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The contribution of foreign workers on productivity and wages: firm level evidences from Italy

Corrado Polli^{*}, Oliviero Casacchia^{**}, Michelangelo Filippi^{***}

^aINAPP - National Institute for the Analysis of Public Policies

^bSapienza University of Rome – Department of Statistical Sciences

^cR&P sc e LABORatorio Riccardo Revelli

Population Days 2019 at glance

Italian Association for the Study of Population (Sis-Aisp)

Parallel session in “Immigrants and the labour market in Italy” (chair C. Bonifazi)

Bocconi University, Milan 24-26 January 2019

Aim of Paper

- To evaluate the impact of *foreign workers* on firms' productivity in Italy
- To analyze the relationship between the share of *foreign-born employees, labour productivity and wages* of Italian firms, in order to draw conclusion concerning their similarities and/or differences.
- To examine the impact of foreign workers on productivity and wages by distinguishing between *high tech industry and knowledge aggregation of sector* (OECD classification based on NACE).

Theoretical background

-Several studies analyzed how foreign workers affected different aspect of economies such as *labour market* (Borjas, 2006; Card, 2001, 2007, 2009; Peri and Spaber, 2009), *industrial specialization* (Card and Lewis, 2007) and *innovative capacity* (Gauthier-Loiselle and Hunt, 2008).

-Some research indicates that a large share of foreign-born worker could have a negative effect of firms' productivity (Faini, 2005).

-Some studies argue that immigration could reduce real wages paid to native-born workers without a high school degree (Borjas, 2003; Borjas and Katz, 2007).

-In contrast, other studies indicate no effect of immigration on the wages of less educated native workers (Card, 2001; Card and Lewis, 2007; Lewis, 2005).

-Peri and Sparber (2009) show that less educated native and immigrant workers specialize in differentiated production tasks; this suggests that the economy absorbs immigrants by expanding job opportunities rather than by displacing natives.

Data sources

- We combined data from different data sources (ASIA enterprises, ASIA employees and AIDA –Bureau Van Dijk).
- ASIA -carried out by ISTAT- contains all the data from the census of firms and related employees (employer-employee dataset).
- AIDA includes private companies data and audited accounts for Italian firms.

We selected in 2015 (N=104,080 firms):

- 1) Firms present in both 2014 and 2015
- 2) Capital companies and cooperative societies in 2015
- 3) Firms with more than 9 employees and less than 1000
- 4) Are excluded «Financial and insurance activities» and «Real Estate activities»

Theoretical methods

-We assume that production in a given firm i can be represented by a Cobb-Douglas function

-to investigate the effect of foreign-born workers on labour productivity and wages, we estimate the following 2 equations:

$$(1) \quad \ln(\Pi_i) = \alpha * foreign_i + \beta * ExtraEU_i * bc_i + \gamma * F_i + \delta * X_i + \varepsilon_i$$

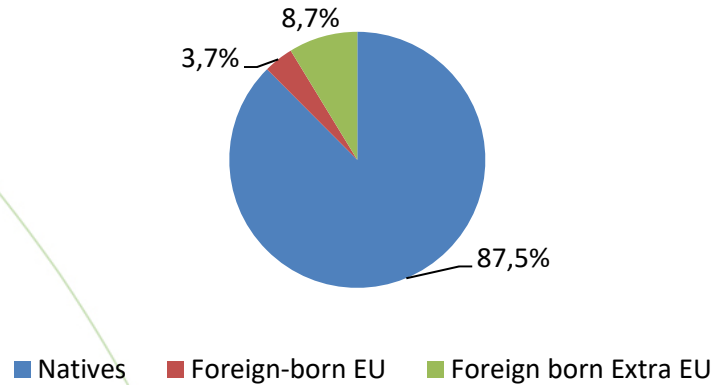
$$(2) \quad \ln(W_i) = \alpha * foreign_i + \beta * ExtraEU_i * bc_i + \gamma * F_i + \delta * X_i + \varepsilon_i$$

where dependent variable $\ln(\Pi_i)$ is $\ln(\text{value added per employee})$ and $\ln(W_i)$ is $\ln(\text{wage per employee})$.

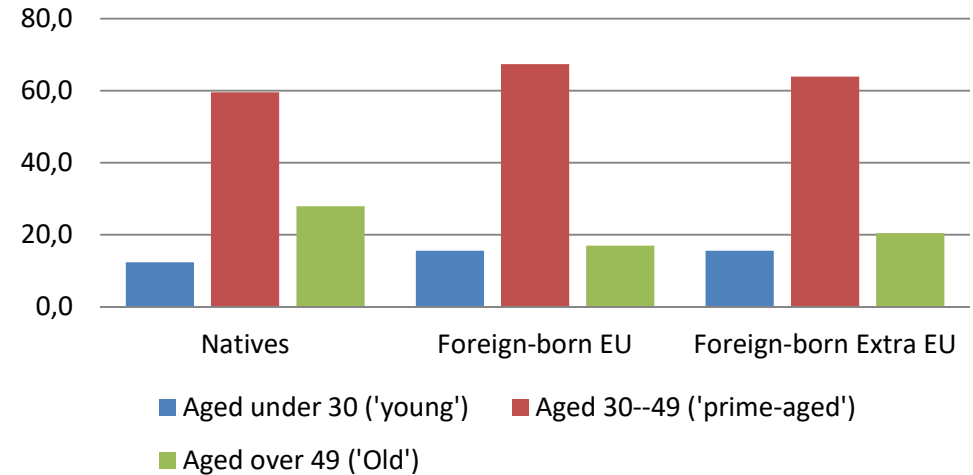
Our key explanatory variable, *foreign*, is the share of employees by distinguishing among place of birth (Italian, Eu and Extra-Eu). Further the variable *ExtraUE*bc* is the interaction between the share of extra-eu employees and *bc* (dummy variable) of the high (above the median) presence of blue collars at firm level i . Other controls F and X formalize respectively firm characteristics and workforce composition.

Results: socio-demographic characteristics

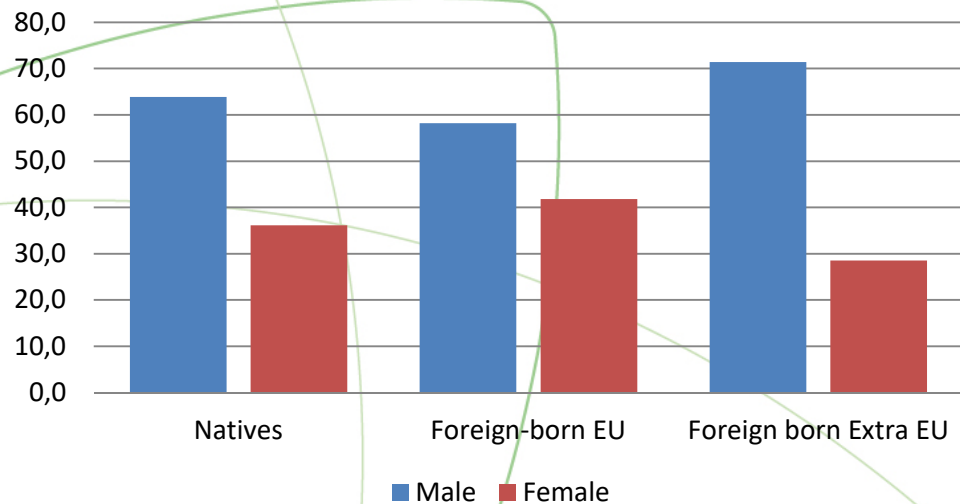
Composition of employees by place of birth



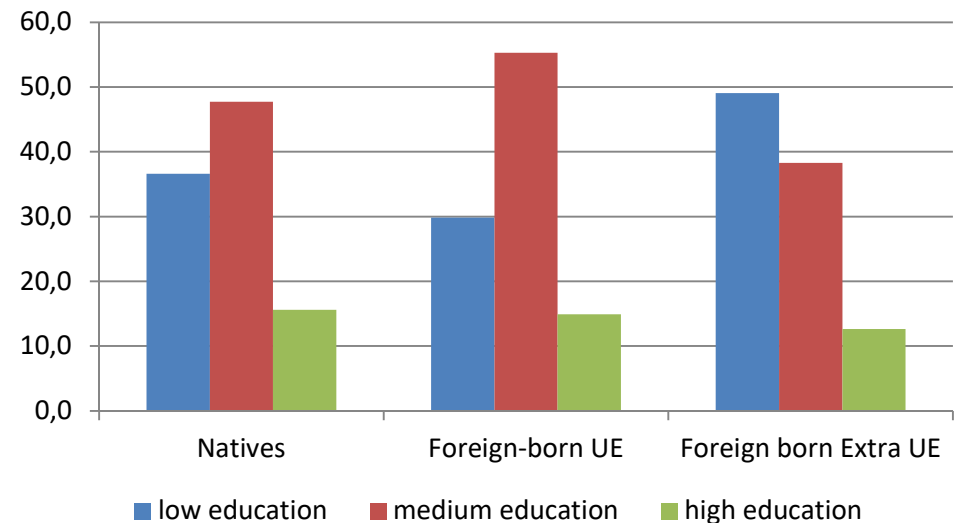
Employees (Italian, Eu and Extra Eu by age)



Employees (Italian, Eu and Extra Eu by gender)

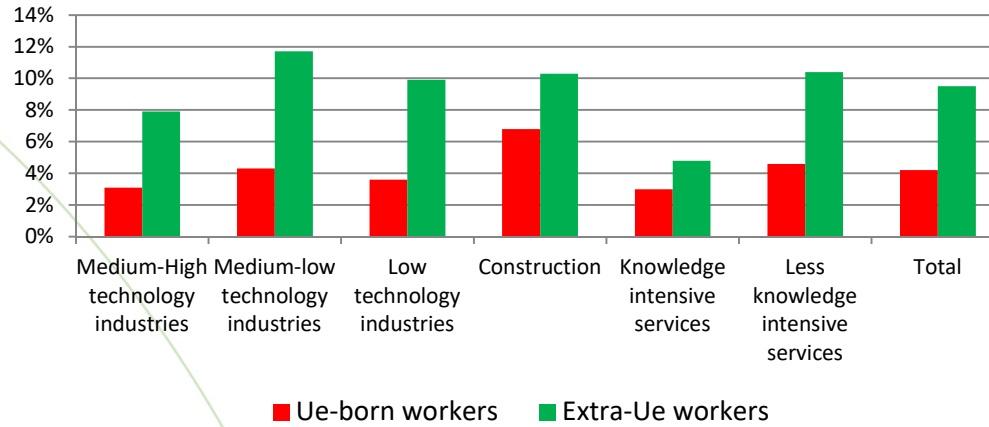


Employees (Italian, Eu, Extra Eu by education)

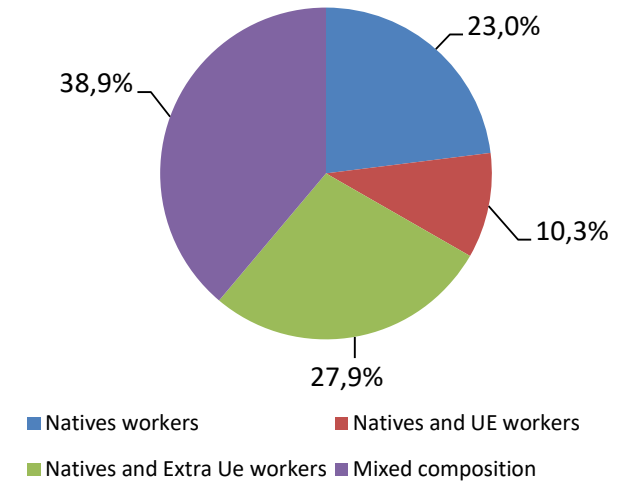


Results: firms characteristics

Share of foreign workers by high tech industries

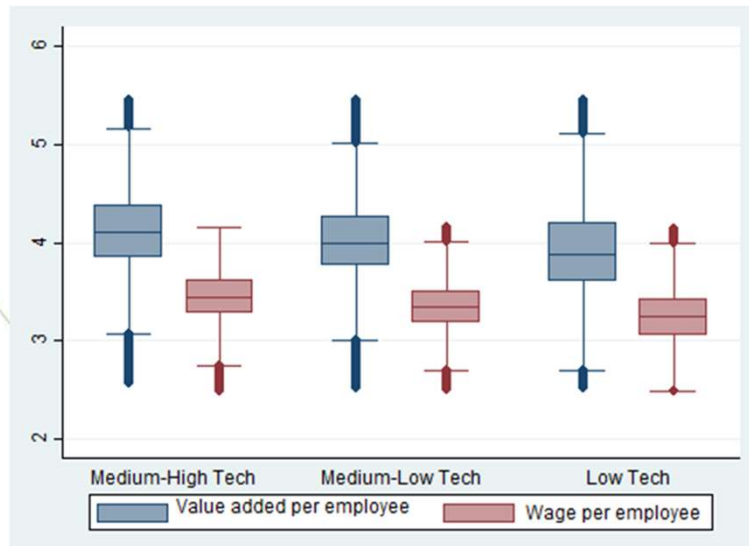


Type of firm by place of birth of employees

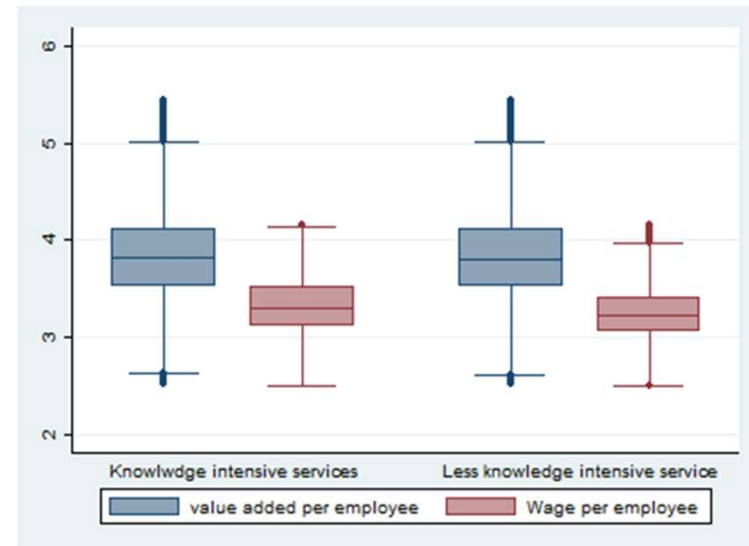


Productivity and wages by high-tech classification

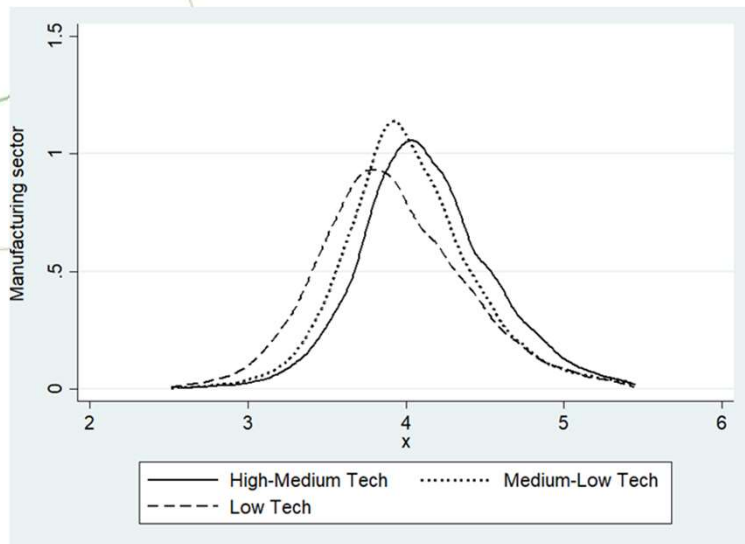
Productivity and wages by level of technology (box-plot)



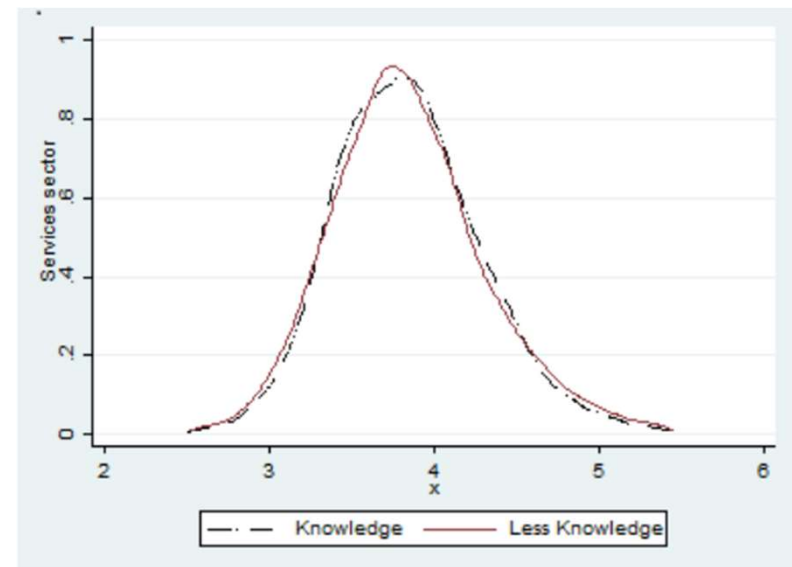
Productivity and wages by knowledge services (box-plot)



Productivity by high-tech industries (kdensity)



Productivity by knowledge services (kdensity)



Empirical results of regression analysis

Estimation results on productivity and wages

	Productivity		Wages	
	(1)	(2)	(3)	(4)
Proportion of employees:				
<i>Natives (Ref. Cat.)</i>	-	-	-	-
<i>EU Foreign-born</i>	-0.0635***	-0.0639***	-0.0525***	-0.0530***
<i>Extra EU Foreign-born</i>	-0.147***	-0.124***	-0.115***	-0.0904***
<i>Proportion of ExtraUe-born * blue collar (dummy)</i>		-0.0299		-0.0329**
Proportion of employers with:				
<i>Primary level of education (Ref. Cat.)</i>	-	-	-	-
<i>Secondary level of education</i>	0.174***	0.174***	0.136***	0.136***
<i>Tertiary level of education</i>	0.318***	0.319***	0.220***	0.220***
Proportion in occupation:				
<i>Blue-Collar</i>	-0.306***	-0.306***	-0.225***	-0.226***
<i>White-Collar (Ref. Cat.)</i>	-	-	-	-
<i>Cadre</i>	0.898***	0.899***	0.857***	0.858***
<i>Apprentice</i>	-0.443***	-0.446***	-0.337***	-0.340***
<i>Manager</i>	2.328***	2.330***	2.455***	2.457***
Other controls	yes	yes	yes	yes
Observations	103,357	103,357	103,357	103,357
R-squared	0.393	0.393	0.503	0.503

Standard errors in parentheses

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

Other controls include: gender, age, level of education, organizational position, ln(fixed assets per employee), sector, firms' size, geographical area

Empirical results of regression analysis

Estimation results by high technological industries

Medium-high intensive technology industries				
	Productivity		Wages	
	(1)	(2)	(3)	(4)
Proportion of Eu-born	-0.228***	-0.228***	-0.0832*	-0.0833*
Proportion of Extra Eu -born	-0.184***	-0.168**	-0.105***	-0.0795**
Proportion of Extra Eu-born * blue collar (dummy)		-0.0265		-0.0414
Medium-low technology industries				
	Productivity		Wages	
	(5)	(6)	(7)	(8)
Proportion of Eu-born	-0.137***	-0.137***	-0.111***	-0.111***
Proportion of ExtraEu-born	-0.0942***	-0.106**	-0.0868***	-0.0589**
Proportion of Extra Eu-born * blue collar (dummy)		0.0156		-0.0357
Low-technology industries				
	Productivity		Wages	
	(9)	(10)	(11)	(12)
Proportion of Eu-born	-0.188***	-0.188***	-0.0791**	-0.0788**
Proportion of Extra Eu-born	-0.0792***	-0.0528	-0.0512***	-0.0791**
Proportion of Extra Eu-born * blue collar (dummy)		-0.0355		0.0375
Other controls:	yes	yes	yes	yes

Other controls include: gender, age, level of education, organizational position, ln(fixed assets per employee), sector, firms' size, geographical area

Empirical results of regression analysis

Estimation results by knowledge intensive services

	Knowledge intensive services			
	Productivity		Wages	
	(1)	(2)	(3)	(4)
Proportion of Eu-born	0.175**	0.182**	0.127***	0.130***
Proportion of Extra-Eu born	-0.0715	-0.289***	-0.0725**	-0.187***
Proportion of ExtraEu-born * blue collar (dummy)		0.330***		0.173***
	Less knowledge intensive services			
	Productivity		Wages	
Proportion of Eu-born	-0.0388	-0.0400	-0.0467***	-0.0485***
Proportion of Extra-Eu born	-0.192***	-0.149***	-0.158***	-0.0981***
Proportion of ExtraEu-born * blue collar (dummy)		-0.0535		-0.0751***
Other controls:	yes	yes	yes	yes

Other controls include: gender, age, level of education, organizational position, ln(fixed assets per employee), sector, firms' size, geographical area

Conclusions

We found three main results in this paper:

1. Higher share of foreign workers have a negative impact on productivity and wages of Italian firms
2. The interaction between Extra-EU born workers and blue collars (**do not**) reduce significantly (**labour productivity**) wages.
3. Larger share of foreign-born employees that work in knowledge services sector increases labour productivity and wage. Instead, it is associated to lower wages in less-knowledge service sector.

Further developments

- Analyze individual income of employees adding INPS (National Institute of Social Security) data to our firms' sample.
- Examine the flows of hiring and quitting jobs of firms using MLPS (Italian Ministry of Labour) data in order to analyze the characteristics of employees in terms of skills and competence.
- Investigate the different tasks of workers and contents of job using «Indagine campionaria sulle professioni» carried out by INAPP (National Institute of Public Policy Analysis).

**THANK YOU
FOR YOUR ATTENTION!**

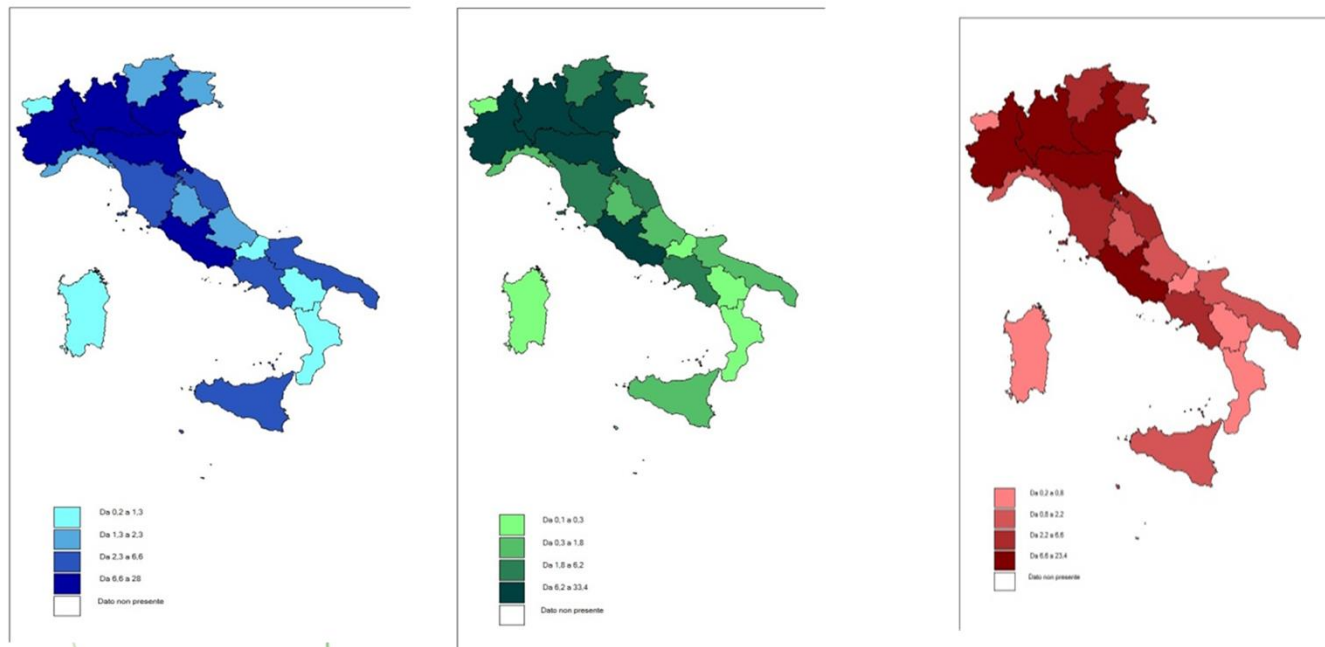
Corrado Polli- c.polli@inapp.org



INAPP - Istituto Nazionale per l'Analisi delle Politiche Pubbliche
Corso d'Italia, 33 - 00198 Roma - tel. +39.06.85447.1 - www.inapp.org

Results: socio-demographic characteristics

Employees' Regional Distribution (1)



A. Natives

B. EU-born

C. Extra EU-born

% in the Northern Region: 65.3

67.3

76.8

Note (1) : Quantiles Distribution

High-Tech classification of manufacturing industries

Manufacturing Industries	NACE Rev. 2 codes – 2-digit level	
High-technology	21	Manufacture of basic pharmaceutical products and pharmaceutical preparations;
	26	Manufacture of computer, electronic and optical products
Medium-high-technology	20	Manufacture of chemicals and chemical products;
	27 to 30	Manufacture of electrical equipment; Manufacture of machinery and equipment n.e.c. ; Manufacture of motor vehicles, trailers and semi-trailers; Manufacture of other transport equipment
Medium-low-technology	19	Manufacture of coke and refined petroleum products;
	22 to 25	Manufacture of rubber and plastic products; Manufacture of other non-metallic mineral products; Manufacture of basic metals; Manufacture of fabricated metals products, excepts machinery and equipment;
	33	Repair and installation of machinery and equipment
Low technology	10 to 18	Manufacture of food products, beverages, tobacco products, textile, wearing apparel, leather and related products, wood and of products of wood, paper and paper products, printing and reproduction of recorded media;
	31 to 32	Manufacture of furniture; Other manufacturing

High-Tech classification of manufacturing industries

Knowledge based services	NACE Rev. 2 codes – 2-digit level	
Knowledge-intensive services (KIS)	50 to 51	Water transport; Air transport;
	58 to 63	Publishing activities; Motion picture, video and television programme production, sound recording and music publish activities; Programming and broadcasting activities; Telecommunications; computer programming, consultancy and related activities; Information service activities (section J);
	64 to 66	Financial and insurance activities (section K);
	69 to 75	Legal and accounting activities; Activities of head offices, management consultancy activities; Architectural and engineering activities, technical testing and analysis; Scientific research and development; Advertising and market research; Other professional, scientific and technical activities; Veterinary activities (section M);
	78	Employment activities;
	80	Security and investigation activities;
	84 to 93	Public administration and defence, compulsory social security (section O); Education (section P), Human health and social work activities (section Q); Arts, entertainment and recreation (section R).

Knowledge based services	NACE Rev. 2 codes – 2-digit level	
Less knowledge-intensive services (LKIS)	45 to 47	Wholesale and retail trade; Repair of motor vehicles and motorcycles (section G);
	49	Land transport and transport via pipelines;
	52 to 53	Warehousing and support activities for transportation; Postal and courier activities;
	55 to 56	Accommodation and food service activities (section I);
	68	Real estate activities (section L);
	77	Rental and leasing activities;
	79	Travel agency, tour operator reservation service and related activities;
	81	Services to buildings and landscape activities;
	82	Office administrative, office support and other business support activities;
	94 to 96	Activities of membership organisation; Repair of computers and personal and household goods; Other personal service activities (section S);
97 to 99	Activities of households as employers of domestic personnel; Undifferentiated goods- and services-producing activities of private households for own use (section T); Activities of extraterritorial organisations and bodies (section U).	

Descriptive statistics

Sector affiliation	Proportion of native workers	Proportion of UE foreign born workers	Proportion of Extra UE foreign born workers	Mean value added per employee	Mean gross wage per employee
Medium-High technology industries	0.891	0.031	0.079	67440.81	32310.86
Medium-low technology industries	0.841	0.043	0.117	60364.36	29271.79
Low technology industries	0.865	0.036	0.099	55722.91	26585.09
Construction	0.829	0.068	0.103	49982.55	26576.31
Knowledge intensive services	0.922	0.03	0.048	51788.48	28979.16
Less knowledge intensive services	0.850	0.046	0.104	52337.13	26699.78
Size of firm					
10--49	0.861	0.043	0.096	54170.65	27313.42
50--249	0.871	0.038	0.091	62238.02	31466.23
250--1000	0.883	0.034	0.083	59372.72	32053.20
Firm characteristics					
Natives workers	1.000	0.000	0.000	56313.32	28141.13
Natives and UE workers	0.909	0.091	0.000	55824.86	27851.12
Natives and Extra Ue workers	0.854	0.000	0.146	55887.27	27947.12
Mixed composition	0.775	0.085	0.141	54439.89	27964.64
Total	0.863	0.042	0.095	55416.61	27988.73

Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Mean value added per employee (log)	104,080	3.908	0.452	2.51	5.45
Mean gross wage and salaries per employee	104,080	3.291	0.286	2.49	4.15
Proportion of					
Natives	104,080	0.863	0.176	0.00	1.00
Foreign born UE	104,080	0.042	0.085	0.00	1.00
Foreign born Extra UE	104,080	0.095	0.145	0.00	1.00
Proportion of					
Male	104,080	0.679	0.263	0.00	1.00
Female	104,080	0.321	0.263	0.00	1.00
Proportion of employees					
Aged under 30 ('young')	104,080	0.148	0.142	0.00	1.00
Aged under 30 to 49 ('prime-aged')	104,080	0.597	0.149	0.00	1.00
Aged over 49 ('old')	104,080	0.254	0.160	0.00	1.00
Proportion of					
Blaue-collar	104,080	0.589	0.316	0.00	1.00
Clerks	104,080	0.347	0.292	0.00	1.00
Cadre	104,080	0.015	0.046	0.00	0.95
Apprentice	104,080	0.039	0.079	0.00	0.91
Manager	104,080	0.006	0.021	0.00	0.45
Other	104,080	0.005	0.039	0.00	1.00

Descriptive statistics

Proportion of employees with					
Primary level of education	104,080	0.420	0.170	0.00	1.00
Secondary level of education	104,080	0.461	0.180	0.00	1.00
Terziary level of education	104,080	0.119	0.160	0.00	1.00
Proportion of permanent contract	104,080	0.892	0.164	0.00	1.00
Fixed Asset per employee (log)	104,080	5.678	2.058	-2.37	10.33
sector affiliation					
Mining, quarryng	103,357	0.019	0.136	0.00	1.00
Light industry (manufacture of food,bevererages, tobacco, wood and paper products)	103,357	0.063	0.244	0.00	1.00
Manufacture of chemicals and metals)	103,357	0.063	0.244	0.00	1.00
Manufacture of chemicals and metals)	103,357	0.049	0.216	0.00	1.00
Manufacture of Machinery and equipment	103,357	0.192	0.394	0.00	1.00
Manufacture of repair and installation of machinery and equipment	103,357	0.020	0.140	0.00	1.00
Construction	103,357	0.095	0.293	0.00	1.00
Commerce, accomodation and food services activities	103,357	0.255	0.436	0.00	1.00
Transportation and storage	103,357	0.062	0.241	0.00	1.00
Information and communication	103,357	0.039	0.193	0.00	1.00
Professional, scientific and technical activities	103,357	0.035	0.183	0.00	1.00
Other service activities	103,357	0.048	0.213	0.00	1.00
Health, education and other personal services	103,357	0.060	0.237	0.00	1.00
size of firm					
10--49	104,080	0.840	0.367	0.00	1.00
50--249	104,080	0.144	0.351	0.00	1.00
250--1000	104,080	0.016	0.127	0.00	1.00
Area					
North-West	104,080	0.355	0.478	0.00	1.00
North-East	104,080	0.273	0.445	0.00	1.00
Center	104,080	0.204	0.403	0.00	1.00
South and Islands	104,080	0.168	0.374	0.00	1.00