Immigration and work-related injuries Evidence from Italian administrative data^{*}

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Abstract

There is increasing evidence that foreign-born workers are over represented in physically demanding jobs. This suggests that they may sort into positions with a relatively higher injury risk than native workers. At the same time, shares of foreign born workers in host economies are growing. Does the increasing presence of migrant workers alleviate natives' injury risk exposure? This paper provides evidence of the effects of immigration on the incidence and severity of work-related accidents in a context in which occupational mobility of native workers is relatively low. We combine administrative data on the universe of work-place accidents in Italy with the Labour Force Survey from 2009 to 2017. Our approach exploits spatial and temporal variation in the inflow of foreign-born individuals across provinces. Using a fixed-effects and an instrumental variable specification based on historical settlements, we show that inflows of foreign-born residents are associated with a reduction in the rate and severity of work injuries for natives. To investigate mediating mechanisms we use a longitudinal version of the Italian Labor Force Survey (2009-2013). The results support the hypothesis that the drop in injuries does not derive from a reallocation of native workers towards less risky jobs, nor a positive selection of the labor force resulting from higher unemployment or internal mobility.

JEL: C55, J61, J28, I1

Keywords: Immigration, labor-market flexibility, work-related injuries, health

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1 Introduction

Injuries and work-related illness cost the European Union 3.3% of its GDP (EU-OSHA 2018). The most updated statistics report a total of 3.2 million of non-fatal accidents at work in the EU-28 during 2015 (Eurostat 2017). Recent research shows that the generosity of medical care compensation for injured workers can longer-term consequences on future earning potentials of affected workers (Powell and Seabury, 2018). In the last decade, Europe has been receiving large inflows of foreign-born workers, and, like in other advanced economies, the consequences of immigration are at the center of its political debate. This increase is accompanied by an over representation of migrant workers in physically demanding jobs and a decline of native workers' accidents. A closer investigation of the consequences of increasing migrant inflows on the occupational health and safety of receiving economies is therefore important in order to comprehensively assess the contribution of foreign born inflows to recipient societies. Our study provides a twofold empirical contribution to a growing literature that addresses the consequences of immigration. More specifically, our work (i) estimates that immigration alleviates natives workers' injury rates and their severity, and (ii) studies a labor market that is characterized by lower occupational mobility and flexibility than that of continental Europe and the UK addressed by Peri and Sparber (2009), DAmuri and Peri (2014), and Giuntella et al. (2018). Crucially, we are able to identify an effect on injury rates which is independent from job turnover.

Figure 1 reports the share of work-related injuries among the foreign born and native employed population resident in Italy between 2009 and 2017. A significant gap between foreign-born and native workers is evident: the former have between 1 and 0.3 percentage points higher injury rate than the latter. The over representation of immigrant workers in occupations with high injury risks, especially for men, has been documented by numerous studies and in several countries, mostly in the epidemiological literature (Orrenius, 2012).¹ Figure 2 shows that a decrease trend in natives' injuries is mirrored by an increasing presence of foreign-born residents in the country. Italy has been receiving large and increasing migration inflows in the last decades. The share of foreign-born residents in Italy has grown from 6% of the native population in 2009 to more than 9% in 2017 for males (7% to 10.5% for females). Most of the immigrant workers in Italy have low education and find employment in low-skill sectors (Bratti and Conti, 2018).

¹See Giraudo et al. (2017), Bena and Giraudo (2014) and Salvatore et al. (2013) for Italy.

Evidence of a significant injury rate gap between immigrants and natives suggests that foreignborn workers may hold occupations or cover tasks characterized by a higher injury risk. Yet, a lower risk aversion or risk perception, a comparative advantage in health endowments, lower bargaining power, and limited outside options may concur in determining the higher exposure to work-related accidents of foreign born (Orrenius and Zavodny, 2009). If migrants hold riskier jobs, does their increasing presence in the labor market contribute to alleviating the incidence and severity of work-related accidents among native workers? The degree of substitution between immigrants and natives in labor markets is a thoroughly debated question in the literature. Most of the existing empirical evidence focuses on the impact of immigration on natives' wages and earnings. Contrary to the implications of a basic demand and supply model, many studies find that immigrant inflows have small or no effects on natives' outcomes (Card (2005), Borjas et al. (2008), and Dustmann and Frattini (2014)). A growing body of literature suggests that immigration may trigger a shift in the types of jobs that natives hold. Peri and Sparber (2009) and Foged and Peri (2016) show that immigration can push natives into jobs that require more communication-intensive skills, where they have a comparative advantage over foreign-born workers. In particular, Foged and Peri (2016) analyze the context of Denmark, characterized by high job flexibility, and find that inflows of refugees distributed through a dispersal policy induced a shift towards less manual-intensive occupations for low-skilled native workers. A reallocation of native workers within the labor market in response to immigrants' inflows could also have consequences in terms of health and safety of the positions held by native workers. Only a few studies have analyzed the impact of immigration on the health outcomes of natives. In the context of Germany, Giuntella and Mazzonna (2015) find that higher concentrations of migrant workers make native residents less likely to self-report adverse health outcomes. The effect is particularly pronounced for blue-collar and low-skilled individuals. Giuntella et al. (2018) find that, in response to migration inflows in the years 2003-2013, mediumskilled native workers in the UK reallocated towards occupations with a lower injury risk index score and lower physical burden. The authors do not find a similar pattern for low-skilled native workers. One interpretation of this result is that a measure of health improvements that relies on changes in occupation may not allow them to identify an effect on low skilled workers if those maintain in their jobs. The literature that analyses the effect of immigration on natives in Italy is limited and focuses predominantly on the labor market (Bratti and Conti, 2018; Giuntella, 2012). Staffolani and Valentini (2010) find a positive impact on native workers' wages. Mocetti and Porello (2010) show that immigration correlates positively with inter-regional inflows of native skilled workers and negatively with low-skilled ones, especially in the South-North directory. Using data from the Italian Labor Force Survey of 2007, Salvatore et al. (2013) shows that male migrants self-report significantly higher rates of work injuries than natives, especially in the construction sector. To the best of our knowledge, there are no studies providing causal evidence on the relation between the presence of foreign-born workers and natives work injuries.

Our study contributes to the literature by estimating the impact of immigration on per-capita injury rates. Because our measure relies on the universe of work-related accidents and is independent from the occurrence of occupational shifts, we are able to study and identify an effect of immigration on workers' health safety also in the presence of limited job mobility. An additional contribution of our study is that we explore not only whether the presence of foreign-born workers has an effect on natives' injury rates, but also on their severity. Next, we investigate whether this implies a reallocation of injury risks between foreign born and native workers or a Pareto improvement in overall accidents. We find that immigration has a positive effect on the reduction of natives' fatal work-related accidents, injuries, and their severity, measured by the number of sick days off work and the degree of impairment. We combine administrative data of workforce injuries from the National Institute for Insurance Against Accidents at Work (INAIL) with the Labour Force Survey (LFS) data, and the flow of foreign-born residents recorded by the Italian National Statistical Office (ISTAT), from 2009 until 2017. More generally, our analysis is informative of similar contexts where job flexibility is limited such as other economies of Southern Europe. As we show in section 4.3, using a longitudinal version of the LFS we find that occupational changes in our period of study are very limited. This suggests that the injury rate gap between native and foreign-born workers may thus reflect an allocation of the former towards riskier tasks within the same job, rather than a shift in natives' occupations. Due to data limitations, we are not able to directly disentangle this channel from, for instance, the role played by linguistic barriers, wage compensations, different job tenures, or a self-selection of native workers that maintain their residence on the territory, but we provide novel suggestive evidence that will hopefully lead future research in those more detailed directions.

A common concern in the analysis of the consequences of immigration is that the concentration

of the foreign-born across provinces may be endogenous with respect to labor market outcomes. In particular, workers location decisions may directly or indirectly correlate with local labor market conditions, including occupational health and safety. We address those endogeneity issues in two ways. First, we include province and year fixed effects, to rule out province-specific fixed characteristics and year-specific shocks to the economy. Then, we employ the widely used "shift-share" instrument à la Card (2001), which consists in imputing the share of foreign-born residents by province from historical settlements by country of origin. Those are used as weights to allocate recent yearly migration inflows across provinces.

This paper is organized as follows. Section 2 provides details about the data used and the immigration and safety regulation background in Italy. Section 3 describes the empirical strategy, followed by the results and their interpretation in Section 4. Section 5 includes our concluding remarks.

2 Background and data: immigration and work injuries in Italy

Our study combines administrative data from (i) the registry of work-related injuries collected by the Italian National Insurance Institute for Employment Injuries (INAIL), (ii) cross-sectional and longitudinal versions of the Labour Force Survey "Rilevazione sulle Forze di Lavoro" (LFS) of the Italian National Statistical Office (ISTAT) between 2009 and 2017, and (iii) the ISTAT municipal registry of foreign-born and Italian residents, for the years 1990 and 2009-2017. We restrict our analysis to individuals of official working age (16-65 years).

The National Institute of Occupational Insurance (INAIL) is the institution in charge of covering insurance for occupational accidents, health complications, and work-related illnesses of workers in Italy. Its administrative archive contains information about basic demographic characteristics of injured workers (age, gender, country of birth), work location (province), sector (up to four digits), whether the accident happened at work or during a displacement, dates of occurrence and notification, days of absence for sickness prescribed by the doctor, degree of menomation, and an identification number for each employer.² The Italian Law mandates that all employers, including those with alternative or private insurance policies, and including the public sector, report the

²Information about the European directives on safety and health at work can be found here: https://osha.europa.eu/en/safety-and-health-legislation/european-directives

occurrence of any accident that causes at least one day of absence, within 48 hours of receipt of the medical certificate, and within 24 hours in case of a fatal accident. Sanctions for notification delays range between 548 (lowest amount for one-day accidents) and 4,932 euros (maximal for injuries with more than three days of absence).³ The total number of injuries in 2008 was 520,401 for native males and 114,056 for foreign-born males. In 2017, the numbers were, respectively, 304,687 and 68,388. Females reported, respectively, a total of 227,041 and 31,534 injuries in 2008, and 1762,029 and 27,241 injuries in 2017.

In the absence of matched individual-level injury and employment data for the universe of workers, we perform the analysis at the province level. We calculate the injury rate by province of employment p at time t (2009-2017) as follows:

$$INJ_{p,t} = \frac{\text{Number of accidents } _{p,t}}{\text{Number of workers } _{p,t}} * 100$$
(1)

The denominator of Equation 1. takes into account the total employed native-born population of a province, computed from the LFS. The LFS, produced by ISTAT, collects quarterly sociodemographic information including country of birth and more general questions about employment status and job characteristics (hours worked, sector, type of contract, etc.), for all individuals in a sample of households that is representative at the national and province level. From this database, we extract the total number of natives and foreign-born workers, by gender and province of residence, for each year of the sample period studied, weighted according to the sampling procedure. The provided sampling weights allow to obtain to a sample that is representative at the national level for the native and foreign born population, and at the province level for the number of employed natives. We focus on individuals aged 15 to 65. We follow the ISTAT classification based on self-reported occupational status to distinguish the employed individuals from the inactive and the unemployed. For 2017, we have 11,575,355 native male workers and 8,211,183 female native workers. Alternatively, we can compute the injury rate in Equation 1 as a share of the total working-age population resident in province p at time t (age 15-65), by citizenship (ISTAT demographic data). This definition produces a more conservative statistic, because it includes inactive and unemployed people.

The main explanatory variable in our analysis is the share of foreign born residents among the

 $^{{}^{3}} https://www.inail.it/cs/internet/attivita/prevenzione-e-sicurezza/promozione-e-cultura-della-sicurezza/promozione-e-cultura-sicurezza/promozione-e-cultura-della-sicurezza/promozione-e-cultura-sicurezza/promozione-e-cultura-sicurezza/promozione-e-cultura-sicurezza/promozione-e-cultura-sicurezza/promozione-e-cultura-sicurezza/promozione-e-cultura-sicurezza/promozione-e-cultura-sicurezza/promozione-e-cultura-sicurezza/promozione-cultura-sicurezza/promozione-e-cultura-sicurezza/prom$

prevenzione/comunicazione-infortunio.html

province population.⁴ As of January 1, 2017, the foreign-born population in Italy reached more than 5 million individuals, mostly concentrated in the Northern regions. The largest community was constituted by Romanians, 23% of the total foreign-born residents, followed by Albanians (9%) and Moroccans (8.7%) (Istat, 2018). It is important to notice that migrants without a regular work/residence permit are not included in municipal registries. As highlighted by Bratti and Conti (2018), however, the spatial distribution and the ratio of irregular migrants in Italy are highly correlated with those of regular migrants, within provinces and over time. Bianchi et al. (2012) provide evidence of this fact by analyzing the regularization episodes that took place in 1995, 1998 and 2002. Irregular migrants may also have a lower likelihood of being reported to INAIL in case of an accident. Similarly, the accidents of native workers in the shadow economy may be less likely to be reported. ⁵

In order to obtain consistent units of analysis over our period of study, we have reclassified the 107 current local administrative units into 91 provinces, grouping together those that new legislative settings aggregated or separated. Because information on foreign-born residents by province and country of origin in 1990 (our baseline for the instrumental variable estimation) is not broken down by sex, we perform the analysis by pooling men and women together.

Figure ?? reports the share of employed men and women among the respective native population aged 15-65, from 2009 until 2017. We can observe that the shares decline until 2014, corresponding to the economic crisis (recovering in 2012 for women but declining again), and recover afterwards. The decline in employment could partially explain the contemporaneous decline in injury rates among natives, if a selection in the labor market occurred. It is noticing that, as employment rates recover, natives' injuries maintain their downward sloping trend (while they stabilize and slightly increase again for migrants), as shown in Figure 1.

Table 1 reports the descriptive statistics for the sample of 91 provinces across the nine years of analysis. The average foreign-born share of the local population is 8.44%, ranging between 1 and

⁴Due to its sampling design, the LFS is not representative of foreign born migrant workers by province and does not allow us to calculate their employment share nor injury rate at this administrative level.

⁵Due to constraints in the availability of data, our study is subject to a number of limitations. Population data is recorded by citizenship, while we construct the number of workers by differentiating Italians from individuals with a foreign country of origin. We expect different labour market conditions due to the foreign origin (Hamermesh, 1997). We compute the number of employees in the province where they perform their main occupation, while the share of immigrants refers to the province in which foreign-citizens register their residence.

17%. The province-level mean injury rate for native workers is 2.47%. The average number of sick leave days prescribed by a doctor among province accidents is 27 for all injuries and 92 for those with a permanent impairment. The degree of impairment is measured by an index that ranges between 0 and 100, depending on the severity. We replace as missing all cases for which a final evaluation is not yet done. On average, the degree of impairment among a province's accidents is 1.29 overall, and 7.39 when restricted to severe injuries. When we decompose the injury rate by sector⁶, we observe that the majority of injuries occur in the industrial sector (2.08%) and on site rather than during a displacement. When we consider all injuries, irrespective of the country of birth, (as a share of the resident population) the average rate is slightly higher than for natives (1.52 versus 1.42), while mean impairment is 1.27 versus 1.29.

Our last data source is the longitudinal version of the LFS that ISTAT produces by reinterviewing half of the individuals surveyed in a trimester after 12 months. Due to its sampling design, the panel includes only individuals that maintain the same residency, but reports retrospective information of previous year residence. Until 2010, the survey includes only the first trimester and we keep this design for the following years, for consistency. The longitudinal LFS reports the province of residence until the end of year 2012, which is why our sample spans from 2009 to the first trimester of 2013. From this source, we use demographic information (age, the square of age to proxy for experience, country of birth, province of residence) and we track labor market outcomes such as the employment status (employed vs unemployed) and, conditional on working, the macro-sector (agriculture, industry, construction, commerce, and other), the two-digit activity code⁷, the employment position (autonomous, collaborator, or employee). We compute changes over time in those measures and we relate those to the share of foreign-born residents in the same province. Table 2 reports the summary statistics for native men and women aged 16-65. Changes in self-employment and in the macro sector of activity are very low (0.02%). Similarly, changes in activity are in the order of 0.07%.

⁶Due to lack of representativeness in the LFS at the province level, the denominator is still made by all workers in the province, irrespective of the sector.

⁷Four-digit codes are reported in the data as two-digits for a large share of observations.

3 Empirical strategy

The objective of our analysis is to investigate whether the presence of migrants affects native workers' injury rates. We identify the relationship between immigration and the occupational injury risk of domestic workers through changes in the concentration of migrant workers across and within local administrative units over time. The following linear model specifies our baseline fixed-effects estimations:

$$INJ_{p,t}^{nat} = \alpha_p + \beta MIG_{p,t} + \eta_t + \epsilon_{p,t}.$$
(2)

 $INJ_{p,t}^{nat}$ represents the share of injuries among native workers in province p at time t. $MIG_{p,t}$ is the share of migrants among province p's residents. α_p and η_t are province and time fixed effects. Migrants may endogenously locate in administrative provinces whose characteristics correlate with the degree of occupational health safety. In order to tackle this source of endogeneity of immigrants, we instrument the share of resident migrants in the local labor market based on their historical settlement, following the "shift-share" approach (Card, 2001), extensively employed in the literature. The rationale behind this strategy is that the historical distribution of migrants across provinces is independent of future changes in the local labor market conditions. By constructing an instrumental variable based on historical shares by area of origin, the estimation captures the variation of migrant shares which is due to historical settlements rather than contemporaneous location-specific characteristics. First, we impute the distribution of migrant inflows by country of origin c at time tacross provinces p by allocating future national-level inflows on the basis of their historical spatial allocation:

$$MC_{c,p,t} = ShM_{c,p,1990} * FlowM_{c,t} + StockM_{c,p,1990}$$
(3)

 $ShM_{c,p,1990}$ is the share of migrants from origin c settled in province p in January first of 1990 (not distinguished by sex). To obtain the imputed number of migrants from origin c in province pat time t ($\hat{MC}_{c,p,t}$), we multiply the national-level inflows of migrants at time t by area of origin $FlowM_{c,t}$ by their "historical" (year 1990) province-level shares, and then we add the initial (1990) stock of migrants from c in p. Additionally, we perform the same estimation, but multiply the shares in 1990 by country of origin and province to the stock of immigrants from area c at time t:

$$\hat{MC}_{c,p,t} = ShM_{c,p,1990} * StockM_{c,t}$$

$$\tag{4}$$

Next, for each province, we sum all areas of origin and divide by the total number of male or female residents aged 15-65 (including natives and the imputed stock of migrants), obtaining the imputed share of migrants in $p(\hat{M}_{p,t})$:

$$\hat{M}_{p,t} = \sum_{c} (\hat{MC}_{c,p,t}) / Pop_{p,t}$$
(5)

We thus proceed with a two-stage least-squares estimation, instrumenting the share of migrants among the resident population in the administrative unit $(MIG_{p,t})$ with the imputed share $\hat{M}_{p,t}$.

Our main dependent is the share of injuries among the working-age population born in the country. However, we additionally estimate the impact of immigration on the severity of work-related accidents, as measured by the degree of impairment and the average number of sick leave days prescribed by the doctor over the total number of injuries in the province, and then exclusively for those with a permanent impairment ("severe" injuries). We also estimate separate regressions for the share of injuries in the industrial, agricultural, and service sector, and for accidents classified as related to work on site or while traveling.

Next, our analysis moves to the potential underlying mechanisms that may convey a reduction in the native workers' injury rate. Using longitudinal data from the Italian LFS, which provides information on the province of residence only for the years 2009-2012⁸, we analyze whether the likelihood that native workers change employment status, economic activity (macro sectors and subcategories), and professional position changes in relation with the share of immigrant workers in their province. We estimate a fixed-effects regression, with the following specification:

$$Y_{i,t}^p = \alpha_i + \beta M I G_{p,t} + \gamma A g e_{i,t} + \delta A g e_{i,t}^2 + \eta_t + \epsilon_{i,t}$$
(6)

 $Y_{i,t}^p$ indicates, for the native worker *i* residing in province *p*, either (i) the occupational status (employed vs unemployed), (ii) the autonomous worker status, (iii) a change in economic activity (classified by the four-digit *ateco* code), or (iv) a change in the professional position (employee, collaborator, or autonomous worker), conditional on being continuously employed. The regression includes individual α_i and year η_t fixed-effects, and the square of age, to account for experience.

⁸The longitudinal version of the Italian LFS is run every trimester. For all the years prior to 2012, however, ISTAT releases only data from the first trimester. For consistency, we employ only data from the first trimester also for 2012.

 $MIG_{p,t}$ represents the share of foreign-born residents in individual *i*'s province at time *t*. Similarly to the estimation of work-related injuries by province (Equations 2 to 5), we instrument the share of migrants with its imputed share $\hat{M}_{p,t}$ based on 1990 settlements and recent inflows by country of origin, as already described.

4 Results

4.1 Presence of foreign-born residents and native workers' injury rate

This section presents the estimates of the impact of immigration on the incidence and severity of native workers' injuries. The main outcome, injury rate, is constructed as the share of total yearly injuries among native employed individuals aged 16-65, by province. The explanatory variable is the share of immigrants among the total number of residents within a province, at a given year (2009 to 2017). Table 3 reports the results that we obtain by estimating Equation 2 including province-specific fixed-effects and year fixed effects with robust standard errors (Column 1), standard errors clustered at the province level (Column 2), the two-stage least squares (2SLS) instrumental variable estimations (Column 3), and its first stage (Column 4). The OLS regression with province and year fixed effects show a negative relation between the share of foreign born residents and the injury rate of native workers at the province level. In Column 2, the coefficient for immigration is not statistically significant. When we instrument the share of migrants with the share imputed through historical settlements, we find a drop in work-related injuries that is statistically significant at the 10% level. More specifically, an increase in the share of foreign born by 10 percentage points corresponds to a reduction in the injury rate of native workers by 2.1 percentage points. The instrumental variable estimation addresses the concern that migrant location directly or indirectly correlates with contemporaneous changes in the labor market conditions that include natives' exposure to injury risk. As explained in Section 3, we adopt the "shift-share" or networkbased instrumental variable approach (Card, 2001), based on 1990 settlements by continents of origin, weighting the origin-specific number of residents by year by their historical distribution across provinces, and summing all areas of origin. The first stage coefficient shows a positive and significant prediction.

Figure 4 reports the coefficient estimates with the 90% confidence interval for the effect of

immigration on different types of injuries (full regression estimates are reported in Table 6). There are two main takeaways from the Figure. First, both accidents occurring at the workplace and those occurring during a displacement experience a statistically significant decrease, but the impact is higher for the former. Second, a separate analysis of work-related accidents by sector reveals that the decrease is driven by the industrial sector. On the contrary, the agricultural and service ones present slightly positive coefficients, while not statistically distinguishable from zero.

The instrumental variable estimation requires some caution in its interpretation, for three reasons. The first one is that the first-stage F-test for the excluded instrument is slightly below the critical value of 10 (8.19). Next, (i) the historical distribution of migrants across provinces, by country of origin, may not be exogenous, and (ii) inflows of migrants by country of origin may be too persistent, implying that (Jaeger et al., 2018).

4.2 The severity of work injuries: days of absence and degree of impairment

Next, we analyze whether the presence of foreign-born residents contributes to a decrease in the severity of work-related accidents. To do so, we focus on four additional outcomes: the degree of impairment and the average number of days away from work that doctors assign to the injured workers, (i) for all injuries and (ii) by selecting only those accidents that are classified with a degree of *permanent* impairment ("severe" injuries).

Table presents the results of the 2SLS second stage instrumental variable estimation: a higher share of immigrants in the province implies a decrease in all the indicators of severity. A percentage point increase in the share of foreign-citizens decreases the average sick leave by 2 days, with significance at the 5% level. For severe injuries, the impact is of 8.5 days and a decrease of 0.4 degrees of impairment (both significant at the 10% level).

This analysis shows that not only do the share of injuries among workers decline, but also their severity falls in response to immigration. This is only statistically significant in the case of male workers, while for female workers we can never reject the null hypothesis, neither in the FE nor in the IV estimation. This is somewhat consistent with the fact that the injury rate for women is lower, and with the finding that the impact of immigration on the injury rate of Italian women has a significantly smaller magnitude than in the case of men.

4.3 Reallocation or Pareto improvement? Native workers' job mobility

5 Conclusion

Our analysis supports the hypothesis that inflows of foreign-born residents of working age alleviate the injury risk of native workers. The smallest impact that we detect implies that a ten percentage point increase in the share of migrants reduces the injury rate by 2 percentage points. Not only the incidence of work-related accidents, but also the severity of such accidents significantly falls in response to immigration. Despite the limitations given by the province-level dimension of variation in our data, this analysis shows that immigration can have a positive effect on native workers' exposure to accidents.⁹ The existing literature shows that, in the UK, middle-skilled natives shift towards jobs with a lower injury risk (Giuntella et al., 2018), away from manual-intensive tasks, and, in Scandinavian countries, towards a higher communication-based component (Foged and Peri, 2016; Peri and Sparber, 2009). We contribute to this literature by analyzing the impact of immigration on native workers' health, with two innovations: we address a context that is characterized by limited job flexibility and mobility, and we extend the analysis to the *universe* of labor market injuries, drawn from administrative data. We show the existence of an immigrantnative injury gap that absorbs a significant part of the reduction in natives' accidents. Starting from this evidence, we wish that future research will shed further light on the potential mechanisms behind these results, disentangling the role of language-related communication issues in risk intake from selection into riskier tasks based on risk aversion and discrimination. In our future steps, we will also investigate whether immigration results in an overall Pareto-improving health scenario for the labor market. The existing literature also suggests that inflows of mainly unskilled foreignborn women concentrated in the household production sector may provide an opportunity for skilled natives to increase their labor market participation (Cortes and Tessada, 2011). The net effect on injuries for native women would thus depend on the relative increase in their participation in occupations with higher injury risk exposure. This focus is beyond the scope of this paper, but we believe that it constitutes an additional interesting possible avenue for future work.

⁹An ideal estimation of the individual-level occurrence of injuries for native and migrant workers would require a match between the employment and injuries administrative archives based on a unique individual identifier. This is not a possibility at the moment in the case of Italy.

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Tables and Figures



Figure 1: Injury rate among the foreign-born and the native employed population (16-65) in Italy

Source: Authors' estimations from ISTAT demographic data and the INAIL archive of work-related accidents.



Figure 2: Injury rates among native workers (16-65) and share of foreign-born residents in Italy

Source: Authors' estimations from LFS-ISTAT data and the INAIL archive of work-related accidents.

	Ν	Mean	SD	Min	Max
	010	~	0.0 ×	1 0 0	1 - 0 /
Foreign-born Share	819	8.44	3.95	1.02	17.04
Injury Rate (% of Workers)	819	2.47	0.80	0.87	5.66
Injury Rate (% of Residents)	819	1.42	0.63	0.32	3.97
Severity					
Sick Leave Days per Accident	819	27.11	5.28	13.35	45.55
Degree of Impairment per Accident	819	1.29	0.49	0.36	3.57
Days (severe)	819	92.04	15.21	53.30	168.55
Impairm.(severe)	819	7.39	0.95	4.19	11.20
Injury Rate (% all native worke	ers)				
On site	819	2.17	0.73	0.81	5.42
Traveling	819	0.29	0.11	0.05	0.64
Sector-specific Rate (% all nativ	ve wo	rkers)			
Agriculture	819	$0.20^{'}$	0.14	0.01	0.93
Industry	819	2.08	0.75	0.62	4.71
Service	819	0.19	0.04	0.02	0.32
Overall injuries: native + foreig	n bo	rn (% I	Residen	nts)	
Injury Rate	819	1.52	0.72	0.32	4.42
Impairment	819	1.27	0.54	0.30	3.87
Agriculture	819	0.12	0.09	0.00	0.65
Industry	819	1.31	0.67	0.26	3.75
Service	819	0.10	0.03	0.01	0.17

Table 1: Descriptive statistics, Italian provinces (2009-2017)

Source: Authors' estimation from ISTAT demographic data, INAIL archive of work injuries, and the Italian Labour Force Survey (LFS-ISTAT), years 2009-2017. We replaced as missing the injury rate for migrant men in the Province of La Spezia in 2009 because of its outlier injury rate of 41%.

	Ν	mean	sd	min	max
Sample of active individuals					
Age	258946	41.99	10.60	16.00	65.00
Female	258946	0.41	0.49	0.00	1.00
Employed	258946	0.86	0.34	0.00	1.00
Employed only, panel (2010-2013)					
Age	156119	43.17	10.14	17.00	65.00
Female	156119	0.40	0.49	0.00	1.00
Sector					
Agriculture	156119	0.03	0.18	0.00	1.00
Industry	156119	0.21	0.41	0.00	1.00
Construction	156119	0.07	0.25	0.00	1.00
Commerce	156119	0.15	0.36	0.00	1.00
Other	156119	0.54	0.50	0.00	1.00
Professional position					
Dependent	156119	0.75	0.43	0.00	1.00
Collaborator	156119	0.01	0.12	0.00	1.00
Self-employed	156119	0.24	0.43	0.00	1.00
Change in					
Self-employment	156119	0.02	0.13	0.00	1.00
Macro-sector	156119	0.02	0.14	0.00	1.00
Activity (2digit)	156119	0.07	0.25	0.00	1.00

Table 2: LFS Longitudinal. Individual-level Descriptive Statistics

Source: Authors' estimation from Italian Labour Force Survey (LFS), longitudinal version, first quarter 2009 to first quarter of 2013. Sample sizes refer to individual-year observations. The sample of employed individuals is constructed by following IDs across two waves, hence the coverage of years 2010-2013 and ages 17-65. All estimates are weighted using the provided sampling weights.



Figure 3: Injury Rates in 2017 at the province level (age 16-65)

Source: Authors' estimations from ISTAT demographic data and the INAIL archive of work-related accidents. Injury rates are computed as total injuries by country of birth (Italy vs foreign-born), divided by the resident population aged 15-65 by sex and citizenship.

	(1)	(2)	(3)	(4)
	OLS-FE	\mathbf{FE}	IV	First Stage
Foreign-born Share	-0.03**	-0.03	-0.21^{*}	
	(0.01)	(0.02)	(0.12)	
^				
Instrument $M_{c,p,t}$				0.28^{***}
				(0.10)
Mean Dep. Var.	2.47	2.47	2.47	8.44
StDev Dep. Var.	0.80	0.80	0.80	3.95
Ν	819	819	819	819
R2	0.97	0.84	0.95	0.99
F-Stat (First Stage)				71.10
F-Stat (First Stage)	Excl. Instr.			8.19

Table 3: Foreign-born residents and native workers' injury rates

Source: Authors' estimation from ISTAT demographic data, INAIL archive of work injuries, and the Italian Labour Force Survey (LFS-ISTAT), years 2009 to 2017. All regressions include province and year fixed effects and control for the log of province GDP. Standard errors in parentheses are clustered at the province level, except for column (1) in which they are robust. Asterisks denote statistical significance at the 1(***), 5(**) or 10(*) percent level.

	(1)	(2)	(3)	(4)
	All I	njuries	Severe	Injuries
	Mean days	Impairment	Mean days	Impairment
Foreign-born Share	-1.939^{**} (0.969)	-0.090 (0.058)	-8.489* (4.808)	-0.415^{*} (0.251)
Mean Dep. Var.	27.113	1.295	92.039	7.386
StDev Dep. Var.	5.281	0.494	15.214	0.949
Ν	819.000	819.000	819.000	819.000
R2	0.866	0.908	0.746	0.729

Table 4: Foreign-born residents and the severity of natives' injuries (2SLS - Second Stage)

Source: Authors' estimation from ISTAT demographic data, INAIL archive of work injuries, and the Italian Labour Force Survey (LFS-ISTAT), years 2009 to 2017. All regressions include province and year fixed effects and the log of province GDP. "Mean days" are sick paid leave days prescribed by the doctor (avg. of municipality's injuries). "Impairment" is an index of the severity of impairment. "Severe Injuries" refers to those with a degree of permanent impairment. Robust standard errors in parentheses, clustered at the province level. Asterisks denote statistical significance at the 1(***), 5(**) or 10(*) percent level. First stage results are in Table 3.

Figure 4: Immigration and natives' injuries (% of native workers 16-65) in Italy. IV-2SLS Second stage coefficient estimates



Source: Authors' estimation from ISTAT demographic data, INAIL archive of work injuries, and the Italian Labour Force Survey (LFS-ISTAT), years 2009 to 2017. See Table 6 for full results. All regressions include province and year fixed effects and the log of province GDP. Dependent variables are computed as a share of total workers (%). Standard errors are clustered at the province level. Results from the first stage are in Table 3.

	(1)	(2)	(3)	(4)	(5)
	Injury rate	Impairment	Agriculture	Industry	Service
Foreign-born Share	-0.206^{**} (0.095)	-0.091 (0.071)	$0.005 \\ (0.010)$	-0.215^{**} (0.092)	0.004 (0.003)
Mean Dep. Var.	1.524	1.268	0.118	1.306	0.100
StDev Dep. Var.	0.719	0.545	0.091	0.668	0.026
Ν	819.000	819.000	819.000	819.000	819.000
R2	0.965	0.858	0.957	0.961	0.895

Table 5: Foreign-born residents and overall injuries: Pareto improvement? (2SLS - Second Stage)

Source: Authors' estimation from ISTAT demographic data, INAIL archive of work injuries, and the Italian Labour Force Survey (LFS-ISTAT), years 2009 to 2017. All regressions include province and year fixed effects and control for the log of province GDP. Dependent variables are computed as a share of the total resident population (%). Robust standard errors in parentheses, clustered at the province level. Asterisks denote statistical significance at the 1(***), 5(**) or 10(*) percent level. First stage results are in Table 3.

	(1)	(2)	(2)	(4)	(5)
	(1)	(2)	(3)	(4)	(0)
	On site	Traveling	Agriculture	Industry	Service
Foreign-born Share	-0.190^{*}	-0.024^{*}	0.018	-0.244^{**}	0.010
	(0.112)	(0.012)	(0.015)	(0.120)	(0.007)
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Mean Dep. Var.	2.173	0.292	0.196	2.081	0.187
StDev Dep. Var.	0.727	0.111	0.142	0.753	0.043
Ν	819.000	819.000	819.000	819.000	819.000
R2	0.953	0.931	0.948	0.949	0.835

Table 6: Effect on injuries by type and sector (2SLS - Second Stage)

Source: Authors' estimation from ISTAT demographic data, INAIL archive of work injuries, and the Italian Labour Force Survey (LFS-ISTAT), years 2009 to 2017. All regressions include province and year fixed effects and the log of province GDP. Dependent variables are computed as a share of total workers (%). Robust standard errors in parentheses, clustered at the province level. Asterisks denote statistical significance at the 1(***), 5(**) or 10(*) percent level. Results from the first stage are in Table 3.

Table 7: Immigration and labor market flows, province-level (16-65)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Low Skilled Natives (Seco	ondary ed	ucation d	or less)				
	New	Hires	Separ	ations	Change	in activity	First Stage
Migrant Share	-0.07 (0.57)	0.45 (3.86)	-0.43 (0.56)	4.74 (4.08)	0.12 (0.78)	7.18 (7.56)	
Imputed Migrant Share							$\begin{array}{c} 0.13^{***} \\ (0.04) \end{array}$
Mean of Dep. Var.	4.56	4.56	2.03	2.03	6.71	6.71	7.81
StDev of Dep. Var.	3.43	3.43	2.29	2.29	4.31	4.31	3.77
R-squared	0.36		0.25		0.47		0.84
F-stat (weak-id)							8.11

High Skilled Natives (Above Secondary Education)

	New I	Hires	Separ	Separations Change in activity First		First Stage	
Migrant Share	-1.33^{***} (0.47)	-4.59^{*} (2.39)	-0.12 (0.38)	0.41 (1.41)	$0.46 \\ (0.64)$	-1.03 (3.05)	
Imputed Migrant Share							$\begin{array}{c} 0.13^{***} \\ (0.04) \end{array}$
Mean of Dep. Var.	3.96	3.96	1.26	1.26	7.05	7.05	7.81
StDev of Dep. Var.	2.56	2.56	1.66	1.66	4.05	4.05	3.77
R-squared	0.35		0.26		0.52		0.84
F-stat (weak-id)							8.11

FE in odd columns, IV-2SLS in even columns. Source: Authors' estimation from ISTAT demographic data and the Italian Labour Force Survey (LFS-ISTAT), years 2010 to 2013. Sample size is 364 (91 provinces). All regressions include province and year fixed effects. Dependent variables are computed as a share of total employed natives in the province (%), over annual gaps. Notice: by design, the sample is made of individuals that do not leave the province in two consecutive years. Robust standard errors in parentheses, clustered at the province level. Asterisks denote statistical significance at the 1(***), 5(**) or 10(*) percent level. Results from the first stage are in Table 3.

	(1)	(2)	FIRST Stage (3)	гЕ (4)	(5)	F E (6)	(7)	FE (8)	(9)	FITSU STAGE (10)
		Employme	int				Change	in		
				Activity	(2 digit)	Self-emp	loyment	Macro	Sector	
Migrant Share	0.596^{***}	1.721^{**}		-0.556	-6.973	0.175	-0.752	-0.297	-4.496^{**}	
1	(0.217)	(0.751)		(0.700)	(4.315)	(0.219)	(0.998)	(0.375)	(2.094)	
$\operatorname{Insturment}$	r.		0.114^{***}				х х			0.094^{***}
			(0.024)							(0.021)
Ν	258,946	258,946	258,946	156,119	156,119	156,119	156, 119	156,119	156,119	156, 119
R-squared	0.001		0.751	0.037		0.006		0.012		0.753
Number of ID	101,282	101,282	101,282	82,499	82,499	82,499	82,499	82,499	82,499	82,499
F-Stat (first stage)										

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Macro sectors are classified as agricultural, industry, construction, commerce, and other. "Employment" is a dummy variable with value 1 for employed, 0 for unemployed status. Standard errors in parentheses are clustered at the province level. Asterisks denote statistical significance at the 1(**), 5(**)or 10(*) percent level.

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