



The Role of Migration for Workplace Safety in Italy

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Received: 28 November 2023 / Accepted: 23 March 2024

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Abstract

Using microdata from the Labour Force Survey (2009–2019) and special Labour Force Surveys conducted in 2007, 2013, and 2020 in Italy, this study examines (i) whether immigrants are more likely than native-born workers to experience occupational injuries and job-related health problems and (ii) the effects of immigration on the allocation of occupational risks. We also contribute to the literature in this context by considering differences between natives and immigrants that may exist outside individual characteristics (age, gender), such as education, the age at which immigrants entered Italy and the length of stay. We find that immigrants are involved in riskier and more unsafe tasks; moreover, immigration in the last decade has led to a reduction in the average physical burden of native-born workers. Our results have important policy implications because they might be weighed against the racist sentiments of the local community.

Keywords Migration · Workplace safety · Education

JEL Classification J15

1 Introduction

Migrants make up 4.7% of all workers worldwide (ILO 2018) and approximately 12% of all workers in the World Health Organization European Region (WHO 2018).

Social and political debate in Europe in recent decades has widely focused on concerns about growing immigration flows, in addition to the high unemployment

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rate and economic crisis. The main worries of native-born citizens are about increased criminality, additional burdens on the welfare system and, most importantly, the fear that immigrants “take their jobs”. In this context, Edo and Özgüzel (2023) show that the increase in the share of immigrants across European regions over the 2010–2019 period has a detrimental effect on employment, particularly among low-skilled workers, in less economically dynamic contests and in countries that provide less employment protection. However, these effects disappear in the long run. Fusaro and López-Bazo (2021) analyse the effects of immigration inflows on native-born employment in the Italian provinces in the years 2009–2017, and their findings show no or negligible effects of migration on native-born employment rates.

A related aspect is whether immigrants actually compete with native-born persons for the same jobs or whether they accept “inferior jobs” that native-born people dislike (Hamermesh 1995, 1997¹; Orrenius and Zavadny 2015). In fact, the majority of immigrants work in more dangerous and demanding jobs, in agriculture, construction, manufacturing and domestic work (EU-OSHA 2007; Brian 2021).

While a significant amount of literature focuses on both job injuries and the effects of immigration in Europe, there is limited research that specifically examines the intersection of these two topics.

More recently, however, the placement of foreign workers in occupations with greater physical demands and health risks than the jobs held by native-born workers has received attention as a further effect of immigration in host countries, particularly focusing on the workplace safety of native-born workers. For example, Giuntella et al. (2019) and Bellés-Obrero et al. (2021), in the UK and in Spain, respectively, find that, on average, immigration causes native-born workers to be reassigned to positions that require plenty of communication and have lower physical demands and injury hazards.

This study focuses on the Italian context where, as in the UK and Spain, limited attention has been given to the safety of immigrant workers (Shepherd et al. 2021). Italy, together with Greece, Portugal and Spain, has become a “country of immigration” only in the last decades of the twentieth century (Bettin and Cela 2014). The proportion of foreigners in the population during the first decade of the 2000s increased from 2.3% in 2002 to 6.84% in 2011. Simultaneously, coinciding with the events of the Arab Spring, the number of refugees and asylum seekers surged from 16,844 in 2012 to 188,084 in 2016 (Colucci 2018), with the percentage of the population that was foreign-born reaching approximately 8% in that year. Most immigrants to Italy are low-skilled and come from developing nations outside of the European Union.

Previous studies (Bena and Giraudo 2014; Giraudo et al. 2017, 2019; D’Ambrosio et al. 2022) have shown that immigrant workers in Italy are more likely to experience workplace injuries than are native-born workers. The aforementioned studies draw on the Work History Italian Panel-Salute integrated database and concentrate on the injuries experienced by workers in the private economic sector (engineering, building, wholesale and retail commerce, transportation, and storage). The need of qualitative

¹ Hamermesh (1995) reports that minority workers in the U.S. and the foreigners in Germany are more likely to work at undesirable times (e.g. in the evening or at night). In a further work, Hamermesh (1997) shows that African-Americans, not immigrants, take jobs that similar native-born people are unwilling to take.

data on migrants, including information on education and language proficiency, as well as psychological health and occupational safety, emerges in earlier studies.

We extend the literature as follows. First, we present new information from the Labour Force Survey (2009–2019) and special rounds of the Labour Force Surveys (2007, 2013, and 2020) regarding workplace safety in Italy, as well as any differences between native-born workers and immigrants. We obtain information on the characteristics of the workers (e.g., their educational level, the age at which immigrants entered Italy, and how long they have lived there), any workplace accidents they may have had in the preceding year, and the degree of mental and physical stress they face at work. We also report measures of the burden associated with a given job (e.g., exposure to physical and psychosocial issues, as well as to carcinogenic agents) relying on the “General Index for Job Demands in Occupations” (Kroll 2011).

Second, we add to the ongoing discussion (Giuntella et al.; 2019; Bellés-Obrero et al. 2021) on whether and how migration affects native-born workers’ safety. Relying on the LFS surveys between 2009 and 2019, we define an indicator of overall occupational risk experienced by native-born workers on a yearly basis. Finally, we address the potential endogeneity of migration flows with valid instruments (immigrant enclaves and public opinion towards immigrants).

The paper is structured as follows. Section 2 introduces the theoretical framework and our research hypotheses. Section 3 describes the data used in the analysis. Sections 4 and 5 present the empirical models and summarize the findings. Section 6 contains concluding remarks and insights for future research.

2 Background and Hypotheses

The mechanisms that determine the equilibrium levels of workplace safety and wages are usually explained in the framework of the hedonic wage model (Rosen 1974, 1987). Theory predicts that workers dislike physical burden and risk and may self-sort into relatively safe occupations, or require a compensating wage premium for risky jobs.

However, a number of circumstances may make it more difficult for immigrant workers than for native-born workers to trade wages for increased safety or to demand compensation for their risks, thus leading to a segmented labour market where immigrants are engaged in risky jobs with little or no matching compensation (Hersch and Viscusi 2010). These circumstances may include low productivity, particularly lower safety-related productivity² (Hersch and Viscusi 2010) because of low language proficiency³ and lack of national-specific skills (Bratti and Conti 2018; Lee et al. 2022), less risk-aware behaviour (D’Ambrosio et al. 2022), discrimination (Sparber and Zavodny 2022), poor social networks and trade union integration (Orrenius and Zavodny 2015). Finally, due to different educational systems or distinct on-the-job training, education and experience acquired in various countries of origin—particularly in comparatively

² Hersch and Viscusi (2010) argue that “if immigrant workers have a lower marginal product, whether it is because of lower productivity or greater safety training costs, they will be paid lower wages and face a lower wage offer curve from the firm”, p. 5. 5.

³ For example, risk assessments and safety instruction are typically given in the language of the host nation.

less developed countries—immigrants may not be given the respect they deserve in the host country (Zorlu and Hartog 2012; Basilio et al. 2017).

Another strand of the literature emphasizes that immigrants are more willing than native-born workers to accept physically demanding or hazardous jobs because they have differing preferences for risk/reservation wages. Indeed, they are usually healthier and younger than native-born workers (Giuntella et al. 2019), and come from places where job security is lower (Antecol and Bedard 2006). According to Dustmann et al. (2023), immigrants should be less risk averse than native-born workers and their countrymen who stay in the source nation. In addition, they may underestimate occupational danger when they first arrive in their new country due to a lack of knowledge and local experience, and some employers may exploit undocumented workers by paying them low wages and exposing them to dangerous working conditions without proper protections (Davila et al. 2011; Porru and Baldo 2022).

Several studies on workplace safety for immigrants and native-born workers as well as on wage compensation for risk have been conducted in the US and several European countries, occasionally yielding conflicting results (Orrenius and Zavodny 2015⁴).

Most empirical research in Italy shows that foreigners, especially if males, continue to be overrepresented in dangerous or unhealthy industries (and occupations), such as engineering, construction, wholesale and retail trade, transportation, and storage (Barone and Nese 2002; Bena and Giraudo 2014; Giraudo et al. 2017, 2019; Arici et al. 2019; Bossavie et al. 2022; D'Ambrosio et al. 2022).

D'Ambrosio et al. (2022), relying on the Work Histories Italian Panel (WHIP), show that, over the 1994–2012 period, low-wage employees in Italy are significantly more likely to be injured; however, considering the same wage level, the number of injuries reported for foreigners is far greater than for native-born workers. The authors claim that the downwards wage pressure, lessened by minimum contractual wage floors, shifts to (unobserved) workplace unsafety.

The fact that a greater proportion of immigrants than native-born workers engage in hazardous jobs raises a further questions regarding how immigration affects natives' prospects in terms of working conditions. Giuntella et al. (2019) identified two potential results. On the one hand, more immigration means more competition in the labour market, which may push native-born workers to face worse working conditions (and to underreport security threats) to maintain their jobs. Consequently, we should expect an overall increase in workplace injuries and a decrease in the safety of native-born workers. On the other hand, immigrants are more likely to replace native-born workers in jobs with a higher risk of injury if they differ in some way (for example, if immigrants are younger, healthier, less risk averse and less skilled than the average population in the host country). This would imply a decrease in injuries and healthy diseases among native-born workers.

⁴ Orrenius and Zavodny (2015) reported the following conclusions. Immigrants are overrepresented in occupations and industries with higher injury and fatality rates in the US, Canada and Spain; in certain advanced economies (France, Germany, the Netherlands, Switzerland, and Spain), but not everywhere (i.e., Sweden and Finland), immigrants suffer greater rates of work-related injuries and fatalities; last, most immigrants—although not all—earn risk premiums similar to native-born workers for taking up hazardous jobs.

Indeed, empirical research has shown that when the number of immigrants increases, communication-intensive jobs yield higher relative returns, which incentivizes native-born people to pursue them (Peri 2012, 2016; D'Amuri and Peri 2014; Ottaviano et al. 2013; Peri and Sparber 2009). However, the literature on the effects of immigration on native-born workers' safety is scarce. In Germany, Bauer et al. (1998) found that in 1975, for every 1% increase in the share of foreign workers, there was a 0.45% decrease in severe injuries among native-born workers. According to Giuntella et al. (2019), immigration in England and Wales between 2003 and 2013 resulted in a reallocation of workers who were born in the UK to jobs that had less physical labour and fewer injury risks. Bellés-Obrero et al. (2021) highlighted a significant decrease in workplace injuries among native-born workers in Spain due to the large influx of immigrants between 2003 and 2009. This decrease was primarily caused by Spanish-born workers shifting from manual labour to jobs requiring more interpersonal interactions and language skills.

Considering prior empirical and theoretical contributions in this field, our aim is to test the following hypotheses.

Hypothesis 1: Immigrants work in riskier jobs than native-born workers.

In this respect, we extend the empirical literature since we focus on both the psychological and physical aspects of workplace safety (beyond the occurrence of injuries).

Hypothesis 2: Immigrants are employed in riskier jobs because, in addition to having, on average, less education than native-born workers, most of them lack language proficiency and national-specific skills.

We overcome an additional constraint in the empirical literature by highlighting whether different skills, in particular education and language proficiency, matter in determining immigrants' access to job benefits. If these skills have a key role, we should expect no differences in workplace safety between native-born workers and immigrants who arrived in Italy at school age, particularly those who have been living in Italy for many years.

Hypothesis 3: Immigrants are more likely to be employed in unhealthy and unsafe jobs because they underestimate occupational risk.

Indeed, immigrants, particularly those who recently arrived, may possess less awareness of local working conditions and language proficiency than native-born workers. Conversely, we should not expect differences in workplace safety for native-born workers or immigrants who have resided in Italy for more than ten years, as this duration is deemed sufficient for integration (Lee et al. 2022).

Hypothesis 4: Immigration reduces the average physical burden and health risks of native-born workers.

The placement of foreign-born workers in occupations with greater physical demands and health risks should be considered a beneficial effect of immigration on host communities. In line with previous research in the UK and Spain, we argue that

the decline in illnesses and injuries among local workers should be the consequence of their shift to jobs requiring more communication skills than hard labour.⁵ However, due to data limitations,⁶ we are unable to conduct a more thorough investigation of this process, and this explanation remains speculative.

3 Data

The main dataset is drawn from the Labour Force Survey (2009–2019). The EU-LFS is a large household sample survey providing quarterly and yearly results on labour participation and on people outside the labour force. Our sample is limited to employees aged between 18 and 65 years old, that is, those of working age. The dataset includes information on individual characteristics (age, sex, education level, country of birth), professional status, and occupation. As in Giuntella et al. (2019), we measured the burden of a given job by relying on the “General Index for Job Demands in Occupations” elaborated by Kroll (2011). By taking into account factors such as the need to lift and/or move heavy objects, stretch, kneel, lie down, work around smoke or other gases, and work in cold, hot, or wet conditions, Kroll derives physical and psychosocial exposure indices, a heavy work index, and a carcinogenic agents index for each occupation at the 2-digit ISCO-88/08 classification (see Appendix B for more details).⁷ These indices have been matched to our dataset with occupations classified at the ISCO-08 level.

Figures 1 and 2 (Table 1A in Appendix A) summarize the different risks associated with the occupations held by the workers in our sample (EU-LFS, 2009–2019), measured by Kroll’s indices on a scale of 0–10

We distinguish between males and females, as well as between native-born workers and foreigners who came to Italy before the age of 18 and those who arrived after the age of 18, to isolate the effect of host country education (Lee et al. 2022). Foreign-born people face greater risks than native-born workers, especially if they have arrived in Italy after the age of 18 (in Table 1A, 8.07 vs. 5.82 for males, 7.33 vs. 4.8 for females). When we consider psychological dangers, the gap between native-born workers and outsiders narrows, particularly among males.⁸ Among low-educated workers in Fig. 3 (Table 2A in Appendix), the native-foreigner disparity decreases.

We also rely on the Labour Force Surveys-Ad Hoc Modules (LFS-AHM) on accidents at work and other work-related health problems conducted in 2007, 2013, and 2020. These surveys asked how many accidents the respondents had experienced in the

⁵ Alternatively, some may argue that immigrants have merely replaced native-born workers in riskier jobs, potentially leading to increased unemployment among native-born workers. This argument is not supported by previous findings in Fusaro and López-Bazo (2021): they demonstrate that, irrespective of their skill level, native males’ employment remained largely unaffected by immigration shocks during the period 2009–2017.

⁶ Unfortunately, since we do not have access to past employee employment records, we are unable to determine whether any employment changes in the sample coincided with the rise in immigration.

⁷ <https://data.gesis.org/sharing/#!Detail/10.7802/1102>. The data were accessed on 22 December 2022.

⁸ Most female migrants in Italy are employed as caregivers of disabled people, Alzheimer’s patients, or in jobs that usually require psychological stress.

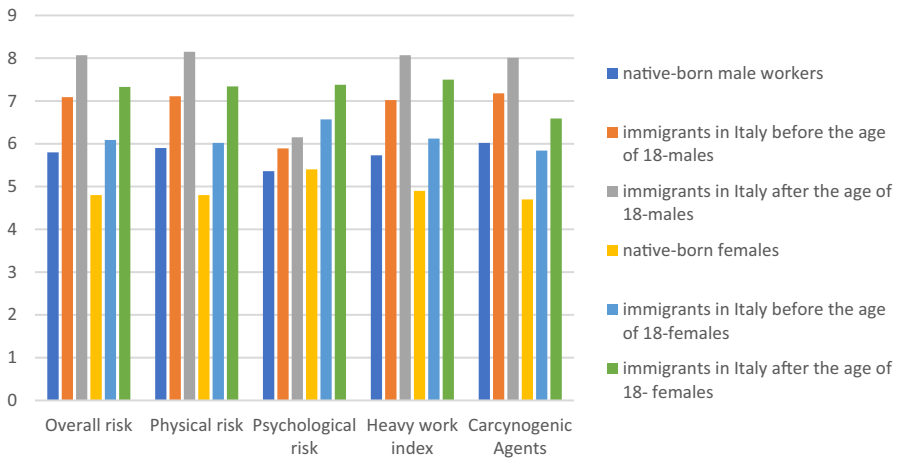


Fig. 1 Risks on the job—our elaborations on LFS 2009–2029

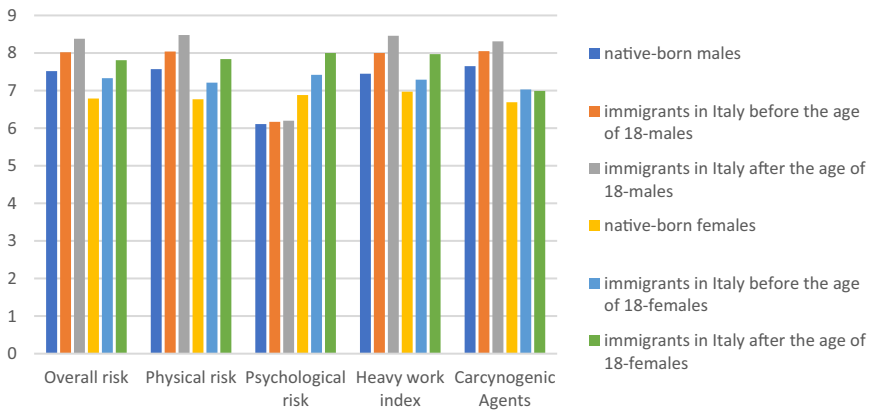


Fig. 2 Risks on the job—our elaborations on LFS 2009–2029—respondents with low education (compulsory level or less)

year preceding the interview, which were caused or aggravated by work. Furthermore, each LFS–AHM survey reports information on employees’ exposure to physical and psychological risk factors as evaluated by the workers themselves.

Figures 3 and 4 (Table 3A in Appendix A) report the main statistics from the AHM-LFS for the whole sample and for less educated workers, respectively. There are no noticeable differences between immigrants and native-born workers, even if the probability of injuries remains slightly higher among immigrant workers. It is interesting to note that only among native-born workers does the incidence of accidents decline as education levels rise. This suggests that immigrants perform jobs that are below their educational level.

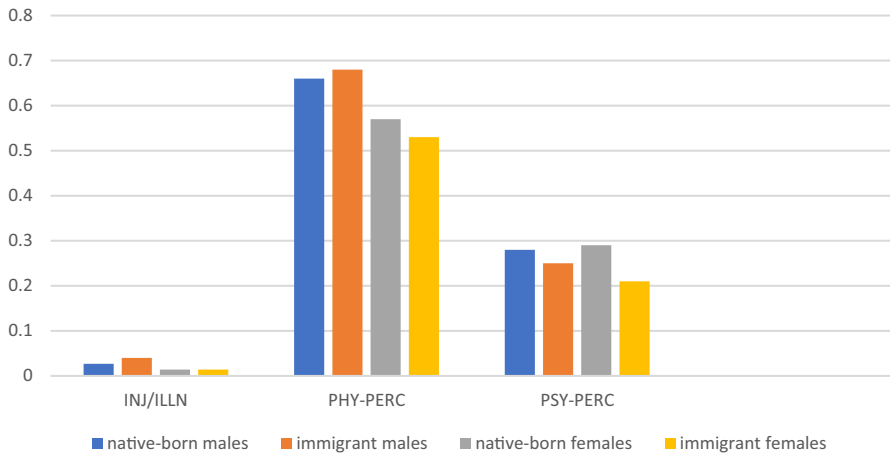


Fig. 3 Risks on the job—our elaborations on LFS AHM 2007, 2013, 2020

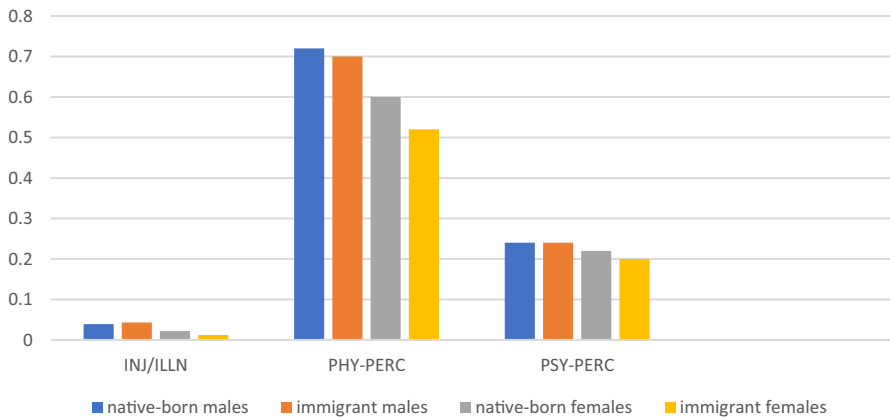


Fig. 4 Risks on the job—our elaborations on LFS AHM 2007, 2013, 2020—workers with low education-compulsory level or less

4 Differences in Occupational Risks Between Immigrants and Native-Born Workers

4.1 Empirical Model and Results

To examine the risk faced by each worker in a given occupation, we rely on ordered probit regressions. The model is built around a latent regression as follows:

$$\text{AIIR}^* = a_0 + a_1\text{AGE} + a_2\text{AGESQUARED} + a_3\text{LOW} + a_4\text{IMM} + a_5\text{REG} + a_6\text{YEAR} + \epsilon \quad (1)$$

We consider male workers because, compared with women, they are more prone to accidents, expected to engage in heavy labour, and exposed to harmful substances, all of which are well described by the Kroll index.⁹ The observed outcome, AIIR (i.e., “Overall Risk”), indicates the physical burden or occupational risk as measured by the overall exposure index on a scale 0–10 (Kroll 2011). In a parsimonious version of the model, the set of explanatory variables includes worker age, age squared, a dummy variable (LOW) equal to 1 if the worker’s education is equal to or lower than the compulsory level, a dummy variable (IMM) equal to 1 for foreign-born workers, and regional and year dummies (REG and YEAR, respectively); then, marital status and the presence of children—two potentially endogenous variables—are added to the set of covariates.

Alternatively, we consider physical and psychosocial exposure indices (PHY-INDEXT and PSY-INDEXT, respectively), a heavy work index (HEAVY-WORK), and a carcinogenic agents index (CARCY-INDEXT) as dependent variables. The results are reported in Table 1.

Our findings suggest that low-skilled workers and immigrants are engaged in less safe tasks. When the dependent variable is the overall risk at work (AIIR), the marginal effect of the variable “Imm” is approximately 0.11; the gap between native-born workers and immigrants slightly decreases considering psychological risk (approximately 0.09), but increases in relation to physical work (0.13).

In a further specification of the model, reported in Table 2, we consider the age at arrival and the length of stay in Italy as further explanatory variables. More specifically, we categorize immigrants into three groups using three dummy variables: “Imm12” for immigrants who arrived in Italy before the age of 12, “Imm18” for those who arrived between the ages of 12 and 18, and “Imm18+” for immigrants who arrived after the age of 18. We argue that first-generation immigrants who arrived when they were of school age (in particular before the age of 12) spend their formative age in receiving countries and, compared to older immigrants, tend to develop skills—such as language—necessary to adjust to the host society more easily (Hypothesis 2).

Similarly, the length of stay is expected to narrow the disparity between native-born workers and immigrants (Hypothesis 3). As previously mentioned, migrants arriving in a host country are initially unfamiliar with local issues and practices. However, over time, they establish social networks, acquire country-specific skills, and gain local knowledge during their stay, potentially enabling them to choose safer jobs.

The findings in Table 2 (Column I) confirm the significance of the age at arrival in Italy in explaining the gap between natives and immigrants; indeed, the marginal effects reported for the variables “Imm18” and, notably, “Imm12” are 0.092 and 0.022, respectively, which are lower than that estimated for the third group of immigrants, “Imm18+” (i.e., 0.14).

Focusing on the subsample of less educated workers in Column III, the disparity between immigrants who arrived after the age of 18 and native-born workers decreases slightly from 0.14 to 0.11, while the marginal effect on “Imm12” becomes negative, albeit very modestly (− 0.007). Consequently, immigrants who arrived in the host

⁹ Further research could focus on women who, for example, are more exposed to stress in family-related jobs, such as caregivers.

Table 1 Ordered probit estimates of risks at work- gaps between native-born workers and immigrants – male workers (LFS data-2009–2019)

Outcome	AIR I	AIR II	PHY-INDEX III	PSY-INDEX IV	Heavy-work V	CARY-INDEX VI
Covariates						
Age	Coeff. (std. errs) – 0.038*** (0.0007)	Coeff. (std. errs) – 0.043*** (0.0008)	Coeff. (std. errs) – 0.042*** (0.0008)	Coeff. (std. errs) – 0.017*** (0.0008)	Coeff. (std. errs) – 0.052*** (0.0008)	Coeff. (std. errs) – 0.038*** (0.0008)
Agesquared	0.0003*** (0.00008)	0.0003*** (0.0009)	0.0003*** (0.00009)	0.0002*** (0.00009)	0.0005*** (0.00009)	0.0003*** (0.00009)
Low	0.992*** (0.002)	0.99*** (0.002)	0.991*** (0.002)	0.396*** (0.002)	1.003*** (0.002)	0.92*** (0.002)
Imm	0.623*** (0.003)	0.616*** (0.008)	0.618*** (0.004)	0.197*** (0.003)	0.64*** (0.003)	0.484*** (0.004)
Married		0.052*** (0.003)	0.054*** (0.003)	– 0.034*** (0.003)	0.032*** (0.003)	0.087*** (0.003)
Children aged less than 14		0.002 (0.002)	– 0.003* (0.002)	0.007*** (0.0015)	0.001 (0.001)	– 0.0009 (0.001)
Marginal effects (prob. outcome = 10)						
Imm	0.11	0.11	0.13	0.09	0.12	0.09
Number of observations	1369,002	1369,002	1378,224	1369,002	1398,909	1398,909
Wald chi2 (parameters)	229,404.03	229,749.85	224,087.55	41,918.61	249,431.26	209,076.05
Log-lik	– 317,776.23	– 317,739.05	– 331,523.91	– 338,001.84	– 325,561.19	– 328,971.39

Dependent variables: AIR (Overall Exposure Index), PHY-INDEX (Physical Exposure Index), PSY-INDEX (Psychosocial Exposure Index), HEAVY-WORK (Heavy work index), CARY-INDEX (Carcinogenic Agents Index); indices measuring several types of risks for specific jobs at an ISCO08/88 level, 2 digit; the indices range from 0 (no risks) to 10 (highest level of risk)

Independent variables: Low: dummy equal to 1 if the schooling level is equal to or lower than the compulsory one; Imm: dummy equal to 1 if the worker is foreign-born; Married: dummy equal to 1 if married, 0 otherwise; Children aged less than 14: dummy equal to 1 if respondents have children aged less than 14 years, 0 otherwise
Regional and year dummies included; *statistically significant at 10% level; **statistically significant at 5% level; ***statistically significant at 1% level. Robust standard errors. Overall, the design weights provided in the LFS data that correct for differences in sampling were applied

Table 2 Ordered probit estimates of the overall risk at work (AIIR)—gaps between native-born workers and immigrants- male workers (LFS data-2009–2019)

Outcome	AIIR	AIIR living in Italy for at least ten years	AIIR	AIIR living in Italy for at least ten years
	I	II	Low skilled workers III	Low skilled workers IV
Covariates	Coeff (std. errs)	Coeff (std. errs)	Coeff (std. errs)	Coeff (std. errs)
Age	− 0.048 *** (0.0008)	− 0.05*** (0.0008)	− 0.011*** (0.003)	− 0.011*** (0.001)
Agesquared	0.004*** (0.00006)	0.004*** (0.00006)	0.0002 (0.00002)	0.0003 (0.0002)
Low	0.99*** (0.002)	1.038*** (0.002)		
Imm18+	0.775*** (0.004)	0.801*** (0.006)	0.357*** (0.006)	0.395*** (0.008)
Imm12	0.12*** (0.007)	0.102*** (0.008)	− 0.024** (0.012)	− 0.04*** (0.013)
Imm18	0.509*** (0.01)	0.543*** (0.013)	0.301*** (0.013)	0.32*** (0.017)
Married	0.047*** (0.003)	0.034*** (0.003)	0.052*** (0.004)	0.046*** (0.005)
Children aged less than 14	0.004** (0.002)	0.002 (0.002)	0.018*** (0.002)	0.014*** (0.003)
Marginal effects (prob. outcome = 10)				
Imm	0.14	0.14	0.11	0.12
Imm12	0.022	0.017	− 0.007	− 0.012
Imm18	0.092	0.092	0.092	0.096
Number of observations	1369,002	1301,779	532,585	497,399
Wald chi2 (parameters)	234,108.86	216,989.62	9527.90	6322.72
Log-lik	− 317,225.21	− 302,185.85	− 108,942.07	− 102,001.67

Dependent Variables: AIIR (Overall Exposure Index): it ranges from 0 (no risks) to 10 (highest level of risk)

Independent Variables: Low: dummy equal to 1 if the schooling level is equal to or lower than the compulsory one; Imm18 + : dummy variable equal to 1 if the worker migrated to the host country after the age of 18; Imm12 (Imm18): dummy variable equal to 1 if migrated to the host country before the age of 12 (18), 0 otherwise; Married: dummy equal to 1 if married, 0 otherwise; Children aged less than 14: dummy equal to 1 if respondents have children aged less than 14 years, 0 otherwise

Regional and year dummies included; *statistically significant at 10% level; **statistically significant at 5% level; ***statistically significant at 1% level; Robust standard errors. Overall, the design weights provided in the LFS data that correct for differences in sampling were applied

country during compulsory school age tend to adapt more easily, thereby converging with native-born workers in the labour market. In conclusion, our findings corroborate Hypotheses 1–2.

Examining the subsample of immigrants with a length of stay of at least 10 years (Columns II and IV in Table 2), the gap between native-born workers and immigrants remains substantially unchanged. Hence, our results do not support Hypothesis 3. This might be the outcome of immigrants being first assigned to risky jobs, which has the self-reinforcing effect of gradually separating these individuals into those jobs (D'Ambrosio et al. 2022).

4.2 Self-Reported Measures

When we estimate (1), we look at the "average" hazards associated with each worker's occupation at the ISCO-08 (two digit) level. Because measurement errors can affect the outcome variable in (1), we also investigate individual probabilities of injury/illness at work using microdata from the AHM-LFS surveys conducted in 2007, 2013, and 2020.

Overall, 97.25% of workers (13,092 immigrants and 108,702 native-born workers) reported no injuries/illness on the job in the twelve months preceding the interview, 2.48% reported 1 episode (412 immigrants and 2,699 native-born workers), and only 0.27% declared 2 injuries (88 immigrants and 253 native-born workers).

Since the dependent variable takes the values 0, 1, and 2, we estimate a Poisson regression model:

$$E(\text{INJ/ILLN}) = \exp(b_0 + b_1\text{AGE} + b_2\text{AGESQUARED} + b_3\text{LOW} + b_4\text{IMM} + b_5\text{ARR} + b_6\text{REG} + b_7\text{YEAR}) \quad (2)$$

As before, the correlates include demographic variables, years, and geographical dummies. We do not include age upon arrival in Italy because this information is not available in the 2007 survey.¹⁰ However, the length of stay in the host country (ARR) is specifically considered.

Finally, we provide probit estimates of workers' perceptions about their own job's safety. Equations (3) and (4) below are latent models: PHY-PERC and PSY-PERC are the observed outcomes, which are equal to 1 if the workers perceive significant risks for physical or psychological health, respectively, and 0 otherwise.¹¹

$$\text{PHY-PERC}^* = c_0 + c_1\text{AGE} + c_2\text{AGESQUARED} + c_3\text{LOW} + c_4\text{IMM} + c_5\text{ARR} + c_6\text{YEAR} + c_7\text{REGION} + \mu \quad (3)$$

¹⁰ In instance, the age of entry is unknown in the 2007 survey, and the length of stay is in part concealed.

¹¹ The dependent variable in our model is 0 when respondents indicate that none of the risk factors specified in the questionnaire are present at work. The number of physical risk factors specified in the questionnaire raised from 6 in 2013 and 4 in 2007 to 13 in 2020, while the number of mental risk factors increased from 3 to 8. Further estimates focused exclusively on the data drawn from the 2020 survey to test for robustness, and the results were substantially the same.

$$\text{PSY-PERC}^* = d_0 + d_1\text{AGE} + d_2\text{AGESQUARED} + d_3\text{LOW} + d_4\text{IMM} + d_5\text{ARR} + d_6\text{YEAR} + d_7\text{REGION} + \eta \quad (4)$$

The findings presented in Table 3 (Column 1) confirm that less skilled workers and foreigners reported a greater frequency of injuries over the previous 12 months (Hypothesis 1). Conversely, they appear to experience less psychological stress, likely due to their greater involvement in manual tasks.

Immigrants, but not low-skilled workers, report higher levels of physical danger, suggesting a possible underestimation of workplace risks on their part. However, the results remain substantially the same when considering foreigners who have resided in Italy for at least ten years. In addition, when examining the subsample of low-skilled workers (Column VII), the gap with native-born workers is statistically significant only at the 20% level. Our evidence supports the consideration of the alternative theory, which suggests that immigrants underreport workplace hazards due to their fear of job loss (Orrenius and Zavodny 2015).

5 Impact of Immigration on Native-Born Workers' Occupational Risks

5.1 Model

This section will examine whether immigration lowers the average occupational risk of native workers. To this end, we rely on LFS surveys from 2009 to 2019.

Since the LFS surveys consist of repeated cross sections, we define an indicator of the overall occupational burden experienced by native-born workers on a yearly basis. The methodology we employ is akin to that proposed by Rosen (1974) for calculating price indices. First, we estimate the following regression model for the subsample of native male workers separately by year and by region (at the NUTS2 level):

$$\text{AllR} = f_0 + f_1\text{AGE} + f_2\text{AGESQUARED} + f_3\text{LOW} + \rho \quad (5)$$

where AllR, as in Eq. (1), represents an individual's workplace risk, and LOW is a dummy variable equal to 1 if the schooling level is equal to or lower than the compulsory level.

Overall, we estimated 231 regressions (21 regions \times 11 years).

Second, for each year "t" and region "r", the estimated parameters were used to compute the occupational risk experienced by a native-born male worker aged 40, reflecting the average age in our sample, and possessing a low level of education. Therefore, our indicator represents the "average" risk encountered by low-skilled employees across different European regions and years, controlling for age.

We obtain the variable EST (AllR), which is used as the outcome variable in a panel of 231 observations. We estimate the following model:

$$\text{EST (AllR)}_{rt} = g_0 + g_1\text{Foreign}_{rt-1} + \gamma_t + \delta_r + \eta_{rt} \quad (6)$$

Table 3 Workplace injuries and workers' risk perceptions-male workers—AHM-LFS data, 2007, 2013, 2020

Outcome	INJ/ILLN Poisson Model	PSY-PERC Probit Model	PHY-PERC Probit Model	INJ/ILLN Poisson Model	PSY-PERC Probit Model	PHY-PERC Probit Model	INJ/ILLN Poisson model	PSY-PERC Probit Model	PHY-PERC Probit Model
	I—full sample	II—full sample	III—full sample	IV—Stay > 10	V—stay > 10	VI—stay > 10	VII—low skilled	VIII—low skilled	IX—low skilled
Covariates									
Age	- 0.024 (0.016)	0.057*** (0.038)	0.019*** (0.004)	- 0.022 (0.017)	0.061*** (0.04)	0.021*** (0.004)	- 0.004 (0.022)	0.049*** (0.006)	0.019*** (0.006)
Agesquared	0.00019 (0.00019)	- 0.006*** (0.0004)	- 0.0025 (0.0004)	0.0002 (0.0002)	- 0.006*** (0.0004)	- 0.003*** (0.0004)	0.00004 (0.0002)	- 0.006*** (0.0007)	- 0.0025*** (0.0007)
Imm	0.271*** (0.065)	- 0.116*** (0.017)	- 0.062*** (0.017)	0.301*** (0.075)	- 0.16*** (0.019)	- 0.081*** (0.019)	0.109 (0.089)	- 0.053*** (0.025)	- 0.154*** (0.025)
Low	0.549*** (0.043)	- 0.172*** (0.01)	0.298*** (0.01)	0.576*** (0.044)	- 0.182*** (0.01)	0.308*** (0.011)			
Married	0.064 (0.056)	0.039*** (0.007)	0.078*** (0.013)	0.086 (0.058)	0.033** (0.013)	0.078*** (0.013)	0.184** (0.079)	- 0.0002 (0.021)	0.111 (0.021)
Children less than 14	0.059** (0.029)	0.026** (0.013)	0.025*** (0.007)	0.056* (0.031)	0.039*** (0.007)	0.023*** (0.007)	0.065* (0.038)	0.035*** (0.011)	0.046** (0.011)
Marginal effect									
dY/d "Imn"	0.008	- 0.037***	- 0.021***	0.009***	- 0.05***	- 0.027***	0.004	- 0.016**	- 0.049***
Number of obs	125,246	115,140	112,690	121,716	112,086	109,649	50,762	45,500	44,685

Table 3 (continued)

Outcome	INJ/ILLN Poisson Model I—full sample	PSY-PERC Probit Model II—full sample	PHY-PERC Probit Model III—full sample	INJ/ILLN Poisson Model IV—Stay > 10	PSY-PERC Probit Model V—stay > 10	PHY-PERC Probit Model VI—stay > 10	INJ/ILLN Poisson model VII—low skilled	PSY-PERC Probit Model VIII—low skilled	PHY-PERC Probit Model IX—low skilled
Log Lik	- 7223.929	- 28,999.382	- 29,465.636	- 6890.043	- 28,107.217	- 28,452.34	- 3611.284	- 10,415.224	- 10,771.853
Wald—stat (parameters)	553.73 (29)	2642.83 (28)	7292.09	538.21	2754.51	7393.52	191.75	678.85	2022.06

Dependent variables: INJ/ILLN: number of injuries in the previous year; PHY-PERC (PSY-PERC): dummy equal to 1 if the respondent is exposed to physical (psychological) risk factors as evaluated by the worker himself, 0 otherwise

Independent variables: Low: dummy equal to 1 if the schooling level is equal to or lower than the compulsory one; Imm: dummy equal to 1 if the worker is foreign born; Married: dummy equal to 1 if married, 0 otherwise; Children less than 14: dummy equal to 1 if respondents have children aged less than 14 years, 0 otherwise

Regional and year dummies included; *statistically significant at 10% level; **statistically significant at 5% level; ***statistically significant at 1% level. Robust standard errors. Overall, the design weights provided in the LFS data that correct for differences in sampling were applied

where “FOREIGN” is the share of immigrants in region r in year $t - 1$ and γ and δ are year and geographical dummies, respectively. We add the share of low-educated immigrants (LOW-FOREIGN) among the correlates in a further formulation of the model. Using sample weights, the share of immigrants in the population at the regional level (NUTS2), as well as the percentage of low-skilled immigrants, are computed using data from the Labour Force Survey (2008–2018).

As argued in the literature (Giuntella et al. 2019), migration flows could be endogenous since the same socioeconomic factors at the regional level could both attract immigrants and affect native-born workers’ internal mobility. To address potential endogeneity, we propose an instrument largely used in previous studies¹² that relies on the tendency for immigrants to migrate to areas where communities of immigrants from the same country of origin have already settled.

Therefore, the distribution among regions of immigrants according to their country of origin should provide the needed exogenous source of variation in the local share of immigrants.

Formally, the instrumental variable “Immigrant enclaves” can be written as follows:

$$\text{Immigrant enclaves} = \sum_{a=1}^N \frac{\text{immigrants}_{ar,2001}}{\text{immigrants}_{a,2001}} * \frac{\text{immigrants}_{a2001-i}}{\text{immigrants}_{ae,2001}} \quad (7)$$

where “ r ” denotes the NUTS2 region and “ a ” denotes immigrants’ geographical area of origin¹³; hence, the first term represents the share of immigrants from “ a ” living in region r in 2001, whereas $\text{immigrants}_{a2001-r}$ denotes the total number of immigrants coming from “ a ” in 2001 minus the contribution of region r to this total, and $\text{immigrants}_{ae2001}$ denotes the total number of immigrants coming from “ a ” to Europe in 2001. The data about the share of immigrants in 2001 are drawn from the census.

To test the validity of the chosen IV (by the Sargan test), we rely on an additional instrument, namely, natives’ concerns about the consequences of immigration (*imwcnt*). A large body of literature has been written about the correlation between migration flows and local population attitudes towards immigrants (Fetzer 2000; Dustmann and Preston 2007; Sobczak 2007; Jolly and DiGiusto 2014). Immigrants may choose to live in regions where residents are less averse to foreigners; at the same time, the share of foreigners at the regional level may increase hostility towards ethnic minorities, particularly for economic reasons.

The instrument, *imwcnt*, was developed at the regional level (NUTS-2) based on responses to the following inquiry drawn from the European Social Survey (2012)¹⁴: “Immigrants make the country a worse or better place to live”. The answers were coded on a scale ranging from 0 to 10.

¹² Card (2001), Cortes and Pan (2015), Barone et al. (2016), Bratti and Conti (2018), Caselli et al. (2020), Giuntella et al. (2019), Nese (2023).

¹³ We considered the following geographical areas: EU-15 nations, Central and Eastern Europe, Other European countries, Northern Africa, other African countries, North America, other American countries, Near and Middle Asia, Other Asian countries, Oceania. Hence, in (2) $N = 15$.

¹⁴ We refer to 2012 because the preceding survey in Italy was carried out only in 2004. We assume that the variation in citizens’ opinion across regions has remained generally steady since 2008.

Table 4 Estimates on the occupational safety of native-born male workers (AIIR)—(LFS data-2009–2019)

	OLS I	2 SLS II	2 SLS III
Covariates	Coeff (std. errs)	Coeff (std. errs)	Coeff (std. errs)
Foreign	− 0.07 (4.462)	− 0.32** (13.119)	
Low-foreign			− 0.7*** (30.29)
Year dummies	Yes	Yes	Yes
Geographical dummies	Yes	Yes	Yes
Number of obs	231		
R-squared × 100	14		
Wald test		33.04	32.5
Durbin-Wu-Hausman χ^2 (1)		5.06 (p = 0.02)	4.55 (p = 0.03)
Sargan Test χ^2 (1)		0.005 (p = 0.94)	0.68 (p = 0.41)

Dependent variable: “AIIR” faced by an “average” native-born male worker, low-skilled and aged 40 years
 Independent Variables: Foreign: share of foreigners in the local population; Low-skilled Foreign: percentage of low-educated immigrants on local population. Geographical areas: North East, North Ovest, Centre, South Italy

Regional and year dummies included; *statistically significant at 10% level; **statistically significant at 5% level; ***statistically significant at 1% level. Robust standard errors. Overall, the design weights provided in the LFS data that correct for differences in sampling were applied

5.2 Results

The results from Model (6) are reported in Table 4.

The OLS estimates do not provide statistically significant evidence. Considering that immigration may be correlated with unobserved determinants of working conditions and work health risks, we rely on the instrumental variable approach using immigrant enclaves (Eq. 7) and public opinion about immigrants as instrumental variables.

The 2SLS estimate of the coefficient on the share of immigrants (“FOREIGN”) in Column II is negative (− 0.32) and statistically significant, suggesting that the regional share of immigrants reduces the average occupational risk encountered by native-born workers (Hypothesis 4). The negative impact of immigration is significantly greater (− 0.7) when considering the proportion of less educated immigrants (“LOW-FOREIGN”), confirming that this group is more likely to be engaged in manual and physically demanding tasks.

6 Conclusions

Most previous studies suggest that immigrants are more vulnerable than native-born workers to on-the-job injuries because of several factors, such as workers’ productivity, risk awareness, risk aversion, and discrimination. Immigrants are on average less

educated than native-born workers and are employed in jobs and sectors that are physically demanding, such as construction or manufacturing. Furthermore, immigrants may not be aware of the laws and regulations concerning workplace safety in their new country, and language barriers may prevent them from understanding instructions and safety procedures. Incidentally, all the above factors should be addressed by employers and labour organizations for the benefit of all workers regardless of their immigration status.

In line with the theoretical hypotheses, our findings report that immigrants are engaged in occupations with greater occupational risk than native-born workers, even when we control for education.

As expected, the development of national-specific skills among immigrants who arrived in Italy during compulsory school age promotes convergence with native born workers' outcomes in the labour market. Conversely, the safety of immigrants on the job is not influenced by the length of their stay in Italy upon arrival in the country as adults.

Our results also contribute to the ongoing discussion on how migration affects working conditions in the host countries, showing that an increase in immigration reduces the average occupational risks encountered by native-born workers. This effect is much greater when we consider the share of low-skilled immigrants. In line with findings in previous research for the UK and Spain, we argue that the observed decline in illnesses and injuries among native-born workers might be the consequence of their shift to jobs requiring more communication skills than hard labour. However, additional study should further explore this mechanism.

Indeed, the shifting of occupational risks from native-born workers to immigrants has important policy implications to consider when weighing the costs and benefits of migratory flows. Immigration may imply a Pareto improvement in working conditions if it not only reduces the average physical burden and injury risks among native-born workers, but immigrants themselves have lower injury rates in the host countries than in their source countries (Giuntella et al. 2019).

Finally, further research should focus on other Western European countries that receive increasing migration inflows and, at the same time, present some heterogeneity with respect to integration policies and socioeconomic factors.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s40797-024-00275-5>.

Acknowledgements Three datasets are employed in the empirical analysis: European Labour Force Survey (2010–2018); EU Labour Force Survey modules on accidents at work and work—related health problems (2007, 2013, 2020); European Social Survey (2010). The results and conclusions are only ours and not those of Eurostat, the European Commission or other statistical institution whose data have been used.

Funding Open access funding provided by Università degli Studi di Salerno within the CRUI-CARE Agreement.

Data availability The microdata can be obtained through research proposals to Eurostat.

Declarations

Conflict of interest We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all the authors. We declare that there is no conflict of interest.

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References

- Antecol H, Bedard K (2006) Unhealthy assimilation: why do immigrants converge to American health status levels? *Demography* 43(2):337–360
- Arici C, Ronda-Pérez E, Tamhid T, Absekava K, Porru S (2019) Occupational health and safety of immigrant workers in Italy and Spain: a scoping review. *Int J Environ Resour Public Health* 16:4416. <https://doi.org/10.3390/ijerph16224416>
- Barone A, Nese A (2002) Rischio sul lavoro e premio salariale in Italia. *Lavoro e Relazioni Industriali* 1:121–146
- Barone G, D'Ignazio A, de Blasio G, Naticchioni P (2016) Mr Rossi, Mr Hu and politics. The role of immigration in shaping natives' voting behaviour. *J Public Econ* 136:1–13
- Basilio L, Bauer TK, Kramer A (2017) Transferability of human capital and immigrant assimilation: an analysis for Germany. *Labour* 31(3):245–264
- Bauer TK, Million A, Rotte R, Zimmermann KF (1998) Immigration labor and workplace safety. IZA Discussion paper series, No. 16
- Bellés-Obrero C, Martín Bassols N, Vall Castello J (2021) Safety at work and immigration. *J Popul Econ* 34:167–221. <https://doi.org/10.1007/s00148-020-00791-5>
- Bena A, Giraudo M (2014) Occupational injury risk in immigrant workers in Italy: differences in work characteristics and age. *Epidemiol Prev* 38(3–4):208–218
- Bettin G, Cela E (2014) The evolution of migration flows in Europe and Italy. *J Appl Econ* 33(1):37–63
- Bossavie L, Garrote-Sanchez D, Makovec M, Ozden C (2022) Do Immigrants shield the locals? Exposure to COVID-related risks in the European Union. *Rev Int Econ*. <https://doi.org/10.1111/roie.12609>
- Bratti M, Conti C (2018) The effect of immigration on innovation in Italy. *Reg Stud* 52(7):934–947. <https://doi.org/10.1080/00343404.2017.1360483>
- Brian T (2021) Occupational fatalities among international migrant workers: a global review of data sources. International Organization for Migration (IOM), Geneva
- Card D (2001) Immigrant inflows, native outflows, and the local market impacts of higher immigration. *J Labor Econ* 19:22–64
- Caselli M, Fracasso A, Traverso S (2020) Globalization and electoral outcomes: evidence from Italy. *Econ Polit* 31(1):68–103
- Colucci M (2018) Per una storia del governo dell'immigrazione straniera in Italia: dagli anni sessanta alla crisi delle politiche. *Meridiana* 91:9–36
- Cortes P, Pan J (2015) Immigration and occupational choice of natives: the case of nurses in the United States. *Cesifo Econ Stud* 61:1–27
- D'Ambrosio A, Leombruni R, Razzolini T (2022) Trading off wage for workplace safety? Gaps between immigrants and natives in Italy. *Econ Polit* 39:903–960
- D'Amuri F, Peri G (2014) Immigration, jobs, and employment protection: evidence from Europe before and during the great recession. *J Eur Econ Assoc* 12(2):432–464

- Davila A, Mora MT, Gonzalez R (2011) English-language proficiency and occupational risk among Hispanic immigrant men in the United States. *Ind Relat J Econ Soc* 50(2):263–296
- Dustmann C, Preston I (2007) Racial and economic factors in attitudes to immigration. *B E J Econ Anal Policy* 7(1):1–39
- Dustmann C, Fasani F, Meng X, Minale L (2023) Risk attitudes and household migration decisions. *J Hum Resour* 58(1):112–145
- Edo A, Özgüzel C (2023) The impact of immigration on the employment dynamics of European regions. *Labour Econ* 85:102433
- EU Labour Force Survey modules on accidents at work and work—related health problems (2007, 2013, 2020) <https://ec.europa.eu/eurostat/web/products-statistical-reports/-/ks-ft-21-007>
- EU-OSHA-European Agency for Safety and Health at Work (2007) Literature study on migrant workers. European Risk Observatory. <https://osha.europa.eu/en/publications/literature-study-migrant-workers/view>
- European Labour Force Survey (2010–2018) <https://ec.europa.eu/eurostat/web/microdata/european-union-labour-force-survey>
- European Social Survey Round (2012) Data NSD-Norwegian Centre for Research Data—data archive and distributor of ESS data for ESS ERIC. <https://www.europeansocialsurvey.org/data>
- Fetzer J (2000) Public attitudes toward immigration in the United States, France and Germany. Cambridge University Press
- Fusaro S, López-Bazo E (2021) Immigration and native employment. Evidence from Italian Provinces in the Aftermath of the Great Recession. *Pap Reg Sci* 100(2):405–429
- Giraud M, Bena A, Costa G (2017) Migrant workers in Italy: an analysis of injury risk taking into account occupational characteristics and job tenure. *BMC Public Health* 17:351
- Giraud M, Bena A, Mosca M, Farina E, Leombruni R, Costa G (2019) Differences in work injury risk between immigrants and natives: changes since the economic recession in Italy. *BMC Public Health* 19:836. <https://doi.org/10.1186/s12889-019-7178-2>
- Giuntella O, Mazzonna F, Nicodemo C, Vargas-Silva C (2019) Immigration and the reallocation of work health risks. *J Popul Econ* 32(1009–1042):1042. <https://doi.org/10.1007/s00148-018-0710-3>
- Hamermesh DS (1995) Who works when? Evidence from the U.S. and Germany. NBER Working Papers 5208, National Bureau of Economic Research, Inc.
- Hamermesh DS (1997) Immigration and the quality of jobs. Working Paper 6195, National Bureau of Economic Research
- Hersch J, Viscusi WK (2010) Immigrant status and the value of statistical life. *J Hum Resour* 45:3
- International Labour Organization (ILO) (2018) ILO global estimates on international migrant workers: Results and methodology. https://www.ilo.org/wcmsp5/groups/public/dgreports/dcomm/publ/documents/publication/wcms_652001.pdf
- Jolly KS, DiGiusto GM (2014) Xenophobia and immigrant contact: French public attitudes toward immigration. *Soc Sci J* 51(3):464–473
- Kroll LE (2011) Construction and validation of a general index for job demands in occupations based on ISCO-88 and KldB-92, Methoden—Daten—Analysen, Jg. 5. Heft 1:63–90
- Lee TH, Peri G, Viarengo M (2022) The gender aspect of immigrants' assimilation in Europe. *Labour Econ* 78:1–30
- Nese A (2023) Migrations in Italy and perceptions of ethnic threat. *J Int Migr Integr* 24:939–968
- Orrenius PM, Zavodny M (2015) Immigrants in risky occupations. In: Constant AF, Zimmerman KF (eds) *International handbook on the economics of migration*. Edward Elgar Publishing, Cheltenham
- Ottaviano GI, Peri G, Wright GC (2013) Immigration, offshoring, and American jobs. *Am Econ Rev* 103(5):1925–1959
- Peri G (2012) The effect of immigration on productivity: evidence from US states. *Rev Econ Stat* 94(1):348–358
- Peri G (2016) Immigrants, productivity, and labor markets. *J Econ Perspect* 30(4):3–30
- Peri G, Sparber C (2009) Task specialization, immigration, and wages. *Am Econ J Appl Econ* 1(3):135–169
- Porru S, Baldo M (2022) Occupational health and safety and migrant workers: has something changed in the last few years? *Int J Environ Res Public Health* 19(15):9535. <https://doi.org/10.3390/ijerph19159535>
- Rosen S (1974) Hedonic prices and implicit markets: Product differentiation in pure competition. *J Polit Econ* 82(1):34–55
- Rosen S (1987) The theory of equalizing differences. In: Ashenfelter O, Layard R (eds) *Handbook of labor economics*, vol 1(12). Elsevier, New York, pp 641–692

- Shepherd R, Lorente L, Vignoli M, Nielsen K, Peiró JM (2021) Challenges influencing the safety of migrant workers in the construction industry: A qualitative study in Italy, Spain, and the UK. *Saf Sci*. <https://doi.org/10.1016/j.ssci.2021.105388>
- Sobczak M (2007) Attitudes toward immigrants and immigration in the United States toward a structural approach. *SAS Global Forum 2007 Statistics and Data Analysis*, paper 180–2007
- Sparber C, Zavodny M (2022) Immigration, working conditions, and compensating differentials. *ILR Rev*. <https://doi.org/10.1177/00197939211021379>
- World Health Organization (WHO) (2018) Report on the health of refugees and migrants in the WHO European Region. No public health without refugee and migrant health. <https://www.who.int/europe>
- Zorlu A, Hartog J (2012) Employment assimilation of immigrants in the Netherlands: dip and catchup by source country. *Int J Popul Res*

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