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How resilient were essential workers during the COVID-19 pandemic?*

Friedrich Poeschel

Eurac Research and European University Institute

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Abstract

The COVID-19 pandemic highlighted the role of essential workers - the employees in essential sectors like health, long-term care and food supply that had to continue operating also during lockdowns. Using detailed data from the first two waves of the pandemic in Italy, this study investigates empirically how essential workers responded to the impact of the pandemic, compared to other workers. As the often strong presence of migrants among essential workers was widely noted, special attention is given to differences in behaviour between migrants (or foreign citizens) and the native-born (or Italian citizens). The considerable variation of the COVID-19 impact in Italy over time and regions allows for estimating workers' individual responses in terms of hours worked, sick leave and intentions to find another job. The results suggest that essential workers have shown a certain resilience. Hours worked strongly increased for native-born essential workers and remained roughly stable for their foreign-born colleagues. While native-born essential workers stayed home sick more often, there was no such change for foreign-born essential workers. With the exception of foreign citizens, essential workers did not start looking more often for another job.

JEL Classification Numbers: J61, J15, J22, J24

Key words: COVID-19, key sectors, essential services, migrant workers, critical infrastructure, resilience

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1 Introduction

The COVID-19 pandemic in effect ‘revealed’ a previously unobserved category of workers: essential workers, also referred to as key workers or system-relevant workers. Without them, essential sectors – such as health, long-term care, logistics, energy and the food supply chain – cannot operate. Under pressure to reduce contacts between persons, in order to slow COVID-19 infections down to a manageable rate, governments decreed lockdowns but also published lists of exemptions from lockdowns. On the one hand, exemptions had to be as limited as possible in order to stop the dynamics of the pandemic as quickly as possible. On the other hand, sectors whose workers are not exempted would be disrupted at best and at worst unable to continue operating.

The hard choices governments made resulted in a concrete definition of essential workers: employees exempted from lockdowns because of their role in essential sectors. What sounds like a privileged status may have come with particular hardships. Those still going to work in person were exposed to possible contagion at work and in public transport. Many essential workers also faced rising pressure at work, due to the fallout of the pandemic in their sector. This made the resilience of essential workers an important factor for the resilience of essential sectors, and – given the functions of essential sectors – for the resilience of society and the economy at large. This paper therefore investigates how resilient essential workers were during the pandemic.

When lockdowns made essential workers visible as a distinct group, it also became apparent that many of them are migrants. Essential sectors therefore partly rely on migrants (and by extension on migration and integration policies) to function and to keep functioning during crises. However, only little is known about why many migrants work in essential sectors, how they support the resilience of these sectors, how their contributions differ from those of native-born workers (if at all) and what migrants’ specific strengths and weaknesses are. If this was better understood, policies and management practices could be adjusted in order to raise resilience, by mitigating the risks and fostering the benefits that come with an extensive reliance on migrants in essential sectors.

This study is among the first to quantitatively assess the resilience of essential workers during the COVID-19 pandemic. It focuses on the case of Italy, where the pandemic hit earlier and harder than in most other countries, putting substantial pressure on Italy’s essential sectors, where migrants play a greater role than in many other EU countries. Using regional numbers of deaths and patients in intensive care as measures for the impact of the pandemic, the study tracks individual responses of employees to the impact on their region, as observed in micro-data from the Italian labour force survey. The results uncover differences in responses not only between essential workers and other workers, but also between foreign-born and native-born essential workers. The findings offer some guidance to managers and policy makers in their efforts to maintain an effective workforce in essential sectors during crises.

2 Key workers in the pandemic: literature review

For various countries, studies have documented adverse effects of the COVID-19 pandemic and the associated lockdowns on both employment and labour force participation (Adams-Prassl et al., 2020, Aldan et al., 2021 and Ardiyono, 2022, among others), while many of these studies also emphasise different effects across sectors and demographic groups. In Italy, a government intervention as early as mid-March 2020 banned layoffs and promoted short-time work (Casarico and Lattanzio, 2021). Employment fell only somewhat but numerous workers reported zero working hours during lockdowns (Brini et al., 2024) and women with small children often left the labour force altogether (Fiaschi and Tealdi, 2023).

While a large share of work could be performed from home, and perhaps even without a significant loss in productivity (Etheridge et al., 2020), so-called essential workers or key workers often had to continue working much like before and were explicitly exempted from lockdowns. In the case of Italy, these were employees in activities listed as “essential” in government decrees, and by contrast, employees in non-essential activities required a permission to move around during lockdowns (e.g. CNA Varese, 2020). This implied a very different experience of the pandemic for essential workers, compared to other workers, arguably with greater exposure to the risk of contagion and additional causes of stress. For example, Martin et al. (2022) report a higher incidence of smoking and lack of sleep among essential workers during the pandemic. Specifically for health workers, Gustavsson et al. (2023) find a declining satisfaction with safety aspects at work, and Di Porto et al. (2022) demonstrate for the case of Italy that a greater presence of essential workers in a municipality - implying a larger share of workers exempted from lockdowns - was associated with more contagions and deaths.

The first lockdowns also highlighted that essential workers include many migrants, who became very visible through their work in ‘frontline’ roles such as healthcare and long-term care but also as bus drivers and at supermarket tills. Statistical enquiries for various countries (e.g. Fasani and Mazza, 2020; Kerwin and Warren, 2020) confirmed that migrants make up a substantial share of essential workers. Broberg et al. (2024) as well as Fasani and Mazza (2024) find that migrants indeed appear over-represented in the key sectors of many European countries, after accounting in detail for the composition of the labour force. In fact, migrants’ over-representation is highest in Italy, among 17 countries covered by Broberg et al. (2024) who also link their over-representation to structural factors such as working conditions. Nivorozhkin and Poeschel (2022) demonstrate for the case of Germany that, within the group of essential workers, migrants were concentrated in precarious jobs with poor working conditions.

Similarly, migrants were over-represented in some of the most severely affected sectors of the economy (OECD, 2020). Migrants both in the EU and the US were at higher risk than native-born employees to lose their job, partly because their work was not as easily

transformed into remote work (Fasani and Mazza, 2023; Borjas and Cassidy, 2023). For the same reason, migrants faced greater health risks (Bossavie et al., 2022). For Italy, Bonifazi et al. (2023) find that the employment of foreign citizens declined more strongly than that of Italians, and that especially female foreigners became inactive comparatively often. They partly attribute these results to foreigners working more often with contracts of limited duration: while layoffs were soon banned, these contracts could still run out. With the sudden introduction of travel restrictions, migrants were especially at risk of ending up ‘stranded’ (IOM, 2020) and stressed by the separation from partners or families (McDermid et al., 2022).

Regarding specifically the migrants among essential workers, the literature highlights how their front-line roles and working conditions exposed them more to the risk of contagion (e.g. Vaillancourt-Laflamme et al., 2022). Adverse effects on health could be connected with financial problems and vice versa, as Gawlewicz et al. (2023) find for Polish essential workers in the UK. Already existing issues in the employment of migrants in Italian agriculture were exacerbated by the pandemic, as non-EU migrants stepped in for EU migrants and labour inspections became less frequent (Palumbo and Corrado, 2020; Tagliacozzo et al., 2021). Also migrant care workers, in Italy as elsewhere, seemed to experience particular difficulties (e.g. Dotsey et al., 2023). A recent paper by Fasani and Mazza (2024) finds that working hours increased in 2020 for migrants among essential workers, in contrast to their native-born peers, and the jobs of migrants more often came to end.

3 Context: severity of the pandemic in Italy

In international comparison, Italy was badly affected by the pandemic. Final figures published by the Coronavirus Resource Centre at the Johns Hopkins University in March 2023 indicate Italy as the sixth worst affected country worldwide in terms of mortality, with an estimated 311 deaths per 100,000 population.¹ The same source also highlights two potential reasons for high mortality, namely a high share of older persons in the population and the health system struggling to cope with the number of patients, and both reasons might apply to Italy. The now well-known measure of excess mortality confirms that Italy was one of the 20 most heavily affected countries worldwide, and the estimate for Italy appears very much in line with reported deaths from COVID-19 (Msemburi et al., 2023). This means that Italy is a prime case to study the situation of high stress on key sectors and their employees.

However, Italy is also known for wide regional differences (e.g. OECD, 2014). During the pandemic, excess deaths varied considerably between Italian regions (Konstantinoudis et al., 2022; Henry et al., 2022), which is tantamount to regions being differently affected

¹See figures reported on <https://coronavirus.jhu.edu/data/mortality> as of March 3, 2023.

by the pandemic. To some extent, regional policy makers could adopt region-specific measures in response to the pandemic, such as voluntary mass testing in South Tyrol (Ferrari et al., 2022). These observations do not only mean that regional variation should be taken into account. They also imply that regional variation may allow for insights that are not captured by aggregate analyses at the national or even European level (such as Fasani and Mazza, 2024).

In fact this paper exploits the fact that employees in different Italian regions had to react to starkly different impacts from the pandemic, obtaining results from comparisons between these regions. To this end, two regional measures of the pandemic’s severity will be used, reported deaths from COVID-19 and patients in intensive care (see the next section). While reported deaths in Italy nearly coincide with excess deaths as estimated by Msemburi et al. (2023), the results obtained by Henry et al. (2022) suggest that excess deaths might be substantially higher than reported deaths. Regarding the economic impact of the pandemic in Italy, Cerqua and Letta (2022) find that it also varied very strongly across Italian regions but showing a quite different pattern from the impact on health indicators. Although COVID-related deaths still appear as the most relevant measure in the context of this paper, the number of patients will be used as an alternative measure in all analyses, and regional fixed effects will allow for regional differences not captured by either measure.

4 Data and descriptive statistics

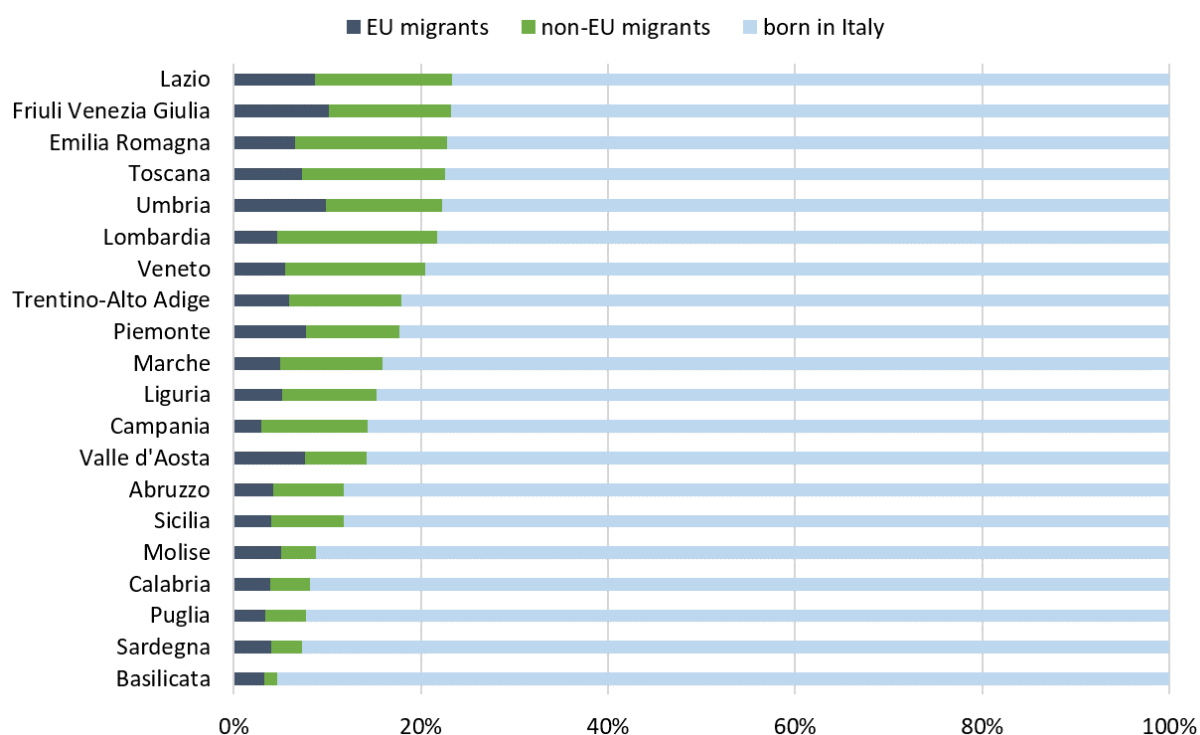
The Italian labour force survey (*Rilevazione sulle forze di lavoro*) is compiled on a quarterly basis by Italy’s national statistical agency ISTAT. According to ISTAT, every year the Italian labour force survey draws on responses from more than 250,000 households drawn randomly from the national population registry ANPR, with the aim of obtaining a representative sample of Italy’s resident population (at least for the purposes of the topics in the survey). Most households are initially interviewed in two consecutive quarters, not in the following quarter but then again in two consecutive quarters. While the household is visited in person for the first interview, subsequent interviews are conducted over the phone whenever possible. The households covered are distributed across some 1,400 municipalities and comprise of more than 600,000 individuals. Starting with the first quarter of 2014, anonymised micro data have been made available, with almost complete consistency until Q1 2021, when a partly revised questionnaire was introduced and the provision of micro data became more restrictive. Therefore, this paper mainly draws on the micro data up to Q4 2020. The sample used in the analyses (Section 6) will focus exclusively on 2020 and include all employed persons aged 15+, also the self-employed.

At the beginning of the pandemic, in Q1 2020, employees in essential occupations represented a third of all employed persons in Italy (aged 15-67). This share was significantly higher for women (37%) than for men (29%). It was even higher among EU

migrants (44%) and non-EU migrants (42%), well above the share for the native-born (31%). When considering women only, the share reaches 57% among EU migrants and 62% among non-EU migrants, compared to 33% among the native-born. This amounts to a strong tendency of migrants – and especially migrant women – to be over-represented in essential occupations. Broberg et al. (2024) show that this over-representation not only persists after accounting for socio-demographic factors such as age and education (that might make persons with certain profiles more likely to work in essential occupations) but it is even estimated to be the strongest over-representation in all 17 EU countries analysed in the period 2016-2020.

This over-representation likely explains why many in Italy expressed their surprise at the frequency with which they encountered migrants in some essential occupations. While migrants accounted for 14% of total employment in Italy (ages 15-67) in the first quarter of 2020, they accounted for 18% of employment in essential occupations. As detailed in Table 10 in the annex, based on all of 2020 for more reliability, migrants were especially frequently encountered among food processing workers (accounting for 21%), workers cleaning by hand (25%), child care workers (26%), food products machine operators (26%), transport and storage labourers (27%), domestic and office cleaners (45%) as well as personal care workers in health services (46%).

Figure 1: Regional employment in essential occupations by origin, Q1 2019 and Q1 2020



Across Italian regions, migrants' share of employment in essential occupations tended to be higher in the North than in the South of Italy (see Figure 1). All regions with dense urban areas such as Rome, Milan, Turin, Bologna and Venice exhibit relatively high

shares of migrants, with the notable exception of Naples in Campania. This may simply reflect that migrants cluster in cities. Accordingly, the lowest shares of migrants are found in rather rural regions. Four of them (Valle d'Aosta, Molise, Sardegna and Basilicata) are the only regions where more EU migrants than non-EU migrants work in essential occupations. The shares of non-EU migrants are especially significant in Lombardy (17% of total employment in essential occupations), Emilia Romagna (16%) as well as Tuscany, Veneto and Lazio (15% in each case).

The migrants who work in essential occupations in Italy come especially often from Central and Eastern Europe, notably the Balkans. Many others come from East and South Asia, North and West Africa as well as Latin America (Figure 2). Based on data for 2019/ 2020, persons born in Romania were by far the largest group and accounted for nearly a quarter of all migrants in essential occupations. At a distance, they were followed by persons born in Ukraine, the Philippines, Moldova, Albania and Morocco, with each group accounting for 5% to 8%. Overall, non-EU migrants accounted for almost seven out of ten migrants employed in essential occupations (69%).

Figure 2: Origin countries of the migrants employed in essential occupations, Q1 2019 and Q1 2020

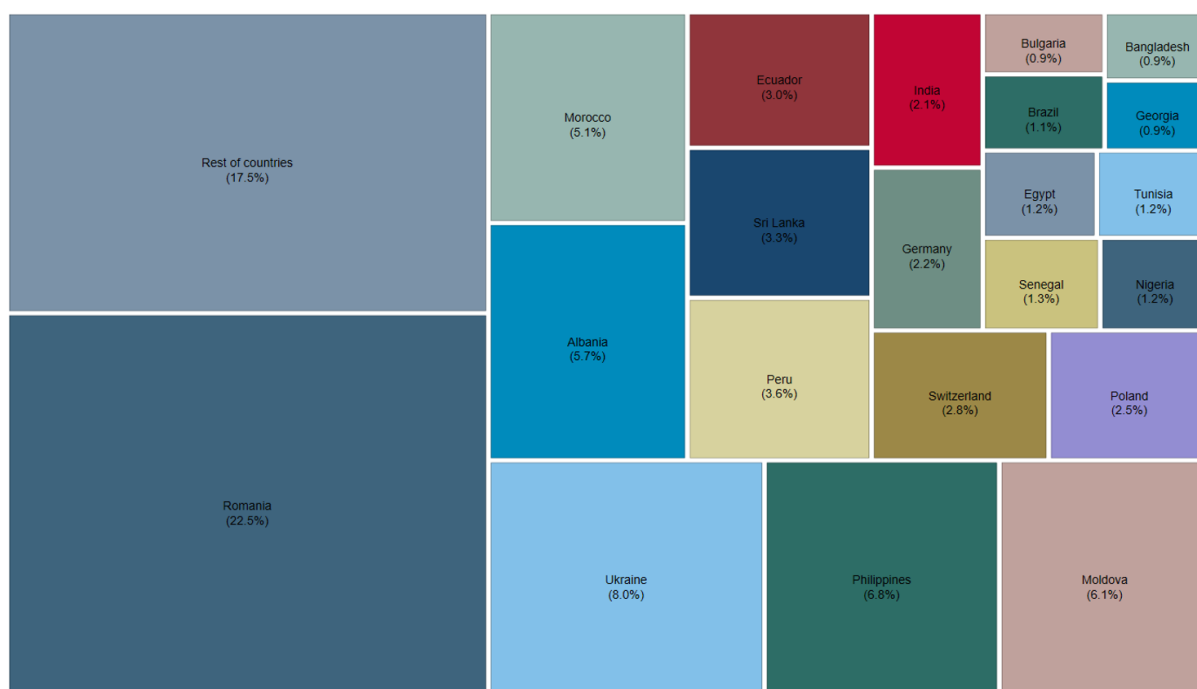


Figure 3 offers more detailed descriptive statistics on key variables in the data, also specifically for EU and non-EU migrants, migrants who hold Italian citizenship and recent migrants (who had been in Italy for up to 5 years when interviewed). Migrants working in Italy's essential occupations tend to be somewhat younger than their native-born colleagues, and EU migrants are especially often women. More migrants than native-born have a low education level, and the share with a high education level is only half as high

for migrants. While only a fifth of the native-born have an income in the bottom 30%, this holds for the majority of migrants (even almost three-quarters of recent migrants). Far fewer migrants than native-born have an income in top 30%. Migrants work about twice as often in part-time jobs but rarely as self-employed or managers. Almost two-thirds of the migrants work in small firms with less than 20 employees, compared to only 28% of the native-born. While only 3% of the native-born are looking for another job, this rate reaches 9% for migrants and 12% for recent migrants.

Figure 3: Employees in Italy's essential occupations, Q1 2014 to Q4 2020

indicator	native-born	foreign-born				
		all	EU	non-EU	Italian cit.	recent
female	45%	65%	72%	61%	58%	64%
aged 16 to 35	18%	20%	19%	20%	12%	45%
aged 35 to 54	57%	63%	65%	63%	69%	46%
aged 54 to 67	25%	17%	16%	17%	19%	8%
median age	47	44	44	44	47	36
married	58%	46%	46%	46%	63%	34%
lives in a city	58%	57%	57%	58%	62%	48%
low education level	27%	41%	31%	47%	31%	45%
medium education level	40%	42%	52%	37%	43%	37%
high education level	33%	16%	17%	16%	27%	19%
median net income (€)	1400	920	970	900	1200	830
income in bottom 30%	19%	60%	56%	63%	34%	72%
income in top 30%	31%	10%	13%	8%	22%	7%
working part-time	17%	37%	34%	38%	28%	36%
holds a second job	2%	3%	3%	3%	2%	2%
mean usual working hours	35.1	33.2	33.9	32.8	33.4	34.2
median usual working hours	38	36	38	36	36	38
firm size less than 20	28%	65%	62%	66%	37%	72%
firm size 250 or more	15%	6%	7%	6%	13%	5%
self-employed	10%	3%	3%	2%	5%	1%
managerial role	11%	2%	3%	2%	7%	3%
illness: no work last week	1%	1%	1%	1%	1%	0%
illness: less work last week	1%	1%	1%	1%	1%	0%
rather low job satisfaction	9%	10%	10%	10%	10%	11%
looking for another job	3%	9%	7%	10%	5%	12%
observations (N)	247,852	52,470	18,309	34,161	11,526	2,926

Note: migrants with duration of stay in Italy up to 5 years are considered recent migrants. Low education refers to ISCED levels 1+2, medium to 3+4, high to 5 or higher.

In order to complement the labour force survey data with data on the severity of the pandemic, this paper draws on the daily reports by Italy's Department for Civil Protection

during the pandemic. Each region compiled certain figures on a daily basis, which were reviewed by both the Italian Ministry of Health and the Department for Civil Protection, before being published every evening on a dashboard and on GitHub. From aggregating the daily data, two measures are derived for each region in each quarter of 2020: reported new deaths related to COVID-19 and patients in intensive care. New deaths are defined as the difference in reported cumulative deaths between the last day of the quarter and the last day of the previous quarter. Patients in intensive care are counted in person-days, adding up the reported number of patients currently in intensive care across all days of the quarter. Figure (11) in the annex shows both impact measures for each region, relative to regional population (figures from ISTAT). While the measures are highly correlated (with correlation coefficients above 0.93 in every region), results below may differ depending on which measure is used in the analysis.

5 Theoretical considerations and empirical strategy

Essential workers work in essential sectors, which need to be resilient in the event of a crisis. So how resilient have essential workers been during the global crisis of the COVID-19 pandemic? Concretely, resilience here means maintaining the provision of essential services under the pressures of a major crisis, such as pandemics but also wars, natural catastrophes and large-scale infrastructure failures. From essential workers, this requires efforts to maintain and often raise their labour input despite hardships that arise at work but also in their family and private life. The analysis in this paper therefore considers the following as indicators: absence from work due to illness, weekly hours worked, and searching for another job.²

Given the significant presence of migrants in Italy's essential occupations, how have they contributed to the resilience of key sectors during the COVID-19 pandemic? After all, the employment of migrants and foreign citizens may be influenced comparatively easily through targeted migration and integration policies, which makes it a potentially crucial policy lever in the efforts to ensure or increase the resilience of key sectors (Anderson et al., 2021). A priori, migrant employees in essential occupations might encounter specific challenges and exhibit specific strengths. Where these specific circumstances are linked to migration policies or aspects of integration, they could apply more strongly to foreign citizens. For example, foreign citizens may be affected by border closures, in contrast to naturalised migrants. Hence the empirical analyses will also consider foreign citizens instead of the foreign-born, in order to pick up on any differences along this dimension.

Since the chosen indicators not only reflect resilience but also the severity of the COVID-19 wave, the analysis must somehow account for differences in severity. For

²The empirical analysis does not depend on the notion of these indicators remaining the same from pre-pandemic times, as only relative differences in 2020 are examined. In particular, absence due to illness likely includes absence due to precautionary self-isolation.

example, due to regional differences, a simple comparison between migrants and native-born might seemingly find that migrants exhibited a low degree of resilience: this could be driven entirely by migrants working primarily in badly affected regions such as Lombardy (as migrants tend to cluster in urban areas). Therefore the analyses are performed at the regional level, always comparing migrants and native-born working in the same region. With the additional data from the Department for Civil Protection, the analyses can directly account for the regional severity of the COVID-19 pandemic. Since two measures of the pandemic impact are available (new deaths and the number of patients in intensive care), the analysis will always check whether results depend on which measure is used, and to what extent the alternative estimations reinforce each other.

So to assess how employees responded to the pandemic, all analyses below estimate the relationship between a resilience indicator as dependent variable and the regional severity of the COVID-19 pandemic as an independent variable, alongside various control variables. By way of interactions between the regional pandemic severity and variables for essential workers and migration status, it is investigated whether this relationship depends on being an essential worker, being foreign-born (or a foreign citizen), or both. The estimation uses a linear probability model in both cases of binary dependent variables, absence from work due to illness and looking for another job. As both describe rare events, a linear probability model may be more appropriate in this context than Probit or Logit estimation (Timoneda, 2021). The estimated equation is

$$(1) \quad Y_i = \beta_0 + \beta_1 F_i + \beta_2 EW_i + \beta_3 I_{rt} + \beta_4 F_i \times EW_i + \beta_5 F_i \times I_{rt} + \beta_6 EW_i \times I_{rt} \\ + \beta_7 F_i \times EW_i \times I_{rt} + V_i' \gamma + W_i' \delta + Q_q + R_r + u_i$$

where Y_i is a dummy for the binary dependent variable, β_0 is a constant, F_i is an indicator for being foreign-born (alternatively, a foreign citizen), EW_i is an indicator for being an essential worker, and I_{rt} refers to the impact of the pandemic in region r and the quarter t (measured alternatively as new deaths or patients in intensive care, relative to regional population). The following terms capture interactions among the three aforementioned variables. The three-way interaction term $\beta_7 F_i \times EW_i \times I_{rt}$ allows the impact of the pandemic on essential workers to differ between foreign-born and native-born essential workers (alternatively, between foreign and Italian citizens). V and W are vectors of control variables on demographic aspects (gender, age, education level, civil status, children in the household, being a student) and job characteristics (part-time, firm size, job tenure and its square, managerial role, frontline role, one of two jobs held), respectively. Q_q refers to fixed effects for broad occupational groups q (at ISCO 1-digit level), R_r to region fixed effects and the error term u_i represents random noise.

This model is estimated for 2020, pooling all four quarters. In the case of weekly hours worked, the dependent variable is continuous and linear regression is used, so that the estimated equation is otherwise still the same as in equation (1). The variables included

in V and W are meant to control for relevant variables that might differ between essential workers and others, and between foreign-born and native-born. Different subsets of V and W turn out to be significant for different dependent variables, and insignificant variables are dropped unless they should be included on theoretical grounds. The estimation for absence due to illness ultimately does not include occupation fixed effects, as they were by and large insignificant in this context.

6 Results

6.1 Absence from work due to illness

Many employees were infected during the pandemic and became ill or had to self-isolate. In addition, employees may have experienced mental health issues or illness from exhaustion. This section explores how essential workers fared in this context, compared to all employees, with special attention to the situation of migrants among the essential workers. The dependent variable in these analyses is whether the employee did not work in the calendar week before being interviewed for the labour force survey, citing “illness” as the reason for the absence from work. That is, the variable equals 1 if this particular constellation is indicated by the surveyed employee, and 0 otherwise. The large number of observations used here (some 129,000 in 2020, more than 31,000 in each quarter) allows investigating this aspect even though normally only a tiny fraction of employees are absent in a given week due to illness (around 1%, according to Figure 3).³

Table A1 in the annex shows the estimated coefficients from several regressions of absence from work due to illness. Based on the results in column (1), Figure 4 depicts how their probability⁴ of absence from work due to illness (on the vertical axis) changed with increasing regional severity of the pandemic (on the horizontal axis). The panel on the left suggests that the probability rose more strongly for native-born essential workers than for other native-born workers, depicted by the diverging slopes. By contrast, no such difference emerges between foreign-born essential workers and other foreign-born workers, as the lines in the right panel hardly diverge.

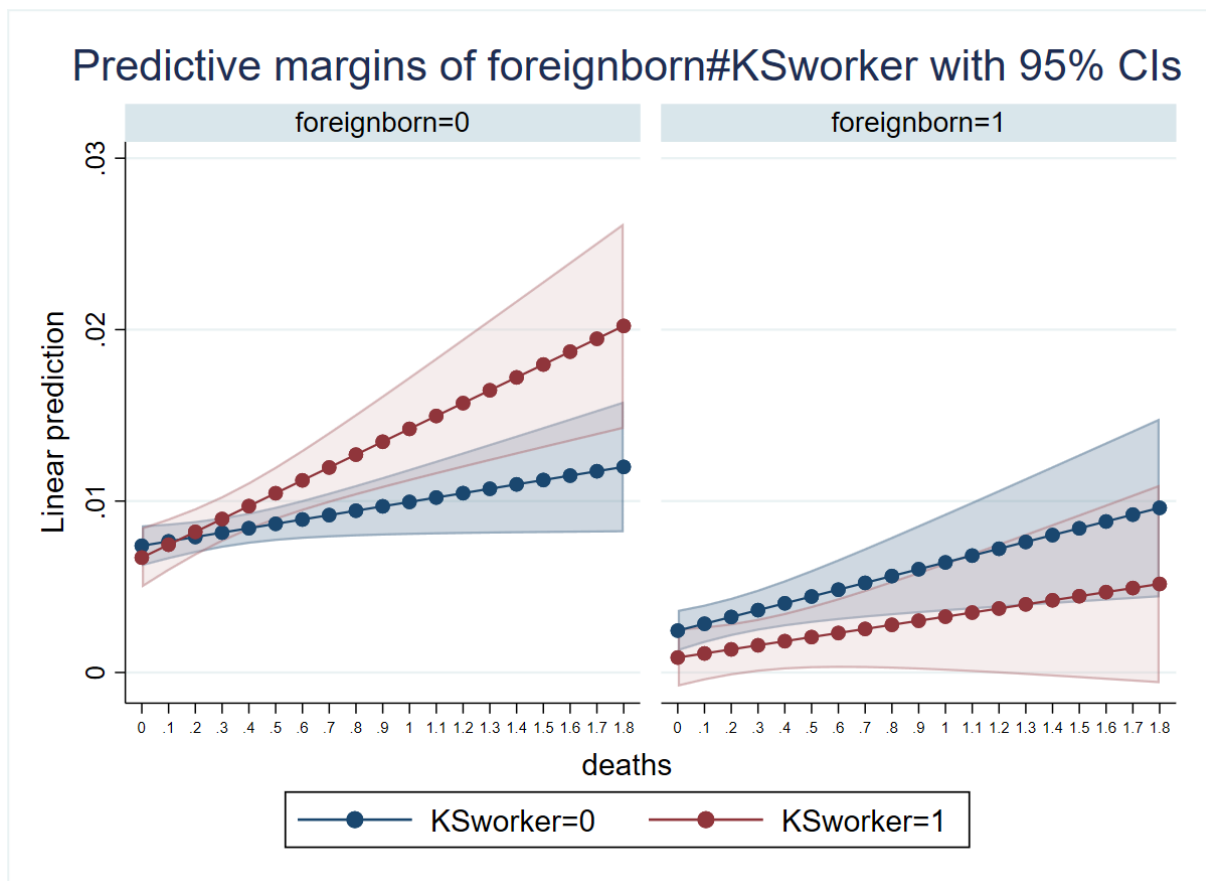
Statistical tests (F-tests on marginal linear predictions, using the Bonferroni correction for family error rates) reveal that the interaction between essential workers and the impact of the pandemic is significant for native-born workers, albeit only at the 10% significance level - in the left panel, the confidence intervals overlap too strongly to conclude that the slopes differ at the 5% significance level. This changes when patients in intensive care are used as measure of the regional pandemic severity (column (3) of Table A1): as shown in the left panel of Figure 5, the confidence intervals overlap much less and the difference

³While it was considered to also count in cases of less work due to illness, this appeared to add few observations while blurring the variable, possibly because “less work” is vague.

⁴More precisely, the linearly predicted probability derived from the regression results, i.e. the predictive margins, separately for native-born and foreign-born.

in slopes is now significant at the 5% level. When foreign citizens are considered instead of the foreign-born, the interaction is again significant for native-born at the 5% level, provided the severity of the pandemic is measured through patients in intensive care.

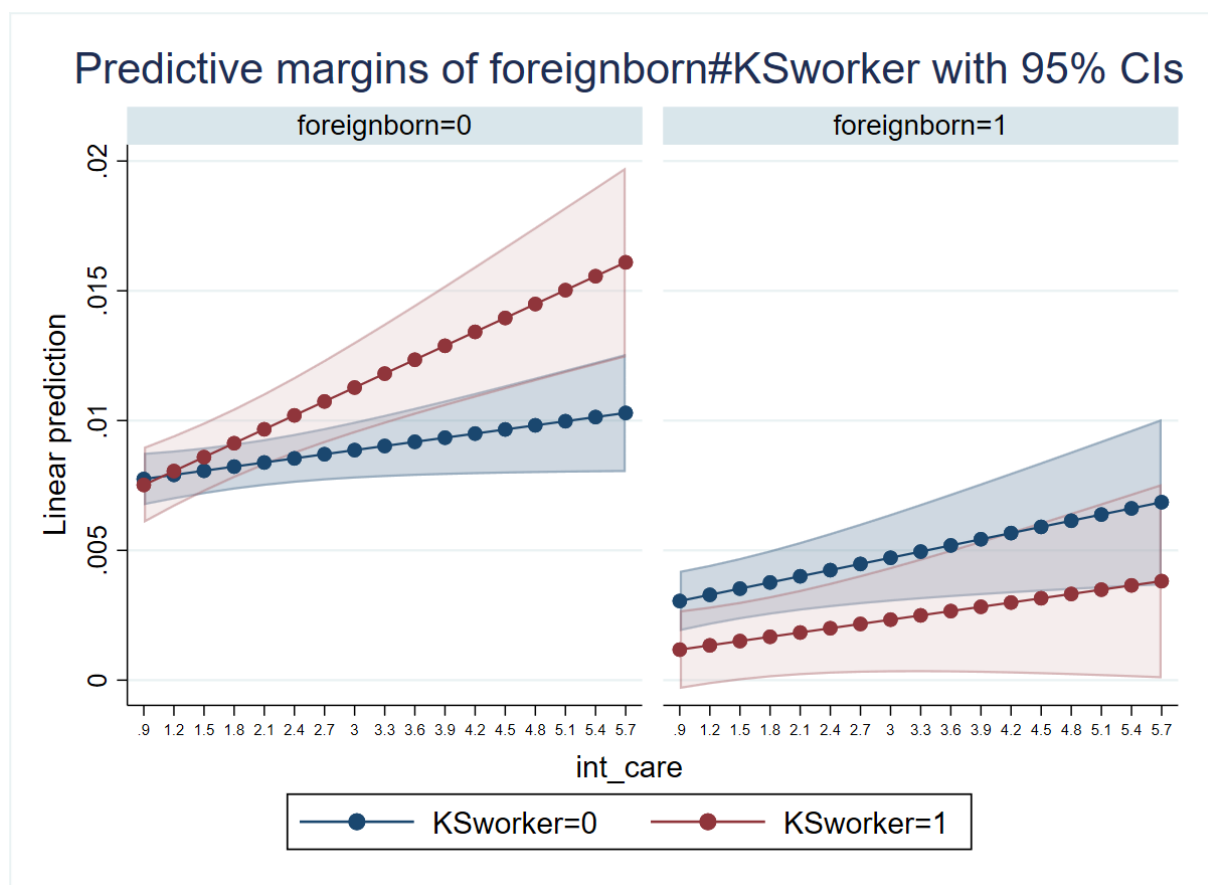
Figure 4: Estimated effect of the pandemic on essential workers' probability to be absent from work due to illness, Q1-Q4 2020



Note: Sources: own calculations based on the ISTAT labour force survey.

As further results, Figure 4 and Figure 5 suggest that the pandemic also raised non-essential workers' probability of absence from work due to illness, corresponding to the significant coefficient for deaths in column (1) of Table A1 and the almost significant coefficient for patients in intensive care in column (3). The slopes are roughly the same for both native-born and foreign-born non-essential workers. In addition, foreign-born workers seem to have an almost generally lower probability of absence from work due to illness, corresponding to significant negative coefficients for being foreign-born in Table A1. **Overall, these results indicate that the pandemic made employees stay home sick more often and that this effect was especially strong for native-born essential workers but not for foreign-born essential workers.**

Figure 5: Estimated effect of the pandemic on essential workers' probability to be absent from work due to illness, Q1-Q4 2020



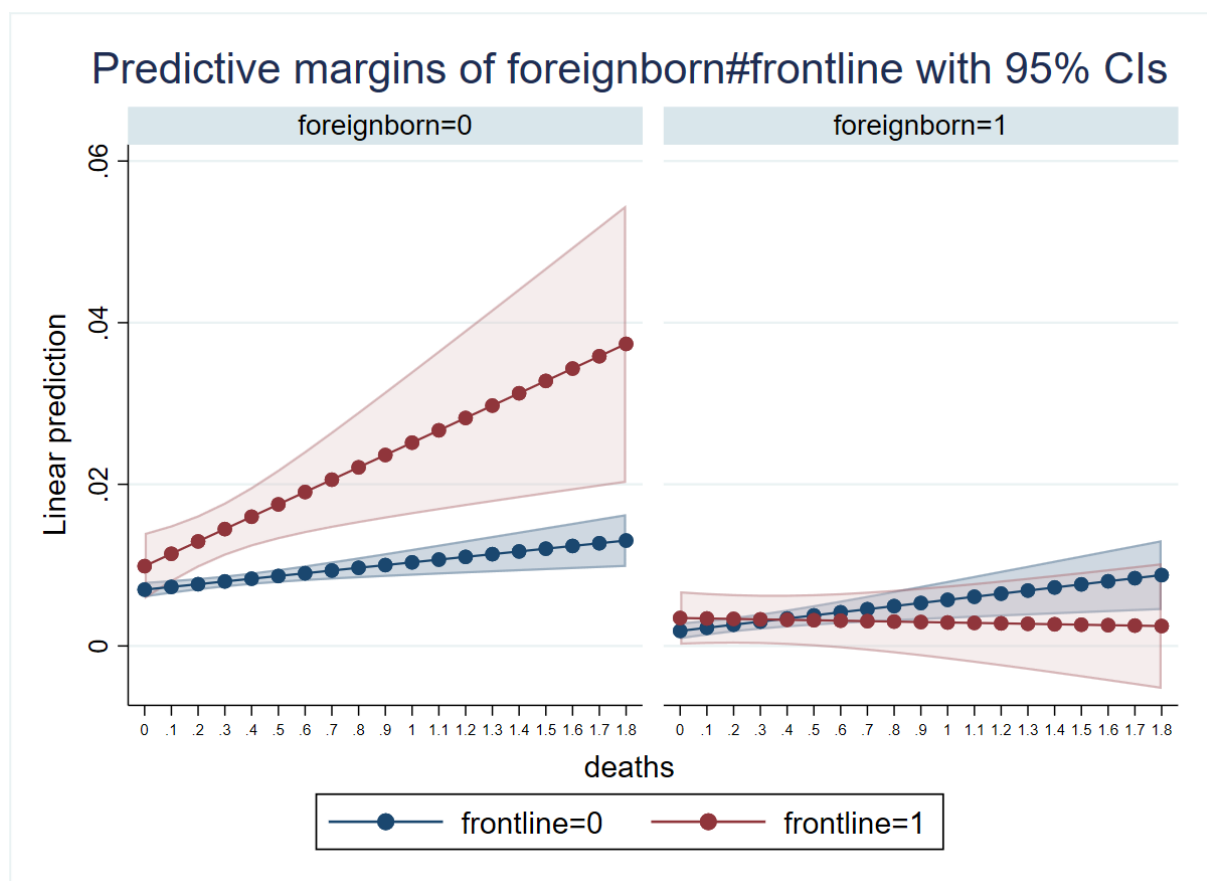
Note: Sources: own calculations based on the ISTAT labour force survey.

Although potential explanations will be discussed further in Section 7, one particular explanation is best evaluated here, also as a robustness check: could the difference between native-born and foreign-born essential workers reflect a different presence in “frontline” roles where employees were most exposed to the pandemic? If native-born essential workers were more concentrated in frontline roles than foreign-born essential workers, this could drive the difference in Figure 4 and Figure 5. If so, then one would not expect to find any significant difference among the essential workers in frontline roles, be they native-born or foreign-born.

To perform this test, the analysis temporarily shifts its focus from essential workers to essential workers in frontline roles only. As frontlines roles, those occupations are counted where contact with other people and therefore the risk of contagion seem highest: medical doctors (ISCO group 221), other health professionals (226), nursing and midwifery associate professionals (322), travel attendants, conductors and guides (511), other personal service workers (516), child care workers and teachers' aides (531) and personal care workers in health services (532). This selection largely aligns with the occupations that Bauer et al. (2021) identify as the most risky occupations in the pandemic, based on an

assessment of the tasks involved. The selection of frontline roles here does not include cleaners but does include public transport conductors. Employees in these frontline roles account for about 22% of all essential workers. In fact an indicator for these frontline roles was already included in the regressions above (among job characteristics) and always had a significant coefficient.

Figure 6: Estimated effect of the pandemic on frontline workers' probability to be absent from work due to illness, Q1-Q4 2020



Note: Sources: own calculations based on the ISTAT labour force survey.

When employees in frontline roles are in focus rather than all essential workers, the results turn out to reinforce the difference found above between native-born and foreign-born essential workers. As shown in column (1) of Table A2 in the annex, there is again a stronger effect of the pandemic on native-born frontline workers but not on foreign-born frontline workers (the interaction of the foreign-born and the pandemic impact is significant for frontline workers, at the 5% level). Also in other respects, these results mirror those in column (1) of Table A1. As seen in Figure 6, the graphical representation of the results looks similar. The results even stay essentially the same when foreign citizens are considered instead of the foreign-born; see column (2) of Table A2 (notably the interaction of foreign citizens and the pandemic impact is again significant for frontline

workers, at the 5% level). Qualitatively similar results arise when patients in intensive care are used as measure of the regional pandemic severity, shown in columns (3) and (4). On this background, the finding above of different effects on native-born and foreign-born essential workers appears more reliable.

6.2 Weekly hours worked

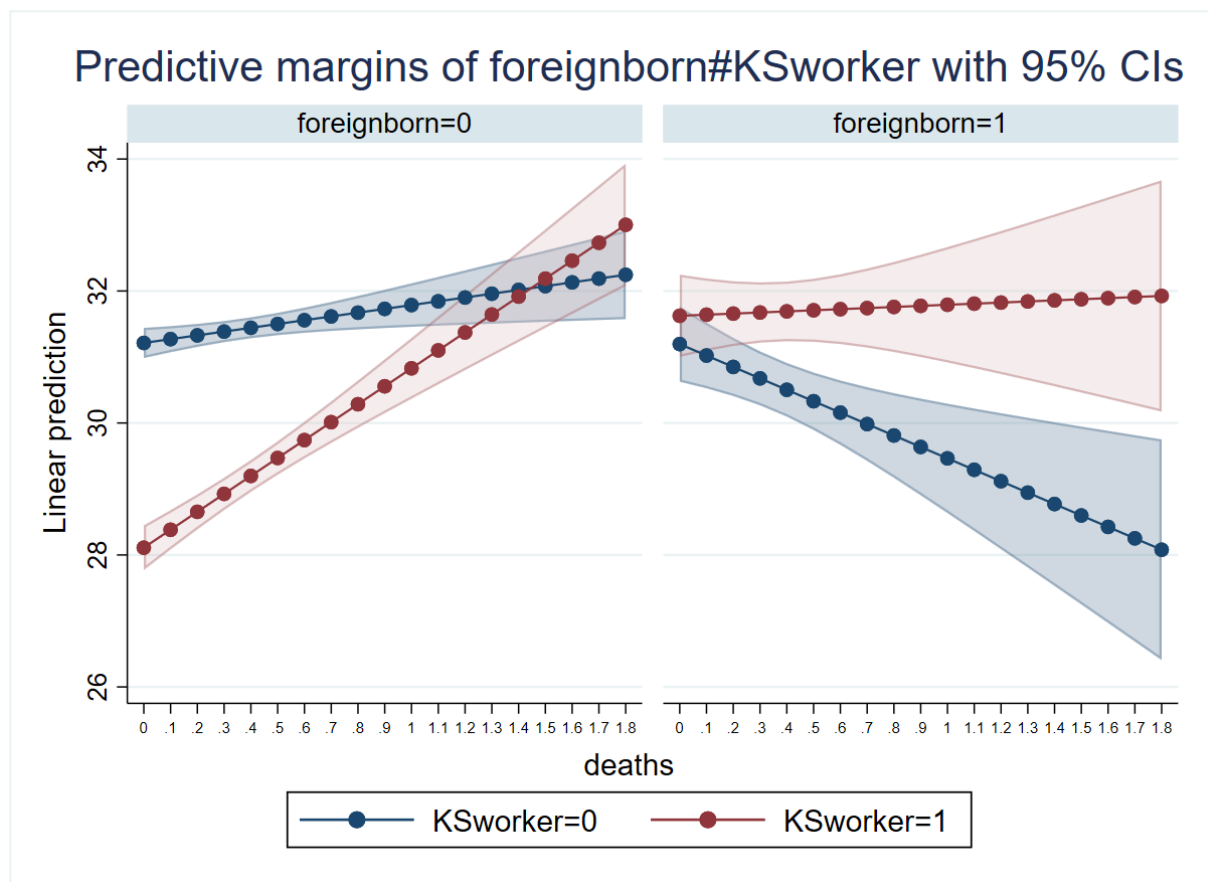
The next analysis investigates how weekly hours worked were impacted by the pandemic, and whether any differences emerge for essential workers or between native-born and foreign-born essential workers. Table A3 shows the estimated coefficients from regressions with weekly hours worked as dependent variable, defined as (self-reported) actual hours worked in the calendar week preceding the interview. The explanatory variables notably include an indicator for part-time work, the tenure in the current job and its square – as before but arguably especially relevant in the context of working hours. In addition, the controls in these regressions include fixed effects for broad occupational groups (at ISCO 1-digit level).

The results in column (1) of Table A3 show diverging developments in several respects. The actual working hours of native-born essential workers increased strongly with the regional severity of the pandemic (depicted the left panel of Figure 7). This result is significant at any significance level; see the coefficient for the interaction of essential worker and deaths in column (1). Working hours also increased for other native-born workers, albeit only slightly (a result significant at the 2% level). Starting from a far higher level than native-born essential workers, the working hours of foreign-born essential workers appear to have increased much less if at all. The slope for foreign-born essential workers appears quite uncertain, as suggested by the comparatively wide confidence intervals. By contrast, the working hours of other foreign-born workers clearly declined with the severity of the pandemic: the negative interaction of foreign-born and deaths in column (1) is significant at any significance level.

While the coefficient for the three-way interaction in column (1) of Table A3 is not significant, Figure 7) shows considerable differences in slopes and confidence intervals that hardly overlap. Indeed, further statistical tests (F-tests on marginal linear predictions with the Bonferroni correction) establish that the interaction of being an essential worker and the pandemic impact is highly significant for the native-born and still significant at the 5% level for the foreign-born. The interaction between being foreign-born and the pandemic impact is likewise significant at the 5% level, for both essential and non-essential workers. **Together, these results suggest that how weekly hours worked responded to the pandemic was different for essential workers: for native-born essential workers, hours apparently rose much stronger than for other native-born workers, and for foreign-born essential workers, hours apparently did not rise as for native-born essential workers but did not exhibit the strong decline**

seen for other foreign-born workers either.

Figure 7: Estimated effect of the pandemic on weekly hours worked, Q1-Q4 2020



Note: Sources: own calculations based on the ISTAT labour force survey.

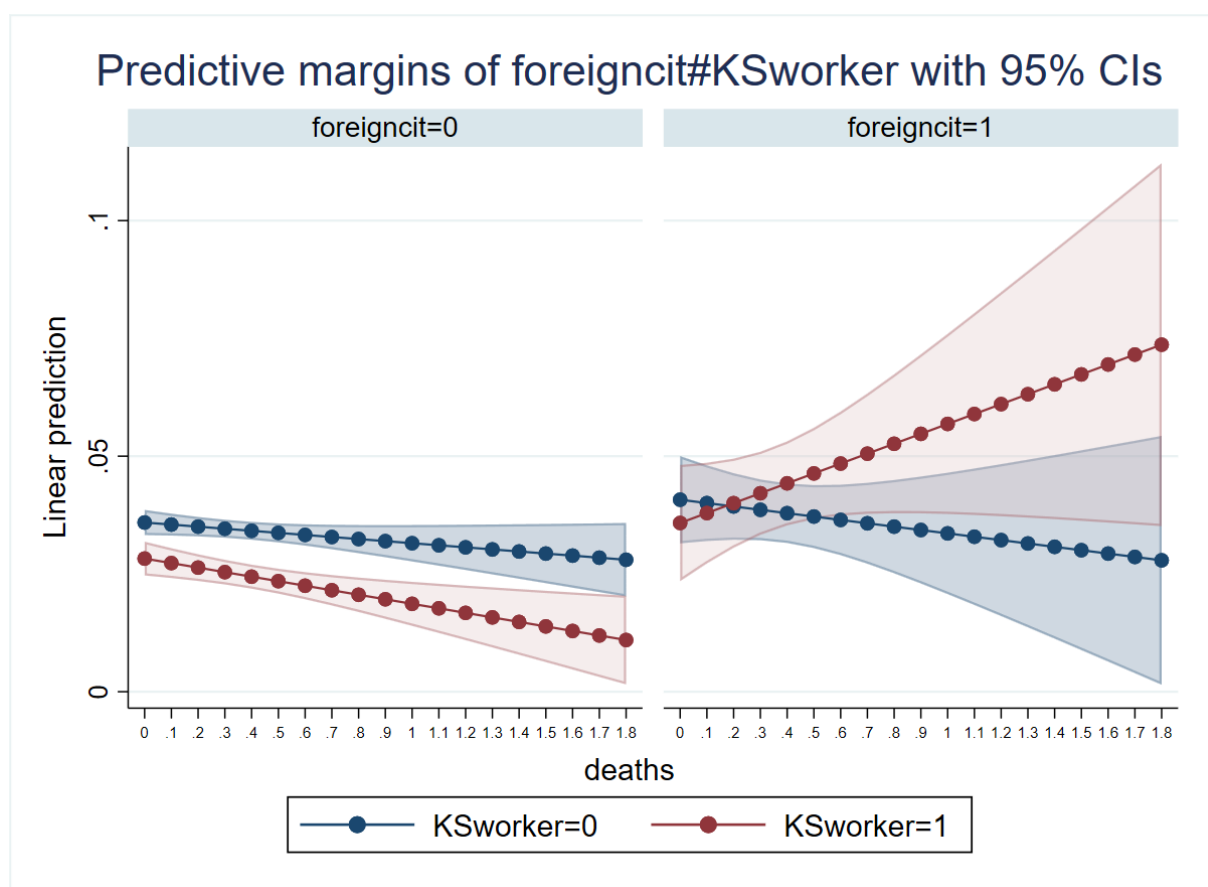
Very similar results are obtained when patients in intensive care are used as the measure of regional pandemic severity, with one difference: the slope for native-born non-essential workers has flattened to the extent that an increase of weekly hours worked for this group is no longer significant at the 5% level but only at the 10% level. Also this level of significance is not reached anymore when, in addition, foreign citizens are considered instead of the foreign-born. However, the significant results for the three-way interactions remain, except that the interaction of being an essential worker and the pandemic impact is no longer significant for foreign citizens (in their case, the slope for essential workers in the right panel differs less from the slope for other workers, both seem to be declining at least somewhat).

Overall, the results point to strongly increasing hours for native-born essential workers and roughly stable hours for foreign-born essential workers, perhaps not least because hours worked by foreign-born essential workers were already at a high level. In both cases, these developments seem to contrast with those for non-essential workers. Yet the hours of essential workers who are foreign citizens may have declined roughly in line with the hours of other foreign citizens.

6.3 Looking for another job

As third a final aspect, it is investigated how interest in another job was affected by the pandemic, as before looking for any differences between essential workers and others, and between the native-born and the foreign-born (or foreign citizens). The dependent variable equals 1 whenever employees answer “yes” to the question whether they are looking for another job, and equals 0 otherwise. Responses to this question were probably at least somewhat affected by shifting expectations of Italy’s economic and labour market situation, or growing uncertainty: job search by employed persons changes with business cycles (e.g. Bransch et al., 2024). Therefore, the relationship between the pandemic impact and looking for another job might have been instable over the course of 2020.

Figure 8: Estimated effect of the pandemic on looking for another job, Q1-Q4 2020



Note: Sources: own calculations based on the ISTAT labour force survey.

From the analysis of this relationship, comparatively few significant results arise (see Table A4). The probability that native-born essential workers are looking for another job seems to be generally lower than for other native-born workers (in every column, the coefficient for essential workers is negative and significant). The probability to be looking for another job appears by and large less affected by the pandemic than absence from work due to illness and weekly hours: across the four columns, the effect of the pandemic

on non-essential native-born workers is once just significant at the 10% level, once nearly significant at the 10% level, and otherwise not significant (see the coefficients for deaths and patients in intensive care), which largely does not differ for essential workers and migrants, as most coefficients for interactions are not significant.

Significant results notably arise for foreign citizens. Based on the regression results in columns (2) and (4) of Table A4), statistical tests (F-tests on marginal linear predictions with the Bonferroni correction) establish that the interaction between foreign citizens and the pandemic impact is significant for essential workers, at the 5% level when the pandemic impact is measured by deaths and at the 10% level when it is measured by patients in intensive care. The right panel of Figure 8 shows how the slope for essential workers who are foreign citizens diverges from the slopes of all other groups in the graph. While the corresponding figures on the foreign-born look similar, the slopes in the right panel diverge less and confidence intervals overlap more strongly. **These findings suggest that only essential workers who are foreign citizens were more often looking for another job as the severity of the pandemic increased, while everyone else was either looking rather less often for another job or did not exhibit any significant change.**

7 Discussion and policy implications

7.1 Interpretation of the results in context

Several results presented in Section 6 are unexpected or contrast with earlier findings. Many studies have highlighted a higher risk of contagion during the pandemic for certain occupations, often referring to essential workers or those in frontline roles (e.g. Pouliakas and Branka, 2020). The results in Section 6 for absence due to illness confirm this only in the case of native-born employees. Essential workers (or frontline workers) who are foreign-born or foreign citizens are not appear significantly more likely to stay home sick than non-essential workers (or non-frontline workers). This contrasts with widespread fears that migrant workers would be especially exposed to COVID-19 precisely because they often work in essential occupations or frontline roles (Bossavie et al., 2022; Vaillancourt-Laflamme et al., 2022). Apparently, greater exposure has not necessarily resulted in more absence due to illness – it did for native-born essential workers but not for their colleagues who are foreign-born or foreign citizens.

While potential explanations for this discrepancy abound, few can be linked to the results. Since the vulnerability to the COVID-19 virus varied greatly by age, migrants may be less affected if they tend to be younger. Indeed, a significant coefficient for being older than 54 was estimated in this context (see Table ??), which suggests that age played a role – but accounting for age groups should largely cover this aspect. Other explanations focus on some insecure status of migrants, legally (migrants might still lose their work or

residence permit) or economically (migrants might not yet be entitled to social security, family abroad depends on remittances). This insecurity could induce migrants to take fewer risks and greater precautions at work than native-born essential workers, resulting in less absence due to illness. Yet one could just as well argue that concerns over keeping their job make migrants more risk-taking than the native-born, in order to perform well despite the pandemic. Such concerns might even make migrants more often work while ill (Reuter et al., 2019), notably in the marginal early or late stages of an illness (while working with an acute COVID-19 infection or disrespecting quarantine could endanger the job).

However, if age or insecure status were behind the discrepancy between migrant and native-born essential workers, these effects should if anything be stronger for foreign citizens: naturalised migrants tend to be older and they enjoy a much more secure status. Yet the results seem to remain roughly the same, whether only foreign citizens or all foreign-born are considered (if anything, the discrepancy appeared to be slightly weaker for foreign citizens). Similarly, if migrants had e.g. a tendency to stay longer in their jobs as essential workers, and were therefore more seasoned and less likely to fall ill, there should again be a difference in results between the foreign-born and foreign citizens – the latter include many recent arrivals. A potential explanation that remains is the so-called healthy migrant effect, the still debated proposition that those who endeavour to migrate are a positive selection in terms of health-related attributes or personal resilience (e.g. Domnich et al., 2012).

The results in Section 6 on working hours contrast with pooled results that Fasani and Mazza (2024) reported for 12 European countries. They explore, in two separate estimations, how weekly hours worked by essential workers and non-essential workers changed from 2019 to 2020, accounting for a few demographic variables but not for the severity of the pandemic. The analysis in this paper of course only covers Italy, and instead estimates how the regional severity of the pandemic affected working hours, allowing the effect to differ between essential and non-essential workers. Table 9 juxtaposes the results for hours worked, and they match only for foreign-born non-essential workers. For essential workers, this paper even finds the opposite of the result in Fasani and Mazza (2024): an increase in hours worked by native-born essential workers, relative to foreign-born colleagues, instead of a relative decrease. Both papers agree, however, that the hours worked by native-born essential workers increased relative to non-essential workers.

The results in Section 6 on looking for another job seem surprising in so far as this indicator changed only in the specific case of essential workers who are foreign citizens. Given the hardships that a more severe pandemic impact might impose on essential workers, one could have expected a link with higher intentions to change jobs, across the board. However, it appears plausible that foreign citizens stand out in this context: this group includes many recently arrived migrants (as opposed to settled migrants who have often been naturalised). Recent migrants are still more mobile and less committed to a

particular job or place (in line with the negative effect of job tenure on looking for another job, see Table A4). Their family might still be abroad, which makes changing jobs in a pandemic easier for them, and possibly a part of efforts to return to the family (Poeschel, 2020). As recent migrants who are essential workers can be more likely to have temporary jobs, few career prospects and poor working conditions (Nivorozhkin and Poeschel, 2022), they may have more reasons to look for a better job.

Figure 9: Comparison of results on hours worked by essential workers, 2020

	Essential workers		Other workers	
	Fasani & Mazza	this paper	Fasani & Mazza	this paper
Native-born	Decrease	Strong increase	Strong decrease	Stable
Foreign-born	Increase*	Stable	Strong decrease	Strong decrease

*Found for migrants from EU countries, not for non-EU migrants. Note: The results are not directly comparable, as Fasani and Mazza (2024) report changes from 2019 to 2020 for 12 European countries combined, while this paper reports changes with rising severity of the pandemic, for Italy only.

7.2 Implications for policies on essential sectors and migration

Essential workers facing a crisis situation are likely to be themselves affected, directly or indirectly. A global pandemic caused by an airborne virus that is easily transmitted from one person to another may be one of the scenarios in which essential workers are especially often affected indirectly, by exposure as part of their work. Keeping this in mind, the estimates in this paper suggest that essential workers in the worst-affected region-quarter combinations were absent due to illness at roughly double the rate seen in the least affected region-quarter combinations. Compared to non-essential workers, who were deliberately shielded by lockdowns and working from home and therefore less affected, the increase in absence due to illness was between two and four times as high for essential workers. For essential workers in frontline roles, the rate of absence due to illness nearly quadrupled, and was around six times as high as for all workers not in frontline roles. These relations can inform contingency plans and the size of staff reserves needed for a high level of preparedness. They can also motivate investing in personal protective equipment and the like, in order to dampen the effect on essential workers.

Other results of the analysis appear rather encouraging. Policy makers can not only expect that the hours worked by individual essential workers will remain stable, but that they will even increase significantly when necessary. Essential workers in the worst-affected region-quarter combinations were working between 10% and 20% more hours than those in the least affected region-quarter combinations. A comparable increase was not observed for non-essential workers (at most 3% more). However, the figures also hint that existing part-time work made these increases possible for essential workers, so

that the extent of part-time work in normal times could be an important determinant for increasing working hours in crises. Next, most essential workers did not exhibit a discernible tendency to look for another job more often – if anything, this appeared to happen slightly less in the worst-affected region-quarter combinations (as for non-essential workers).

The specific results for foreign-born and foreign citizens demonstrate again that migrants in essential occupations are not simply clones of native-born workers. On the downside, their work may be adversely affected by migration and integration policies, including travel restrictions that were widely used during the pandemic. On the upside, migrant labour can be an important part in a mix of policies that raises the resilience of essential sectors. The results in this paper suggest that the individual resilience of migrant essential workers is high: they were comparatively rarely absent due to illness, their working hours remained stable and with the exception of foreign citizens, the pandemic did not make them look for another job more often.

One could therefore say that the contribution by migrant essential workers to Italy’s COVID-19 response does not leave much to be desired. If foreign citizens are more often looking for another job, it may be possible to retain them through both public policies and personnel management that take into account the particular situation of foreign citizens, including many persons who arrived only recently. That apart, it should be explored why the working hours of migrant essential workers did not rise (in contrast to the native-born) even though more than one-third work part-time (see Figure 3).

The findings of this paper appear to strengthen the case for rethinking labour migration policies after COVID-19 (Anderson et al., 2021). Following the realisation that many essential workers are migrants, there is now also evidence that reliance on migrant essential workers correlates with job attributes and working conditions (Broberg et al., 2024; Nivorozhkin and Poeschel, 2022), that they faced a higher risk of job loss during the pandemic (Borjas and Cassidy, 2023; Fasani and Mazza, 2024) and that labour migration policies with more emphasis on essential workers would also enjoy public support (Allen et al., 2023).

8 Conclusions

The COVID-19 pandemic has put severe pressure on countries around the world, often resulting in high excess deaths compared to normal times. At the example of Italy, one of the worst-hit countries, this paper investigates how essential workers - the persons employed in sectors that could not go into lockdown - adapted to this situation in 2020. Using the variation in the impact of the pandemic over time and across 20 Italian regions, and relating it to micro-level labour force survey data on workers, the analyses find that essential workers were more exposed to the pandemic. For example, they were more often absent from work due to illness than non-essential workers in the same region. On the

other hand, weekly hours worked by essential workers increased substantially, also relative to non-essential workers, and there was no general tendency for essential workers to look more often for another job. These empirical results only follow from careful inspection of how the pandemic interacted with particular groups and are not necessarily visible in overall trends during the pandemic.

However, the analysis also finds pronounced differences between patterns for foreign-born and native-born essential workers. Given that migrants often account for unexpectedly large shares of employment in essential sectors (Broberg et al., 2024), such differences deserve attention and can inform efforts to raise the resilience of essential sectors. Specifically, this paper finds that migrants were not staying home sick more often and had rather stable hours. Migrant workers in Italy's essential sectors have therefore shown a certain resilience, which speaks to their contribution to essential sectors more generally. Foreign-born essential workers did not exhibit a growing tendency to look for another job either (in line with the native-born), but this was found for the group of foreign citizens among essential workers (who have on average spent less time in Italy than naturalised migrants and therefore often hold a different status). Overall, the differences compared to native-born and Italian citizens suggest that migration and integration policies have implications for the workforce in essential sectors and therefore also affect the resilience of these sectors.

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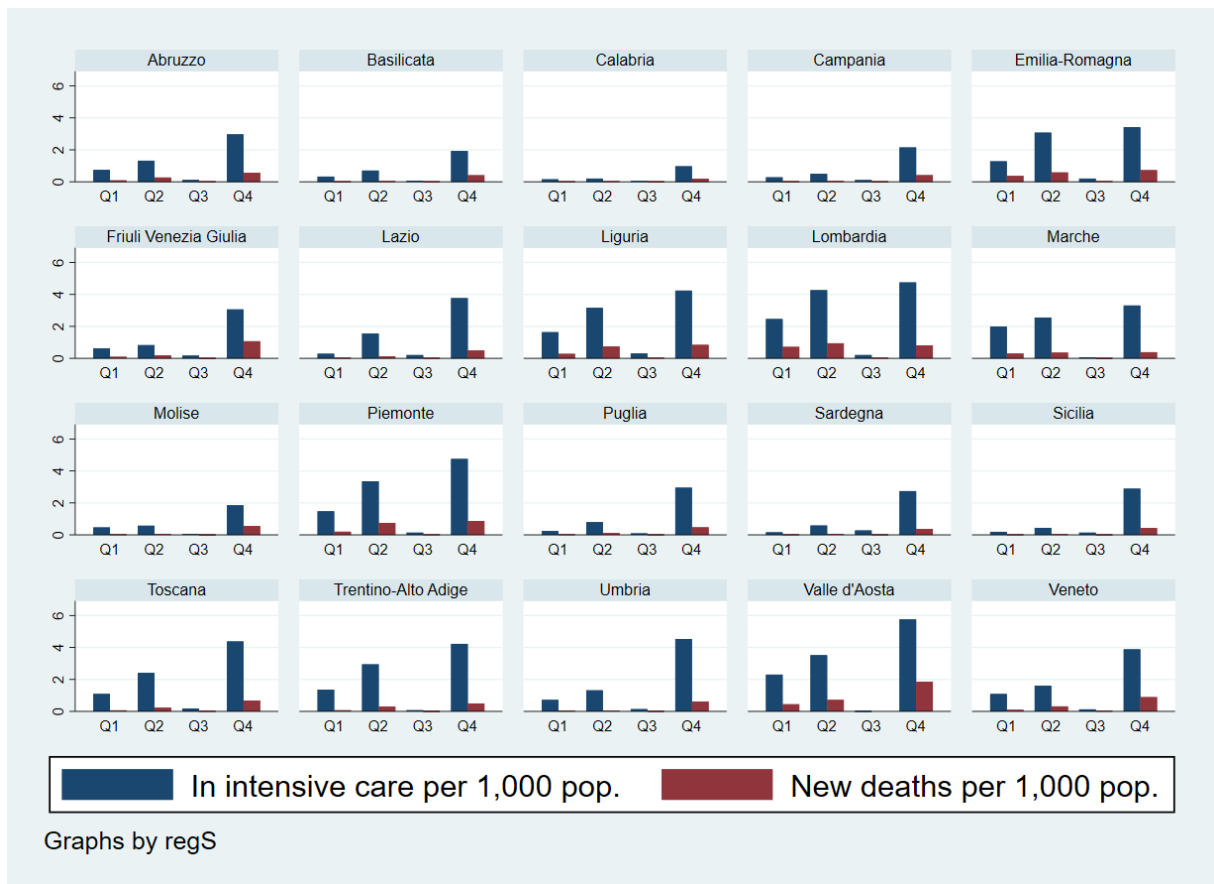
A Appendix

Figure 10: Composition of employment in essential occupations by employee origin, 2020

Occupation	ISCO3D code	native-born	EU migrants	non-EU migrants	all migrants
Life science professionals	213	96%	3%	1%	4%
Engineering professionals (excluding electrotechnology)	214	96%	2%	2%	4%
Medical doctors	221	96%	1%	3%	4%
Other health professionals	226	97%	1%	2%	3%
University and higher education teachers	231	94%	3%	3%	6%
Vocational education teachers	232	95%	1%	4%	5%
Secondary education teachers	233	96%	1%	2%	4%
Primary school and early childhood teachers	234	98%	1%	1%	2%
Other teaching professionals	235	90%	4%	6%	10%
Software and applications developers and analysts	251	96%	0%	4%	4%
Database and network professionals	252	94%	5%	1%	6%
Physical and engineering science technicians	311	96%	1%	3%	4%
Mining, manufacturing and construction supervisors	312	93%	3%	5%	7%
Process control technicians	313	87%	4%	9%	13%
Life science technicians and related associate professionals	314	96%	4%	1%	4%
Ship and aircraft controllers and technicians	315	96%	2%	2%	4%
Medical and pharmaceutical technicians	321	96%	1%	3%	4%
Nursing and midwifery associate professionals	322	89%	5%	5%	11%
Information and communications technology operations and user support technicians	351	97%	1%	2%	3%
Telecommunications and broadcasting technicians	352	99%	0%	1%	1%
Travel attendants, conductors and guides	511	81%	4%	15%	19%
Other personal services workers	516	92%	3%	4%	8%
Child care workers and teachers' aides	531	74%	5%	22%	26%
Personal care workers in health services	532	54%	16%	30%	46%
Market gardeners and crop growers	611	85%	5%	10%	15%
Animal producers	612	89%	2%	9%	11%
Mixed crop and animal producers	613	97%	2%	1%	3%
Fishery workers, hunters and trappers	622	84%	2%	14%	16%
Food processing and related trades workers	751	79%	6%	15%	21%
Food and related products machine operators	816	74%	8%	18%	26%
Locomotive engine drivers and related workers	831	96%	4%	0%	4%
Car, van and motorcycle drivers	832	85%	5%	10%	15%
Heavy truck and bus drivers	833	82%	10%	9%	18%
Ships' deck crews and related workers	835	95%	4%	0%	5%
Domestic, hotel and office cleaners and helpers	911	55%	11%	34%	45%
Vehicle, window, laundry and other hand cleaning workers	912	75%	8%	17%	25%
Transport and storage labourers	933	73%	6%	21%	27%
Refuse workers	961	89%	2%	10%	11%

Note: Based on the definition of essential occupations used in Broberg et al., 2024.

Figure 11: Regional impact measures employed in the analysis, 2020



Sources: Italian Department for Civil Protection (figures on deaths and numbers in intensive care) and ISTAT (population figures).

Table A1: Regression results with absence from work due to illness as dependent variable

Column	(1)	(2)	(3)	(4)
Pandemic impact measure	deaths	deaths	intensive care	intensive care
Definition of subgroup	foreign-born	foreign citizen	foreign-born	foreign citizen
in subgroup (foreign-born/foreign cit.)	-0.005 ** (0.001)	-0.006 ** (0.001)	-0.005 ** (0.001)	-0.005 ** (0.001)
essential worker	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
pandemic impact (death/intensive care)	0.003 * (0.001)	0.003 * (0.001)	0.001 (0.000)	0.001 * (0.000)
essential worker X pandemic impact	0.005 * (0.002)	0.004 (0.002)	0.001 * (0.001)	0.001 * (0.000)
subgroup X essential worker	-0.001 (0.001)	-0.002 (0.001)	0.000 (0.002)	-0.002 (0.001)
subgroup X pandemic impact	0.001 (0.002)	0.000 (0.002)	0.000 (0.000)	0.000 (0.000)
subgroup X ess. worker X pand. impact	-0.007 (0.003)	-0.004 (0.003)	-0.001 * (0.001)	-0.001 (0.001)
aged 54 to 67	0.004 ** (0.001)	0.004 ** (0.001)	0.004 ** (0.001)	0.004 ** (0.001)
female	0.002 * (0.001)	0.002 * (0.001)	0.002 * (0.001)	0.002 * (0.001)
child under 6 in the household	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
high education level	-0.004 ** (0.001)	-0.004 ** (0.001)	-0.004 ** (0.001)	-0.004 ** (0.001)
working part-time	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
holds a second job	-0.003 ** (0.001)	-0.003 ** (0.001)	-0.004 ** (0.001)	-0.004 ** (0.001)
small firm (less than 20 persons)	-0.003 ** (0.001)	-0.003 ** (0.001)	-0.003 ** (0.001)	-0.003 ** (0.001)
tenure	0.000 ** (0.000)	0.000 ** (0.000)	0.000 ** (0.000)	0.000 ** (0.000)
tenure squared	0.000 ** (0.000)	0.000 ** (0.000)	0.000 ** (0.000)	0.000 ** (0.000)
frontline role	0.005 ** (0.001)	0.005 ** (0.002)	0.005 ** (0.001)	0.005 ** (0.001)
occupational groups fixed effects	no	no	no	no
region fixed effects	yes	yes	yes	yes
observations (N)	129032	129032	129032	129032

Note: * indicates statistical significance at the 5% significance level, ** at the 1% significance level.

Table A2 Regression results for workers in frontline occupations, with absence from work due to illness as dependent variable

Column	(1)	(2)	(3)	(4)
Pandemic impact measure	deaths	deaths	intensive care	intensive care
Definition of subgroup	foreign-born	foreign citizen	foreign-born	foreign citizen
in subgroup (foreign-born/foreign cit.)	-0.005 ** (0.001)	-0.006 ** (0.001)	-0.005 ** (0.001)	-0.006 ** (0.001)
frontline occupation	0.003 (0.002)	0.003 (0.002)	0.001 (0.002)	0.002 (0.002)
pandemic impact (death/intensive care)	0.003 ** (0.001)	0.003 ** (0.001)	0.001 ** (0.000)	0.001 ** (0.000)
frontline occ. X pandemic impact	0.012 * (0.006)	0.010 (0.005)	0.003 * (0.001)	0.003 * (0.001)
subgroup X frontline occ.	-0.001 (0.003)	-0.004 * (0.002)	0.000 (0.003)	-0.003 (0.002)
subgroup X pandemic impact	0.000 (0.002)	0.000 (0.001)	0.000 (0.000)	0.000 (0.000)
subgroup X frontline occ. X pand. impact	-0.016 ** (0.006)	-0.012 * (0.005)	-0.004 * (0.001)	-0.003 * (0.001)
aged 54 to 67	0.004 ** (0.001)	0.004 ** (0.001)	0.004 ** (0.001)	0.004 ** (0.001)
female	0.002 * (0.001)	0.002 * (0.001)	0.002 * (0.001)	0.002 * (0.001)
child under 6 in the household	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
high education level	-0.004 ** (0.001)	-0.004 ** (0.001)	-0.004 ** (0.001)	-0.004 ** (0.001)
working part-time	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)
holds a second job	-0.003 ** (0.001)	-0.003 ** (0.001)	-0.004 ** (0.001)	-0.003 ** (0.001)
small firm (less than 20 persons)	-0.003 ** (0.001)	-0.003 ** (0.001)	-0.003 ** (0.001)	-0.003 ** (0.001)
tenure	0.000 ** (0.000)	0.000 ** (0.000)	0.000 ** (0.000)	0.000 ** (0.000)
tenure squared	0.000 ** (0.000)	0.000 ** (0.000)	0.000 ** (0.000)	0.000 ** (0.000)
occupational groups fixed effects	no	no	no	no
region fixed effects	yes	yes	yes	yes
observations (N)	129032	129032	129032	129032

Note: * indicates statistical significance at the 5% significance level, ** at the 1% significance level.

Table A3: Regression results with weekly hours worked as dependent variable

Column	(1)	(2)	(3)	(4)
Pandemic impact measure	deaths	deaths	intensive care	intensive care
Definition of subgroup	foreign-born	foreign citizen	foreign-born	foreign citizen
in subgroup (foreign-born/foreign cit.)	-0.017 (0.311)	0.311 (0.367)	0.032 (0.329)	0.381 (0.385)
essential worker	-3.103 ** (0.213)	-3.051 ** (0.209)	-3.322 ** (0.226)	-3.269 ** (0.222)
pandemic impact (death/intensive care)	0.574 * (0.232)	0.512 * (0.228)	0.083 (0.046)	0.073 (0.045)
essential worker X pandemic impact	2.145 ** (0.369)	2.153 ** (0.359)	0.507 ** (0.076)	0.508 ** (0.074)
subgroup X essential worker	3.532 ** (0.456)	4.102 ** (0.517)	3.687 ** (0.483)	4.299 ** (0.542)
subgroup X pandemic impact	-2.305 ** (0.608)	-2.476 ** (0.714)	-0.449 ** (0.122)	-0.489 ** (0.142)
subgroup X ess. worker X pand. impact	-0.246 (0.904)	-0.419 (1.029)	-0.123 (0.182)	-0.179 (0.204)
female	-3.442 ** (0.126)	-3.448 ** (0.126)	-3.442 ** (0.126)	-3.449 ** (0.126)
married	-0.081 (0.117)	-0.074 (0.117)	-0.081 (0.117)	-0.075 (0.117)
child under 6 in the household	-0.971 ** (0.169)	-0.991 ** (0.169)	-0.975 ** (0.169)	-0.995 ** (0.169)
high education level	0.677 ** (0.161)	0.683 ** (0.161)	0.675 ** (0.161)	0.681 ** (0.161)
also student	-1.748 ** (0.386)	-1.721 ** (0.386)	-1.750 ** (0.386)	-1.722 ** (0.386)
working part-time	-15.036 ** (0.133)	-15.026 ** (0.133)	-15.036 ** (0.133)	-15.026 ** (0.133)
holds a second job	-1.269 ** (0.392)	-1.271 ** (0.393)	-1.266 ** (0.392)	-1.270 ** (0.393)
small firm (less than 20 persons)	0.211 (0.122)	0.175 (0.122)	0.212 (0.122)	0.176 (0.122)
managerial role	1.863 ** (0.229)	1.858 ** (0.229)	1.865 ** (0.229)	1.859 ** (0.229)
tenure	-0.007 (0.016)	-0.005 (0.016)	-0.007 (0.016)	-0.004 (0.016)
tenure squared	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
frontline role	4.107 ** (0.239)	4.070 ** (0.239)	4.100 ** (0.239)	4.063 ** (0.239)
occupational groups fixed effects	yes	yes	yes	yes
region fixed effects	yes	yes	yes	yes
observations (N)	128158	128158	128158	128158

Note: * indicates statistical significance at the 5% significance level, ** at the 1% significance level.

Table A4: Regression results with looking for another job as dependent variable

Column	(1)	(2)	(3)	(4)
Pandemic impact measure	deaths	deaths	intensive care	intensive care
Definition of subgroup	foreign-born	foreign citizen	foreign-born	foreign citizen
in subgroup (foreign-born/foreign cit.)	0.005 (0.004)	0.005 (0.005)	0.006 (0.005)	0.005 (0.005)
essential worker	-0.008 ** (0.002)	-0.008 ** (0.002)	-0.008 ** (0.002)	-0.008 ** (0.002)
pandemic impact (death/intensive care)	-0.004 (0.003)	-0.004 (0.003)	-0.001 (0.001)	-0.001 (0.001)
essential worker X pandemic impact	-0.005 (0.004)	-0.005 (0.004)	-0.001 (0.001)	-0.001 (0.001)
subgroup X essential worker	0.006 (0.007)	0.003 (0.008)	0.005 (0.008)	0.002 (0.009)
subgroup X pandemic impact	-0.006 (0.008)	-0.003 (0.009)	-0.002 (0.002)	-0.001 (0.002)
subgroup X ess. worker X pand. impact	0.024 (0.014)	0.033 * (0.016)	0.005 (0.003)	0.006 (0.003)
female	-0.012 ** (0.002)	-0.011 ** (0.002)	-0.012 ** (0.002)	-0.011 ** (0.002)
aged 16 to 34	-0.005 * (0.002)	-0.005 * (0.002)	-0.005 * (0.002)	-0.005 * (0.002)
aged 54 to 67	-0.014 ** (0.001)	-0.014 ** (0.001)	-0.014 ** (0.001)	-0.014 ** (0.001)
married	-0.014 ** (0.001)	-0.014 ** (0.001)	-0.014 ** (0.001)	-0.014 ** (0.001)
older than 75	-0.010 ** (0.002)	-0.010 ** (0.002)	-0.010 ** (0.002)	-0.010 ** (0.002)
medium education level	0.006 ** (0.002)	0.006 ** (0.002)	0.006 ** (0.002)	0.006 ** (0.002)
high education level	0.018 ** (0.003)	0.018 ** (0.003)	0.018 ** (0.003)	0.018 ** (0.003)
income in top 30%	0.002 (0.001)	0.002 (0.001)	0.002 (0.001)	0.002 (0.001)
income in bottom 30%	0.014 ** (0.002)	0.014 ** (0.002)	0.014 ** (0.002)	0.014 ** (0.002)
working part-time	0.043 ** (0.003)	0.043 ** (0.003)	0.043 ** (0.003)	0.043 ** (0.003)
holds a second job	0.019 * (0.008)	0.019 * (0.008)	0.019 * (0.008)	0.019 * (0.008)
tenure	-0.003 ** (0.000)	-0.003 ** (0.000)	-0.003 ** (0.000)	-0.003 ** (0.000)
tenure squared	0.000 ** (0.000)	0.000 ** (0.000)	0.000 ** (0.000)	0.000 ** (0.000)
frontline role	0.004 (0.003)	0.004 (0.003)	0.004 (0.003)	0.004 (0.003)
permanent contract	-0.008 ** (0.003)	-0.008 ** (0.003)	-0.008 ** (0.003)	-0.008 ** (0.003)
occupational groups fixed effects	yes	yes	yes	yes
region fixed effects	yes	yes	yes	yes
observations (N)	129032	129032	129032	129032

Note: * indicates statistical significance at the 5% significance level, ** at the 1% significance level.