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Do immigrants squeeze natives out of bad schedules? Evidence from Italy

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Abstract

This paper documents the effect of immigrant concentration on natives' work schedules. I show that immigrants are more likely to work at non-standard hours (i.e. evenings, nights and Sundays) and that a higher proportion of immigrants in the local labor market is associated with a lower probability of employed natives working non-standard shifts. Results are strongest in sectors and occupations that are more accessible to immigrants. In particular, I find that a 1 standard deviation increase in the foreign population residing in a province is associated to a 4% reduction in the natives' likelihood of working non standard hours.

JEL codes: J15, J81, J61

Keywords: Immigration, Working conditions, Nonstandard schedules

1 Introduction

The effects of immigration on economic outcomes for native workers have been widely investigated. While there is an academic consensus that immigration does not have a significant effect on average native wages in the long-run (Borjas 1995; Card 1990; Carrington and Lima 1996; Friedberg and Hunt 1995; Hunt 1992) its effect on the relative wage redistribution across different skill groups is more controversial (Borjas et al. 2011, 2008; Ottaviano and Peri 2012). At the same time, little is known about the effects of immigration on native job quality and working conditions. Several studies document that working late at night or not taking breaks over the weekend is associated with negative health outcomes, less time spent with family and friends, less marital stability, and negative effects on children's well being. In particular, working nonstandard hours has been shown to be associated with negative health outcomes including chronic fatigue, a higher probability of accidents, anxiety, depression, hypertension, obesity, ischemic heart disease, and breast cancer (Costa 1996; Davis et al. 2008; Vyas et al. 2012).[1] Nonstandard schedules reduce time spent with family and friends, affecting the consumption of relational goods, with important consequences for marital stability (Presser 2000), children's well-being (Lyndall et al. 2006) and more generally individual well-being (Becchetti et al. 2008; Clark 1998; Gui and Sugden 2005; Poggi 2010). Interestingly, Hamermesh 1999 shows that modeling nonstandard hours as a disamenity explains the sharp decline in evening and night hours worked in the U.S. better than industry shifts or demographic changes. Together, this evidence suggests that we cannot neglect nonwage effects,
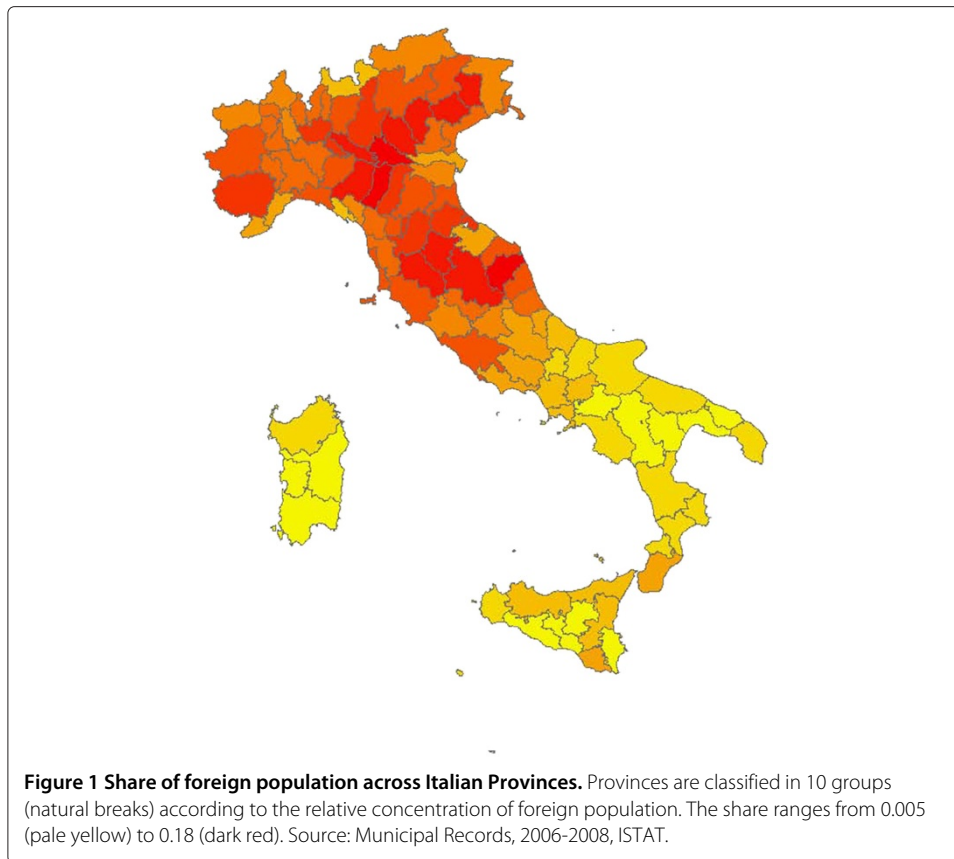
such as work schedules, when analyzing the overall impact of immigration on the native labor market.

This paper investigates whether an increased presence of immigrants in the local labor market affects the nonwage attributes of natives' jobs. Specifically, this study provides evidence that immigrants have a higher likelihood to work nonstandard hours (relative to natives) and then analyzes the effects of immigration on the likelihood of natives working nonstandard hours.

While the main contribution of this study is to provide an empirical investigation of the relationship between native working schedules and the proportion of immigrants in a local labor market, there are several reasons why immigrants might show a higher tendency to work nonstandard hours and in turn affect the likelihood of natives working non-standard hours. Since most immigrants are lower-skilled (relative to natives) and lower-skilled jobs are more likely to involve nonstandard schedules, the increased number of immigrants could partly crowd out natives from non-standard employment. As discussed by Orrenius and Zavodny (2009), since job amenities are usually considered a normal good and since immigrants have on average less wealth than natives, immigrants might be more willing to trade-off higher wages for worse shifts. Furthermore, because many occupations that have nonstandard shifts may require less interpersonal skills, immigrants with poor Italian-speaking skills and lower communicational skills might have a comparative advantage in working these shifts. Consistently with recent literature on immigration and task specialization (Cortes and Tessada 2011; D'Amuri and Peri 2010; Peri and Sparber 2009), the complementarity of different working schedules and group heterogeneity in the propensity to work nonstandard shifts might induce a negative effect of immigration on the likelihood of natives working nonstandard hours.[2]

Previous studies analyzed whether immigrants are more likely than natives to work in risky jobs (Berger and Gabriel 1991; Orrenius and Zavodny 2009, 2012) as well as differences in time use by nativity (Hamermesh and Trejo 2012; Ribar 2013). However, to my knowledge, only Hamermesh (1998) has examined the impact of immigrants on natives' job quality using US data. In particular, he provides evidence that similar immigrant and native workers enjoy the same job amenities, including the likelihood of working at inferior times and having higher injury rates, and that the immigrant concentration has no consistent effect on the quality of natives' job amenities. However, his analysis and the causal interpretation of his findings are severely restricted by the paucity of data on workplace disamenities and information identifying workers' national origin.

By taking advantage of the Italian Labor Force Survey (LFS), which contains information on both schedules and nativity since 2006, I contribute to the previous literature by investigating the role that immigration plays on native job quality using a much larger sample and by focusing on the impact of immigration on native schedules in the Italian labor market. Italy offers an interesting example of a developed country that has rapidly shifted from origin to destination for migration flows. Until the mid-1980s, the net migration rate was negative, but between 2002 and 2008, Italy attracted about half a million foreign citizens per year, bringing the foreign population to an estimated 4.5 million persons in 2008, which was about 7.5 percent of total population. Substantial variation in the concentration of immigrants across Italian provinces allows us to identify the effect of immigration on native working schedules (see Figure 1).

Figure 1 Share of foreign population across Italian Provinces. Provinces are classified in 10 groups (natural breaks) according to the relative concentration of foreign population. The share ranges from 0.005 (pale yellow) to 0.18 (dark red). Source: Municipal Records, 2006-2008, ISTAT.

To account for potential endogeneity in immigrant location choices, I use historical settlement choices of immigrants across local labor markets to instrument for current immigrant distribution across Italian provinces (Card 2001; Lewis 2005). At the same time, I include in the estimation a range of past local labor market characteristics, such as sectoral composition and labor productivity that might affect both immigrant settlements and the demand for nonstandard schedules.

The empirical analysis suggests that immigrants -I exclude EU-15 citizens from the analysis- are more likely to work at nonstandard hours (32% versus 28%) and that a larger proportion of foreign workers in a local labor market reduces the likelihood of working nonstandard hours for natives. In particular, doubling the share of immigrants living in a province (a 1.3 standard deviation increase) reduces the share of natives working nonstandard hours by 2 percentage points (from 28% to around 26%, a 7% reduction). The improvement in average working conditions is driven by the changes recorded in sectors that are generally considered more accessible to immigrants (hospitality, retail, transports etc.), while results are not significant in sectors that are typically less accessible to non-citizens and in which natives face lower competition from immigrants (for example, the public or financial sectors). Similarly, there is no significant effect on the schedules of self-employed workers and highly specialized white collars. This reduction in the likelihood of working nonstandard hours is not associated with significant effects on the probability of being employed or on the number of hours worked. When looking at labor market flows, using the longitudinal component of the Italian LFS, I find that a larger predicted

foreign population significantly decreases natives' probability of worsening the schedule or remaining employed at nonstandard hours. All other flows do not appear to be significantly shaped by a predictably larger immigrant stock. The results are robust to different specifications as well as different measures of foreign population.

The structure of the paper is as follows. Section 2 provides a description of the data and illustrates the empirical specification and identification strategy. Section 3 presents the main results of the paper. In Section 4 I discuss key results and robustness checks. Concluding remarks are in Section 5.

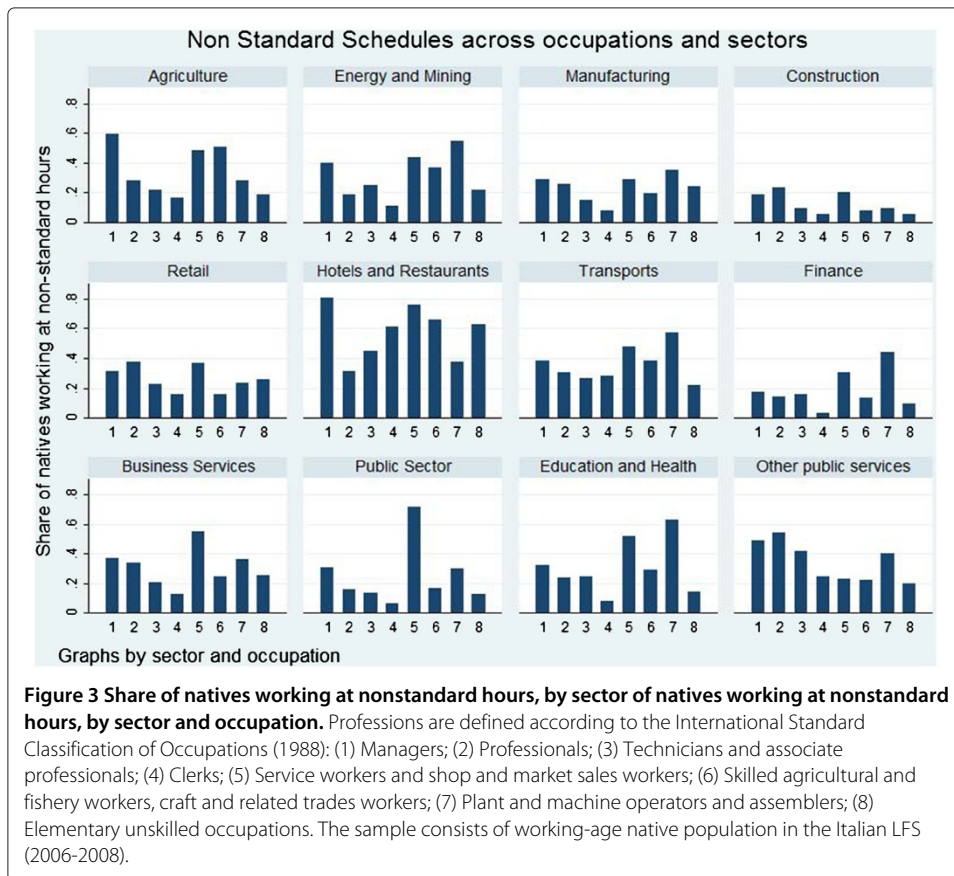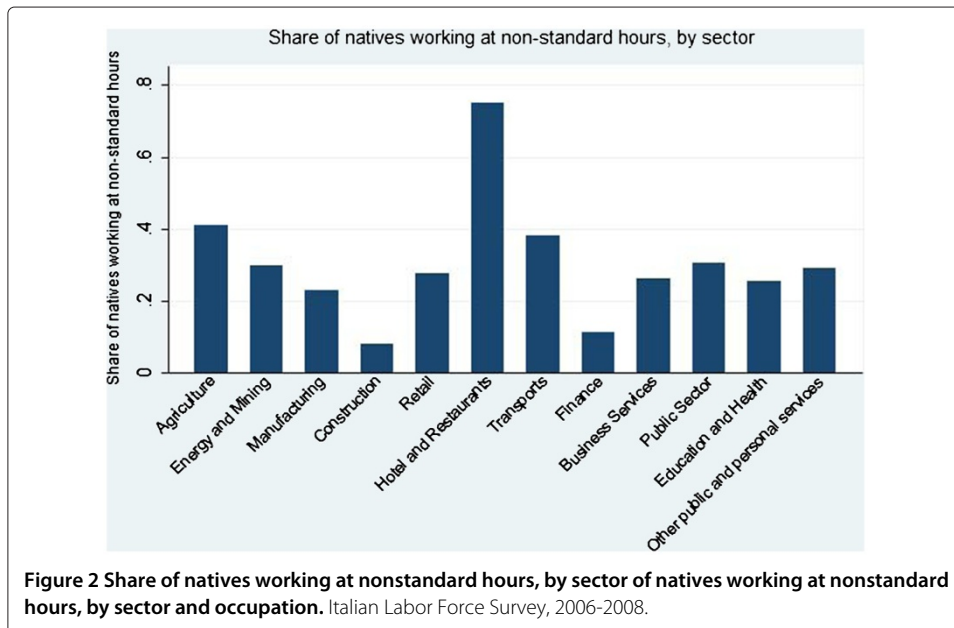## 2 Data and empirical specification

2.1 Data

The main data sources for this paper are the 2006-2008 waves of the Italian Quarterly Labor Force Survey (LFS). The survey was originally designed to produce cross-sectional data, as each sample household is interviewed for four quarters, but the records can be linked to produce longitudinal data at three, nine, twelve and fifteen month intervals.[3] The LFS yields a rich set of socio-demographic information on individuals, including hours worked and whether nonstandard hours were worked over the month prior to the survey. Specifically, individuals were asked if they worked in the evening (between 8 pm and 11 pm), at night (later than 11 pm), and on Saturday or on Sunday.[4]

Nonstandard hours are quite common in this representative sample of workers. About 14 percent of those employed reported having worked between 8 pm and 11 pm at least twice a week; and another 5.5 percent reported working at least once a week. Work after 11 pm is less frequent, but still more than 10 percent reported having done so one or more times a week. More than one-third of the workers reported working at least twice on Saturday over the previous month, and an additional 10 percent reported working at least once on a Saturday (see Table S14 in the Additional file 1). Approximately 20 percent of the workers reported working on Sunday. In the following analysis, I define nonstandard schedules (NS) as those involving work in the evening or at night at least once a week, or work on Sunday at least once a month. I consider working on Saturday standard for a work schedule, as working on Saturday is common in Italy, especially for retailers and many segments of the public sector (see Table S11 in the Additional file 1). However, I explore different definitions of nonstandard hours in the robustness checks.[5] As shown in Figures 2 and 3, a significant proportion of employed persons in all sectors and professions work nonstandard hours, ranging from around 80 percent among managers and service workers in the hospitality sector, to less that 10 percent among clerks in the public sector.

Following the traditional area approach, I exploit the heterogeneous geographical distribution of immigrants across Italy as the main source of variability. The analysis focuses on immigrants who are not EU-15 citizens and who are in large part coming from Maghreb and Eastern Europe.[6] In particular, I combine the micro-data drawn from the LFS with aggregate data on the immigrant distribution from the Survey on demographic balance and resident foreigners provided by the National Institute of Statistics (ISTAT).[7]

This survey includes data on all the immigrants recorded in Municipal records.[8] The Municipal Records on population report both the native and foreign population for all 8,100 municipalities in Italy and can be aggregated for the 626 Italian local labor markets

Figure 2 Share of natives working at nonstandard hours, by sector of natives working at nonstandard hours, by sector and occupation. Italian Labor Force Survey, 2006-2008.

Figure 3 Share of natives working at nonstandard hours, by sector of natives working at nonstandard hours, by sector and occupation. Professions are defined according to the International Standard Classification of Occupations (1988): (1) Managers; (2) Professionals; (3) Technicians and associate professionals; (4) Clerks; (5) Service workers and shop and market sales workers; (6) Skilled agricultural and fishery workers, craft and related trades workers; (7) Plant and machine operators and assemblers; (8) Elementary unskilled occupations. The sample consists of working-age native population in the Italian LFS (2006-2008).

(LLM) as defined by ISTAT. However, information on country of origin and area of residence is publicly available only at the province level.[9] Since my identification strategy is based on historical settlement patterns of immigrants in Italy by country of origin (e.g., Card (2001)), I use province as the geographic unit in the main specification of this paper. I discuss the results obtained using the population in a LLM as the main explanatory variable in the robustness checks.

Finally, I use province-level aggregate accounts released by ISTAT to describe local economic features as of 1995, the earliest year for which data are available. I consider the 95 provinces that existed in 1995 in order to be consistent with the data that I used to construct my instrument (see the following Section).[10] In the main specification, the sample is restricted to employed natives between the ages of 15 and 64. I consider the overall working age population when discussing the effects on employment and yearly labor market flows. Summary statistics of the variables used in the analysis are provided in the Additional file 1 (Tables S11, S12, S13).

2.2 Empirical specification and identification strategy

To test the effects of immigration on native schedules, I estimate a linear model for the probability that a native worker i works on a nonstandard schedule[11] :

$$Y_{ipt} = \alpha + log(FP_{pt})\beta + log(TP_{pt})\lambda + X_{ipt}\gamma + P_p\theta + \eta_{pt} + \tau_{pt} + \epsilon_{ipt} \qquad (1)$$

where Y_{ipt} is an indicator equal to unity if i, living in province p at time t, worked at least once after 8 pm or on a Sunday over the month prior to the interview; the logarithm FP_{pt} measures immigrant concentration in province p at the beginning of period t, controlling for the logarithm of the total population $log(TP_{pt})$ living in province p at the beginning of period t; X_{ipt} is a set of individual level controls; P_p are province level characteristics; η_{pt} and τ_{pt} are region-year and trimester fixed effects, respectively. I use region-year fixed effects to account for regional business cycles, but the results are nearly identical when simply using region and year fixed effects (see Table 1).[12]

Since immigrants do not locate randomly but are likely concentrate where labor demand is higher, areas with more immigrants may also be characterized by more work during nonstandard hours. This effect is likely to be strong in Italy because employment protection legislation is pervasive, and employers tend to satisfy increased demand by raising hours rather than employment (Nunziata 2003). Failure to appropriately control for factors that shape local labor demand could thus induce a spurious positive correlation between immigrant concentration FP_{pt} and the incidence of nonstandard hours in the province. I address this issue by exploiting historical settlement patterns of immigrants in Italy by country of origin (e.g., Card (2001)). These patterns are able to predict the current foreign population in a given local labor market since immigrants tend to reside where previous immigrants from the same country are established (Bartel 1989). At the same time, past settlements are unlikely to be correlated with more recent positive labor market shocks that might induce a stronger inflow of foreigners to the province. A relevant concern is that there could be unobserved and time invariant province characteristics shaping the immigrant distribution over provinces and the native nonstandard schedule demand and supply. To partially address this concern, I control for the 1995 sectoral composition of value added and sectoral labor productivity.[13] One might conceive of persistence in business practices. In some provinces firms who adopt nonstandard hours

Table 1 Effects of immigrants on natives working schedules

	(1)	(2)	(3)	(4)	(5)	(6)
LS, log (Foreign Population)	-0.019***	-0.017***	-0.016**	-0.016***	-0.013***	-0.013***
	(0.003)	(0.003)	(0.007)	(0.004)	(0.004)	(0.005)
2SLS, log (Foreign Population)	-0.016***	-0.014***	-0.026**	-0.020***	-0.016***	-0.016***
	(0.004)	(0.005)	(0.013)	(0.005)	(0.005)	(0.005)
log (Total Population)	Yes	Yes	Yes	Yes	Yes	Yes
Individual & household characteristics	No	Yes	Yes	Yes	Yes	Yes
Trimester FE	No	No	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	No	No	No
Region FE	No	No	Yes	No	No	No
Region-Year FE	No	No	No	Yes	Yes	Yes
Sector	No	No	No	Yes	Yes	Yes
Province Characteristics as of 1995	No	No	No	Yes	Yes	Yes
Occupation	No	No	No	No	Yes	Yes
Past non-standard schedule as of 1994	No	No	No	No	No	Yes
Observations	684,530	684,530	684,530	684,530	684,530	684,530
Mean of Dep. Var.	0.28					

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: The sample considered is the overall working age population (15-64) employed at the time of the interview. All the estimates are weighted using the weights provided in the LFS. The dependent variable is the probability of working at non-standard hours. The measure of immigrant concentration is the logarithm of foreign population (mean 9.78, s.d. 1.08) as defined in the Data Section. Standard errors are clustered at the province level. The data sources are LFS (2006-2008 and 1994), Municipal Records (2006-2008), ISTAT Province Accounts (1995) and Minister of Interior for Residence Permits issued at the province level as of 1995.

might continue to do so over time due to competition with other firms along these dimensions. In the presence of such province characteristics the exogeneity assumption would not hold. To take into account of persistences in business practices I include the share of population working nonstandard hours in the province as of 1994 in the robustness checks. Since all the specifications control for regional fixed effects, the existence of an omitted variable not correlated with the observed province characteristics and that varies within the region is unlikely.[14]

For all the above reasons, predicted foreign population stock at a given location is a valid instrument for FP_{pt} in equation (2). Formally, I compute the predicted stock of immigrants in province p in year t as:

$$\widehat{FP}_{pt} = FP_{p,0} + \sum_{n=1}^{N} \lambda_{np,0} * \Delta_{nt} \qquad (2)$$

where the first term on the right, $FP_{p,0}$, is the stock of immigrants in the province in the base-year; $\lambda_{np,0}$ is the proportion of immigrants from country n in the base-year that live in province p; and Δ_{nt} is the inflow from country n to Italy between the base-year and time t. I define the instrument used in the estimation as:

$$Z_{pt} = \widehat{FP}_{pt} \qquad (3)$$

I obtained from the Ministry of Interior data on the geographic distribution of immigrants by country of origin ($\lambda_{np,0}$), which refers to the stock of residence permits issued at the province level in 1995.[15] The span of more than ten years between the base

year and the sample window should limit concerns that early settlements are correlated with current labor market conditions. First stage estimates (reported in Table S15 in the Additional file 1) show that the predicted share of immigrants using the shift-share methodology is strongly correlated with the actual share of immigrants living in a province. In particular, t and F statistics of the first stage are above 11 and 107, respectively (column 4, Table S15).

3   Results

3.1   Main results

Table 2 compares the shares of employed natives and foreigners working nonstandard hours and shows that, in general, immigrants appear to be more likely to work during nonstandard hours. About 32 percent of employed immigrants reported having worked a nonstandard work schedule at least once over the past month, as compared with 28 percent among natives; night-work (after 11 pm) is less frequent than work between 8 and 11 pm or work on Sunday. Even after controlling for standard socio-demographics, such as age, gender, education, household characteristics (column 4), sector and occupation dummy variables (column 5), and province fixed-effects (column 6), immigrants still appear to work more nonstandard hours than natives.[16] All the estimates are weighted using the weights provided in the LFS.

I now turn to the main objective of this analysis. The main findings are reported in Table 1. The dependent variable is a dummy variable equal to one for Italian citizens who report having worked nonstandard hours at least once over the survey reference week. I show that a large proportion of foreigners in the local labor market affect the work-schedule of natives. In particular doubling the share of immigrants residing in a province - a 1.3 standard deviation increase - is associated with a reduction in natives' likelihood

Table 2 Nonstandard working hours, immigrants and natives

	(1)	(2)	(3)	(4)	(5)	(6)
	I	N	I-N	I-N	I-N	I-N
Evening	0.23	0.199	0.029***	0.014***	0.028***	0.030***
			(0.002)	(0.002)	(0.002)	(0.002)
Observations	35,983	684,530	720,513	720,513	720,513	720,513
Night	0.136	0.109	0.027***	0.014***	0.021***	0.024***
			(0.002)	(0.002)	(0.001)	(0.001)
Observations	35,983	684,530	720,513	720,513	720,513	720,513
Sunday	0.208	0.188	0.020***	0.002	0.020***	0.024***
			(0.00)	(0.00)	(0.00)	(0.00)
Observations	35,983	684,530	720,513	720,513	720,513	720,513
Non-Standard Hours	0.317	0.278	0.039***	0.018***	0.033***	0.036***
			(0.003)	(0.003)	(0.002)	(0.003)
Observations	35,983	684,530	720,513	720,513	720,513	720,513

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: The sample is restricted to working age population (15-64) employed at time of the interview. All the estimates are weighted using the weights provided in the LFS. In columns 1 and 2 I report summary statistics for immigrants and natives. In column 3 I report the unconditional mean-difference among the two-groups considered. In column 4 I add standard socio-demographic controls (5 year-interval age dummies, gender, education dummies (middle school diploma and below, high school diploma, some college and above) family size, family type, number of people in household under 9 years old, between 10 and 18 and older than 65). In Column 5 I add sector and occupational dummies. Finally in column 6 I add province fixed effects. Standard errors are in parenthesis. Source: Italian Labor Force Survey, 2006-2008.

of working nonstandard hours that ranges between 2 and 4 percentage points depending on the different specifications of the model. Since on average 28% of natives reported working nonstandard hours shifts, the coefficient implies a reduction of 7% to 15% of the share of natives working nonstandard hours, which is an economically significant effect.[17]

Column 1 offers results only controlling for the logarithm of total population in province p at time t. In column 2, I add standard socio-demographic characteristics (education, gender, 5-year interval age dummy variables, marital status, family size, family type, share of children below 9 years old, share of children between 9 and 18 years old, share of individuals over 65 years old in the household). In column 3, I control for region, year and trimester fixed effects. The results still hold when I introduce 12 sectoral dummy variables (ISTAT classification), a full set of dummy variables for the interaction of region and year to account for labor shocks of the labor market (column 4) and a description of relevant economic features of the province as of 1995 (the sectoral composition of value added and sectoral labor productivity). Introducing occupational dummy variables (1 digit, ISCO88) reduces the effect by 15% (column 5), but the coefficient remains negative and significant.[18] Finally, including the share of employment during nonstandard hours in 1994, as computed from the corresponding LFS, allows me to capture potentially unobserved and persistent labor market characteristics that affect both the intensity of nonstandard schedules and the immigrant concentration across provinces; the results, reported in column 6, are substantially unchanged. The IV estimates tend to be larger than the OLS in absolute value when controlling for regional fixed effects and province characteristics. This finding is consistent with the assumption of a positive correlation between the demand for nonstandard hours and immigrant concentration. Since I am interested in capturing the average effect on native working schedules, I use the IV specification reported in column 4 as the baseline.[19]

3.2   Effects of immigration on hours worked and employment

The evidence presented above suggests that a larger immigrant concentration in the province changes the incidence of nonstandard work schedules among employed natives. However, a number of factors may contribute to this result. This result may reflect a change in the employment composition from a higher immigrant concentration, whereby the relative share of jobs during nonstandard hours then declines either through selective job destruction or selective job creation. For example, complementarity between low-skill immigrants and high-skill natives may induce the creation of more standard high-skill jobs; on the other hand, substitutability between immigrants and low-skill natives may displace the latter out of nonstandard employment. Alternatively, this result may occur through a rescheduling of individual work toward standard hours facilitated by a larger supply of immigrants working nonstandard hours. Moreover, the decline in nonstandard hours might be associated with a decline in hours worked per week and thus, possibly, earnings. To explore the potential avenues leading through which immigration affects native schedules, I replicate the estimation exercise on a set of complementary dependent variables. The first column of Table 3 reports results for the most preferred specification (see column 4, Table 2). The second column presents results on the effect of immigration on the logarithm of weekly hours worked. I find that a larger foreign presence does not significantly change total hours worked by natives, suggesting that rescheduling work effort is not associated with a change in work intensity.

Table 3 Effects of immigrants on natives working arrangements, 2SLS

Dependent Variable:	(1) Employed population (15-64)		(3) Working-age population(15-64)
	Non-Standard hours	Log (Weekly Hours)	Employment Rate
log (Foreign Population)	-0.020***	0.009	0.018**
	(0.006)	(0.008)	(0.009)
Observations	684,530	631,040	1,230,660
Mean of Dep.Var.	0.28	3.56	0.56

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: The sample considered in the first two columns is the overall working age population (15-64) employed at the time of the interview, while in columns 3 I consider the overall working age population (15-64) including non-employed individuals. 3. The dependent variables are: the probability of working at non-standard hours (col.1), the logarithm of number of hours worked (col.2) and the likelihood of being employed (col.3). In the first two columns I used the baseline specification (col.4, Table 1). In the third column I cannot include sector dummies since I am considering the overall working-age population. The data sources are LFS (2006-2008), Municipal Records (2006-2008), ISTAT Province Accounts (1995) and Minister of Interior for Residence Permits issued at the province level as of 1995.

To establish whether the improvement of labor conditions is caused by immigrants crowding natives out of occupations more likely to involve nonstandard work schedules or whether it is accompanied by the creation of jobs with more standard schedules, I examine the effect of immigration on the probability of being employed (column 3). The results show that a lower proportion of natives employed working nonstandard hours is not associated with a decline in employment, and if anything, the results suggest a positive correlation with native employment. Table 4 shows that this coefficient is mostly driven by women, while is not statistically significant for men. Cortes and Tessada (2011) provides evidence of a positive effect on female labor supply through the increase in the supply of household help. These findings may be explained by partial complementarity between immigrants and natives - in particular, native women - and their different propensities to work nonstandard hour shifts (for instance, D'Amuri and Peri (2010); Peri and Sparber (2009)). Furthermore, these results are consistent with recent papers studying the effects of immigrants in Italy and showing the existence of potential complementarities on particular subgroups of the Italian population (Barone and Mocetti 2011; Mocetti and Porello 2010).

3.3 Panel analysis

So far, the analysis has been limited to employment status and work schedules at a given point in time. Examining yearly transitions in the labor market allows me to establish whether living in a province with a higher proportion of immigrants affects labor market flows and whether this happens differently for individuals working standard and nonstandard hours.[20] Similarly, I am able to examine whether employment inflows changed and whether they led to a decline in the proportion of workers with nonstandard schedules. The results are reported in Table 5. The first two columns illustrate the effect of the presence of immigrants in a province p at time t_0 on the probability of moving from nonemployment (at time t_0) to employment (at time t_1) (NE-E), and to employment with nonstandard hours (NE-NS). In both cases, a larger stock of immigrant workers does not seem to be associated with significant changes in the probability of becoming employed. The same result is obtained for the probability of remaining employed, independent of the type of employment (column 3), and for employed persons with nonstandard and

Table 4 Immigrants and nonstandard hours, by subgroups, 2SLS

Dependent Variable:	(1) Overall	(2) Men	(3) Women	(4) Under 25	(5) 25-54	(6) Over 54	(7) Low-Skilled	(8) High-Skilled
Non-Standard Hours	-0.020***	-0.021***	-0.019***	-0.015	-0.021***	-0.018**	-0.024***	-0.010
	(0.006)	(0.007)	(0.006)	(0.010)	(0.006)	(0.008)	(0.006)	(0.011)
Observations	684,530	406,111	278,419	44,860	554,563	85,107	580,925	103,605
Mean of Dep. Var.	0.28	0.31	0.24	0.29	0.28	0.25	0.28	0.27
log (hours worked)	0.009	0.006	0.010	0.004	0.010	0.007	0.009	0.001
	(0.008)	(0.008)	(0.009)	(0.018)	(0.007)	(0.011)	(0.008)	(0.014)
Observations	631,040	379,994	251,046	42,686	510,541	77,813	537,473	93,567
Mean of Dep. Var.	0.56	0.67	0.44	0.23	0.72	0.32	0.53	0.78
Employment Rate	0.018**	0.012	0.025***	0.007	0.018**	0.027**	0.021**	0.001
	(0.008)	(0.008)	(0.009)	(0.013)	(0.008)	(0.012)	(0.009)	(0.011)
Observations	1,230,660	603,958	626,702	195,566	770,163	264,931	1,096,776	133,884
Mean of Dep. Var.	3.59	3.70	3.43	3.57	3.60	3.57	3.61	3.52

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: The sample considered in the first is the overall working age population (15-64) employed at the time of the interview when we analyze the effect of immigration on non-standard hours and hours worked. The sample is the overall working age population when we analyze the effect on employment rate. All the specifications use the baseline model as specified in col. 4 of Table 1. Standard errors are clustered at the province level. The data sources are LFS (2006-2008), Municipal Records (2006-2008), ISTAT Province Accounts (1995) and Minister of Interior for Residence Permits issued at the province level as of 1995.

Table 5 Effects of immigrants on natives labor market transitions, 2SLS

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Transitions	NE-E	NE-NS	E-E	NS-E	S-E	NS-NS	S-NS
log (Foreign Population)	0.005	-0.002	0.004	0.006	0.003	-0.041***	-0.012***
	(0.00440)	(0.00187)	(0.00412)	(0.00531)	(0.00421)	(0.0124)	(0.00410)
Observations	196,221	196,221	246,119	68,347	177,393	63,465	162,815
Mean of the Dep.Var.	0.09	0.026	0.92	0.93	0.92	0.68	0.11

Standard errors in parentheses

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Notes: NE = non-employed; E = employed; NS = employed on non-standard schedule; S = employed on a standard schedule. Columns headings describe states as $t_0 - t_1$. Samples, NE-E and NE-NS: non employed at t_0; E-E: employed at t_0; NS-E: employed on non-standard schedule at t_0; S-E: employed on standard schedule at t_0; NS-NS: employed at t_0 and t_1, on non-standard schedule at t_0; S-NS: employed at t_0 and t_1, on standard schedule at t_0. All the estimates presented include standard socio-demographic controls (age dummies, gender, education dummies, family size, family type, number of people in household under 9 years old, between 10 and 18 and older than 65, relevant economic features of the province as of 1995 (the sectoral composition of value added and sectoral labor productivity) and province size and region-year fixed effects as in column 4 of Table 1. Sector dummies are included only when the sample is restricted to the employed population. The data sources are LFS (2006-2008), Municipal Records (2006-2008), ISTAT Province Accounts (1995) and Minister of Interior for Residence Permits issued at the province level as of 1995.

standard schedules (columns 4 and 5). Finally, in columns 6 and 7, I provide the probability of moving between nonstandard and standard schedules conditional on remaining employed. I detect a large and statistically significant decline in the probability of workers remaining on nonstandard schedules after a year, as well as a decline in the probability of workers worsening their schedules (column 7).[21]

Taken together, the results suggest that the decline in natives' likelihood of working nonstandard hours is not caused by a decline in employment opportunities for the nonemployed, or by a higher destruction rate for jobs with nonstandard hours. Rather, these results appears to occur mainly from a decrease in the probability of workers on a "bad" ("good") schedule remaining in (start working) such nonstandard schedules a year later. In other works natives work hours do not change, but they are more likely to work during a standard schedule.[22]

3.4 Heterogeneous effects of immigration on work schedules

In Tables 4, 6 and 7, I investigate whether the overall effect of immigrant concentration on native schedules is driven by specific subgroups of the population. In Table 4, I use the preferred specification and show that while the sign of the effect is always negative in the different subgroups considered, it has different magnitudes and is not significantly different from zero among workers who are college graduates (high-skilled) and under 25. Work schedules of college graduates appear not to be affected by immigration, although a proportion similar to that of less educated groups report having nonstandard work schedules. This finding is consistent with the presumption that the labor market for college graduates is hardly contestable by immigrants. This study does not find significant evidence of a change in hours worked for any of the subgroups considered. I then examine whether improvements in the schedule result from the crowding out of natives from "good occupations". The results confirm that even across the main demographic groups, a lower proportion of natives working nonstandard hours are not associated with a decline in employment. The overall positive coefficient seems to be determined by the positive effect on women and individuals over 54.

Table 6 shows the impact of immigration on natives' schedules across sectors. One could expect that the impact of immigration should be weaker in those sectors that are less

Table 6 Immigration and nonstandard hours, by sector, 2SLS

Sample:	(1) Overall	(2) Public	(3) Private	(4) Construction, Energy, Manufacturing	(5) Manufacturing	(6) Non-Financial Services	(7) Financial Services
log (Foreign Population)	-0.020***	0.005	-0.028***	-0.033***	-0.043***	-0.042***	-0.004
	(0.005)	(0.007)	(0.007)	(0.009)	(0.012)	(0.011)	(0.011)
Observations	684,530	195,001	489,529	198,957	136,408	170,950	87,337
Mean of Dep.Var.	0.28	0.27	0.28	0.19	0.23	0.38	0.22

Standard errors in parentheses

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Notes: The sample considered in columns 1-3 is the overall working age population (15-64) employed at the time of the interview. The dependent variable is the probability of working at non-standard hours. All estimates follow the baseline specification (col.4, Table 1). The data sources are LFS (2006-2008), Municipal Records (2006-2008), ISTAT Province Accounts (1995) and Minister of Interior for Residence Permits issued at the province level as of 1995.

Table 7 Immigration and nonstandard hours, 2SLS: blue collars, white collars, self-employed

Sample	(1) Overall	(2) Blue collars	(3) White collars	(4) Highly-specialized White collars	(5) Self-employed
log (Foreign Population)	0.020***	-0.029***	-0.017**	-0.009	-0.002
	(0.005)	(0.010)	(0.008)	(0.021)	(0.013)
Observations	684,530	233,280	271,278	52,624	179,567
Mean of Dep.Var.	0.28	0.29	0.22	0.27	0.35

Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The sample considered in columns 1-3 is the overall working age population (15-64) employed at the time of the interview. The dependent variable is the probability of working at non-standard hours. All estimates follow the baseline specification (col.4, Table 1). The data sources are LFS (2006-2008), Municipal Records (2006-2008), ISTAT Province Accounts (1995) and Minister of Interior for Residence Permits issued at the province level as of 1995.

exposed to immigrant competition.[23] In column 1, I report the main results on the overall sample. From columns 2 and 3, it is clear that the private sector is driving the result. As one may expect, there is no effect of immigrant concentration on working schedules in the public sector (column 2), though the share of natives working nonstandard hours in it is not negligible (see Figure 2).[24] This result is probably because immigrants have less access to public sector jobs, which are often reserved for Italian citizens. The effect of immigrant concentration is driven by the private sector, where doubling the share foreign population - a 1.3 standard deviation increase - living in a province is associated with a reduction of approximately 4 percentage points in the share of people working nonstandard hours. Within the private sector, I find evidence of significant negative effects in the manufacturing, construction and energy sectors (column 4) and nonfinancial services such as retail, hospitality, and transport (see column 6). In these sectors, a 1.3 standard deviation increase in the foreign population reduces the share of people working nonstandard hours by more than 6 percentage points. The coefficient is much smaller and is not significant in the business and financial services sector (see column 7), which is consistent with the presumption that this sector is less exposed to the immigrant inflow. One might still be concerned that white collar workers may be working nonstandard hours from home rather than in a factory or in a hotel and that this effect might not be completely captured by the sectoral analysis conducted so far. Table 5 shows that the main results are driven by blue-collars (column 2). The coefficient is slightly smaller, but still negative and significant, among white collars (column 3). However, the effect becomes non-significant when focusing on highly specialized white collars (directors and managers), excluding clerks (column 4). There is no significant effect on the working schedules of self-employed (column 5). These results suggest that the effect of immigration on nonstandard hours is driven by occupation that are likely to be conducted at the place of work and in which natives are more likely to face the competition of immigrants.[25]

3.5 Robustness checks

In this section, I check the sensitivity of my results with alternative definitions of nonstandard schedules, different measures of foreign population and different specification of the models (see Tables 8, 9 and 10). In column 2 of Table 2, I show that the results hold when considering working on Saturday to be a nonstandard schedule. When I run separate regressions following the baseline model to analyze the effects of immigration on the

Table 8 Different definitions of nonstandard hours, 2SLS

Dependent Variable	(1) NS	(2) NS+Saturday	(3) Evening	(4) Night	(5) Saturday	(6) Sunday
log (Foreign Population)	-0.020***	-0.024***	-0.015***	-0.013***	-0.023***	-0.019***
	(0.006)	(0.008)	(0.005)	(0.003)	(0.003)	(0.006)
	684,530	684,530	684,530	684,530	684,530	684,530
Mean of Dep.Var.	0.28	0.52	0.20	0.11	0.48	0.19

Robust standard errors in parentheses

*** p<.01, ** p<0.05, * p<0.1

Notes: The sample considered is the overall working age population (15-64) employed at the time of the interview. All estimates follow the baseline specification (see col.4, Table 1). Standard errors are clustered at the province level. The data sources are LFS (2006-2008), Municipal Records (2006-2008), ISTAT Province Accounts (1995) and Minister of Interior for Residence Permits issued at the province level as of 1995.

likelihood of working in the evening, at night, on Sunday and Saturday, respectively, I find negative and significant effects. However, the magnitude of the effect, accounting for the share of natives working each shift, is stronger when I consider the natives' likelihood of working on Sunday and over night as dependent variable. In particular, doubling the foreign population in a province reduces by around 10% the likelihood of working on Sunday and at night. The effect of immigration is smaller on the likelihood of working at evening (-7%) and on Saturday (-5%).

In Table 9, I further investigate the robustness of my results to the use of alternative measure of foreign population. In column 2, I use the weights provided by the Labor Force Survey to compute the working-age foreign population living in each province. While there are several issues related to the representativeness of the sample that are discussed at length in Albisinni and Quattrociocchi (2006), the advantage of using this source is that one can restrict the analysis to the effects of the working-age foreign population. Not surprisingly, the results are similar to the main specification as the working-age foreign

Table 9 Alternative measures of foreign population, 2SLS

Geographic Unit of Analysis Source for FP	(1) Province MR	(2) Province LFS	(3) Province MR	(4) LLM MR	(5) LLM MR
log (Foreign Population)	-0.020***	-0.021***	-0.014	-0.054***	-0.044
	(0.006)	(0.006)	(0.049)	(0.003)	(0.033)
log (Total Population) in Province	YES	YES	YES	NO	NO
log (Total Population) in LLM	NO	NO	NO	YES	YES
Individual and household characteristics	YES	YES	YES	YES	YES
Sectoral Dummies	YES	YES	YES	YES	YES
Trimester FE	YES	YES	YES	YES	YES
Region-Year FE	YES	YES	NO	YES	NO
Province FE	NO	NO	YES	NO	YES
Year FE	NO	NO	YES	NO	YES
Province Characteristics as of 1995	YES	YES	NO	YES	NO
Observations	684,530	684,530	684,530	684,530	684,530

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: The sample considered is the overall working age population (15-64) employed at the time of the interview. All estimates follow the baseline specification (see col.4, Table 1). Standard errors are clustered at the geographic unit of analysis. The data sources are LFS (2006-2008), Municipal Records (MR, 2006-2008), ISTAT Province Accounts (1995) and Minister of Interior for Residence Permits issued at the province level as of 1995.

Table 10 Alternative estimation strategies, 2SLS

	(1)	(2)	(3)	(4)
Estimation Technique	Baseline	Probit	Donald-Lang	Donald-Lang
Source of Foreign Population Measure	Baseline	Baseline	Baseline	Baseline
log (Foreign Population)	-0.020***	-0.022***	-0.020***	-0.021***
	(0.006)	(0.006)	(0.004)	(0.006)
log (Total Population) in Province	YES	YES	YES	NO
Individual & household chars	YES	YES	YES	YES
Sectoral Dummies	YES	YES	YES	YES
Trimester FE	YES	YES	YES	YES
Region-Year FE	YES	YES	YES	NO
Region FE	NO	NO	NO	YES
Year FE	NO	NO	NO	YES
Province Characteristics as of 1995	YES	YES	YES	YES
Observations	684,530	684,530	285	95

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: The sample considered is the overall working age population (15-64) employed at the time of the interview. All estimates follow the baseline specification (see col.4, Table 1). Standard errors are clustered at the province level. The data sources are LFS (2006-2008), Municipal Records (2006-2008), ISTAT Province Accounts (1995) and Minister of Interior for Residence Permits issued at the province level as of 1995.

population is highly correlated with the foreign population in the province and registered in the Municipal Records (MR). It is worth noting that there might be unobserved factors at the province level that are not captured by the main specification of the model. While I control for a set of current and past province characteristics and region-year fixed effects, I do not include province-fixed effects in the baseline model because of lack of enough time-variation in the immigrant population within the provinces between 2006 and 2008. When including province fixed effects, the point-estimate is smaller than the one obtained in the baseline specification (see column 3), yet relevant. In column 4, I present the results obtained using the immigrant population in the LLM as the main explanatory variable. Not having data on foreign population at the LLM's level before 2002, and information on the country of origin of immigrants residing in a LLM, I instrument for the foreign population in a given LLM with the province foreign population predicted using the 1995 distribution of immigrants over Italian provinces. The coefficient remains negative and significant. Province fixed effects (column 5) reduce the magnitude of the coefficient by roughly 20%, but the standard deviation increases by 1 order of magnitude resulting in a non-significant estimate.

In Table 10, I report the results of alternative estimation strategies. In column 2, I present the marginal effects of a probit model. Finally, columns 3 and 4 show the coefficients obtained by correcting standard errors following the Donald and Lang (2007) two-step approach. In column 3 (4), the data are collapsed at the province-year (province) level after controlling for individual characteristics in the first step. The results following this approach are substantially identical to the baseline specification (column 1).

4   Discussion

This study has made no claims about welfare. It suggests that a higher concentration of immigrants reduces the likelihood of natives working nonstandard hours, but it does

not discuss whether this is to be considered an overall improvement for native workers. The results might be explained in a model allowing for complementarity between labor services at standard and nonstandard schedules and heterogeneity in the willingness to work nonstandard hours. Similar to the mechanism studied in previous literature on immigration and task specialization (D'Amuri and Peri 2010; Peri and Sparber 2009), immigration will cause a reallocation of native labor supply toward standard schedules, which will partially compensate for the depressing effect of immigration on nonstandard wages. However, the paucity of data on the timing of work, wages, and nativity severely restricts the scope of any welfare analysis and the ability to test all the implication of a theoretical model.

The Italian LFS released information on wages (only on employees) in January 2010, but the LFS does not include information about overtime compensations. It is possible that the wage compensation for working nonstandard hours may actually make natives better off and that at least some of them may have preferred working those hours. Using the latest available data, which is for the first two semesters of 2009, I do not find evidence of a negative effect of immigration on natives' wages (see Table S16 in the Additional file 1). Furthermore, it is not even clear what the general equilibrium effects on consumers who might be affected by the lower availability of natives working at nonstandard hours would be. Estimates of the impact of immigration on the log of weekly hours worked in Table 3 show no significant effects across all subgroups. This result suggests that at a given employment rate, workers are working the same number of hours but are rescheduling their work toward more regular hours, as confirmed by the panel analysis reported in Table 5. Unfortunately, I do not have information on natives overall job satisfaction, which would be relevant to address possible welfare implications.

For the above reasons, it is difficult to derive any welfare claim from these results. However, it is worth noting that contracts in Italy are not particularly flexible and that the labor market is characterized by a high level of employment protection legislation. In several occupations, a worker's bargaining power is relatively low, and employers impose a schedule on workers. This is particularly true in the sectors driving the results (hospitality, retail, transport and manufacturing). Furthermore, as mentioned earlier in the paper there is abundant evidence on the negative effect of irregular shifts (and in particular night shifts) on health outcomes, marital stability and children well-being (Lyndall et al. 2006; Presser 2000, Vyas et al. 2012). Thus, even if it is not clear whether the results imply an overall improvement for native workers, this paper suggests that the effects on natives' working conditions, such as schedules, should not be neglected when evaluating the overall impact of immigration on the native population.

5 Conclusion

This paper extends previous literature on the impact of immigration by examining the effect on natives' working schedules. I exploit the heterogeneity of immigrant distribution across Italian provinces as a major source of identification. To isolate the endogeneity of immigrant concentration across the country, I use previous settlements of immigrants. The results suggest that immigration reduces natives' likelihood of working nonstandard hours but that it does not significantly affect employment and hours worked. The reduction in native nonstandard hours is significant across the main demographic sub-groups. However, I do not find significant effects on high-skilled workers, highly

specialized white collars, self-employed and in sectors in which immigrants have less of a presence (that is, the public sector or the financial sector). These effects are robust when using different empirical specifications and different measures of foreign population. Though it is difficult to disentangle whether this effect is due to the rescheduling of working hours or due to changes in the employment flows, the results from a panel analysis suggest that immigration raises the probability of improving natives' schedules and that it reduces the natives' risk of having undesirable schedules. This study is unable to test whether the results suggest an overall improvement for native workers, given the limited information on wages and overall job satisfaction. While this paper is not sufficient to provide an assessment of the welfare effects of increased immigration, it provides a first insight into a neglected margin of investigation.

6 Endnotes

[1]In a recent article published in the British Medical Journal, Vyas et al. (2012) analyze the findings of 34 studies and found that shift work was associated with a 23% increased risk of heart attack, a 5% increased risk of stroke and that people working night shifts are the ones at the highest risk for vascular diseases. They confirm the results of previous studies which found irregular shifts to be correlated with high blood pressure, diabetes and obesity and suggest that the lack of sleep, poor eating habits, higher smoking rates and lower levels of physical activity are likely to affect the health of shift workers. See also http://www.bbc.co.uk/news/health-18996082

[2]One could also think that working nonstandard hours may affect the social relationships of immigrants less; if an immigrant's family and friends did not migrate, they may not need to synchronize with the schedule of other people. Finally, depending on their religious beliefs, some immigrants may be more willing to work on weekends.In addition, immigrants might have fewer alternatives than natives. The fear of losing a job and the concern that this might also affect their legal status may increase their willingness to work nonstandard hours.

[3]From the survey design, 50% of the cross-sectional household sample for each quarter should be reinterviewed twelve months later Discenza 2004.

[4]The question on the survey is "Have you worked at night (evening, Saturday, Sunday) in the last four weeks?" Possible answers are (1) Yes, at least twice per week (or month, if question is about weekends); (2) Yes, less than twice per week (or month, if question is about weekends); (3) No; (4) Do not know.

[5]Similar results are found when using as an alternative dependent variable the likelihood of being employed in occupations involving shifts and or having worked on shifts in the last month.

[6]I excluded all the immigrants who were EU-15 citizens. Mocetti and Porello (2010) discuss in detail the changes in immigrant flows to Italy in the last fifteen years. After the EU enlargement (2007) Romanians are the largest minority group, followed by Albanians and Moroccans. These three groups account for 39% of the working-age immigrant population, after excluding EU15 citizens (source: LFS, 2006-2008).

[7]As mentioned earlier in the paper, the LFS data allow us to distinguish natives from immigrants in the sample. One potential advantage of using the LFS to construct the explanatory variable is that one can compute the concentration of immigrants

across different segments of the population (which would not be possible from non-survey administrative registries). This computation allows one to focus on the effects of working-age immigrant concentration. However, the LFS survey is only representative at the regional level and the sampling error might be particularly high for the share of immigrants who represent only a minor fraction of the total population. Furthermore, sampling weights are stratified to match population in the second trimester of each year. For the above reasons I chose to use municipal records in the baseline specification. In the robustness checks (see Table 9), I show that the results hold when using the LFS survey with the LFS weights to compute the province-year share of immigrants in the working-age population. The correlation between the share of foreign population computed using the LFS and the same measure computed using the Municipal records is 0.98.

[8]Data are publicly available for the period from 2002 to 2010. Immigrants who illegally entered Italy are not included in the sample, while those who overstay might still show up in Municipal records. However, Fasani (2009) provides evidence that the distribution of undocumented immigrants across provinces tend to mirror legal ones.

[9]In Italy, a province (in Italian: provincia) is an intermediate administrative division between the municipality (comune) and the region (regione).

[10]However, I obtain similar results using more recent province classifications. The results are available upon request.

[11]In Additional file 1: Table S12, I report the marginal effects obtained using a probit model.

[12]This specification allows me to add province fixed effects (rather than using a set of current and past province characteristic) and to exploit variation over time for identification. In practice, I do not have enough time-variation in the immigrant population within a province between 2006 and 2008. However, while the estimate becomes nonsignificant when including province fixed effects, the point estimate is only slightly smaller than in the baseline model (see Table 8).

[13]When including data on local industry composition (available at the province level 1999 onwards), results are substantially unchanged and if anything the coefficients is slightly higher in absolute value (coef.: 0.022; s.d.: 0.008).

[14]Italy is subdivided in 20 regions.

[15]The earliest year for which I obtained data from the Ministry of Interior on foreign population by country of origin and province of residence in electronic format is 1995.

[16]Descriptive statistics of the main variables used are provided in the Additional file 1 (Tables S11, S12 and S13).

[17]A one standard deviation increase in the share of immigrants in a province would be associated with a 4% decrease in native non-standard hours. Equivalently, a 15% increase in the immigrant population in a given province would be associated with a 1.1% reduction in the native nonstandard hours.

[18]One concern is that my results might be picking up the fact that employers assign rookies the "bad" schedules in a market in which immigrants are the new "employees". However, controlling for other job characteristics such as job tenure, a dummy for those on a temporary contract and job position results are substantially unchanged. In particular the coefficient of interest slightly increases: coef., 0.024; s.d., 0.08.

[19]However, most of the robustness checks still hold when controlling for occupational characteristics and past nonstandard schedules. The results are available upon request.

[20]As mentioned in the Data Section, the LFS survey was designed to produce cross-sectional data, but as each sample household is interviewed for 4 quarters, the records can be linked to produce longitudinal data at 3, 9, 12 and 15 months. From the survey design, 50% of the cross-sectional household sample for each quarter should be reinterviewed a year later.

[21]Equivalently, living in province with a higher share of immigrants at time t_0 is associated with a higher likelihood of being on a regular schedule at time t_1 among those who were working non-standard hours at time t_0.

[22]This is consistent with the fact that a larger share of immigrants is also associated with a 5% decrease in the native likelihood of being employed in occupation involving shifts (coef., 0.016; s.e., 0.007) and a 10% decrease in the likelihood of having worked on shifts in the last month before the survey (coef., -0.018; s.e., 0.006).

[23]Mocetti and Porello (2010) show that about 80% of the immigrants in Italy are blue-collar workers and most of them work in the manufacturing and construction sectors or in the personal services industry.

[24]The public sector includes hospitals, public services, police, and the army.

[25]The LFS includes a question asking whether individuals worked from home in the last month. About 5.4% of the employed population worked from home at least once in the four weeks preceding the survey. When restricting the analysis to those workers who did not report working at home, results are substantially unchanged (coef., 0.022; s.e, 0.005), while the coefficient is small and non-significant when focusing on those who reported working at home at least once in the month before the survey.

Additional file

Additional file 1: Appendix.

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