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Abstract

This paper analyses theoretically and empirically the effects of immigration on the wage rate of native workers. Empirical literature rarely finds that immigration generates a fall in the wages of manual workers. The theoretical model presented in this paper justifies those results, by hypothesizing an economic system where *advanced* firms buy an intermediate good from *traditional* firms, which employ manual workers in both *clean* and *dirty* tasks, the latter being more disliked by native workers. We conclude that native skilled wages always increase whereas native unskilled wages can both increase or decrease with immigration. An empirical analysis of the Italian labour market follows, showing that all native workers' wages rise with immigration

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Does immigration raise blue and white collar wages of natives?

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1 Introduction

Massive migration from poor to rich countries is probably one of the most important features of contemporary economic systems. Social scientists are obviously aware of the relevance of this topic.

Economists, in particular, analyze this phenomenon under various perspectives: the effects of migration on labor markets or on fiscal systems for both host countries and countries of origin are only two examples of the existing literature[1]. In this paper we focus on one of the most debated topics: does immigration reduce or increase native wages?

Samuelson's approach describes the classical theoretical position on migration and wages. An increase in the supply of manual workers surely reduces their wages while the wages of skilled workers grow, generating an increase in inequality [2].

However, various empirical analyses signal controversial outcomes[3]. Card (1990) showed that the 1980 Mariel boatlift had no significant adverse effect on wages of Miami natives. Butcher and Card (1991) extended the analysis to major American cities and also found little wage effect from immigration.

More recently, by examining how natives' wages of different skill groups (defined by educational attainment and years of work experience) were related to the immigrant supply shocks, Borjas (2003) showed that immigration can increase inequality, undercutting the wages of unskilled natives. Using the same approach, Borjas and Katz (2005) found that, considering a long run view in which capital can adjust to the larger workforce, overall wages were unaffected by immigration, but this result was the product of gains for "skilled" US-born workers and losses for "unskilled" US workers. Ottaviano and Peri (2006), using a general equilibrium approach, analyzed

[1]See Borias (1999) and Glover et al. (2001).

[2]In the long run, the dynamic is a bit more complex: the supply of skilled workers should grow in response to increased wage, and wages for skilled workers should therefore decrease. The inverse is true for unskilled workers. Therefore, in the long period the labour market could achieve an equilibrium characterized by wage differentials similar to those of the starting situation.

[3]For a survey, see Venturini (2004)

the period 1990-2004 in the US and their findings indicate that immigrants, being imperfect substitutes for natives, do not affect native earnings.

Studies on Germany (see Pischke et al.,1997 and Bonin, 2005) do not find wage effects, despite the large amount of immigration into this country. Immigrants are not found to significantly affect the real wages of native Australians (Addison et al., 2002). Some empirical analyses suggest a complementarity effect: an inflow of migrant workers raises the wages of national manual workers[4]. In the UK "the main result of the empirical analysis is that there is no strong evidence of large adverse effects of immigration on employment or wages of existing workers. ... Insofar as there is evidence of any effect on wages, it suggests that immigration enhances wage growth" (Dustmann et al., 2006).

Aydemir e Borjas (2006) concluded that the impact of immigrant inflows can be different in various economic systems: "International migration narrowed wage inequality in Canada, increased it in the United States and reduced the relative wage of workers at the bottom of the skill distribution in Mexico". Gaston and Nelson (2002) state that "the overwhelming majority of empirical studies conclude that there is essentially no statistically significant effect of immigration on labour market outcomes, with the possible exception of the least skilled domestic workers".

Regarding Italy, the "complementarity effect" hypothesis is supported by Gavosto et al. (1999): including the sector (or the region/sector) shares of immigrants in a wage equation (with a two stages procedure) they showed that an inflow of migrant workers raises the wages of national manual workers. On the contrary, Falzoni et al. (2007), running a GLS at aggregate (by sector and region) level, found that the number of immigrants negatively affects blue collar wages, while the effect is not significant for white collar ones. Venturini et al. (2006) found that natives' occupational chances are not affected by the presence of immigrant workers.

Presenting a theoretical model where the economic system is characterized by outsourcing from an "advanced" sector to a "traditional" one and inflows of migrants from poor countries (more likely to accept *dirty* tasks in the traditional sector), we obtain that the wage rate of unskilled native workers may be influenced both positively and negatively from immigration whereas the wage rate of skilled native workers always raises. By using a panel data that refers to employees in the period 1990-2004 we estimate wage equations for natives considering the share of immigrants as a regressor. We obtain that in the Italian labour market all native workers' wages rise with immigration.

The paper is organized as follows. In the second section we present the theoretical model. In the third one we perform an empirical analysis of the

[4]See Dolado et al. (1996) for Spain, Winter-Ebmer et al. (1999) for Austria, Carrington et al. (1996) for Portugal.

impact of immigrants on the Italian labour market. Section four concludes.

2 Theory

We assume that the economy is composed of two sectors that we will call *advanced* (A) and *traditional* (T). The former buys an intermediate product from the latter and, combining it with skilled workers, produces a final product sold in a non-competitive market. The latter produces the intermediate product, employing blue collars in two different tasks, that we will for simplicity call *clean* (c) task and *dirty* (d) task.

Working in *dirty* tasks generates a higher disutility for all workers. Our main assumption is that immigrants suffer less than natives in doing these tasks.

2.1 Firms

Production functions are characterized by an elasticity of substitution between inputs equal to unity in both sectors.

The advanced sector is composed by n identical firms (with $n = 1$ for simplicity), uses skilled workers and intermediate goods as inputs in the production function. The profit function of firm j in the advanced sector is:

$$\pi_{A_j} = p(y_{A_j})y_{A_j} - w_{s_j}H_{s_j} - p_{T_j}y_{T_j}$$

where[5] $p(y_A)$ is the price of output, with $\frac{dp}{dy_A} < 0$, w_s is the hourly wage rate of skilled workers, H_s is the amount of hours worked, p_T is the price of the intermediate input y_T. Thereafter, index A refers to the advanced sector and index T to the traditional one.

Assuming that $-\eta$ represents the constant elasticity of output to price in the advanced sector and that the constant return to scale production function is $y_A = H_s^{\beta} y_T^{1-\beta}$, we can easily define the factor demand functions in the advanced sector for a representative firm that maximises its profits:

$$H_s = \left(\frac{\beta\kappa}{w_s}\right)^{\frac{1-(1-\beta)\kappa}{1-\kappa}} \left[\frac{(1-\beta)\kappa}{p_T}\right]^{\frac{(1-\beta)\kappa}{1-\kappa}} \tag{1}$$

$$y_T = \left(\frac{\beta\kappa}{w_s}\right)^{\frac{\beta\kappa}{1-\kappa}} \left[\frac{(1-\beta)\kappa}{p_T}\right]^{\frac{1-\beta\kappa}{1-\kappa}} \tag{2}$$

where $\kappa = 1 - \frac{1}{\eta} < 1$ is the elasticity of total revenue to output.

The identical firms operating in the traditional sector are constrained in demand by equation 2 and minimize their costs given the constant return to scale production function: $y_T = H_d^{\gamma} H_c^{1-\gamma}$, where H_c represents the hours

[5] Thereafter, we drop the index j unless necessary.

worked by unskilled workers employed in *clean* tasks and H_d the hours of unskilled workers employed in *dirty* tasks. We obtain the conditional demand functions in the two tasks:

$$H_c = \left(\frac{1-\gamma}{\gamma}\frac{w_d}{w_c}\right)^{\gamma} y_T \tag{3}$$

$$H_d = \left(\frac{\gamma}{1-\gamma}\frac{w_c}{w_d}\right)^{1-\gamma} y_T \tag{4}$$

where w_c is the hourly wage rate for *clean* tasks and w_d the hourly wage rate for *dirty* task. Assuming perfect competition and free entry in the traditional sector, the price of traditional output is equal to the average cost (constant with respect to output) that can be easily computed by the previous two equations. We obtain:

$$p_T = \left(\frac{w_c}{1-\gamma}\right)^{1-\gamma}\left(\frac{w_d}{\gamma}\right)^{\gamma} \tag{5}$$

2.2 Workers

Let us now analyse labour supply. Utility functions are assumed to be separable in income and working time, linearly increasing in income and decreasing and concave in working time. Given the hypothesis concerning labour demand, all skilled workers are employed in the advanced sector and all unskilled in the traditional one. Defining h working time, the utility of skilled workers is:

$$U_s = w_s h_s - \frac{h_s^{\rho}}{\rho}$$

with $\rho > 1$, so that their working time supply function becomes:

$$h_s = w_s^{\frac{1}{\rho-1}} \tag{6}$$

Unskilled workers can be *natives* or *migrants*. The working time of unskilled workers is split between clean and dirty tasks. Therefore, the utility function of the representative unskilled worker is:

$$U_{u,i} = w_d h_{d,i} + w_c h_{c,i} - \frac{(h_{c,i} + \frac{\phi_i}{\lambda} h_{d,i}^{\lambda})^{\rho}}{\rho}$$

where $i = n, m$ stand for "natives" and "immigrants", $\lambda > 1$ represents the higher disutility of *dirty* tasks and ϕ_i is a parameter that differentiates preferences between natives and immigrants. $\phi_n > \phi_m$ must hold because we assume that working in *dirty* task is less damaging for immigrants.

Maximizing utility, we obtain that labour supply of a generic unskilled worker for the two tasks are:

$$h_{c,i} = w_c^{\frac{1}{\rho-1}} - \frac{1}{\lambda}\left(\frac{1}{\phi_i}\frac{w_d}{w_c}\right)^{\frac{1}{\lambda-1}} \tag{7}$$

$$h_{d,i} = \left(\frac{1}{\phi_i}\frac{w_d}{w_c}\right)^{\frac{1}{\lambda-1}} \tag{8}$$

for $i = n, m$. Considering unskilled workers (in number N_u) as both natives (N_n) and immigrants (N_m), the overall supplies for the two tasks are:

$$H_c = N_n h_{c,n} + N_m h_{c,m} \tag{9}$$

$$H_d = N_n h_{d,n} + N_m h_{d,m} \tag{10}$$

2.3 Equilibria

For the given numbers of skilled (N_s) and unskilled ($N_u = N_n + N_m$) workers, the equilibria conditions can be computed using:

- equations 6 and 1, for the skilled labour market, after substituting p_T from equation 5;

$$w_s^{\frac{1}{\rho-1}} N_s = \left(\frac{\beta\kappa}{w_s}\right)^{\frac{1-(1-\beta)\kappa}{1-\kappa}} \left[\frac{(1-\beta)\kappa}{\left(\frac{w_c}{1-\gamma}\right)^{1-\gamma}\left(\frac{w_d}{\gamma}\right)^{\gamma}}\right]^{\frac{(1-\beta)\kappa}{1-\kappa}}$$

- equations 9, 7 and 3, for the unskilled *clean* labour market, after substituting y_T from equation 2 and p_T from equation 5;

$$w_c^{\frac{1}{\rho-1}}(N_n + N_m) - \left[N_n\left(\frac{1}{\phi_n}\right)^{\frac{1}{\lambda-1}} + N_m\left(\frac{1}{\phi_m}\right)^{\frac{1}{\lambda-1}}\right]\left(\frac{w_d}{w_c}\right)^{\frac{\lambda}{\lambda-1}}\frac{1}{\lambda} =$$

$$= \left(\frac{1-\gamma}{\gamma}\frac{w_d}{w_c}\right)^{\gamma}\left(\frac{\beta\kappa}{w_s}\right)^{\frac{\beta\kappa}{1-\kappa}}\left[\frac{(1-\beta)\kappa}{\left(\frac{w_c}{1-\gamma}\right)^{1-\gamma}\left(\frac{w_d}{\gamma}\right)^{\gamma}}\right]^{\frac{1-\beta\kappa}{1-\kappa}}$$

- equations 10, 8 and 4, for the unskilled *dirty* labour market, after substituting y_T from equation 2 and p_T from equation 5;

$$\left[N_n\left(\frac{1}{\phi_n}\right)^{\frac{1}{\lambda-1}} + N_m\left(\frac{1}{\phi_m}\right)^{\frac{1}{\lambda-1}}\right]\left(\frac{w_d}{w_c}\right)^{\frac{1}{\lambda-1}} =$$

$$= \left(\frac{\gamma}{1-\gamma}\frac{w_c}{w_d}\right)^{1-\gamma}\left(\frac{\beta\kappa}{w_s}\right)^{\frac{\beta\kappa}{1-\kappa}}\left[\frac{(1-\beta)\kappa}{\left(\frac{w_c}{1-\gamma}\right)^{1-\gamma}\left(\frac{w_d}{\gamma}\right)^{\gamma}}\right]^{\frac{1-\beta\kappa}{1-\kappa}}$$

This is a system of three equations with three unknowns (w_s, w_c, w_d). The whole solution can be obtained by the usual tools and it is available to the Authors.

Since we are interested only in the effects of migrations on wages, a simplified solution as been presented below. The variables $A_i > 0$ for $i = s, c, d$ and $\Theta > 0$ are complex combinations of the parameters of the utility and the productions functions (particularly, of $\lambda, \rho, \gamma, \beta, \kappa$) and of the exogenous number of skilled workers[6].

Defining $\Phi = \left(\frac{\phi_m}{\phi_n}\right)^{\frac{1}{\lambda-1}}$, with $0 < \Phi < 1$, the "relative" disutility of working in dirty tasks for immigrants and defining $\xi = \frac{\lambda}{\lambda-1}\left[\left(\frac{1}{\kappa} - \frac{\beta}{\rho}\right)\frac{1}{1-\beta} - 1\right] > 0$, the solutions of the system are the following[7]:

$$w_s(N_m)^* = A_s \left[(N_m + N_n)^{\frac{\rho-1}{\rho}\left(\frac{\lambda}{\lambda-1}-\gamma\right)} [N_m + \Phi N_n]^{\gamma}\right]^{\Theta} \tag{11}$$

$$w_c(N_m)^* = A_c \left[\left(\frac{1}{N_m + N_n}\right)^{\xi+\gamma} [N_m + \Phi N_n]^{\gamma}\right]^{\Theta} \tag{12}$$

$$w_d(N_m)^* = A_d \left[\left(\frac{1}{N_m + N_n}\right)^{\frac{\xi}{\lambda}-1+\gamma} \left[\frac{1}{N_m + \Phi N_n}\right]^{\frac{\frac{\rho}{\kappa}-1}{(\rho-1)(1-\beta)}-\gamma}\right]^{\Theta} \tag{13}$$

where all the exponents of equations 11 and 12 must be positive and where the exponents of equation 13 are also assumed positive[8].

What happens when the number of immigrants (N_m) increases with respect to a given number of native unskilled workers?

From equation 11, given that the exponents are positive, it is straightforward to show that a higher N_m implies higher wages for skilled workers. This happens because they benefit from the complementarity effects with the product of the traditional sector which is sold at a lower price.

From equation 13, it emerges that w_d monotonically decreases in N_m[9]. The wage rate in *dirty* tasks depends negatively on the number of immi-

[6]In this way we are simulating a short run impact of unskilled immigrants, assuming that the number of skilled workers is fixed. In the long run, both natives and immigrants living in the country can react to the changed wages, for example by investing in their education.

[7]$\xi > 0$ gives the sufficient condition: $\left[\left(\frac{1}{\kappa} - \frac{\beta}{\rho}\right)\frac{1}{1-\beta} - 1\right] > 0$, that can be written as $\kappa(\rho-1)\beta + \rho(1-\kappa) > 0$ that, given $\rho > 1$ and $\kappa < 1$, always holds.

[8]Remember that $\rho > 1, \lambda > 1, 0 < \gamma < 1, 0 < \beta < 1, 0 < \kappa < 1$. In equations 11 and 12, checking the positivity of the exponents is straightforward. The first exponent of equation 13 does not have a definite sign. Nevertheless, it can be shown that it is positive if $\kappa < \frac{\rho}{\beta+(1-\beta)[\lambda(1-\gamma)+\gamma]}$ holds. This is always true if the right hand side of the previous inequality is higher than unity, a condition always respected unless λ is very high. The second exponent of equation 13 is always positive because, if solved for κ, gives $\kappa < \frac{\rho}{1-\gamma(1-\beta)(1-\rho)}$ that must always be respected because the right hand side is higher than unity.

[9]The whole derivative is available to the Authors, and it can be shown that the sign of the derivatve is negative even if the first exponent of equation 13 is negative.

grants.

Concerning the relationship between w_c and N_m we must conclude that the wage rate of unskilled workers employed in *clean* jobs can both increase or decrease in the number of immigrants. In particular, the incoming of unskilled immigrants positively affects w_c, so that $\frac{dw_c}{dN_m} > 0$ only if:

$$\frac{N_m}{N_n} < \frac{\gamma(1-\Phi)}{\xi} - \Phi \tag{14}$$

The wage rate of *clean* jobs will increase in the number of immigrants if the ratio between immigrants and natives unskilled workers is below a given threshold (that is positive if $\Phi < \frac{\gamma}{\gamma+\xi} < 1$). In turn, this threshold is higher when the disutility of working in *dirty* tasks is strongly differentiated between immigrants and natives (Φ is low) and when the market for the final product is strongly competitive (our parameter κ is close to unity, so that ξ is low).

The theoretical predictions of the model are therefore the following: $\frac{dw_s}{dN_m} > 0$, $\frac{dw_d}{dN_m} < 0$, $\frac{dw_c}{dN_m} > 0$ if $\frac{N_m}{N_n}$ is below a given threshold.

Our results therefore suggest that the inflow of migrants will increase white collar wages because of an increased demand for white collar positions. It also increases the demand for "good" jobs preferred by natives (because of the complementarity effect), but in general it increases the unskilled workers supply. According to the theoretical model, the overall effect could be positive if the ratio between immigrants and the whole labour force is low.

3 Empirical Analysis

In this section we perform an empirical analysis to go deeper into the results of the theoretical model presented above, where three types of jobs were considered.The analysis is based on an administrative dataset where we can split observations by dividing them between white collars (skilled) and blue collars (unskilled) but we cannot distinguish between *dirty* and *clean* tasks within blue collars.

Our assumption is that the *dirty* tasks described in the theoretical model are represented by jobs *not declared to public administration*, i.e. Non Observed Economy (NOE). Therefore, we assume that observations on the wages of workers involved in *dirty* tasks are not available in our empirical analysis. *Dirty* tasks are all those jobs that are at the bottom of workers' preferences. Among them there are illegal activities and ''underground" economy[10]. Foreigners suffer a lower disutility from dirty tasks. If those

[10]Schneider (2005) estimated that the share of NOE (which contains illegal and underground activities) in Italy was 25.7% in 2002 (among OECD countries, only Greece had a highest share of 28.2%)

jobs were on the threshold of legality, natives more than immigrants could prefer to stay away from them[11].

In order to estimate the effects of the whole immigration, we must also assume that legal immigrants (the ones observed in our administrative dataset) are a proxy of the illegal immigration.

Our empirical methodology is based on a wage equation for Italian workers that considers the share of immigrants as a regressor in the age/gender group of the individual. We prefer to use it because this share can be considered as a better proxy of total (legal and illegal) immigration than shares calculated, for example, at branch level (because they can be affected by the no homogenous diffusion of underground activities among sectors). Using this approach, we analyze the impact of migrations on a national level, identified by the gender and age-groups. Local labor market conditions may not provide valuable information about the economic impact of migrations because the internal migration of native workers and firms within the host country probably causes a ‘'spreading out" of the additional workers over the entire nation. See, among the others, Borjias et al. (1997)[12]. Finally, our choice is suggested by the high segmentation between males and females in the Italian labour market.

3.1 Data

We use data from the Work Histories Italian Panel (WHIP). It is a database of individual work histories based on INPS administrative archives[13]. The reference population is made of both Italians and foreigners who have worked in Italy even for only a part of their working career. A large representative sample has been extracted from this population: the sampling coefficient is about 1: 90, for a dynamic population of about 700,000 people. For each of these workers the working periods of their careers are observed. The reference period in the database goes from 1985 to 2004.

[11]Because of the very stringent regulation of immigration, the main opportunity to work for many immigrants already living in Italy is represented by illegal jobs. The presence of a large share of NOE in italian economy supports our interpretation: immigrants are the main source of labor supply for that market.

[12]Contrary to our approach, the Italian case has been analyzed by both Gavosto et al. (1999) and Falzoni et al. (2007) using the share of immigrants in cells identified by region and sector (the former in an individual wage equation and the latter with a GLS at aggregate level). In our approach, the share of immigrants employed in a sector can be a source of biased results because those shares are affected by demand factors, too. Which sectors are more likely to hire unskilled immigrants? Probably, the less productive ones. The results found by Falzoni et al. (2007) can therefore be affected by a problem of endogeneity (especially because they use the number of immigrants in region/sector cells as regressor indicating immigration, and they do not seem to control for sector and region fixed effects.)

[13]INPS is the national Italian social security agency. Nearly all workers in the private sector, except agricultural workers, and some in the public sector are included.

Our analysis is based on observations for the period from 1994 to 2004, characterized by a very high inflow of migrants (Gavosto et al. (1999) used data from 1986 and 1995 and we preferred to analyze the subsequent period).

Given the information on workers' country of birth, we compute the immigrants' shares, considering groups identified by gender and four age brackets[14]: 16-27, 27-39, 39-51, 51-64. We refer to those groups as *demographic groups.*

The descriptive statistics, only for Italians, are presented in table 1.

Table 1: Dataset description

Variable	Mean	Std. Dev.	Min	Max
Daily Wage (euros)	66.6	33.74	20	300
Age	36	10.7	16	64
Female	0.35	0.48	0	1
White Collar workers	0.36	0.47	0	1
Regional Unemployment Rate	0.08	.054	.025	.245
Days worked per year	241.9	97.6	1	318
Immigrants' Share (Gender/Age class)	.069	.042	.01	.17

N(observations)=1098477
20 regional dummies, 10 sectoral dummies, 10 years

3.2 Estimates

We wonder whether an inflow of, for instance, 30 year-old male immigrants, which are more likely to accept *dirty* tasks than natives, increases or decreases the 30 year-old male natives wages with blue collar and white collar jobs.

To check whether immigration affects natives' wages we include the share of immigrants in the demographic group in a traditional wage equation. We adopt the following specification:

$$w_{it} = \xi + \alpha_i + \theta_t + \phi \cdot x_{it} + \delta \cdot A_{it} + \beta \cdot IMM_{it} + \varepsilon_{it} \tag{15}$$

where w_{it} is the (log) wage of individual i, at time t, ξ is the constant term, α_i is the individual effect, θ_t is the years fixed effect, x_{it} is a vector of individual features (age and age^2, dummy for white collars), $A_{i,t}$ is a vector of workplace characteristics (regional and sector fixed effect, regional unemployment rate (log), days worked per year), IMM_{it} is the log of the immigrants' share in the same demographic group of the individual, ε_{it} is the error term.

[14]We do not consider as foreigners individuals born in countries which were members of the "Eu at 25" because we want to analyze the impact of unskilled immigration. For our purpose it is not useful to consider, for instance, Germans or French as foreigners.

We performed the Hausman test, rejecting the null hypothesis that random and fixed effects do not differ substantially. Therefore, we restrict our analysis to the fixed effects model. Our estimates are robust to heteroskedasticity and corrected for arbitrary serial correlation clustering standard errors by individuals[15].

Table 2 shows the results of various specification of the model (and, in the footnotes, some information about their robustness). It is divided into the overall population, the sample of blue collars and that of white collars. We use the contemporaneous value of the IMM variable and/or its lag, but results do not diverge between the various specifications.

An increase in the share of immigrants in a specific demographic group favor a growth in the wages of the natives in the same demographic group, for both white collars and blue collars. Depending on the various specifications, the elasticity of w_i to IMM_i varies between 0.7% and 1.0% for the overall population, between 0.9% and 1.4% for blue collars, between 0.6% and 0.7% for white collars.

In Table 3, we present the coefficients of the other regressors (age, age^2, white collar dummy in the overall analysis, log unemployment, days worked per year), which are all significant with the expected sign, both for the overall model and for the white and blue collar ones.

4 Conclusions

Despite unambiguous results of the classical theory forecasts on the effects of immigrations on natives wages, empirical literature rarely finds economic systems reacting to immigration with a fall of manual workers' wages. Hypothesizing an economic system where *advanced* firms outsource some basic economic activities to *traditional* firms which employ manual workers for both traditional blue collar jobs and *dirty* tasks and assuming that unskilled immigrants from poor to rich countries dislike *dirty* tasks less than the natives, the theory presented in this paper explains those results.

We find that while white collars always gain from immigration and workers employed in *dirty* tasks always lose, blue collars can either gain or lose. Gain occurs with higher probability if: *a)*the ratio between migrants and the whole labour force is low, *b)* the disutility of working in dirty tasks is strongly differentiated between immigrants and natives, *c)* the demand elasticity in the final product market is high.

[15]As regard exogeneity we run OLS model at aggregate level (we collapsed the whole database into our demographic groups, weighted by the share of each group on total workers) with IMM as dependent variable and the following regressors: mean log wage of the group, gender dummy, age-class dummies, year dummies, skilled share in the group. We found a positive but not significant relationship between the mean wage and IMM.

Our empirical analysis focuses on Italy for the period 1994-2004[16]. Measuring the level of immigrations on the basis of the share of immigrants for demographic groups of individuals (same gender and age classes), we find that all wages rise with immigration.

As we stated, a possible interpretation of our results consists in considering dirty tasks as partially or totally illegal or simply "underground" jobs; especially because of the great share of Non Observed Economy that characterizes Italy. In this case, the higher propensity of immigrants to accept dirty jobs can be seen as a consequence of the stringent regulation on immigrants which forces many of them to be "illegal" despite the fact that they are already living in Italy and have a job[17].

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[16]Gavosto et al.(1999) cover the period 1986-1995 and Falzoni et al (2007) analyze the period 1991-1998.

[17]For example, to obtain the Residence Permit Card the Italian legislation imposes some criteria about the home of residence which can be difficult to satisfy even for many Italians.

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Table 2: Results - Dependent variable: Daily Wage (log)

Overall									
IMM[a]		0.25***	0.11***			0.006***	0.005***		0.010***
IMM(t-1)	0.22***		0.13***	0.005***	0.004***		0.004***	0.007***	
Personal Features[b]				yes	yes	yes	yes	yes	yes
Dummies[c]					yes	yes	yes	yes	yes
Other Controls[d]							yes	yes	yes
N(observations)	873333	1098477	873333	873333	872089	1096749	872089	872089	1096749
n(individuals)	159650	183978	159650	159650	159634	183884	159634	159634	183884
R-squared (overall)	.002	.002	.001	.17	.16	.18	.15	.16	.18

	Manual Workers					White Collars				
IMM		0.22***	0.09***		0.014***		0.29***	0.13***		0.007***
IMM(t-1)	0.19***		0.12***	0.009***		0.26***		0.15***	0.006***	
Personal Features				yes	yes				yes	yes
Dummies				yes	yes				yes	yes
Other Controls				yes	yes				yes	yes
N(observations)	551138	708192	551138	550465	707225	322195	390285	322195	321624	389524
n(individuals)	110852	132430	110852	110841	132373	60799	69311	60799	60781	69231
R-squared (overall)	.014	.013	. 012	0.11	0.13	.003	.001	.002	.20	.22

Follows

(a): Immigrants' share (log) in the demographic group (gender/age-class 15-27,27-39,39-51,51-64); (b): Age (and age^2), white collar dummy

(c): Region (20), sector (10) and years' fixed effects (10); (d): Regional Unemployment Rate, days worked per year;

Significance: $\star$: 10%, $\star\star$: 5%, $\star\star\star$: 1%;

Notes: All the estimates refer to fixed effects model and contain the constant term. All standard errors are robust to heteroskedasticity and are clustered by individuals. We opt for a fixed effects model because the Hausman test rejects the random effects model.

The coefficients not presented here (age, age^2, white collar dummy in the overall analysis, log unemployment, days worked per year) are significant with the expected sign. Regarding exogeneity: we run an OLS model at aggregate level (demographic groups, weighted by the share of each group on total workers) with IMM as dependent variable and the following regressors: mean log wage of the group, gender dummy, age-class dummies, years dummies, skilled share in the group. We found a positive but not significant relationship between the mean wage as regressor and IMM as dependent variable.

Table 3: Detailed results of estimation of the last column of table 2

Dependent Variable: Log Daily Wage

OVERALL	Coeff.	t	$p > \|t\|$
Age	.0780	134.64	0.000
Age^2	-.0005	-82.06	0.000
White Collar workers	.1014	41.86	0.000
Log of Immigrants' share in the gender/age group	.0102	8.45	0.000
Log of Regional Unemployment Rate	-.0424	-15.28	0.000
Days Worked per Year	-.0006	-91.49	0.000

Individuals: 183884, Observations: 1096749, F(42,912823)=3088.47, P>F=0.000

WHITE COLLARS	Coeff.	t	$p > \|t\|$
Age	.0800	76.20	0.000
Age^2	-.0005	-39.78	0.000
Log of Immigrants' share in the gender/age group	.0073	3.73	0.000
Log of Regional Unemployment Rate	-.0291	-6.44	0.000
Days Worked per Year	-.0006	-49.11	0.000

Individuals: 69231, Observations: 389524, F(41,320252)=1337.90, P>F=0.000

MANUAL WORKERS	Coeff.	t	$p > \|t\|$
Age	.0783	110.19	0.000
Age^2	-.0006	-72.35	0.000
Log of Immigrants' share in the gender/age group	.0140	9.32	0.000
Log of Regional Unemployment Rate	-.0382	-10.93	0.000
Days Worked per Year	-.0006	-76.84	0.000

Individuals: 132373, Observations: 707225, F(41,574811)=1764.75, P>F=0.000

Fixed Effects estimates. All standard errors are robust to heteroskedasticity and are clustered by individuals. Not reported: 20 Region dummies, 10 Sectorial dummies, 10 year dummies, constant.