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LABOR MARKET CHALLENGES IN TIMES OF GLOBALIZATION, TECHNOLOGICAL AND DEMOGRAPHIC CHANGE

International Workshop
29 May 2019 - Prague

Low-skill jobs and Routine tasks specialization: New insights from Italian provinces

I. Brunetti, *V. Cirillo*, ***V. Intraligi*** *and A. Ricci*
INAPP - National Institute for Public Policy Analysis

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Motivations

- Italy has a very well-known lag in innovations introduction and in adoption of new technologies
- Past researches did not find evidence of *skill-biased change:*
- Naticchioni et al. (2008, 2010) *"Far away from a Skill-biased change in Italy":* decreasing EWP over 1993-2004 (so, not even evidences of returns to education in the nineties)
- So far no paper ever addressed the topic of **ROUTINIZATION** (and its link with LM polarization) in Italy.
- We analyse the period 2004-2016 and assess of the routinisation hypothesis for the Italian labor market

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AUTOR AND DORN (2013) CORNERSTONE PAPER

CORE STRATEGY:

- **LLMs specialization routine tasks** to predict growth of low-skill/low-wage occupations (JOB POLARIZATION)
- ***RSH***: jobs in **the top-tercile** of ***RTI*** distribution (*routine tasks index*)

$$RTI_k = \ln\left(T^R_{k,o*net}\right) - \ln\left(T^C_{k,o*net}\right) - \ln\left(T^M_{k,o*net}\right)$$

LOCAL APPROACH in EUROPE:

- **Gregory et al. (2018):** (EUROPE -1 digit - agg. **RTI**)
- **Consoli & Sanchez (2019):** (SPAIN **–** 1 digit **RSH)**
- **Charnoz & Orand (2017):** (FRANCE - **RSH**)

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Our main research questions:

1) *Can we find any evidence of Routine replacing Technological Change in Italy? (In our case: does a significant relationship between RSH and the growth of low-wage/low- skilled occupations also apply in Italy?*

2) *If so, is the educational attainment composition of low-wage/low-skill jobs changing in highly routine-specialized LLMs? And how?*

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Overview

- Stylized facts for LM polarization in Italy.
- Data description and measurement of Italian provinces' specialization in *routine tasks.*
- Identification strategy and empirical results.
- Conclusions and future research perspectives .

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STYLIZED FACT 1: BROAD OCCUPATIONAL GROUPS REAL WAGE DYNAMICS - WAGE POLARIZATION?

ISCO occupations ordered by Italian 2006 mean wage rank	Mean wage			Median wage		
	2006	2014	%change	2006	2014	%change
Managers	36,81	38,63	4,92%	33,68	33,79	0%
Professionals	24,19	23,96	-0,93%	22,83	22,76	0%
Technicians and associate professionals	16,25	15,41	-5,16%	14,32	13,73	-4%
Clerical support workers	14,07	12,71	-9,66%	12,34	11,28	-9%
Plant and machine operators and assemblers	11,16	10,08	-9,68%	9,95	9,23	-7%
Service and sales workers	10,26	8,89	-13,36%	10,38	8,78	-15%
Craft and related trades workers	10,89	10,57	-2,86%	10,06	9,82	-2%
Skilled agricultural, forestry and fishery workers	11,83	11,16	-5,64%	10,69	10,48	-2%
Elementary occupations	9,59	9,41	-1,91%	8,70	8,88	2%

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STYLIZED FACT 2: BROAD OCCUPATIONAL GROUPS EMPLOYMENT SHARES DYNAMICS - JOB POLARIZATION?

Macro region	Italian occupations ordered by 2006 mean wage rank	2004	2016	Change
Northern Italy	Managers	.017	.028	.011
	Professionals	.039	.101	.062
	Technicians and associate professionals	.186	.216	.030
	Clerical support workers	.169	.123	-.046
	Plant and machine operators and assemblers	.175	.100	-.075
	Service and sales workers	.122	.189	.067
	Craft, agricultural, forestry, fishery workers	.200	.148	-.052
	Elementary occupations	.092	.096	.004
Central Italy	Managers	.017	.029	.012
	Professionals	.048	.119	.071
	Technicians and associate professionals	.171	.183	.013
	Clerical support workers	.163	.135	-.028
	Plant and machine operators and assemblers	.121	.071	-.051
	Service and sales workers	.153	.222	.068
	Craft, agricultural, forestry, fishery workers	.210	.139	-.072
	Elementary occupations	.116	.103	-.014
Southern Italy	Managers	.013	.026	.014
	Professionals	.034	.099	.066
	Technicians and associate professionals	.122	.158	.035
	Clerical support workers	.123	.112	-.011
	Plant and machine operators and assemblers	.133	.079	-.054
	Service and sales workers	.171	.258	.087
	Craft, agricultural, forestry, fishery workers	.259	.153	-.106
	Elementary occupations	.145	.115	-.030

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The Data

- Occupational-tasks data from **O*NET database** (rather standard approach in this literature for European countries but Germany).

- Labor market data from **Italian LFS** (provided by Italian National Statistical Institute - ISTAT):

  - ***95 provinces*** *(NUTS 3) over* ***2004-2016***
  - *Focus on employees in market sectors*

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Measuring Italian provinces' specialization in routine-tasks

1) We use official crosswalks to map O*NET in the Italian "*classificazione delle professioni*" (CPI 2001, 3-digits)
2) Closely follow Acemoglu & Autor (2011) to obtain T^C,T^R and T^M for each Italian occupation
3) Compute $RTI_k = \ln(T^R_{k,o*net}) - \ln(T^C_{k,o*net}) - \ln(T^M_{k,o*net})$
4) Follow Autor and Dorn (2013) to compute ***RSH*** for each Italian province *- i.e. employment share of jobs scoring in the (employment-weighted) top tercile of RTI*

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ROUTINE OCCUPATIONS

CP2001 code	Nomenclature	*RTI*	2004-2016 employment share change
723	Wood-products machine operators	.515	-.003
732	Food and related products machine operators	.587	-.000
741	Locomotive engine drivers and related workers	.597	-.001
728	Other machine operators not elsewhere classified	.624	.000
633	Handicraft workers in wood, textile, leather and related	.636	-.007
727	Assemblers	.636	-.004
731	Agricultural and other mobile plant operators	.658	-.000
721	Metal- and mineral-products machine operators	.699	-.009
331	Administrative associate professionals	.740	-.023
634	Craft printing and related trades workers	.761	-.004
400	Office and numerical clerks	.766	.002
712	Metal-processing plant operators	.798	-.008
714	Wood-processing- and papermaking-plant operators	.805	-.001
863	Manufacturing laborers	.833	-.008
632	Potters, glass-makers and related trades workers	.837	-.001
725	Printing-, binding- and paper-products machine operators	.907	-.001
724	Other wood-products machine operators	.922	-.001
726	Textile-, fur- and leather-products machine operators	.929	-.006
645	Fishery workers, hunters and trappers	.948	-.000
611	Miners, shot-firers, stone cutters and carvers	.982	-.002
651	Food processing and related trades workers	1.147	-.002
743	Agricultural engine drivers	1.880	.000
744	Other engine drivers	1.880	-.004
513	Shop, stall and market salespersons and demonstrators	1.940	.002
615	Painters, building structure cleaners and related trades workers	2.057	-.006
654	Pelt, leather and shoemaking trades workers	2.215	-.005
631	Precision workers in metal and related materials	2.219	-.001

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RSH_j BASIC STATS:

Variable	Min.	Max.	Mean	Median	Std.	Italy
$RSH_{j,2004}$	.173	.491	.343	.354	.076	.327
$RSH_{j,2016}$	.144	.442	.267	.261	.056	.260
ΔRSH_j	-.159	.048	-.078	-.079	.036	-.067

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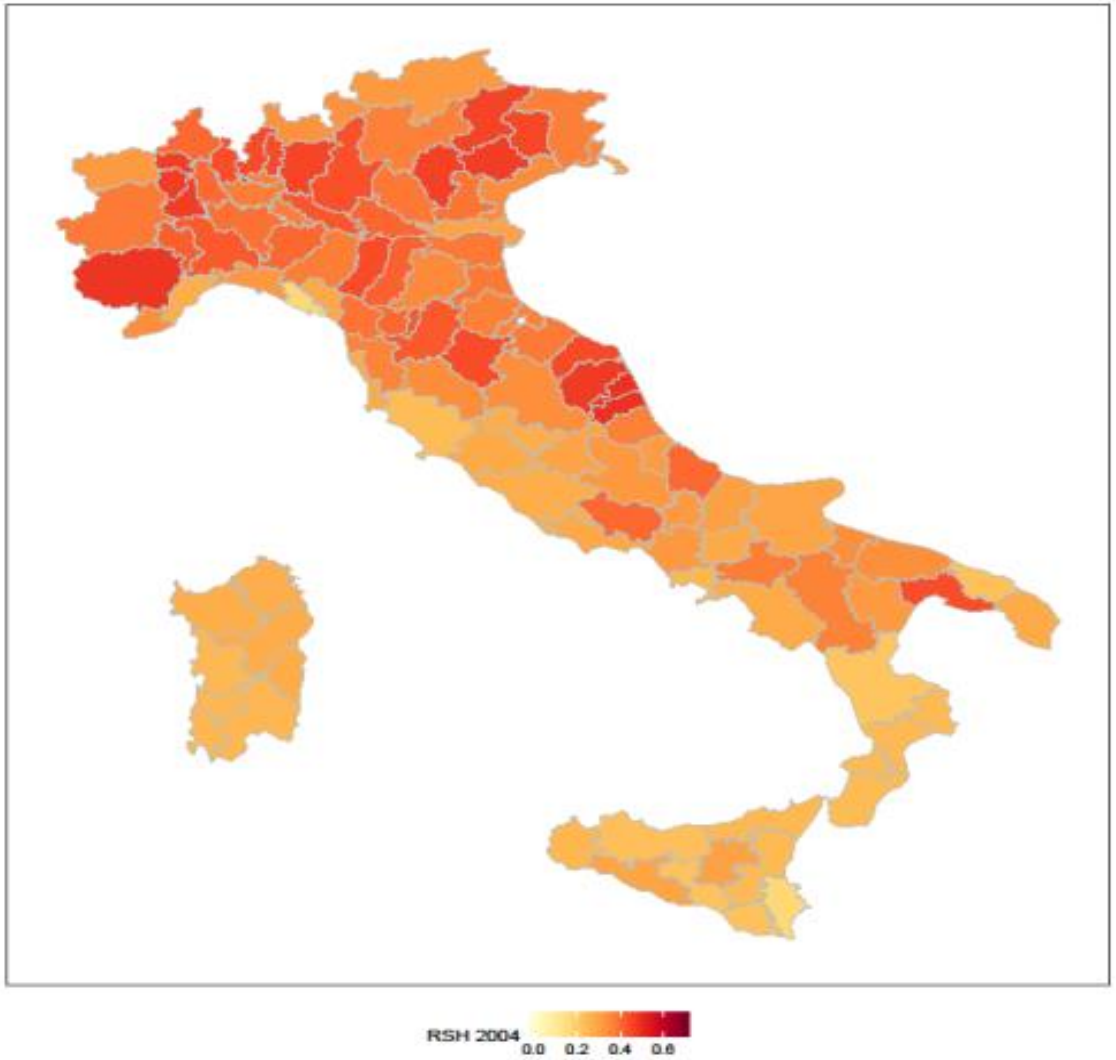

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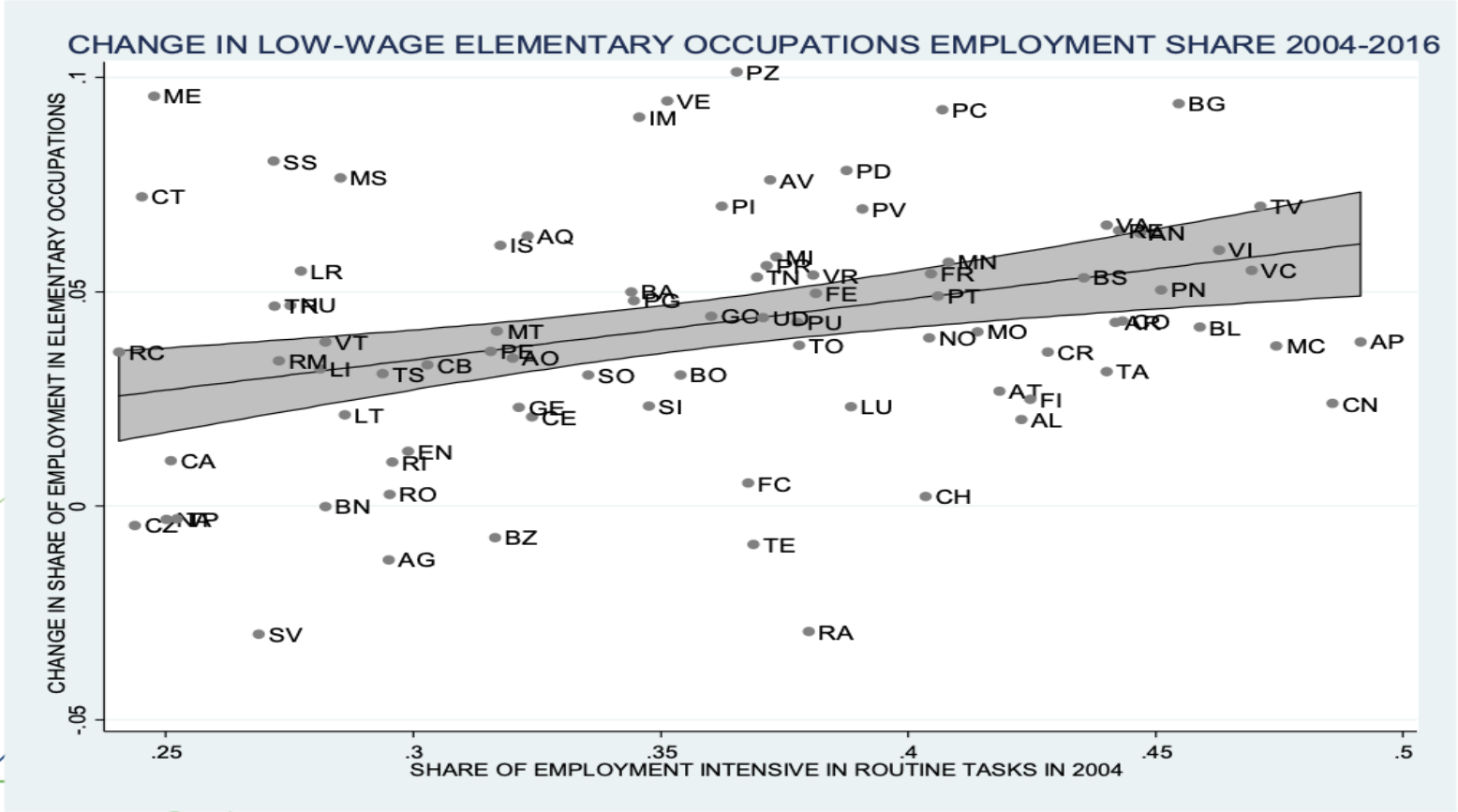
$$\Delta ELM_{j,2004-2016} = -0.023 + 0.169 \times RSH_{j,2004} + e_{jt}, \quad (3)$$

$(t=4.00) \qquad N=95,\ R^2=0.175$



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GROWTH OF ELEMENTARY JOBS EMPLOYMENT SHARE WITHIN PROVINCE (periods:2004-08/2008-12/2012-16)

The model:

$$\Delta ELM_{j,t} = \delta_t + \beta RSH_{j,t} + \mathbf{X}'_{j,t} + \mathbf{F}'_{j,t} + \eta_j + e_{jc}$$

Instrumental variable:

$$\widetilde{RSH}_j = \sum_{i=1}^{I} E_{i,j,1993} \times R_{i,-j,1993}$$

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Table 7: Growth of low-skilled jobs employment share within province

	OLS			2SLS-IV		
	[1]	[2]	[3]	[4]	[5]	[6]
RSH	0.255***	0.299***	0.299***	0.290*	0.490**	0.514**
	(0.088)	(0.090)	(0.090)	(0.174)	(0.225)	(0.228)
tertiary ed		0.326	0.303		0.335**	0.312**
		(0.198)	(0.197)		(0.139)	(0.141)
upper secondary ed		0.173*	0.176**		0.183**	0.186***
		(0.089)	(0.089)		(0.072)	(0.072)
Workforce characteristics.	no	yes	yes	no	yes	yes
Firms characteristics	no	no	yes	no	no	yes
Period FE	yes	yes	yes	yes	yes	yes
Province FE	yes	yes	yes	yes	yes	yes
Kleibergen Paap F				14.728	9.401	9.051
N of Observations	285	285	285	285	285	285
R-squared	0.356	0.416	0.419	0.046	0.400	0.399

Source: our calculations on RCFL-ISTAT 2004-2016 and AIDA archive. Notes: N=285 (3 periods for 95 provinces). Dependent variable: change in share of employment in elementary occupations by provinces (2004-08/08-12/12-16). The vector of workforce characteristics controls for eight different provinces' start of period socio-demographic conditions: unemployment rate, share of population with age >65, shares of employment of immigrant, low-tech manufacturing, female, part-time, and temporary workers. All models include constant, period and province fixed effects and are weighted by start of period province share of national population. In 2SLS-IV estimates, the share of routine occupations is instrumented by interactions between the 1993 industry mix instrument and time dummies. Standard errors in parentheses are clustered by provinces and periods. *** p<0.01, ** p<0.05, * p<0.1.

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Table 8: Growth of L-S jobs employment share within province by educational groups

	Tertiary ed		upper secondary ed		Lower/Primary ed	
	OLS	2SLS	OLS	2SLS	OLS	2SLS
RSH	0.044*	0.075*	0.076	0.033	0.207***	0.510***
	(0.024)	(0.039)	(0.047)	(0.094)	(0.077)	(0.188)
tertiary ed			0.148	0.149*	0.337**	0.351***
			(0.104)	(0.082)	(0.161)	(0.129)
upper secondary ed	-0.033	-0.046			0.282***	0.297***
	(0.052)	(0.040)			(0.079)	(0.064)
lower secondary/primary ed	-0.024	-0.041	0.098**	0.100***		
	(0.047)	(0.038)	(0.039)	(0.031)		
Workforce characteristics.	yes	yes	yes	yes	yes	yes
Firms characteristics	yes	yes	yes	yes	yes	yes
Period FE	yes	yes	yes	yes	yes	yes
Province FE	yes	yes	yes	yes	yes	yes
Kleibergen Paap F		6.067		9.949		10.011
N of Observations	171	171	283	283	285	285
R-squared	0.408	0.394	0.233	0.228	0.457	0.406

Source: our calculations on RCFL-ISTAT 2004-2016 and AIDA archive. Notes: Dependent variable: change in share of employment in elementary occupations by provinces (2004-08/08-12/12-16). The vector of workforce characteristics controls for eight different provinces' start of period socio-demographic conditions: unemployment rate, share of population with age >65, shares of employment of immigrant, low-tech manufacturing, female, part-time, and temporary workers. All models include constant, period and province fixed effects and are weighted by start of period province share of national population. In 2SLS-IV estimates, the share of routine occupations is instrumented by interactions between the 1993 industry mix instrument and time dummies. Standard errors in parentheses are clustered by provinces and periods. *** p<0.01, ** p<0.05, * p<0.1.

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Conclusions

- Past decades Italy showed a lag in innovation, but after the 2000's technology may have started spreading some effect on the occupational composition of employment (consistently with the idea of a certain "delay" of technology/ICT adoption in Italy)

- IOW, routinisation processes may have took around a decade to be observable in Italy (plausible, kind of make sense…)

- According to our "breakdown" regressions, it seems that the the growth of low-wage jobs shares also involve high educated workers - need to make further investigations

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Future possible analysis:

- Taking into account the within-between industry dimensions of the contraction of routine jobs/expansion of low-skill jobs (INAPP work in progress with province-industry cells…).

- Looking at individual careers by using longitudinal data (though unavailability of occupational variables in Italian administrative data).

- In this framework, characterizing job-transitions flows from routine-jobs to low-skill jobs by educational attainment .

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THANK YOU!

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