

## **THE CONTRIBUTION OF FOREIGN WORKERS ON PRODUCTIVITY AND WAGES: COMPANY LEVEL EVIDENCE FROM ITALY <sup>1</sup>**

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### **1. Aims**

The literature dealing with the effect of immigration on the labour market, productivity and the level of wages in the host country is very extensive. Thanks to the pioneering work of Borjas and Katz (2007) and Peri (2009) which centres above all on the Anglo-Saxon context and in particular on the United States, important conclusions supported by empirical research have been reached. Two of the most important research questions addressed are:

a) Does the entry of immigrant workers have a positive or negative effect on the productivity and wages of the domestic workers?

b) What are the gains and losses caused by immigration distributed among local inhabitants? Do the qualification levels of the latter influence the impact?

With reference to these two questions, the macro effects are considered negligible since in the long run the accumulation of capital results in restoring the capital/labour ratio of the pre-immigration period. The results obtained by studying the effect on the level of wages are more controversial: if on the one hand many studies have found minimal or insignificant effects of the involvement of immigrants in the labour market with regard to wages (Card, 1997), using an analysis of historical records at national level, some have estimated an important negative impact on the segment of unskilled domestic workers (and this is where the numerous contributions of Borjas and his school can be found).

In European countries, research has led to two major results. First, the labour market participation of immigrants was lower than that of domestic workers. The new inflows seem to have significant effects especially regarding labour market participation of immigrants who have already been present in the host country for some time. Furthermore, the presence of numerous barriers in the labour market that isolate immigrants to less skilled sectors cause a considerable over-skilled effect,

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<sup>1</sup> The paper is the result of the common work of the authors: in particular Oliviero Casacchia has written sections 1,2 and 6, Corrado Polli has written sections 3,4 and 5.

where foreign workers, even highly educated ones, perform tasks comparable to those of less skilled domestic workers (Dustmann, Frattini, and Preston, 2013).

As for Italy, there is data that allows us to appreciate the direct contribution of immigrants on the country's economy. Currently, the 2.4 million foreign workers present in the country provide 9% of added value and pay approximately 7 billion in taxes and 11 billion in welfare contributions (Leone Moressa Foundation, 2018). Concerning the methodology used in the studies that have addressed the topic, in recent years there has been an important transition from research based on macro-data, often conducted at the local level, to studies based on micro-data which, when possible, permit a longitudinal perspective. However, there are still few studies that analyse the contribution of foreign workers on productivity and the effect on the overall level of wages using micro-data. In general, these studies exploit the data obtained by integrating archives relating both to companies and to workers, these archives are not often readily available.

## **2. Theoretical framework and empirical contributions on the effects of immigrant workforce recruitment on productivity and wages**

Most of the studies examining the economic effects of immigration focus on the consequences - deriving from the entry into the labour market of foreigners - on employment levels, wages and hours worked in companies. At the same time, however, there is a further line of research that analyses the effects of immigrants on productivity, capital intensity and the totality of production factors. In this regard, it is worth recalling the important studies conducted by Peri (2009) on the US labour market, which concludes that the employment of foreign workers involves a more efficient allocation of the workforce through a redistribution of tasks among domestic workers with foreigners, effectively increasing overall productivity. In fact, according to Peri, the employment of foreign workers would push domestic workers to fill jobs that require greater communication skills, while foreigners would carry out jobs that require higher manual intensity. In a nutshell, immigrants in the United States would increase productive and economic capacity by stimulating investment and promoting work specialisation. There are further studies along the same lines (Ottaviano et al., 2012) conducted in the United Kingdom that analyse the impact of immigrants on imports, exports and productivity in the service sector. According to these studies, immigrants can reduce the tendency of companies to relocate through the reassignment of productive tasks to the foreign workforce and can have an impact on company productivity by reducing labour costs. Foreign workers would also increase exports, reducing the costs associated with communication to destination countries and thus favouring trade. Not all studies reveal positive aspects when they

jointly analyse productivity and immigration, especially when the Italian context is analysed (Ferri et al., 2019): these results would be largely influenced by the atavistic productive stagnation of the Italian economy and by the strong presence of foreign workers with low levels of qualification.

Concerning the relation between immigration and wage, Borjas (2014) argues that in sectors where there is no competition between immigrants and domestic workers, the salaries of the latter should be pushed upwards. Furthermore, some studies have shown that immigration reduces the real wages received by domestic workers with scarce human capital (Borjas and Katz, 2007,).

More recent results, often openly in contradiction with those obtained by Borjas and his school, have shown that the consideration of this further element of differentiation between domestic workers and immigrants, even with a similar level of training would lead to an imperfect substitutability in the market and, in essence, in terms of salary variations of domestic workers which - if negative - would be scarce or limited in the short term (Ottaviano and Peri, 2008; 2012). However, it should be emphasised that the empirical results in this regard are rather contradictory: in some studies, a clear negative effect emerges (for example, Borjas, 2003; 2014), in others there would not seem to be a link between immigration and wages, or there would even be a positive relationship.

Analysis methods and strategies are also evolving. In the initial phase most were territorial studies, based on comparisons carried out in the same period between different places, or on analysis of historical records conducted at national level. These were followed by studies that focus on the use of data at the micro level and which have produced, among other results, explicit estimates of the elasticity of substitution between immigrants and domestic workers (Ottaviano and Peri, 2008).

Three strategies have been identified: a) the models are stratified according to the level of qualification on the basis of an imperfect substitutability between skilled and unskilled workers (with constant elasticity). The first studies pointed to a dichotomy differentiating between a high and a low level of education, others introduce a 4-category classification: uneducated, low, medium and higher educational qualifications; b) youth and elderly are differentiated between; c) the role of capital is expressly considered, and generally fixed as a constant in the short term (Ottaviano and Peri, 2008).

The possible differences in the average earnings between Italians and foreigners constitutes a good starting point for more detailed analysis<sup>1</sup>. Estimates from micro data using INPS (social security) data and a survey of financial statements from the Bank of Italy are reported in the study by Brandolini, Cipollone and Rosolia (2005). The authors argue that, based on the first source, in the period 1986-1994 foreign-born workers employed in private companies, operating in the extra-agricultural sector earn on average 4% less than a worker born in Italy.

As for the effect of introducing foreign workers into the Italian labour market, the opinion of those who consider it a cause of increase - and not decrease, on the wages of domestic workers seems to prevail - also according to the results obtained by the Anglo-Saxon school (or also Germany). According to Gavosto, Venturini and Villosio (1999), immigration in Italy influences the salary of those born in Italy in a positive way. Moreover, the parameter that measures the effect is more important in small businesses, and among the blue-collar workers in regions of the North-east and are less relevant in other areas. Similar results were obtained in the study by Staffolani and Valentini (2010). In the Italian labour market, the salaries of the domestic workers would be pushed upwards by the presence of immigrants (and this push would be higher when the share of immigrants in the workforce is low); the latter would also remain encapsulated in unskilled jobs.

### **3. Data and methodology**

To study the effect of foreign workers on the productivity and wage levels of the host country, it was decided to merge three important sources of information.

The first archive considered is the Statistical Register of Active Enterprises (ASIA-Enterprises); ASIA covers all enterprises carrying on economic activities in the field of industry, commerce and services to business and families in Italy. It includes both economic and demographic variables of the main business structure and was carried out through a process of collating various administrative sources, which were then suitably integrated and transformed into statistical archives. The second register examined is ASIA-Employment, which contains information on the employment structure of Italian companies. In order to analyze detailed information on both companies and workers, we have integrated ASIA-Enterprises and ASIA-Employment (Linked Employer Employees Data) using a common code by firm.

To complete the integrated record underlying this study, some budgetary information obtained from the AIDA database (primarily added value and wages) was included at company level. It provides detailed data on the financial statements of Italian joint-stock companies, which were also the result of economic evaluations and a comparative analysis of the financial statements presented by the companies.

The reference period of the proposed analyses is 2015 (the most recent version of the available data). Our analyses include only the companies present in ASIA-Enterprises with the legal form "Capital company" and "Cooperative company". and we take into account only the small and medium-sized enterprises because they have a more economic homogeneous behaviour. We have also excluded companies operating in the "financial and insurance activities" sector and in the "real estate activities" sector because they have few foreign workers. The companies present in

ASIA both in 2014 and in 2015 are considered (companies born in 2015 were excluded). Ultimately, the total number of selected companies was 104,080.

The archive thus constructed contains the following variables relating to the individual worker: gender, age, educational qualification, citizenship (Italian, EU, non-EU), type of employment contract (permanent/temporary), profession, type of working hours (time-full/part-time). As for the companies, the information available is the geographical area in which the company is based, the sector of economic activity, the size, the added value per employee and the gross salary per employee. To interpret the results the degree of competitiveness of the companies were considered, using the Eurostat classification, which reorders the economic sectors of the companies based on the level of technological intensity of the manufacturing companies and in relation to the knowledge content of the services.

Crepon's methodology (2002) was used to evaluate the effect of foreign labour on the productivity and wages of the host country. According to this approach, it is assumed that in each firm the total value of production (Q) is represented by a Cobb-Douglas function, where (A) indicates the technological level, (L) the labour factor and (K) the capital:

$$Q = AL^{\alpha}K^{\beta} \quad (1)$$

with  $\alpha$ ,  $\beta$  representing the elasticity of production against labour and capital. Subsequently, after having assumed perfect substitutability between workers, the factor of labour is broken down into a weighted sum of k workers categories (including, for example, citizenship). After a few mathematical passages, we arrive at the following two formulas that analyse the effect of the foreign component on the productivity and wages of companies, reported here in simplified form:

$$\ln(\Pi_i) = \alpha * foreign_i + \beta * ExtraEU_i * bc_i + \gamma * F_i + \delta * X_i + \varepsilon_i \quad (2)$$

$$\ln(W_i) = \alpha * foreign_i + \beta * ExtraEU_i * bc_i + \gamma * F_i + \delta * X_i + \varepsilon_i \quad (3)$$

The two dependent variables represent, respectively, the logarithm of the value added per employee ( $\Pi_i$ ) and gross wages per employee ( $W_i$ ) for each company. The explanatory variable 'foreign'<sup>2</sup> expresses, in the form of a vector, the quota of workers distinguished by groups of citizenship (domestic workers, EU and non-EU foreigners); the non-EU variable \*bc instead contains the interaction factor between the quota of non-EU workers and an indicator variable bc which is 1 if there is a high

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2 As mentioned in the introduction, it cannot be excluded that the behaviour of companies led by a foreign citizen may present anomalous characteristics compared to companies run by "natives", both in terms of profitability and above all as regards the composition by citizenship of the workers recruited.

presence (higher than the median value) of blue-collar workers in company  $i$ .  $F$  and  $X$  are vectors containing, respectively, characteristics of companies and workers.

#### 4. Productivity and wages in Italy: some characteristics

Some information on the weight of foreign work in Italy allows a more effective classification of the results obtained through our analysis. In 2015 (reference date of the integrated archive) according to the data of the Continuous Labour Force Survey (RCFL), just over 23 million employees, 2.4 million are workers with non-Italian citizenship. It is plausible to hypothesise a diverse performance in terms of productivity and wages of foreign labour depending on whether we refer to individuals from developed countries or not. The data available does not allow us to introduce such a distinction: however, in the archive, we can distinguish, as mentioned above, between employed persons not belonging to the European Union (corresponding to 2015, the year chosen for the integration of the various archives therefore comprising of 27 countries) and non-EU citizens.

The selection analysed in this study presents demographic characteristics not so distant from those of the total employed people in Italy. The weight of men, who make up two thirds of the total number of employees considered is significant, over 70% in the case of non-EU employees. The percentage of young people is low (individuals under the age of 30 are only 12.8% of the total, even less among Italians, 12.4%) mainly due to a significant number of employed people aged 50 and over (over 27%). The distribution by age is then different considering citizenship: the percentage of over 50s drops to 20.5 in the case of non-EU citizens, and as much as 17 in the case of EU citizens.

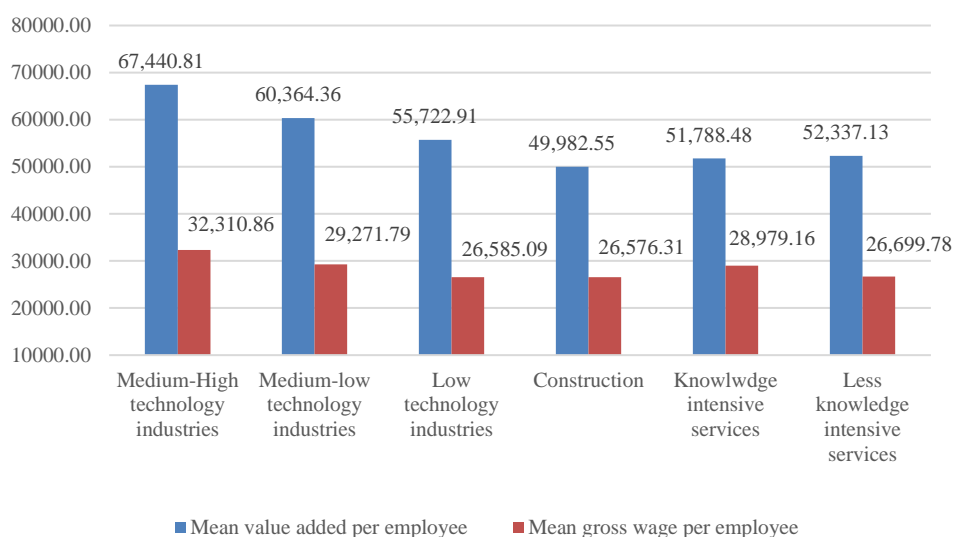
Observing distribution by qualification important indications emerge that will be considered in the study of productivity and wages later on. First, it should be noted that the failure to indicate qualifications, negligible in the case of Italians (1.4%), is instead relevant in the case of non-EU workers (16.6) and especially EU workers (21.3%). Taking into consideration the valid markers, important signs emerge confirming the current situation of human capital in the workforce in Italy. The percentage of workers with only primary school qualifications appears significant among non-EU citizens (about half), but also among Italians (almost 37%), and more moderate among EU workers (about 30%). The percentage holding a university education does not appear particularly different between the three groups: higher for Italians (15.6%) and EU citizens (14.9%), a little lower among non-EU citizens (12.6%): see Figure 1.

Other important characteristics that may underlie different levels of productivity and wages is the type of economic sector in which the company operates. The

different sectors in which the companies in our archive are included guarantee very different levels of average value added per employee: from the construction sector, for which we are talking about an average value of less than 50 thousand euros per year, we move on to the medium high technology sector which guarantees the highest levels of average added value per employee (over 67 thousand euros per year) within the six categories considered. Some surprise is raised by the fact that there are no significant differences in the level of the variable considered by observing the high and low knowledge intensity service sector: in these cases, in fact, the added value, equal to about 52 thousand euros per year, is very similar. The differences in average gross wages per capita are, on the other hand, more contained.

Having mentioned the sectoral differences of the two variables under consideration (added value and remuneration), it is important to pay attention to the differences that occur in terms of the average size of the company and type of sector by distinguishing the citizenship of the worker (between the three groups already submitted).

**Figure 1** - Added value and gross remuneration by production sector. Average values per employee. Year 2015



The average size of companies that recruit domestic workers is higher: 43.8% of locals work in companies that employ fewer than 50 employees, compared to a higher percentage (46.5%) for non-EU citizens and EU workers. Economic sectors characterised by medium or high know-how, such as those typical of medium-high technology manufacturing sectors or those that produce knowledge-intensive

services, are not surprisingly more widespread in companies that recruit domestic employees.

### **5. Productivity and wages: what are the differences?**

As previously mentioned, the database available to us, made at company level, does not allow us to directly estimate the average levels of productivity and wages per worker (we need to insist on this point). To be able to obtain a result of this kind we would have needed information (which is not available) and which in at least in one case, is difficult to evaluate. In fact, the level of productivity of a company is usually assessed synthetically without being able to attribute it to specific employees. The level of average salaries could in theory be obtained, but only after a long process, together with additional databases such as the monthly communications managed by INPS which include the statements sent by employers to report the monthly wages paid to their employees – however, they are however difficult to access. At company level, however, it is possible to evaluate the effect of some aggregate information such as the weight of the quota of different workers in the three groups presented above. The percentage of employees are divided by sex, educational qualification, age, type of contract and so on with two target variables (added value and remuneration). Moreover, in our opinion this is a pioneering attempt never before done, at least in our country, from which valuable and concrete indications emerge about the association - albeit at a macro level (the effect of some variables treated as indicators) in a microenvironment (the analysis, as repeatedly stressed, takes place at the level of the company) - of the two target variables with some characteristics of the staff employed in a company. It should not be forgotten that this attempt follows the LEED approach.

The results obtained through the models described above are contained in Table 5.1. Columns 1 and 3 contain the coefficients deriving from the application of the model on the two dependent variables "average productivity" and "average wages" at company level without the value interaction. Columns 2 and 4 replicate the same models but taking interaction into account. The reading of the coefficients, which we recall are calculated considering all the companies and not a sample of them, would seem to associate a growing share of foreign workers with lower company productivity and wages for lower employees. This trend would seem to apply both to foreigners born in European Union countries and to non-EU citizens. The coefficients reported for educational qualification and professional qualification contain values that are economically predictable and confirm the correctness of the results as a whole. Analysing the results for the models including interaction between companies containing a high number of blue-collar workers and share of non-EU



workers, we note a statistically significant negative correlation between the increase in non-EU workers and wages per employee. The coefficients relating to productivity, on the other hand, are not statistically significant. In order to verify the robustness of the results just presented, the model was replicated on subgroups of companies, using the same specification. For this purpose, it was decided to use a classification proposed by OCDE which distinguishes manufacturing companies through a re-aggregation of the production sectors to which they belong, and which takes into account the investments in Research and Development supported by the companies. On the other hand, as regards the service sector, the companies in each sector are divided according to the percentage of graduates. When a certain threshold of university-trained employees is exceeded, companies belonging to a specific branch of services are defined as “high-knowledge content”.

**Table 1** – OLS estimation results on productivity and wages. Italy, 2015

	Productivity			Wages
	(1)	(2)	(3)	(4)
<i>Share of domestic workers (ref.)</i>	-	-	-	-
Share of EU workers	-0.0635***	-0.0639***	-0.052***	-0.05***
Share of non-EU workers	-0.147***	-0.124***	-0.115***	-0.09***
Interaction of presence of blue-collar workers * quota non-EU		-0.0299		-0.033**
<i>Share of workers with primary education (ref.)</i>	-	-	-	-
Share of workers with secondary education	0.174***	0.174***	0.136***	0.136***
Share of university-educated workers	0.318***	0.319***	0.220***	0.220***
<i>Share of employees (ref.)</i>	-	-	-	-
Share of blue-collar workers	-0.306***	-0.306***	-0.225***	-0.23***
Share of white-collar workers	0.898***	0.899***	0.857***	0.858***
Share of apprentices	-0.443***	-0.446***	-0.337***	-0.34***
Share of managers	2.328***	2.330***	2.455***	2.457***
Share of other typologies	-0.184***	-0.183***	-0.0271	-0.0268
Constant	3.694***	3.693***	3.178***	3.177***
Observations	103357	103357	103357	103357
R-squared	0.393	0.393	0.503	0.503
Other controls <sup>(a)</sup>	Yes	Yes	Yes	Yes

\* p<0.05, \*\* p<0.01, \*\*\* p<0.001

(a) Other controls include sex, age group, school attainment, type of contract, ln(investments in fixed assets per employee), sector, company size, geographical area.

With regard to manufacturing industries, for each technological level used in production processes, a greater share of foreign workers is associated with a negative effect both on productivity and on the wages paid to employees, thus confirming the results obtained in the general model previously described.

Again, with reference to the manufacturing sectors, the interaction value does not seem to have an effect on the two dependent variables. It should be noted, however, that in services with a high content of knowledge, a growing share of workers born in EU countries is associated with a positive effect on the productivity and wages of companies. In these sectors, moreover, the value interaction indicates, in companies with a prevalent presence of blue-collar workers and a higher percentage of non-EU workers, greater productivity and higher wages. Finally, as regards low-knowledge services, the coefficients seem to confirm the negative effect of high percentages of non-EU workers on productivity and wages (Table 5.2). An interesting fact comes from looking at the value interaction: a higher share of non-EU workers would have a negative effect on wages, not on productivity.

**Table 2** – *Some robustness tests by knowledge level. Italy, 2015*

High intensity of knowledge				
	Productivity		Wages	
	(1)	(2)	(3)	(4)
Share of EU workers	0.175**	0.182**	0.127***	0.130***
Share of non-EU workers	-0.0715	-0.289***	-0.0725**	-0.187***
Share of non-EU workers * blue-collar (dummy)		0.330***		0.173***
Low intensity of knowledge				
	Productivity		Wages	
	(1)	(2)	(3)	(4)
Share of EU workers	-0.0388	-0.0400	0.0467***	0.0485***
Share of non-EU workers	-0.192***	-0.149***	-0.158***	-0.098***
Share of non-EU workers * blue-collar (dummy)		-0.0535		-0.075***
Other controls:	yes	yes	yes	yes

## 6. Conclusions and further developments

The analyses conducted in the present study lead primarily to three results. First, a growing share of foreign workers has a negative impact on productivity and wages. Secondly, the interaction between non-EU workers and the high presence of blue-collar workers significantly reduces wages; this effect is not confirmed on company productivity. Finally, knowledge-intensive service companies that employ a larger percentage of foreign workers have a higher level of both wages and productivity. On the other hand, in low-knowledge service companies, a higher share of foreign workers is associated with lower levels of wages. The present study was primarily for exploratory purposes. To refine the analyses, it would be appropriate to consider the different professions carried out by the workers and, above all, it would be

interesting to study them from the point of view of the communication and manual skills necessary to carry them out. In this regard, an in-depth study is envisaged starting from the extensive documentation made available by the INAPP survey on professions. Furthermore, as already mentioned above, the information on salary at an individual level could be considered from administrative sources to improve the analysis carried out at the company level. Finally, to evaluate the behaviour of companies on the labour market with regard to the recruitment of non-domestic labour, new hires and employment terminations could be examined in terms of skills and competences as well.

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## SUMMARY

### **The contribution of foreign workers on productivity and wages: company level evidence from Italy**

The aim of this paper is to describe the main features of firms for socio-characteristics of employees and to investigate the effects of share of foreign workers on firm productivity and wages. The analysis takes focus on the medium and big size firms and on manufactured and not agricultural sectors. For the study, we combined data from different data sources (ASIA enterprises, ASIA employees and AIDA – Bureau Van Dijk). We found three main results in this paper: primary, higher share of foreign workers has a negative impact on productivity and wages of Italian firms, Secondary, the interaction between Extra-UE born workers and blue collars (do not) reduce significantly (labour productivity) wages. Finally, larger share of foreign-born employees that work in knowledge sector increases labour productivity and wages.

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