methods applied to calculate the Lockdown Working Ability index, the wage losses, and the changes in poverty and inequality are presented in Section 3. The main results for poverty and wage inequality are highlighted in Section 4. Finally, Section 5 gives some concluding remarks.


## 2. The productive structure of the Spanish regions

Before estimating the economic consequences of the COVID-19 pandemic on poverty and inequality across Spanish regions, we show some important differences between their production structures.

In 2019 real GDP per capita in Spain was 26,426 euros, although there were important differences across Autonomous Communities. On the upper tail of the distribution, we find Madrid (35,913 euros), the Basque Country (34,142 euros), Navarre (32,141 euros) and Catalonia (31,119 euros). On the lower tail, we have Extremadura (19,454 euros),

Andalusia (19,633 euros), Canary Islands (21,244 euros) and Castile-La Mancha (21,004 euros) (INE, 2021).

With respect to the most important indicator of the labour market, the unemployment rate, Spain presents a highly dysfunctional performance.[2] Thus, the unemployment rate in 2019 was 14.0%, far below the average in Europe (7.4%). Moreover, there exist large regional differences: Extremadura, Andalusia and Canary Islands are the regions with the highest unemployment rate (22.5%, 21.1%, and 21.0%, respectively) while Navarra, the Basque Country and Aragon are the ones with the lowest unemployment rate (8.2%, 9.6% and 10.5%, respectively). In addition, the Spanish labour market shows low mobility of workers and infrequent internal migration across regions. This immobility effect is stronger in depressed regions (Extremadura and Andalusia) which suggests that some people might be trapped in their region when structural conditions are not favourable (Palomares-Linares and Van Ham, 2020).

The sectorial composition in Spain is quite diverse and there are great differences, especially in agriculture and industry shares, across Autonomous Communities (see Table A1 in the Appendix). In the agricultural sector, the national average is 4.2% but some traditionally agricultural regions more than double this value (Extremadura (11.8%), Murcia (10.8%) and Andalusia (9.7%)) while others present values closed to 0% (Madrid −0.2%− and the Balearic Islands −0.8%−). The most industrial regions, on the other hand, are Navarre (24.8%), La Rioja (23.6%) and the Basque Country (19.4%), while the Canary Islands and the Balearic Islands are the Autonomous Communities where the weight of industry is the smallest, 3.3% and 6.2%, respectively. Interestingly, there are fewer differences across regions for the construction sector. The national average is 6.2% and most of the Autonomous Communities shares are around that value.

Finally, services constitute the most important sector for all Autonomous Communities with a national average around 70%. The two regions where this sector plays the most important role are Madrid (80.6%) and the Canary Islands (78.1%), being La Rioja (61.0%), Extremadura (62.0%) and Murcia (62.7%) the Autonomous Communities where this sector is less important. Among all services, tourism is the most important: 84 million visitors in 2019, 12.9% of total employment and 12.4% of GDP.

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[2] For an analysis of the unemployment rate in Spain from a gender perspective see Alonso-Villar and Del Río (2008).

By Autonomous Communities, regardless of the indicator –whether the number of nights in tourist accommodation (per 1,000 inhabitants or per square km) or hotel occupancy rate– the Balearic Islands and Canary Islands are by far the regions with most tourism in Spain. The total number of tourist accommodation beds relative to population can proxy the overall importance of tourism, and it is connected with all related hospitality and leisure services. We can see in Figure 1 that both insular regions are far ahead the rest of the regions, showing a much higher weight of that sector in the economy.

**Figure 1.** Tourist accommodation beds per population in Spanish regions.
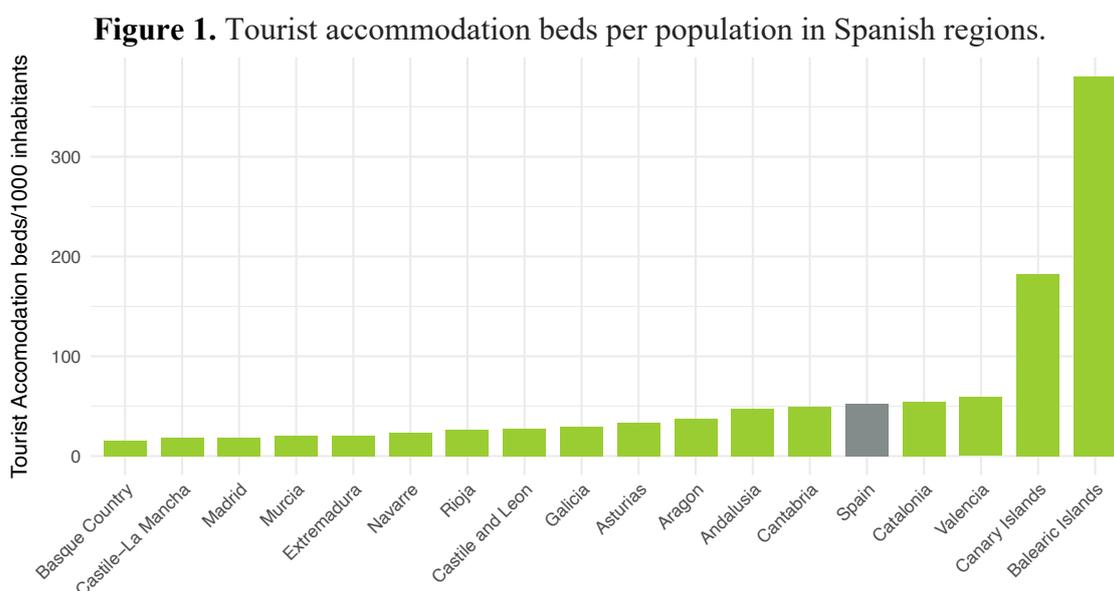


Source: Hotel Occupancy Survey 2019 (INE)

Autonomous Communities also differ in the human capital of the labour force, which is important since, as we shall see below, the LWA is largely related to workers' education. The rate of early educational abandonment at the national level was 17.3% in 2019, being the Balearic Islands (24.2%) and Murcia (22.6%) the two regions with the highest dropout rate, and the Basque Country (6.7%) and Madrid (11.9%) the two with the lowest (INE, 2021). The Balearic Islands, Murcia and Extremadura have the lowest share of the working population achieving a high-education level (ISCED 5-6) while the Basque Country, Madrid and Asturias have the highest (see Table A2 in the Appendix).

## 3. Working during the pandemic: essentiality, closed activities and teleworking

With the dramatic emergence of COVID-19, numerous studies have attempted to assess the potential economic consequences of social distancing by calculating teleworking

capacity (Dingel and Neiman, 2020; Hicks, 2020). The idea is simple: workers who are less able to work from home will suffer a greater increase in unemployment during social confinement and alienation (Mongey et al., 2020). In this respect, Palomino et al. (2020a) and Sebastian (2020) have found that −despite the big progress in connectivity and infrastructure− the productive structure of Spain makes it the fifth worst European economy in terms of the capacity of its labour force to work from home.

Adopting this criterium, if higher wage occupations are more teleworkable, we should see an increase in wage inequality due to the pandemic. However, whether this happens, and its intensity, will depend on the productive structure of each economy. Different regions have not only a different teleworking capacity, but also different levels of essential and closed occupations during the lockdown and the de-escalation period.

Thus, it is essential to classify existing occupations in order to correctly estimate the effects of COVID-19 or any other shock that requires social distance. For that purpose, we will use the Lockdown Working Ability (LWA) index, a measure that summarizes the capacity of each worker to keep working across the pandemic, developed in Palomino et al. (2020b).

Using the most up-to-date wave of the European Survey of Income and Living Conditions (EU-SILC 2019, released November 2020), we consider active workers older than 16 years old in the moment of the survey. In addition to occupational information, EU-SILC provides data on demographic characteristics and, crucially, on gross wages and self-employed income, which allows us to estimate the potential wage loss for each worker given their occupation-industry derived LWA.

This index has the value of 1 when there is full capacity to work during the lockdown and 0 when the individual is not able to work at all. It is obtained based on each occupation's teleworking capacity ($T_i$), but also on its essentiality level ($E_i$) and closure status ($C_i$), where $T_i, E_i, C_i \in [0,1]$. [3]

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[3] We apply the essentiality $E_i$, closure $C_i$, and teleworking $T_i$ indices to each combination of occupation–industry used in Palomino et al. (2020b). The first two indices were obtained according to the legislation developed by the Spanish and Italian governments, while the teleworking index for the ISCO-08 occupations in Spain was constructed based on the estimations of Dingel and Neiman (2020) for the American O*NET database.

The teleworking index $T_i$ tells us to what extent each occupation can be done from home. To the extent that they can continue performing their job activities from home, individuals will not be affected by the lockdown, and their potential wage loss will thus be inversely related to their teleworking ability. Quantifying the ability to telework is necessary to assess the ability of individuals to keep working during the pandemic, but it is not sufficient. On the one hand, many occupations, such as health services, security or food production, have been considered essential and, consequently, have been allowed to work presently throughout the pandemic. The essentiality level of an occupation is captured by the index $E_i$.

On the other hand, necessary social distancing and lockdown measures adopted by governments have resulted in the closure of many businesses in high-risk sectors that could not apply social distancing —such as hospitality, restoration and entertainment. Beyond government mandatory regulations, there has also been a change in consumption habits that individuals have voluntarily adopted to avoid contagion. This combination has meant a significant fall in the demand for services that do not allow for social distance. The intensity with which an industry-occupation is subject to (mandatory or consumption driven) closure is expressed by the index $C_i$ .

Hence, the LWA index for each worker $i \in \{1, 2, \dots, n\}$ with occupation $O_i$ is defined as:

$$LWA_i = \begin{cases} E_i + (1 - E_i)T_i & O_i = essential \\ (1 - C_i)T_i & O_i = closed \\ T_i & O_i \neq essential\ nor\ closed \end{cases} . \qquad (1)$$

For essential occupations ($E_i > 0$), the LWA index equals the essentiality index $E_i$ plus the non-essential part of the tasks that can be done from home. For occupations subject to closure ($C_i > 0$), the LWA index is the non-closed share of the activity that can be teleworked. Finally, when the occupation is not essential nor closed, the capacity to work during the lockdown will then depend only on their teleworking index.

To understand the impact of the pandemic on poverty and inequality at the regional level, it will be key to analyse separately the different components of the LWA index, essentiality, closure and teleworking. In this respect, the regions with the highest level of essentiality (Figure 2a) are Extremadura, Castile and Leon and Andalusia, where agriculture and livestock farming have the most significant weight (as we have seen in Section 2). In contrast, the Balearic Islands, the Canary Islands, Murcia and Valencia, the regions most specialised in the tourism sector, present the highest levels of closed

activities in Spain (Figure 2b). Not surprisingly, it is the most developed regions like Madrid, the Basque Country and Catalonia (which also tend to have a highly educated workforce) the ones that reach the highest levels of teleworking (Figure 2c).

In Table 1 we show the average value of this index in each Autonomous Community. It can be seen that the regions most affected by the pandemic −with lowest average LWA− are largely involved in the tourism industry (the Balearic Islands and the Canary Islands), which implies a higher level of closure, or have a relatively low level of qualification (and therefore low teleworking capacity) in their workforce (Murcia). On the other hand, the regions less affected are those with higher levels of essentiality (Extremadura, Castile and Leon and Andalusia) or those with a very high average level of teleworking (Madrid). We can thus see that the capacity to work under social distancing goes far beyond just the general capacity to telework. In this line, Figure A1 (see Appendix) highlights the low correlation between the LWA index and teleworking.

Our LWA index varies significantly not only by Autonomous Communities, but also by gender, type of contract, type of work and educational level (Table 1). According to their LWA index, women's jobs are less affected by social distancing than men's in all regions except Murcia, where there are no average differences by sex. The greatest difference is found in Navarre (17 points) and the Basque Country (13 points). By type of contract, workers with temporary contracts tend to show a lower LWA index than their counterparts with permanent contracts, although this is not the case in Andalusia, the Basque Country, Canary Islands, and Castile and Leon. Meanwhile, full-time jobs show a higher capacity to work during the pandemic than part-time jobs in all Spanish regions. Finally, we find a very strong positive relationship between the educational level and the LWA index, which points at the importance of the educational level composition of the workforce in analysing the economic impact of the pandemic. The other related key factor is the distribution of occupations, which makes human capital be applied differently in different regions. Thus, the capacity of working under lockdown is much greater for those workers with primary education in Extremadura or Andalusia (where they occupy essential jobs) than in the Balearic Islands or Canary Islands (where they are mostly occupied in the touristic sector). In addition, we observe how the inter-territorial dispersion of the LWA index is ostensibly reduced as educational level increases.

**Figure 2.** Average LWA components across Spanish regions

**a.** Average essentiality.
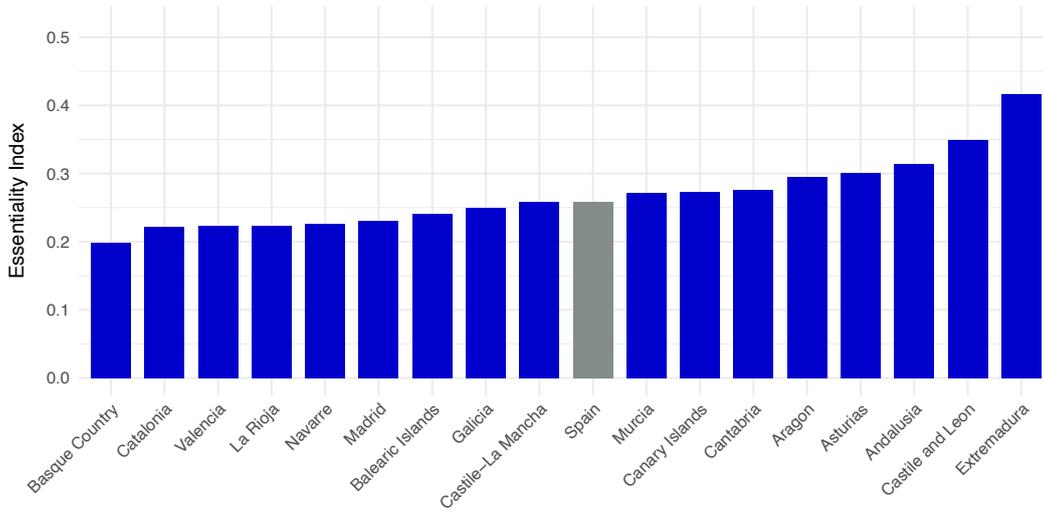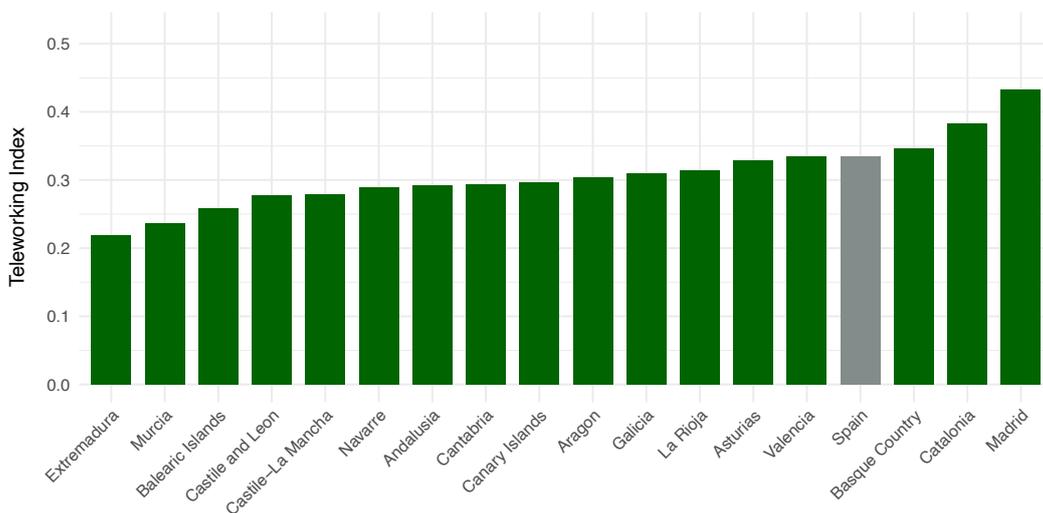


**b.** Average closure.
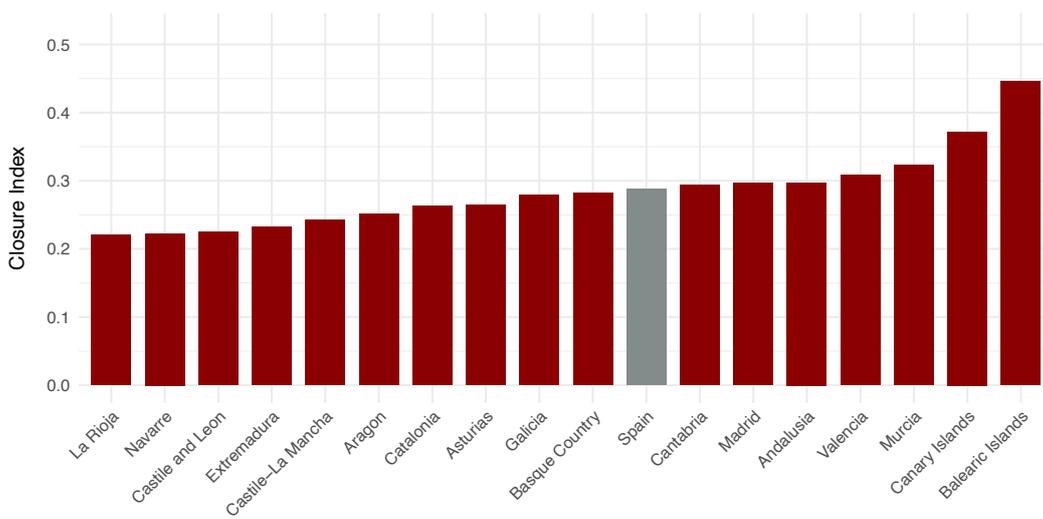


**c.** Average teleworking.

**Table 1.** The LWA index in Spain.

| | All | Sex | | Contract | | Working hours | | Education | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Men | Women | Permanent | Fixed-Term | Full-time | Part-time | Primary | Secondary | Tertiary |
| **Andalusia** | 0.47 | 0.45 | 0.50 | 0.48 | 0.49 | 0.50 | 0.30 | 0.37 | 0.36 | 0.66 |
| **Aragon** | 0.46 | 0.42 | 0.52 | 0.49 | 0.36 | 0.48 | 0.24 | 0.38 | 0.35 | 0.58 |
| **Asturias** | 0.49 | 0.45 | 0.53 | 0.52 | 0.51 | 0.51 | 0.35 | 0.24 | 0.32 | 0.63 |
| **Balearic Islands** | 0.36 | 0.35 | 0.37 | 0.39 | 0.32 | 0.36 | 0.27 | 0.19 | 0.31 | 0.59 |
| **Basque Country** | 0.42 | 0.36 | 0.49 | 0.42 | 0.51 | 0.44 | 0.30 | 0.20 | 0.23 | 0.57 |
| **Canary Islands** | 0.41 | 0.37 | 0.46 | 0.43 | 0.47 | 0.43 | 0.23 | 0.20 | 0.32 | 0.61 |
| **Cantabria** | 0.44 | 0.41 | 0.46 | 0.48 | 0.31 | 0.46 | 0.25 | 0.24 | 0.40 | 0.56 |
| **Castile and Leon** | 0.49 | 0.45 | 0.54 | 0.47 | 0.54 | 0.52 | 0.34 | 0.31 | 0.45 | 0.62 |
| **Castile-La Mancha** | 0.43 | 0.39 | 0.50 | 0.47 | 0.42 | 0.44 | 0.40 | 0.28 | 0.45 | 0.58 |
| **Catalonia** | 0.45 | 0.42 | 0.50 | 0.48 | 0.39 | 0.47 | 0.29 | 0.19 | 0.34 | 0.66 |
| **Extremadura** | 0.53 | 0.49 | 0.58 | 0.56 | 0.54 | 0.54 | 0.45 | 0.44 | 0.55 | 0.67 |
| **Galicia** | 0.42 | 0.37 | 0.48 | 0.47 | 0.35 | 0.45 | 0.20 | 0.23 | 0.37 | 0.62 |
| **La Rioja** | 0.42 | 0.37 | 0.49 | 0.45 | 0.35 | 0.44 | 0.34 | 0.21 | 0.38 | 0.63 |
| **Madrid** | 0.49 | 0.45 | 0.53 | 0.53 | 0.40 | 0.50 | 0.33 | 0.21 | 0.39 | 0.64 |
| **Murcia** | 0.40 | 0.40 | 0.40 | 0.43 | 0.39 | 0.41 | 0.23 | 0.30 | 0.36 | 0.58 |
| **Navarre** | 0.42 | 0.34 | 0.51 | 0.44 | 0.44 | 0.40 | 0.55 | 0.24 | 0.24 | 0.58 |
| **Valencia** | 0.42 | 0.41 | 0.42 | 0.45 | 0.42 | 0.44 | 0.27 | 0.20 | 0.30 | 0.64 |
| **Spain** | 0.45 | 0.42 | 0.49 | 0.48 | 0.44 | 0.47 | 0.30 | 0.27 | 0.35 | 0.63 |

## 4. Poverty and inequality changes across the Spanish regions

The next step is to calculate the possible wage loss of individuals due to the lockdown and the subsequent de-escalation period. As said, following the events observed in Spain during the pandemic, we assume two months of confinement and ten months of partial operation of closed occupations, in which they operate at only 70% of their total capacity. The rationale for this scenario is that the different governments involved (central and regional) have not allowed the full functioning of the closed occupations after confinement to avoid a new outbreak of the virus, and that individuals have voluntarily chosen to stay at home to avoid infection in these sectors (Goolsbee and Syverson, 2021). Thus, activities such as arts, entertainment, restoration, and hospitality continue to suffer a major negative impact on their production and consumption. We simulate this same scenario for all the Autonomous Communities in order to isolate our analysis from the influence of the measures implemented by each regional government, so that the

differences we find between territories are fundamentally due to their different productive structures.

After defining the simulation scenario, we calculated the wage loss experienced by each worker during confinement and de-escalation as the proportion of the annual wage they no longer receive given their inability (measured by 1-LWA) to work during the pandemic. This estimated wage loss for each individual in the population is calculated as follows:

$$wl_{it} = w_{i(t-1)} \cdot \left[ \frac{2}{12} \cdot (1 - LWA_i) + \frac{10}{12} \cdot 0.7 \cdot C_i \right], \tag{2}$$

where, for each individual $i$, $w_{i(t-1)}$ is the annual wage before COVID-19 as reported in the latest available wave of EU-SILC, $LWA_i$ is the Lockdown Working Ability index, and the lockdown period is 2 months ($\frac{2}{12}$ of the annual wage) plus 10 months ($\frac{10}{12}$ of the annual wage) of partial functioning at 70% (0.7) of capacity for those workers in closed occupations.

We can give some insights on the distribution of these wage losses by simply calculating the average loss rate per percentile: we sort workers by their annual wage before confinement ($t - 1$), group them into percentiles, and then calculate the average rate of wage change between periods $t - 1$ and $t$ for each percentile. The result is the Lockdown Incidence Curve (LIC) where it is easy to see which part of the wage distribution suffers the greatest relative wage losses (see Palomino et al., 2020b and Ravallion and Chen, 2003).

At the national level, the wage loss is highest at the lowest percentiles, with a difference of more than 10 p.p. between the extremes of the distribution (Figure A2, panel a, in the Appendix). By regions, we obtain three patterns. Firstly, we find the regions with the greatest essentiality, Extremadura, Castile and Leon and Andalusia (Figure A2, panel b). Here we can see that wage losses in the lower percentiles are the lowest. Secondly, we have the regions which have suffered most from the total or partial closure of activities during the pandemic, the Balearic Islands, Canary Islands and Murcia (Figure A2 panel c). They present the highest wage losses in the middle of the distribution. Finally, we include Madrid, Catalonia and the Basque Country, as these regions present a higher degree of teleworking (Figure 2, panel d). Although they show higher losses at the bottom part than the regions with the highest levels of essentiality, they present lower wage losses

than the tourist-oriented regions at the middle of the distribution. Interestingly, at the top quartile of the distribution, the wage losses in these developed regions, are the lowest among all groups.

Next, we estimate the post-pandemic distribution of labour income as:

$$w_{ht} = w_{h(t-1)} - wl_{ht}. \tag{3}$$

We can compare this new distribution $w_{ht}$ with the pre-pandemic one $w_{h(t-1)}$ to assess the incidence of lockdown and social distancing on relative poverty levels for all regions in Spain. To do this, we consider as poor –following OECD and Eurostat criteria– individuals with earnings below 60% of the median wage (poverty line) in each region. According to our EU-SILC sample for 2019 the gross median wage in Spain is 17,741 euros. During the pandemic, we estimate that, at national level, the percentage of workers whose income falls below the poverty line rises from 25.6 per cent to 36.2 per cent, an increase of 10.6 p.p. (Table 2). In addition, individuals who were already poor before COVID-19 suffer the greatest wage losses, standing at 20.8% nationally.

Similarly, after calculating the poverty line for each region, we measure relative poverty by Autonomous Community. As can be seen in Table 2 and Figure 3 (panel a), the percentage of poor people increases in all regions, with the change ranging from the minimum in Navarre (8.2 p.p.) to the maximum in the Balearic Islands (19.2 p.p.). On the other hand, the Canary Islands, Cantabria, Murcia, Aragon, Madrid and La Rioja show increases in the headcount index above the national average.

The magnitude of the wage loss suffered by workers already below the relative poverty line also shows significant differences across regions (Table 2 and Figure 3, panel b). The Balearic Islands suffers the most according to this indicator. Thus, the working poor in this region are exposed to an average wage loss of 24.8%. Similarly, Cantabria (23.5%), Madrid (23.4%), Valencia (23.2%), Galicia (22.0%), the Basque Country (21.8%), Asturias (21.7%) and Castile-La Mancha (21.1%) present wage losses for their poorest workers above the national average (20.8%). Although these Autonomous Communities are not the ones which have experienced the greatest increase in the percentage of poor people, they are the regions where the intensity of the wage loss for the working poor is greatest. At the opposite extreme are the poor workers in regions with a higher average essentiality score: Extremadura, Andalusia and Castile and Leon. Their average wage loss

is slightly lower, but still significant: 17.5%, 17.5% and 18.3%, respectively. It seems that already poor workers are heavily affected all across the Spanish geography.

Table 2. Poverty changes in Spanish regions.

| | Wage loss for workers (%) | S.E. | Pre-pandemic Headcount Poverty Index (%) | S.E. | Post-pandemic Headcount Poverty Index (%) | S.E. | Headcount Poverty Index Increase (p.p.) | S.E. |
|---|---|---|---|---|---|---|---|---|
| **Andalusia** | -17.5 | 1.0 | 30.0 | 1.2 | 39.3 | 1.0 | 9.3 | 1.0 |
| **Aragon** | -20.8 | 2.8 | 22.1 | 2.3 | 33.8 | 2.3 | 11.7 | 1.9 |
| **Asturias** | -21.7 | 2.0 | 27.7 | 2.1 | 36.9 | 1.7 | 9.1 | 1.6 |
| **Balearic Islands** | -24.8 | 2.4 | 22.6 | 2.6 | 41.9 | 2.6 | 19.2 | 2.8 |
| **Basque Country** | -21.8 | 1.7 | 27.1 | 1.6 | 36.1 | 1.5 | 9.1 | 1.2 |
| **Canary Islands** | -20.4 | 2.4 | 26.3 | 3.2 | 40.9 | 2.1 | 14.6 | 3.0 |
| **Cantabria** | -23.5 | 2.6 | 20.2 | 2.1 | 33.7 | 2.1 | 13.5 | 2.2 |
| **Castile and Leon** | -18.3 | 1.3 | 25.6 | 1.3 | 35.4 | 1.3 | 9.8 | 1.1 |
| **Castile-La Mancha** | -21.1 | 1.8 | 24.0 | 2.0 | 34.2 | 2.0 | 10.1 | 1.8 |
| **Catalonia** | -20.3 | 1.1 | 26.5 | 1.2 | 35.5 | 1.2 | 9.0 | 0.9 |
| **Extremadura** | -17.5 | 1.8 | 28.8 | 1.8 | 37.0 | 1.9 | 8.3 | 1.5 |
| **Galicia** | -22.0 | 1.5 | 26.4 | 1.9 | 36.8 | 1.4 | 10.4 | 1.4 |
| **La Rioja** | -19.6 | 2.6 | 20.6 | 2.3 | 31.4 | 2.4 | 10.8 | 2.2 |
| **Madrid** | -23.4 | 1.2 | 22.6 | 1.2 | 33.6 | 1.4 | 11.0 | 1.0 |
| **Murcia** | -20.4 | 2.1 | 25.7 | 2.0 | 38.3 | 1.7 | 12.6 | 2.0 |
| **Navarre** | -20.4 | 2.2 | 23.3 | 2.7 | 31.5 | 2.4 | 8.2 | 1.8 |
| **Valencia** | -23.2 | 1.5 | 26.3 | 1.4 | 35.7 | 1.6 | 9.5 | 1.4 |
| **Spain** | -20.8 | 0.5 | 25.6 | 0.4 | 36.2 | 0.4 | 10.6 | 0.4 |

Note: S.E. represents bootstrapped standard error.

Given the variable impact of the lockdown and de-escalation period, it is not surprising that our results also show an increase in wage inequality. Measured by the Gini index, this increase is both at the national level (3.2 Gini points) and in each and every one of the Autonomous Communities (Table 3 and Figure 3, panel c). The Gini index is highly inertial so an estimated variation of 3.2 points is quite significant. To put this figure into context, note that the Gini index of equivalent available income in Spain has only varied by half a point in the last 10 years (33.9 in 2010 and 33.0 in 2018; OECD, 2021).

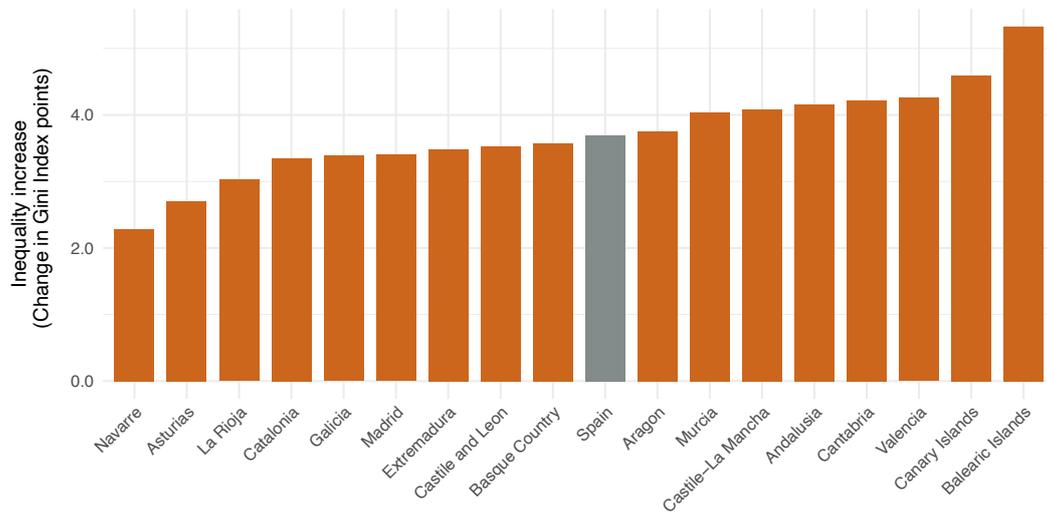**Figure 3**. Poverty and inequality changes in Spanish regions

**a.** Headcount poverty index change.
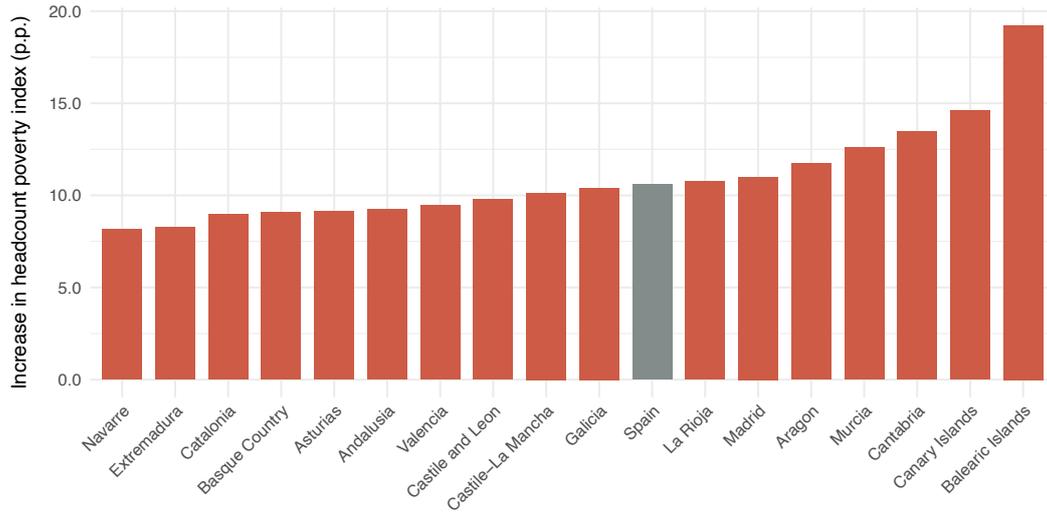
**b.** Wage loss of poor workers.
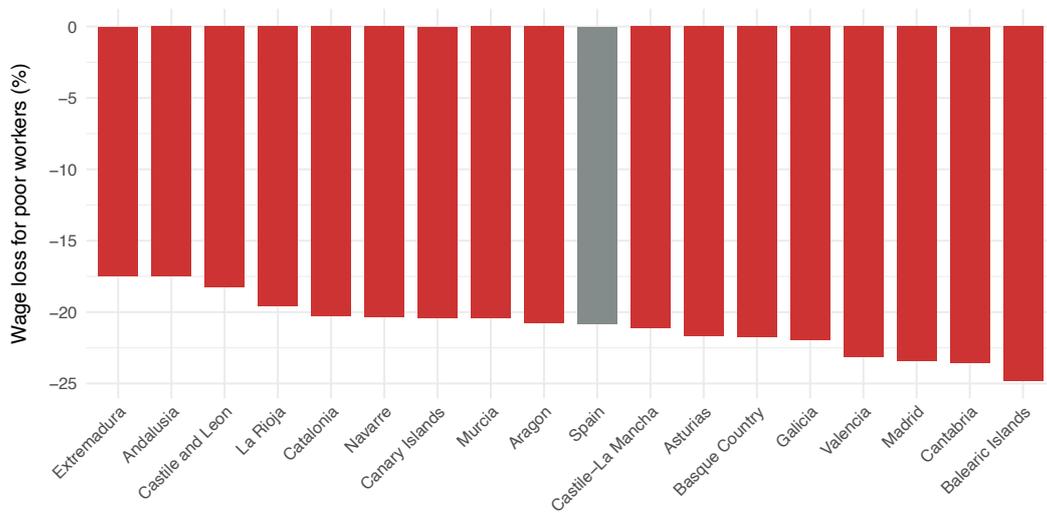
**c.** Inequality change.

As with the poverty indicators, the variation in observed inequality shows large differences between regions. The Balearic Islands (5.3), the Canary Islands (4.6) and Valencia (4.3) are the most affected regions. Cantabria, Andalusia, Castile-La Mancha, Murcia and Aragon also present values higher than the national indicator. At the opposite extreme, with less steep increases in inequality, between 2 and 3 Gini points, we find Navarra (2.3), Asturias (2.7) and La Rioja (3.0).

**Table 3.** Inequality changes in Spain (Gini Index).

| | Pre-pandemic inequality (Gini Index) | S.E. | Post-pandemic inequality (Gini Index) | S.E. | Change in inequality (Gini Index points) | S.E. |
|---|---|---|---|---|---|---|
| **Andalusia** | 42.8 | 0.8 | 47.0 | 0.9 | 4.2 | 0.2 |
| **Aragon** | 35.7 | 1.6 | 39.4 | 1.6 | 3.8 | 0.5 |
| **Asturias** | 41.9 | 2.2 | 44.6 | 1.9 | 2.7 | 0.8 |
| **Balearic Islands** | 37.9 | 2.5 | 43.2 | 2.3 | 5.3 | 0.9 |
| **Basque Country** | 39.0 | 1.4 | 42.6 | 1.4 | 3.6 | 0.4 |
| **Canary Islands** | 40.0 | 1.7 | 44.6 | 1.6 | 4.6 | 0.6 |
| **Cantabria** | 39.4 | 1.8 | 43.6 | 1.8 | 4.2 | 0.6 |
| **Castile and Leon** | 37.0 | 1.3 | 41.1 | 1.2 | 4.1 | 0.3 |
| **Castile-La Mancha** | 37.3 | 0.9 | 40.9 | 0.9 | 3.5 | 0.3 |
| **Catalonia** | 41.6 | 1.4 | 45.0 | 1.5 | 3.3 | 0.3 |
| **Extremadura** | 40.2 | 1.5 | 43.7 | 1.6 | 3.5 | 0.4 |
| **Galicia** | 38.3 | 1.2 | 41.7 | 1.1 | 3.4 | 0.4 |
| **La Rioja** | 37.2 | 2.3 | 40.2 | 2.3 | 3.0 | 0.7 |
| **Madrid** | 43.0 | 1.4 | 46.4 | 1.5 | 3.4 | 0.3 |
| **Murcia** | 39.0 | 1.3 | 43.0 | 1.3 | 4.0 | 0.5 |
| **Navarre** | 33.2 | 1.7 | 35.5 | 1.8 | 2.3 | 0.6 |
| **Valencia** | 39.6 | 1.0 | 43.9 | 0.9 | 4.3 | 0.4 |
| **Spain** | 41.3 | 0.4 | 45.0 | 0.5 | 3.7 | 0.1 |

Note: S.E. represents bootstrapped standard error.

If we now try to relate the observed changes in the percentage of working poor and in inequality to the average value of the LWA index by regions, we find in both cases a negative correlation with $R^2 = 0.57$ for poverty (Figure A4, panel a) and $R^2 = 0.34$ for inequality (Figure A4, panel c). When we consider the Gini of the LWA index by regions, rather than the mean value of the LWA index, the correlation becomes positive with $R^2 = 0.68$ for poverty (Figure A4, panel b) and $R^2 = 0.44$ for inequality (Figure A4, panel d). It seems therefore that the value of the LWA index is more important for the change in poverty than in inequality.

The analysis of inequality leads us to a key question: can the economic impact of the pandemic affect regional cohesion in Spain? To illuminate this issue, we use the MLD (Mean Logarithmic Deviation) inequality index, which can be broken down additively into exactly two components: inter-regional inequality and intra-regional inequality (Table 4). The results we obtain show that inequality measured by this index increases by 16.8% during the pandemic. Inequality between regions rises 5.6%, but the increase in intraregional inequality (17.1%) is the effect that dominates. It seems that inter-territorial cohesion is damaged, but perhaps less than expected. Note, in that respect, that some of the regions most affected by the pandemic are relatively rich (Balearic Islands, Valencia), while several of those less affected are relatively less developed (Extremadura, Andalusia).

**Table 4.** Interregional and intraregional inequality changes in Spain (MLD Index).

|  | Inequality Pre-pandemic | Inequality Post-Pandemic | Variation | Variation (%) |
|---|---|---|---|---|
| **Total** | 0.3653 | 0.4265 | 0.0612 | 16.8% |
| SE | 0.0085 | 0.0096 | 0.0022 | 0.573 |
| **Between regions** | 0.0116 | 0.0123 | 0.0007 | 5.6% |
| SE | 0.0017 | 0.0020 | 0.0005 | 3.729 |
| **Within regions** | 0.3537 | 0.4143 | 0.0606 | 17.1% |
| SE | 0.0080 | 0.0088 | 0.0020 | 0.570 |

Note: S.E. represents bootstrapped standard error.

## 6. Concluding remarks

To contain the spread of COVID-19, social distancing and closure of high-risk productive activities have been generally applied all around the world. These contention measures and the precautionary behaviour adopted by consumers to avoid contagion are having an uneven economic effect on workers from different industries and occupations. In this paper, we find that this has a sizeable impact on wage poverty and inequality in Spain, with differences across Spanish regions that are largely conditioned by their productive structure.

Under a scenario of 2 months of lockdown plus 10 months of partial functioning of closed occupations at 70% of full capacity, we estimate that the percentage of workers whose income falls below the poverty line rises from 25.6 per cent to 36.2 per cent in Spain. Moreover, poverty rises in all Spanish regions (between 8.2 percentage points in Navarre

and 19.2 in the Balearic Islands). In addition, the individuals who were already poor before COVID-19 suffer the greatest wage losses. For wage inequality, we find that the Gini index increases at the national level (3.2 Gini points) and in each and every one of the Autonomous Communities (between 2.3 Gini points in Navarre and 5.3 in the Balearic Islands). Finally, we estimate that during the pandemic both intra-regional and inter-regional inequality increase in Spain.

Our results highlight that −in absence of compensating measures− poverty and inequality increase significantly all across Spain. This increase is greater in tourism-focused regions with a higher average level of closed occupations than in those having higher average levels of essentiality (with more labour force in the primary sector) or teleworking (most developed regions).

**References**

Alonso-Villar, O. and Del Río, C. (2008): "Geographical concentration of unemployment: A male–female comparison in Spain", *Regional Studies*, 42, 401-412.

BBVA Research (2020): "El impacto de COVID-19 en el consumo en tiempo real y alta definición". Retrieved 17 December. Available at:
 https://www.bbvaresearch.com/publicaciones/global-el-impacto-del-covid-19-en-el-consumo-en-tiempo-real-y-alta-definicion-17-dic/

Bourguignon, F. (1979): "Decomposable Income Inequality Measures", *Econometrica*, 47, 901-20.

Chetty, R., Friedman, J.N., Hendren, N., Stepner, M. and the Opportunity Insights Team (2020): "How did COVID-19 stabilization policies affect spending and employment? A new real-time economic tracker based on private sector data", *NBER Working Paper* No. 27431. Retrieved 15 October. Available at: https://tracktherecovery.org.

Dingel, J. and Neiman, B. (2020): "How many jobs can be done at home?", *Journal of Public Economics*, 189, in press.

Foster, J.E. and Shneyerov, A.A. (2000): "Path Independent Inequality Measures", *Journal of Economic Theory*, 91, 199-222.

IMF (2020): "World Economic Outlook Update". Retrieved 7 October. Available at: https://www.imf.org/external/datamapper/NGDP_RPCH@WEO/OEMDC/ADVEC/WEOWORLD

Goolsbee, A. and Syverson, Ch. (2021): "Fear, Lockdown, and Diversion: Comparing Drivers of Pandemic Economic Decline 2020", *Journal of Public Economics*, 193, in press.

Hicks, M.J., Faulk, D. and Devaraj, S. (2020): "Occupational exposure to social distancing: A preliminary analysis using O*NET data", *Center for Business and Economic Research*, Ball State University.

INE (2021): "Indicadores de calidad de vida". Available at: https://www.ine.es/jaxi/Tabla.htm?path=/t00/ICV/dim4/l0/&file=41401.px&L=0

Mongey, S., Pilossoph, L. and Weinberg, A. (2020): "Which workers bear the burden of social distancing policies?", *NBER Working Paper* No. 27085.

OECD (2021), Income inequality (indicator). doi: 10.1787/459aa7f1-en (Accessed on 24 January 2021)

Palomares-Linares, I. and van Ham, M. (2020): "Understanding the effects of homeownership and regional unemployment levels on internal migration during the economic crisis in Spain", *Regional Studies*, 54, 515-526.

Palomino, J.C., Rodríguez, J.G. and R. Sebastian (2020a): "Teletrabajo en España, ¿estamos preparados?", Blog *Nada es Gratis*, 8-5-2020.

Palomino, J.C., Rodríguez, J.G. and R. Sebastian (2020b): "Wage inequality and poverty effects of lockdown and social distancing in Europe", European Economic Review, 129 (103564)

Ravallion, M. and Chen, S. (2003): "Measuring pro-poor growth", *Economics Letters*, 78, 93-99.

Sebastian, R. (2020): "Teletrabajo en España: de dónde venimos y a dónde vamos", Policy Insight #24, EsadeEcPol - Center for Economic Policy.

Shorrocks, A.F. (1980): "The Class of Additively Decomposable Inequality Measures", *Econometrica*, 48, 613-625.

**APPENDIX**

**Table A1.** The sectorial composition in Spain across regions (2019).

|  | Agriculture | Industry | Construction | Services |
|---|---|---|---|---|
| **Andalusia** | 9.7 | 8.2 | 6.0 | 66.8 |
| **Aragon** | 5.7 | 18.4 | 6.4 | 64.8 |
| **Asturias** | 2.9 | 11.7 | 6.3 | 71.4 |
| **Balearic Islands** | 0.8 | 6.2 | 11.7 | 78.1 |
| **Basque Country** | 1.1 | 19.4 | 5.2 | 69.6 |
| **Canary Islands** | 3.0 | 3.3 | 4.9 | 78.6 |
| **Cantabria** | 2.6 | 15.1 | 6.9 | 70.5 |
| **Castile and Leon** | 5.8 | 16.5 | 6.4 | 65.6 |
| **Castile-La Mancha** | 6.0 | 14.4 | 7.8 | 63.7 |
| **Catalonia** | 1.4 | 16.4 | 5.8 | 71.0 |
| **Extremadura** | 11.8 | 10.1 | 5.2 | 62.0 |
| **Galicia** | 5.8 | 15.6 | 6.4 | 66.7 |
| **La Rioja** | 5.9 | 23.6 | 5.4 | 61.0 |
| **Madrid** | 0.2 | 8.3 | 6.1 | 80.6 |
| **Murcia** | 10.8 | 12.5 | 6.8 | 62.8 |
| **Navarre** | 3.2 | 24.8 | 4.4 | 63.7 |
| **Valencia** | 3.0 | 16.4 | 5.9 | 68.0 |
| **Spain** | 4.2 | 12.6 | 6.2 | 70.4 |

Source: INE (2021).

**Table A2.** Share of workers by education level in Spanish regions (2019).

|  | Early Dropout Rate | Low Education | Mid Education | High Education |
|---|---|---|---|---|
| **Andalusia** | 21.6 | 40.7 | 22.1 | 37.2 |
| **Aragon** | 14.6 | 28.6 | 26.9 | 44.4 |
| **Asturias** | 12.4 | 20.5 | 20.8 | 58.7 |
| **Balearic Islands** | 24.2 | 37.2 | 30.3 | 32.5 |
| **Basque Country** | 6.7 | 19.1 | 23.0 | 58.0 |
| **Canary Islands** | 20.8 | 30.5 | 26.7 | 42.8 |
| **Cantabria** | 12.8 | 25.5 | 26.1 | 48.4 |
| **Castile and Leon** | 14.3 | 30.3 | 21.8 | 47.9 |
| **Castile-La Mancha** | 20.2 | 39.1 | 23.4 | 37.5 |
| **Catalonia** | 19.0 | 26.5 | 25.0 | 48.4 |
| **Extremadura** | 20.5 | 50.7 | 17.4 | 31.9 |
| **Galicia** | 12.6 | 34.8 | 24.8 | 40.5 |
| **Madrid** | 11.9 | 20.3 | 24.8 | 54.9 |
| **Murcia** | 22.6 | 48.2 | 22.7 | 29.1 |
| **Navarre** | 13.9 | 26.4 | 20.4 | 53.1 |
| **Rioja** | 13.9 | 34.8 | 24.3 | 40.9 |
| **Valencia** | 16.4 | 29.1 | 28.3 | 42.5 |
| **Spain** | 17.3 | 30.4 | 24.5 | 45.1 |

Source: EU-SILC (2019) and INE (EPA 2019).

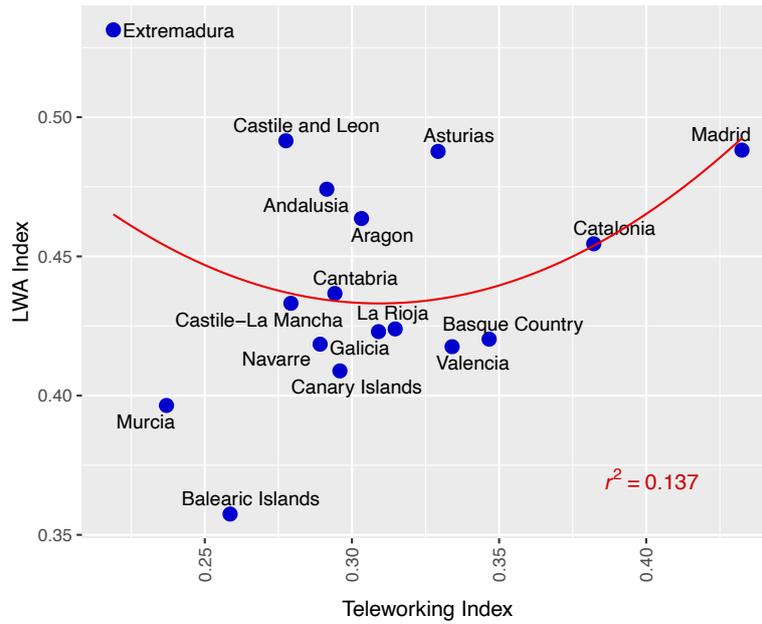**Figure A1.** LWA and Teleworking correlation.



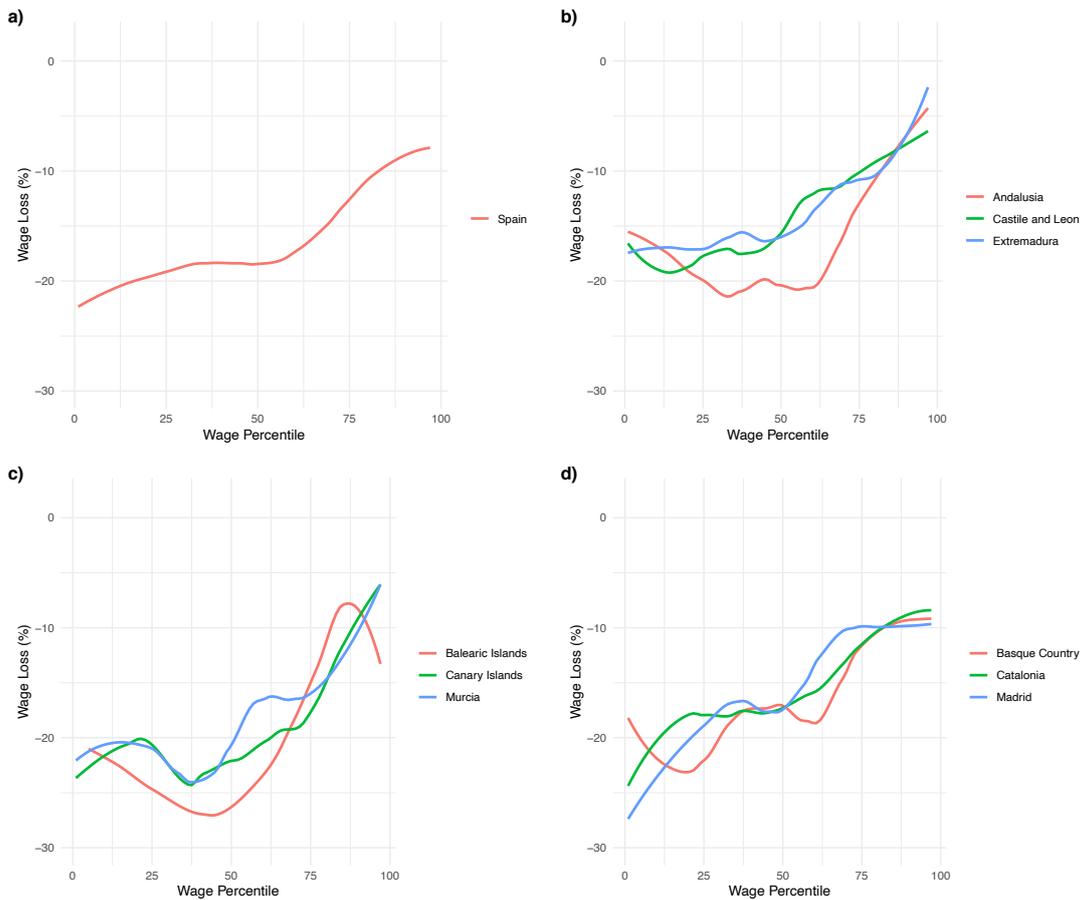**Figure A2.** Losses across the wage distribution in Spain.

**Figure A3.** Correlation between the LWA index and changes in poverty and inequality.