

Job strategies and organizational capabilities of Italian firms in pre- and pandemic times

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Research questions

- How do Italian firms **behave** in “normal” times?
- How did Italian firms react to the COVID-19 crisis?
*(i.e. What **reorganizational and strategic choices** have been adopted?)*
- How did their pre-existing capabilities structure mediate their responses to the crisis?
*(i.e.: Did their **pre-crisis attributes** influence their in-crisis responses?)*

The theoretical framework - 1

Capability-based theory of the firm (*Winter, 1997; Dosi&Marengo, 2015; Teece&Pisano, 2003*)

- The firm is a constantly-evolving place of learning and knowledge, a collection of (*highly idiosyncratic*) technological-organizational capabilities, where organizational routines are put in force to achieve the corporate goals.
- The managerial practices are subjected to the collective knowledge of the organization
 - ⇒ There exist no «optimal» industry configurations
 - ⇒ extreme heterogeneity of firms' organization and performance

The theoretical framework - 2

- **Three dimensions** of firms' resilience and reaction to the crises (*UNIDO Industrial Development Report, 2022*):
 1. **Robustness** → the capacity to absorb the shock, i.e. to survive, maintain operations, sales, profits and employment
 2. **Readiness** → the capacity to transform and recover, i.e. to implement strategic changes in operations;
 3. **Vulnerability** → "incapacity": conservative and non reactive strategies.

- The key: **Industrial capabilities**, i.e. organizational routines, personal and collective knowledge, procedures and shared behaviours to operate production processes.

The data sources - 1

We (progressively) integrated **three main ISTAT microdata sources (and one administrative source)**:

1. **Frame-Sbs** → business register; for all 4.4 million firms operating in Italy, it reports information on:
 - ✓ Structure (size, industry, location, belonging to a group, composition of workers)
 - ✓ Performance (profit-and-loss account; international trade)
2. **Permanent business census survey (IMCPI)** → large multi-purpose survey involving over 200,000 firms with **3+ persons employed** (reference universe: ≈1 Mln firms, accounting for 24% of total firms, 84.4% of value added, 76.7% of workers, 91.3% of employees). Information on **2016-2018** firms' strategies about:
 - ✓ Governance (ownership, management, belonging to groups)
 - ✓ Human capital (investment, skills, competences etc.)
 - ✓ Inter-enterprise relations (contracting/subcontracting, partnerships, etc.)
 - ✓ Competitiveness instruments (price, quality, innovation, location, network, etc.)
 - ✓ Technology (use of Ict, I4.0 technologies, platforms, etc.)
 - ✓ Finance (sources, bank-firm relationship type and conditions, etc.)
 - ✓ Internationalization (international outsourcing, via offshoring or agreement; number and type of counterpart etc.)
 - ✓ Sustainability and new development path

The data sources - 2

3. **The Covid-19 survey (SPIESC; 2nd wave; December 2020)** → a subsample of IMCPI; about 90,000 firms with **3+ persons employed**. Information on firms' 2020 strategies on:
 - ✓ Impact of the pandemic (ex. Turnover losses, domestic vs. foreign demand, supply problems, commodities price increases, etc.)
 - ✓ Human Resources management and policies (ex. Remote working, changes in working hours, use of mandatory holidays, postponement of planned recruitment, layoffs, etc...);
 - ✓ Finance (ex. use of liquid vs. non liquid sources, changes in payment terms and conditions with suppliers and customers, request of new bank credit, crowdfunding etc...)
 - ✓ Digitalization and Technology (ex. Changes in communication strategies, marketing, relationships with customers and suppliers, etc.)
 - ✓ Firms' critical issues (ex. State of firm's overall solidity, domestic vs. foreign demand perspectives, supply chain, etc...) and strategic orientations (ex. Production of new goods, changes in business organisation, in firm's positioning on domestic and international markets, changes in productive inter-enterprise relationships, etc...)
 - ✓ Social responsibility and workplace security
4. **The Ministry of Labour data on “Comunicazioni obbligatorie” (mandatory communications)** → information on all Italian firms' flows of recruitment, termination and transformation of jobs contracts

The methodology

A multivariate, multi-stage analysis:

- ✓ **Factor analysis** (on IMCPI) \Rightarrow Seven factors to synthesize IMCPI sections; then three factors characterizing different sets of technological and organizational capabilities
- ✓ **Cluster analysis** (on IMPCI + Frame-sbs) \Rightarrow Four clusters of firms, from less to more complex ones
- ✓ **Analysis of co-occurrences** (on IMPCI and SPIESC) \Rightarrow Identification of the bundle of firm clusters' practices in pre- and pandemic times
- ✓ **Estimates** (on Frame-Sbs + IMCPI + SPIESC + Mandatory communications) of how pre-crisis clusters' practices correlates with jobs dynamics in pandemic times (SPIESC-19 + Mandatory communications)

Profiling Italian firms - 1

1. Factor analysis on each of seven sections of the IMCPI survey:

1. Ownership and management; 2. Human resources; 3. Inter-firms Relations; 4. Market strengths; 5. Technology, 6. Digitalisation and innovation; 7. New development paths; 8. Sustainability.

2. **New factor analysis on the seven factors** ⇒ **three latent factors** that account for 69% of total variance (KMO test: 86%, above the 80% required threshold).

Main characteristics of the seven indicators (first factors)

	Ownership and management	Human resources	Inter-firms relations	Market strength points	Tecnology, digitalisation, innovation	New development paths	Sustainability
Principal Inertia (%)	77.6	96.1	87.8	84.1	80.5	57.8	94.3
Number of variables	19	19	22	10	45	25	16

Profiling Italian firms - 2

3 main profiles (factors) among Italian firms with **10+ p.e.**, concerning their internal/external, competitive/cooperative choices:

- 1st factor (46% of total variance) → **Firms' technological-organizational capabilities**
- 2nd factor (13% of total variance) → **managerial strategies**
- 3rd factor (10% of total variance) → **relational side**: relation-related strategies, both on internal (i.e. related to workforce) and external (i.e. inter-firm relations) sides.

Profiles		Main key actions				
Technological-organisational capabilities	Staff training activities (for new recruits, or continuous training and retraining)	Investment in the workers' digital skills	Investments in advanced automation and interconnected machines	Investments in technology, digitalisation, R&D, work organisation	Use of management softwares (ERP, CSM, SCM)	Use of remote management services (cloud)
Managerial strategies	Product quality as competitive strength	Market power (in setting prices)	Expansion strategies (products diversification, extension of activities)			
Relations	Adoption of good practices for the staff professional development and equal opportunity protection	Adoption of measures for work-family balance (leave, furloughs leave, hourly flexibility)	Articulation of inter-enterprise relations (contracts, subcontracting, agreements)			

Results (pre-Covid-19) - Clustering Italian firms - 1

Cluster analysis on the three profiles ⇒ **four-class taxonomy** of Italian firms with 10+ p.e.:

- Essentials** → very simple organizations: low organizational capabilities, medium relations, tend to have varied managerial strategies
- Managerials** → relatively simple organizations with **strategies mostly directed outside the firm** (rather than inside, e.g. toward the personnel)
- Interdependents** → relatively complex organizations, **high propensity to activate inter-firm relations**
- Complexes** → Organizations with **complex, rather than strategic, behaviours**; multiple actions, organizational-technological processes implemented to increase firm know-how

Clusters; units with at least 10 workers, seven factors (FacotrsFactors values; overall explained variance: 88%)

Clusters	Ownership and management	Human resources	Inter-firms relations	Market strength points	Tecnology, digitalisation, innovation	New development paths	Sustainability
Essential	23.8	7.1	2.4	62.9	15.7	5.0	15.5
Managerial	43.0	15.0	5.1	79.5	34.8	11.7	26.9
Interdependent	56.7	27.3	9.9	85.0	47.3	20.6	37.3
Complex	68.1	45.1	18.6	88.0	59.3	33.3	48.7
Total	43.4	18.8	6.8	77.0	34.9	14.1	28.4

Results (pre-Covid-19) - Clustering Italian firms - 2

	Firms		Persons employed			Exporters		Value added		Productivity (val add./workers)		Profitability (Ebitda/Turnover)		Average salary (pers. costs/employees)	
	N.	%	N.	%	Average	%	Exp./turn. (average; %)	€ Mln	%	Average (€)	Coeff. of Var.	Average	Coeff. of Var.	Average	Coeff. of Var.
Essentials	60,380	28.5	1,282,830	14.4	21.2	10.7	6.5	47,370.0	8.7	36,926	2.1	7.0	149.9	29,403.3	0.7
Managerials	77,040	36.4	2,106,065	23.6	27.3	22.1	10.7	103,816.5	19.2	49,294	1.1	7.4	60.9	34,714.9	0.5
Interdependents	54,267	25.6	2,595,343	29.1	47.8	36.7	15.6	159,340.2	29.4	61,395	1.3	7.9	3.5	40,543.2	0.4
Complexes	20,070	9.5	2,947,326	33.0	146.9	48.1	22.0	231,373.3	42.7	78,503	1.4	10.1	35.8	49,655.7	0.5
Total	211,757	100.0	8,931,563	100.0	42.2	25.0	16.7	541,900.0	100.0	60,672	1.2	8.7	73.0	40,434.8	0.5

In pre-pandemic times:

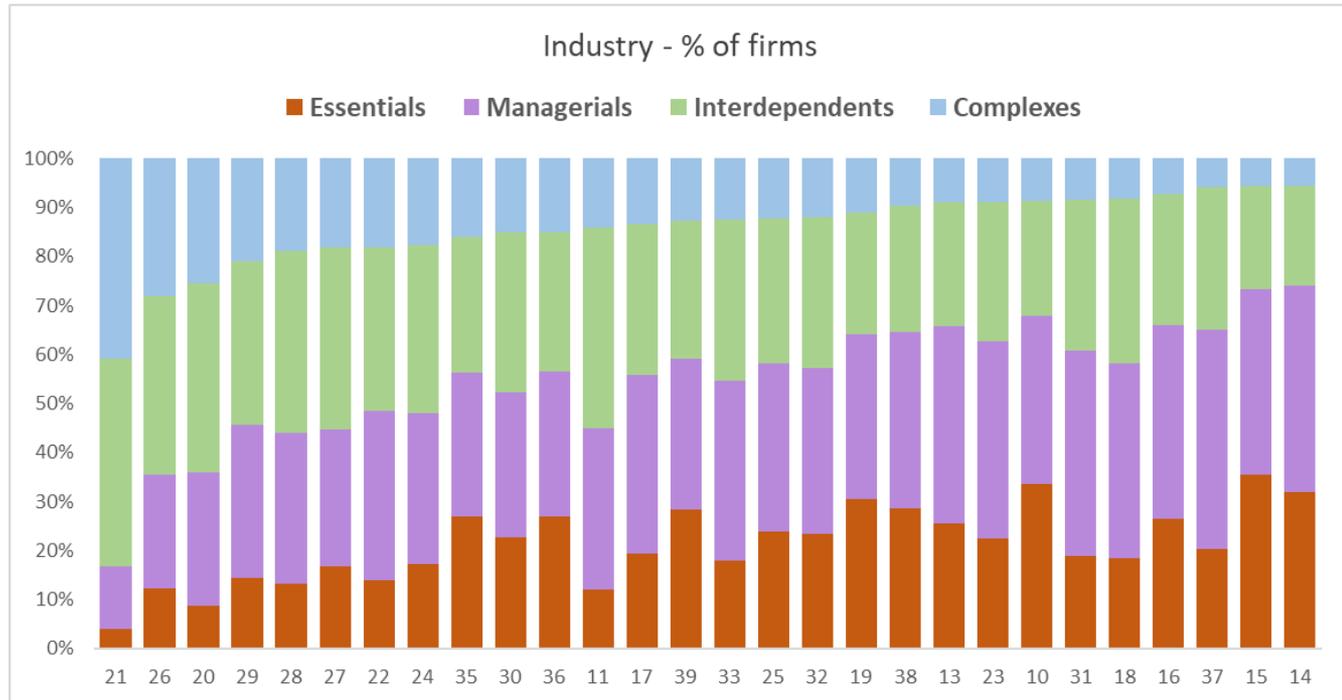
- ≈2/3 of Italian firms with 10+ p.e. **Essentials** or **Managerials**, but generate less than 30% of total value added
- Very few **Complex** firms (less than 10%), accounting for 43% of total value added
- The **productivity** of Complexes is twice as high as that of Essentials (78K € and 37K € respectively).
- The average **salaries** paid by Complexes are 70% higher than those paid by Essentials
- Large **heterogeneity** between (but not within) the classes in average salary

Results (pre-Covid-19) - Clustering Italian firms - 3

- A noteworthy result: a **Complex profile may enable smaller firms to partially overcome the limits of their size:**
- 7.3% of small enterprises (over 14,000 firms) are “Complex”. They:
 - ✓ display a value of “**technological/organizational capabilities**” higher than those of 3/4 of medium and large enterprises belonging to the other three clusters;
 - ✓ have levels of **labour productivity** higher than those of the larger enterprises belonging to the other three clusters;
 - ✓ display high **profit margins** (and high **salary levels**), slightly lower than those of medium and large complex firms

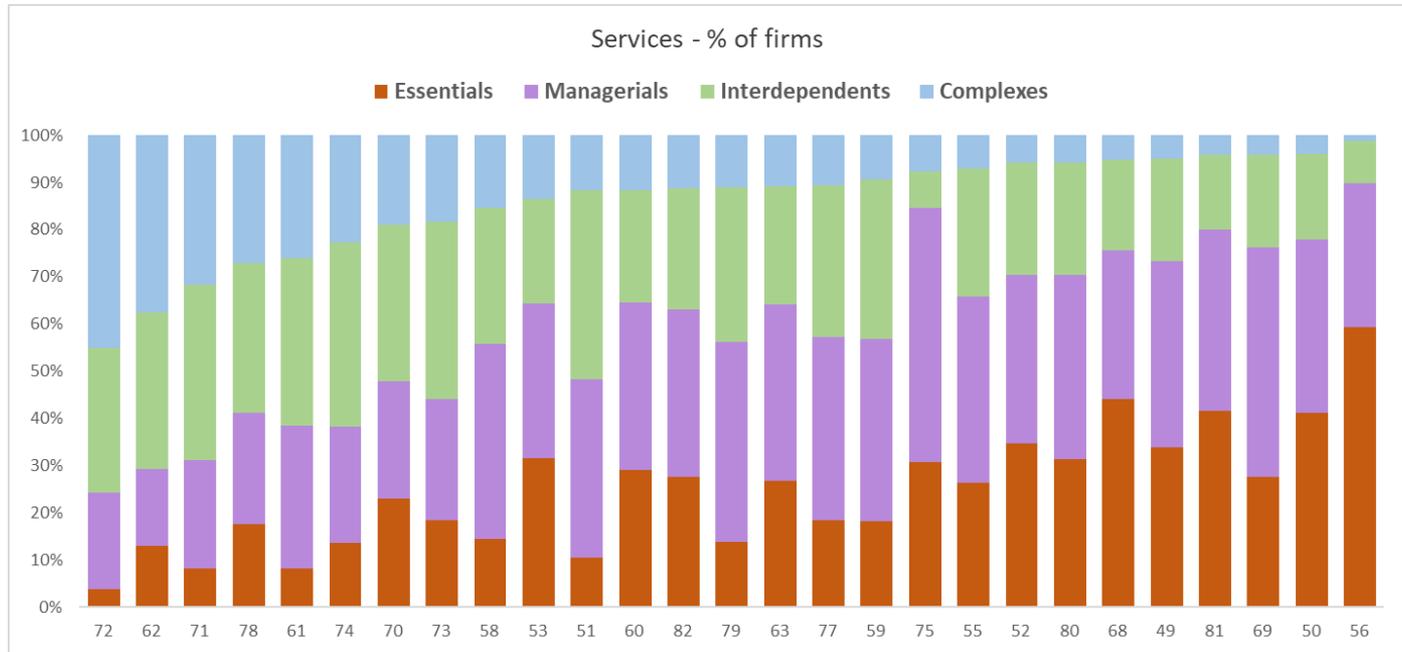
The distribution of clusters - Industry

- ✓ **Essentials** and **Managerials**: higher incidence in traditional manufacturing, e.g. Wearing apparel (14), Leather (15), Food (10), Textiles (13), Furniture (31), Food (10)
- ✓ **Complexes**: higher incidence in sectors with high tech. content and learning processes – e.g. pharmaceuticals (21), electronics (26), chemistry (20) -, and scale-intensive industries, e.g. automobiles (29) and machinery (28)



The distribution of clusters - Services

- **Essentials** and **Managerials**: high incidence in small size dominated activities, e.g. Food services (56), Veterinary (75), Serv. to buildings and landscape (81), Water transport (50)
- **Complexes**: prevail in KIBS, e.g. R&D (72), Computer programming (62), Arch./Engineering (71), Tlc (61), but also in employment activities (78)



Co-occurrences of firms' strategies - 1

How cluster-specific is each strategy? (χ^2 test)

ESSENTIAL

- **Pre-pandemic times** → little (or no) investment activity in digitalization and HR, no policies for process safety, little staff training (mostly on cyber security)
- **Pandemic times** → uncertainty, inability to design reaction strategies, fund raising difficulties, Firing

Pre-pandemic times



HR: data sharing
HR: network security
Products and services diversification
HR: Cyber security
No Process safety policy
Low Investment rates
Staff qualification and suitability
Increase domestic activity
HR: Connectivity and Communications
Protection of personal data and privacy
Price competitiveness

Pandemic times



Ownership capital increases
Serious operational and business sustainability risks
Unclear vision No strategy
Other liquidity instruments Sale of non-liquid assets
Activity not affected by Covid-19 emergency
No current or planned strategy
No required expertise to adopt a strategy
Difficulty in raising financial resources
Hard reorganising production
Difficulty in defining a strategy
Firing No HR management measures
Substantial employee reduction
Reduced working hours

Co-occurrences of firms' strategies - 2

MANAGERIAL

- **Pre-pandemic times** → Mainly defensive strategies in local markets; low investment rates; no investment in R&D or innovation; no specific HR practices
- **Pandemic times** → No specific HR measures or reaction strategies; Difficulties in reorganize the activity and define a reaction strategy

Pre-pandemic times

No Workplace safety policy
No R&D investments
No R&D investments
No cyber security
No innovation projects
Promotion of external collaborations
Low Investment rates
Defensive strategies in local markets
Products and services diversification
Increase domestic activity
No personnel practices
No Attract talent strategy
Access to New Markets Strategy
Localization strategy

Pandemic times

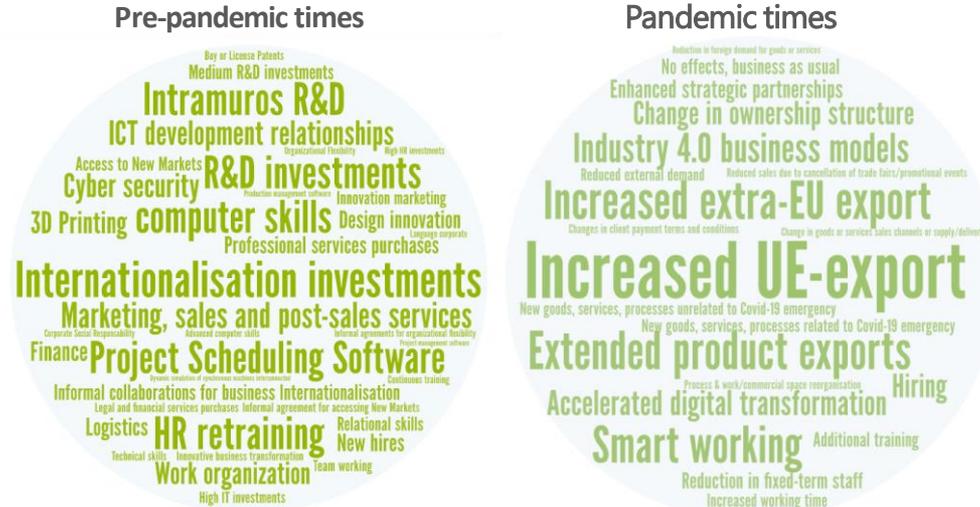
Use of alternative financing instruments
No future strategy
Hard reorganising production
No HR management measures
Difficulty in defining a strategy
Activity not affected by Covid-19 emergency
No current strategy
Radical change in activity type

Co-occurrences of firms' strategies - 3

INTERDEPENDENT

(virtually all activities are carried out by means of inter-firm relationships)

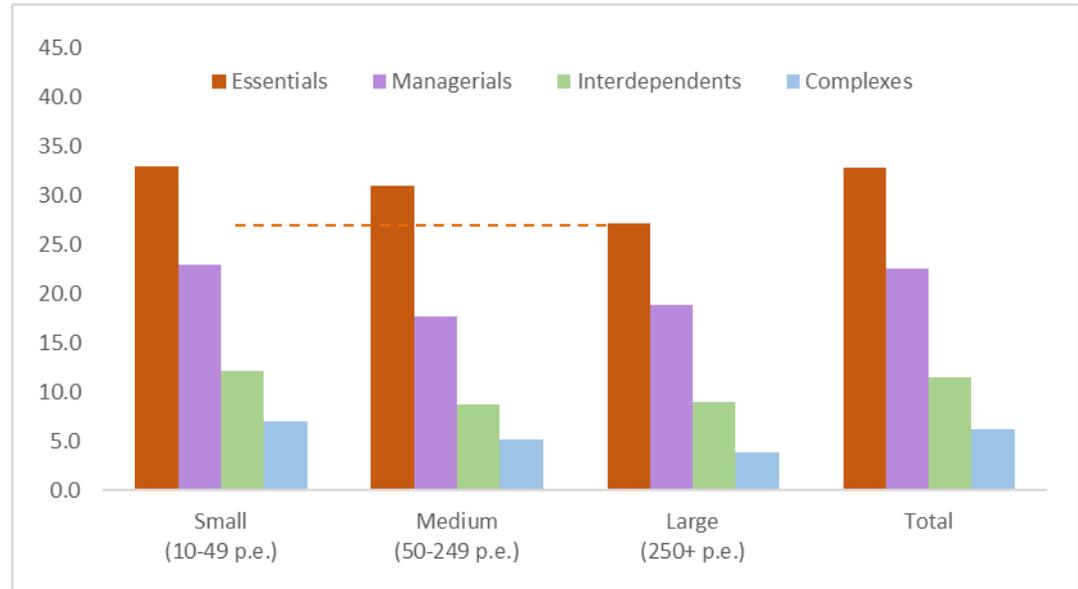
- **Pre-pandemic times** → Propensity to internationalization and R&D ; HR retraining; investment in IT (mostly in project planning software)
- **Pandemic times** → Increased focus on export; wide use of remote working; increasing adoption of I4.0 business models



Results – Pandemic times - 2

- **Higher complexity \cong higher readiness** (Dec. 2020)
- **Lost in pandemic:** among Essentials, the share of firms unable to react to the crisis is 5 to 7 times higher than the Complexes' one (**vulnerability**)
- The % of “lost” **Essential large firms** was higher than that of more complex SMEs

% of firms unable to design reactions, by cluster and size class – Dec. 2020
(stratum percentages)

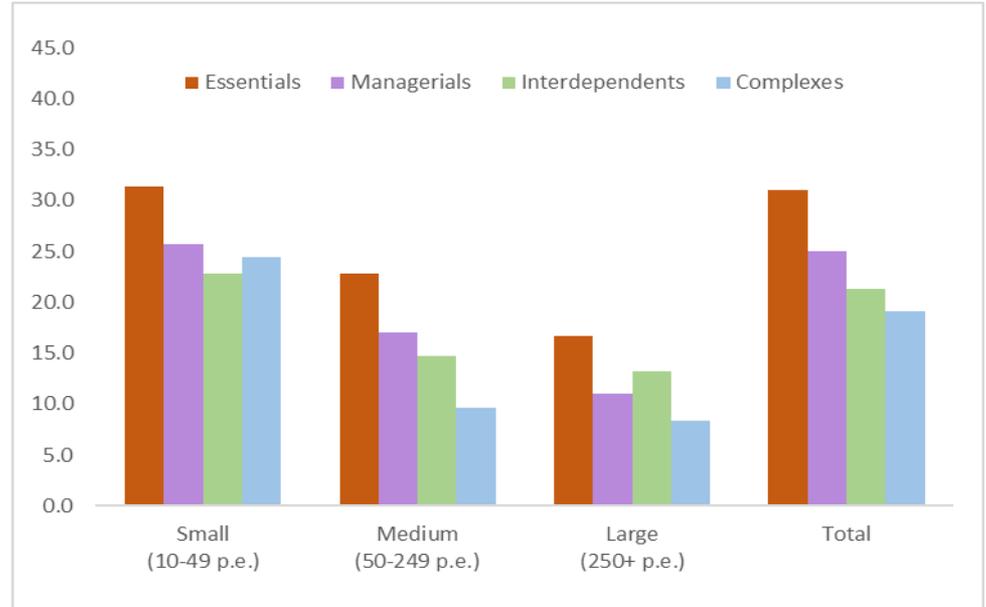


Results – Pandemic times - 3

➤ **Higher complexity \cong higher robustness** (Dec. 2020)

(Even in a crisis with such strong size-related effects)

% of firms considering their activity at risk, by cluster and size class – Dec. 2020 (stratum percentages)



(current developments:) hiring and firing during the crisis

Four outcomes to analyse qualitative and quantitative changes in firms' employment during the pandemic:

1. $\Delta\text{skills} > 0$, $\Delta\text{empl} \geq 0$ → **Occupational upgrading with Employment expansion**

(Occupational upgrading = net increase in the hiring of the top-3 versus bottom-4 ISCO occupations)

2. $\Delta\text{skills} > 0$, $\Delta\text{empl} < 0$ → **Occupational upgrading with Employment contraction**

3. $\Delta\text{skills} \leq 0$, $\Delta\text{empl} \geq 0$ → **Occupational downgrading with Employment expansion**

(Occupational downgrading = net decrease in the hiring of the top-3 versus bottom-4 ISCO occupations)

4. $\Delta\text{skills} \leq 0$, $\Delta\text{empl} < 0$ → **Occupational downgrading with Employment restructuring**

NB: Comunicazioni Obbligatorie are informative of labour force flows, that is new contracts activated/terminated. While activations are a more naturally way to account for firm hiring strategies, firing strategies cannot be directly inferred by the total number of cessations. Therefore it is necessary to control for the motive behind cessations, which might go from retirements, to contract expire.

Higher complexity \cong better employment dynamics

$$Prob(Y_i = j | Cl_{k,2018}, X_{i,2016}) = \frac{\exp(\alpha_{ij} + Cl_{k,2018}\beta_{ij} + X_{i,2016}\gamma_{ij})}{1 + \sum_{m=2}^j \exp(\alpha_{im} + Cl_{k,2018}\beta_{im} + X_{i,2016}\gamma_{im})}$$

Multinomial logit model where:

Dep var. is a variable indicating 4 cases:

1. $\Delta skills > 0$, $\Delta empl \geq 0$;
2. $\Delta skills > 0$, $\Delta empl < 0$
3. $\Delta skills \leq 0$, $\Delta empl \geq 0$
4. $\Delta skills \leq 0$, $\Delta empl < 0$;

Var. of interest ($Cl_{k,2018}$): vector of dummies referring to the clusters;

Covariates ($X_{i,2016}$): firm-level controls in 2016 (size, productivity, tenure, schooling of employees, firm's age (log), profitability, export/turnover, group belonging, sector, location, reason for contracts termination)

In the **growth period 2016-2019** (with respect to **Essentials**):

- **Higher complexity** correlates with a higher probability of employment growth, esp. with occupational upgrading
- \Rightarrow *The capabilities are implemented in a framework of (simultaneous) better performance*

Contributes to the probability of belonging to a class of performance (p.p.)

Employment dynamics (2016-19); Benchmark: Essentials; Covariates at 2016; Marginal effects

Covariates	$\Delta skills > 0$	$\Delta skills > 0$	$\Delta skills \leq 0$	$\Delta skills \leq 0$
	$\Delta empl \geq 0$	$\Delta empl < 0$	$\Delta empl \geq 0$	$\Delta empl < 0$
Managerials	0.066 ***	-0.005	0.041 ***	-0.102 ***
Interdependents	0.094 ***	-0.005	0.061 ***	-0.150 ***
Complexes	0.172 ***	-0.028 ***	0.041 ***	-0.186 ***
<i>Additional firm-level covariates/controls</i>		yes		
Observations		10,112		
Pseudo-R2		0.131		

Higher complexity \cong better dynamics in pandemic times - 1

ALL SECTORS

- **Pandemic times** (2020),
totally exogenous crisis with strong sectoral dimension
- with respect to Essentials:
 - **Higher complexity \cong occupational upgrading + employment expansion**
 - When employment decreases, recomposition with upgrading

Contributes to the probability of belonging to a class of performance – **All sectors** (p.p.)

	Employment dynamics (2020); Benchmark: Essentials; Clusters at 2018; Marginal effects			
	I	II	III	IV
	$\Delta\text{skills} > 0$	$\Delta\text{skills} > 0$	$\Delta\text{skills} \leq 0$	$\Delta\text{skills} \leq 0$
	$\Delta\text{empl} \geq 0$	$\Delta\text{empl} < 0$	$\Delta\text{empl} \geq 0$	$\Delta\text{empl} < 0$
Managerials	0.039*** -0.014	0.046*** -0.01	-0.054*** -0.016	-0.031* -0.017
Interdependent	0.085*** -0.014	0.029*** -0.009	-0.050*** -0.017	-0.064*** -0.017
Complex	0.096*** -0.016	0.026*** -0.01	-0.069*** -0.019	-0.052*** -0.02
<i>Additional firm-level covariates/controls (2016)</i>			yes	
<i>Observations</i>			7,597	
<i>Pseudo-R2</i>			0.124	

Higher complexity \cong better dynamics in pandemic times - 2

INDUSTRY

Contributes to the probability of belonging to a class of performance – **Industry** (p.p.)

Employment dynamics (2020); Benchmark: Essentials; Clusters at 2018; Marginal effects

	I	II	III	IV
	$\Delta\text{skills} > 0$	$\Delta\text{skills} > 0$	$\Delta\text{skills} \leq 0$	$\Delta\text{skills} \leq 0$
	$\Delta\text{empl} \geq 0$	$\Delta\text{empl} < 0$	$\Delta\text{empl} \geq 0$	$\Delta\text{empl} < 0$
Managerials	0.050*** -0.017	0.018 -0.015	-0.102*** -0.021	0.034 -0.022
Interdependent	0.097*** -0.017	-0.006 -0.015	-0.099*** -0.022	0.008 -0.022
Complex	0.128*** -0.019	-0.007 -0.016	-0.121*** -0.025	0.001 -0.024

*Additional firm-level
covariates/controls (2018)*

yes

Observations

5,136

Pseudo-R2

0.124

➤ Sectoral effects:

in industry complexity \cong
expansion + upgrading

Higher complexity \cong better dynamics in pandemic times - 2

SERVICES

- In services (*which were more severely hit than industry*), higher complexity correlates with higher probability of downsizing with occupational upgrading

Contributes to the probability of belonging to a class of performance – **Services** (p.p.)

Employment dynamics (2020); Benchmark: Essentials; Clusters at 2018; Marginal effects

	I	II	III	IV
	$\Delta\text{skills} > 0$	$\Delta\text{skills} > 0$	$\Delta\text{skills} \leq 0$	$\Delta\text{skills} \leq 0$
	$\Delta\text{empl} \geq 0$	$\Delta\text{empl} < 0$	$\Delta\text{empl} \geq 0$	$\Delta\text{empl} < 0$
Managerials	0.029	0.069***	0.02	-0.118***
	-0.025	-0.013	-0.026	-0.029
Interdependent	0.088***	0.064***	0.021	-0.173***
	-0.026	-0.012	-0.027	-0.029
Complex	0.038	0.063***	0.013	-0.113***
	-0.028	-0.016	-0.033	-0.035
<i>Additional firm-level covariates/controls (2018)</i>			yes	
<i>Observations</i>			2,289	
<i>Pseudo-R2</i>			0.151	

Conclusions

- ✓ Linking quantitative and qualitative firm-level datasets makes it possible to construct an **empirical measure of capabilities of the firms**
- ✓ Firm capabilities may **override firms' size limits** (at least in normal times)
- ✓ There emerge **stickiness and (adaptive) persistence** between firms' attitudes in “normal” times and “troubled” ones: higher capabilities appear to have supported firms' *robustness and readiness* during the harsher phase of the pandemic
- ✓ More complex firms are in general **more robust, ready to react and less vulnerable**.

Where to find our papers:

- ✓ "Firm responses to the pandemic crisis: sticky capabilities and widespread restructuring":
<http://www.lem.sssup.it/WPLem/files/2021-48.pdf>
- ✓ "From organizational capabilities to corporate performances: at the roots of productivity slowdown":
<http://www.lem.sssup.it/WPLem/files/2021-21.pdf>

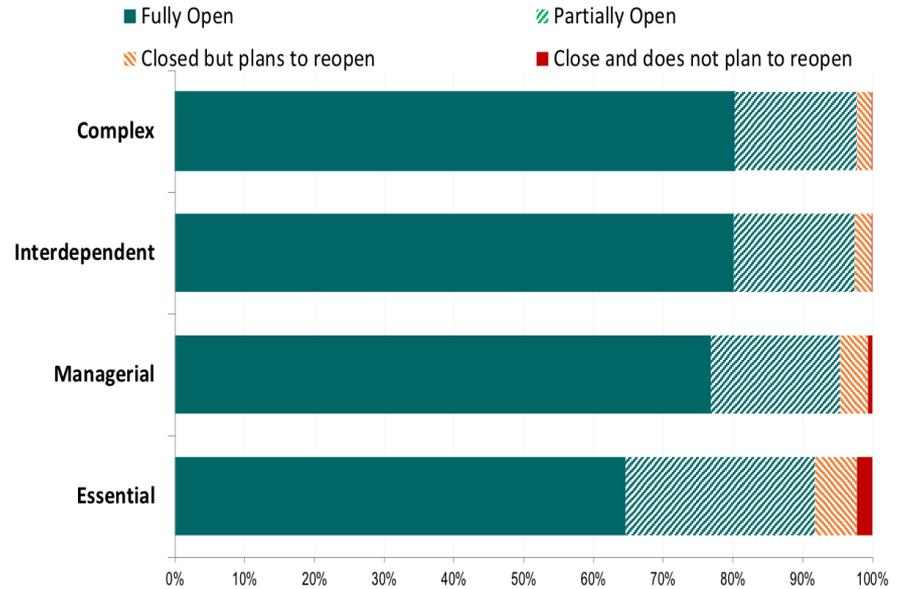
THANK YOU

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Results – Pandemic times - 1

- At the end of 2020 $\approx 80\%$ of Complex and Interdependent firms were fully open again (Essentials: $\approx 65\%$)

Share of firms by cluster



The dataset

The **main integrated dataset** (for the definition of firms' capabilities):

- ✓ about 110,000 firms with **10+ persons employed** (our target size), representative of a universe of about 215,000 units (51%)
- ✓ 9 million persons employed (54.7% of the total)
- ✓ 557 billion euros of value added (71.4%)
- ✓ 3,700 large enterprises (250+ p.e.), generating 38.5% of the overall employment and 45% of total value added

Higher complexity \cong better dynamics

Contributes to the probability of belonging to a class of performance – All business sectors; 2019-2020

VARIABLES	I	II	III	IV	VARIABLES	I	II	III	IV
	$\Delta\text{skills} > 0$ $\Delta\text{empl} \geq 0$	$\Delta\text{skills} > 0$ $\Delta\text{empl} < 0$	$\Delta\text{skills} \leq 0$ $\Delta\text{empl} \geq 0$	$\Delta\text{skills} \leq 0$ $\Delta\text{empl} < 0$		$\Delta\text{skills} > 0$ $\Delta\text{empl} \geq 0$	$\Delta\text{skills} > 0$ $\Delta\text{empl} < 0$	$\Delta\text{skills} \leq 0$ $\Delta\text{empl} \geq 0$	$\Delta\text{skills} \leq 0$ $\Delta\text{empl} < 0$
Managersials	0.039*** <i>-0.014</i>	0.046*** <i>-0.01</i>	-0.054*** <i>-0.016</i>	-0.031* <i>-0.017</i>	LgExportProp ₂₀₁₈	-0.002 <i>-0.003</i>	0.007*** <i>-0.002</i>	-0.003 <i>-0.003</i>	-0.001 <i>-0.003</i>
Interdependent	0.085*** <i>-0.014</i>	0.029*** <i>-0.009</i>	-0.050*** <i>-0.017</i>	-0.064*** <i>-0.017</i>	DomesticGroup ₂₀₁₈	0.024** <i>-0.011</i>	0.002 <i>-0.008</i>	0.006 <i>-0.012</i>	-0.031** <i>-0.012</i>
Complex	0.096*** <i>-0.016</i>	0.026** <i>-0.01</i>	-0.069*** <i>-0.019</i>	-0.052*** <i>-0.02</i>	ForMneGroup ₂₀₁₈	0.011 <i>-0.014</i>	0.003 <i>-0.011</i>	-0.073*** <i>-0.02</i>	0.059*** <i>-0.02</i>
Medium ₂₀₁₈	0.116*** <i>-0.011</i>	0.011 <i>-0.008</i>	0.023* <i>-0.013</i>	-0.150*** <i>-0.013</i>	ItMneGroup ₂₀₁₈	0.033*** <i>-0.012</i>	0.006 <i>-0.009</i>	-0.038** <i>-0.016</i>	-0.001 <i>-0.016</i>
Large ₂₀₁₈	0.156*** <i>-0.02</i>	0.030** <i>-0.012</i>	0.041* <i>-0.023</i>	-0.227*** <i>-0.016</i>	Layoff ₂₀₂₀	-0.034*** <i>-0.009</i>	0.021*** <i>-0.006</i>	-0.095*** <i>-0.011</i>	0.108*** <i>-0.011</i>
LgProductivity ₂₀₁₈	0.048*** <i>-0.009</i>	-0.004 <i>-0.007</i>	0.016 <i>-0.012</i>	-0.060*** <i>-0.012</i>	Expiry ₂₀₂₀	-0.026*** <i>-0.008</i>	0.051*** <i>-0.006</i>	-0.047*** <i>-0.009</i>	0.022** <i>-0.01</i>
LgSchooling ₂₀₁₈	0.456*** <i>-0.041</i>	-0.160*** <i>-0.029</i>	-0.375*** <i>-0.046</i>	0.078 <i>-0.048</i>	Resignation ₂₀₂₀	-0.073*** <i>-0.009</i>	0.043*** <i>-0.007</i>	-0.163*** <i>-0.009</i>	0.193*** <i>-0.01</i>
LgTenure ₂₀₁₈	-0.024*** <i>-0.009</i>	-0.007 <i>-0.006</i>	-0.072*** <i>-0.01</i>	0.103*** <i>-0.011</i>	Retirement ₂₀₂₀	-0.017* <i>-0.01</i>	0.017** <i>-0.007</i>	-0.119*** <i>-0.014</i>	0.118*** <i>-0.013</i>
LgAge ₂₀₁₈	0.009 <i>-0.008</i>	-0.015*** <i>-0.005</i>	0.026*** <i>-0.01</i>	-0.020** <i>-0.01</i>	Territorial controls		yes		
LgProfitability ₂₀₁₈	-0.017 <i>-0.043</i>	-0.008 <i>-0.032</i>	0.023 <i>-0.06</i>	0.001 <i>-0.054</i>	Sector controls		yes		
					Observations		7,597		
					Pseudo-R ²		0.124		

Higher complexity \cong better dynamics

Contributes to the probability of belonging to a class of performance – **Industry**; 2019-2020

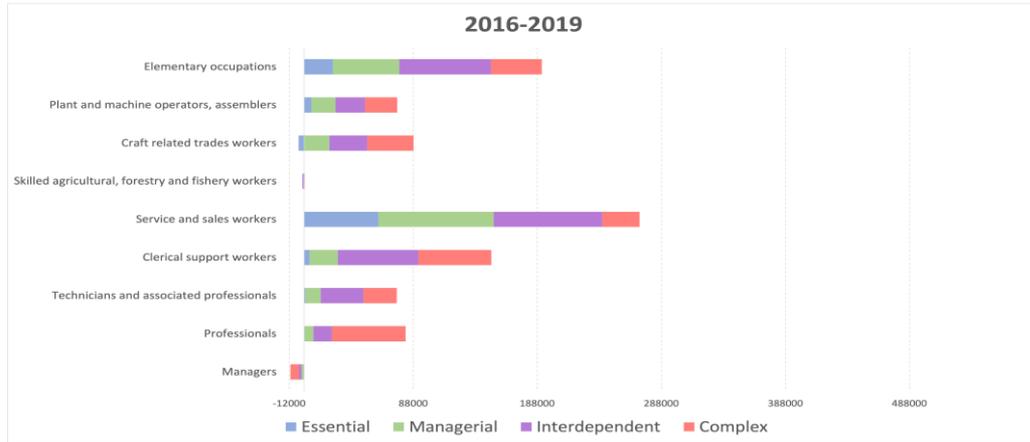
VARIABLES	I	II	III	IV	VARIABLES	I	II	III	IV
	$\Delta\text{skills} > 0$ $\Delta\text{empl} \geq 0$	$\Delta\text{skills} > 0$ $\Delta\text{empl} < 0$	$\Delta\text{skills} \leq 0$ $\Delta\text{empl} \geq 0$	$\Delta\text{skills} \leq 0$ $\Delta\text{empl} < 0$		$\Delta\text{skills} > 0$ $\Delta\text{empl} \geq 0$	$\Delta\text{skills} > 0$ $\Delta\text{empl} < 0$	$\Delta\text{skills} \leq 0$ $\Delta\text{empl} \geq 0$	$\Delta\text{skills} \leq 0$ $\Delta\text{empl} < 0$
Managers	0.050*** -0.017	0.018 -0.015	-0.102*** -0.021	0.034 -0.022	LgExportProp ₂₀₁₈	0.001 -0.004	0.008*** -0.003	-0.010** -0.004	0.001 -0.004
Interdependent	0.097*** -0.017	-0.006 -0.015	-0.099*** -0.022	0.008 -0.022	DomesticGroup ₂₀₁₈	0.023* -0.014	0.001 -0.01	0.009 -0.016	-0.034** -0.016
Complex	0.128*** -0.019	-0.007 -0.016	-0.121*** -0.025	0.001 -0.024	ForMneGroup ₂₀₁₈	-0.003 -0.017	0.000 -0.014	-0.066*** -0.025	0.069*** -0.026
Medium ₂₀₁₈	0.103*** -0.013	0.018* -0.01	0.02 -0.016	-0.141*** -0.016	ItMneGroup ₂₀₁₈	0.023 -0.014	0.005 -0.011	-0.040** -0.019	0.012 -0.019
Large ₂₀₁₈	0.110*** -0.022	0.054*** -0.017	0.028 -0.028	-0.192*** -0.023	Layoff ₂₀₂₀	-0.042*** -0.01	0.034*** -0.008	-0.084*** -0.014	0.092*** -0.013
LgProductivity ₂₀₁₈	0.081*** -0.013	0.014 -0.01	0.042*** -0.016	-0.137*** -0.017	Expiry ₂₀₂₀	-0.007 -0.009	0.059*** -0.007	-0.046*** -0.011	-0.006 -0.012
LgSchooling ₂₀₁₈	0.375*** -0.052	-0.147*** -0.039	-0.275*** -0.06	0.047 -0.062	Resignation ₂₀₂₀	-0.066*** -0.01	0.029*** -0.009	-0.196*** -0.011	0.233*** -0.012
LgTenure ₂₀₁₈	-0.035*** -0.011	-0.012 -0.008	-0.059*** -0.013	0.106*** -0.014	Retirement ₂₀₂₀	-0.022* -0.011	0.007 -0.008	-0.128*** -0.015	0.142*** -0.014
LgAge ₂₀₁₈	-0.002 -0.009	-0.002 -0.007	0.028** -0.012	-0.024** -0.012	Territorial controls		yes		
LgProfitability ₂₀₁₈	-0.154** -0.068	-0.137*** -0.044	-0.081 -0.076	0.372*** -0.085	Sector controls		yes		
					Observations		5136		
					Pseudo-R ²		0.124		

Higher complexity \cong better dynamics

Contributes to the probability of belonging to a class of performance – **Services**; 2019-2020

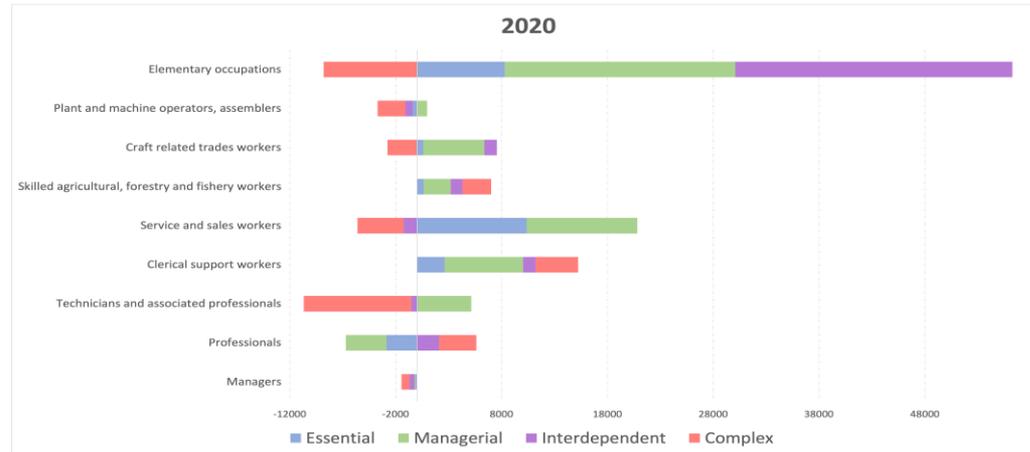
VARIABLES	I	II	III	IV	VARIABLES	I	II	III	IV
	$\Delta\text{skills} > 0$	$\Delta\text{skills} > 0$	$\Delta\text{skills} \leq 0$	$\Delta\text{skills} \leq 0$		$\Delta\text{skills} > 0$	$\Delta\text{skills} > 0$	$\Delta\text{skills} \leq 0$	$\Delta\text{skills} \leq 0$
	$\Delta\text{empl} \geq 0$	$\Delta\text{empl} < 0$	$\Delta\text{empl} \geq 0$	$\Delta\text{empl} < 0$		$\Delta\text{empl} \geq 0$	$\Delta\text{empl} < 0$	$\Delta\text{empl} \geq 0$	$\Delta\text{empl} < 0$
Managerials	0.029 <i>-0.025</i>	0.069*** <i>-0.013</i>	0.02 <i>-0.026</i>	-0.118*** <i>-0.029</i>	LgExportProp ₂₀₁₈	-0.012** <i>-0.006</i>	0.003 <i>-0.004</i>	0.015** <i>-0.006</i>	-0.006 <i>-0.007</i>
Interdependent	0.088*** <i>-0.026</i>	0.064*** <i>-0.012</i>	0.021 <i>-0.027</i>	-0.173*** <i>-0.029</i>	DomesticGroup ₂₀₁₈	0.001 <i>-0.018</i>	0.01 <i>-0.013</i>	0.005 <i>-0.02</i>	-0.015 <i>-0.02</i>
Complex	0.038 <i>-0.028</i>	0.063*** <i>-0.016</i>	0.013 <i>-0.033</i>	-0.113*** <i>-0.035</i>	ForMneGroup ₂₀₁₈	0.024 <i>-0.025</i>	0.022 <i>-0.021</i>	-0.077** <i>-0.032</i>	0.03 <i>-0.032</i>
Medium ₂₀₁₈	0.126*** <i>-0.022</i>	0.007 <i>-0.014</i>	0.014 <i>-0.025</i>	-0.147*** <i>-0.022</i>	ItMneGroup ₂₀₁₈	0.03 <i>-0.025</i>	0.011 <i>-0.019</i>	-0.038 <i>-0.032</i>	-0.004 <i>-0.031</i>
Large ₂₀₁₈	0.228*** <i>-0.036</i>	0.013 <i>-0.019</i>	-0.035 <i>-0.036</i>	-0.206*** <i>-0.027</i>	Layoff ₂₀₂₀	-0.024 <i>-0.015</i>	0.005 <i>-0.011</i>	-0.115*** <i>-0.019</i>	0.134*** <i>-0.018</i>
LgProductivity ₂₀₁₈	0.011 <i>-0.016</i>	-0.040*** <i>-0.013</i>	0.005 <i>-0.019</i>	0.024 <i>-0.019</i>	Expiry ₂₀₂₀	-0.087*** <i>-0.015</i>	0.046*** <i>-0.012</i>	-0.058*** <i>-0.017</i>	0.099*** <i>-0.017</i>
LgSchooling ₂₀₁₈	0.494*** <i>-0.075</i>	-0.164*** <i>-0.048</i>	-0.526*** <i>-0.078</i>	0.196** <i>-0.083</i>	Resignation ₂₀₂₀	-0.109*** <i>-0.016</i>	0.063*** <i>-0.013</i>	-0.085*** <i>-0.017</i>	0.130*** <i>-0.018</i>
LgTenure ₂₀₁₈	-0.004 <i>-0.014</i>	-0.001 <i>-0.01</i>	-0.070*** <i>-0.017</i>	0.075*** <i>-0.017</i>	Retirement ₂₀₂₀	-0.014 <i>-0.022</i>	0.035** <i>-0.015</i>	-0.088*** <i>-0.032</i>	0.067** <i>-0.028</i>
LgAge ₂₀₁₈	0.036** <i>-0.015</i>	-0.028*** <i>-0.009</i>	-0.003 <i>-0.017</i>	-0.005 <i>-0.017</i>	Territorial controls		yes		
LgProfitability ₂₀₁₈	0.192* <i>-0.103</i>	0.367*** <i>-0.082</i>	-0.023 <i>-0.135</i>	-0.536*** <i>-0.133</i>	Sector controls		yes		
					Observations			2289	
					Pseudo-R ²			0.151	

Jobs by occupations and clusters



Pre-pandemic times (2016-2019):

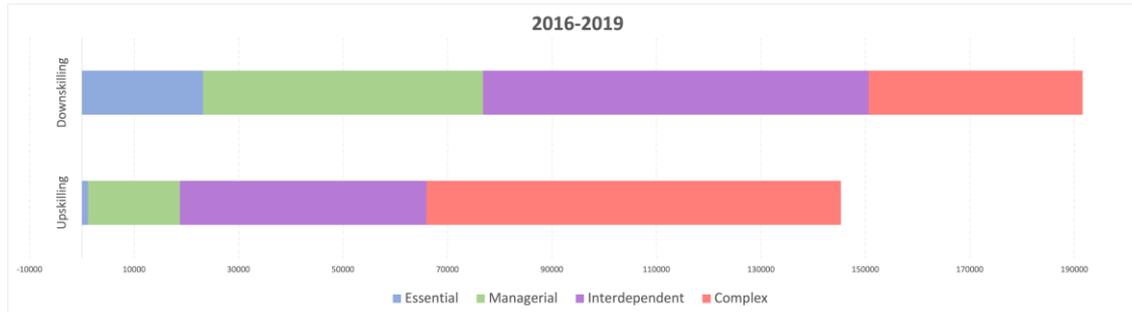
1. The highest incidence of new activated jobs is in service and sales workers;
2. Occupations at the top of the hierarchy are largely demanded by Complex and Interdependent.



Pandemic times (2020):

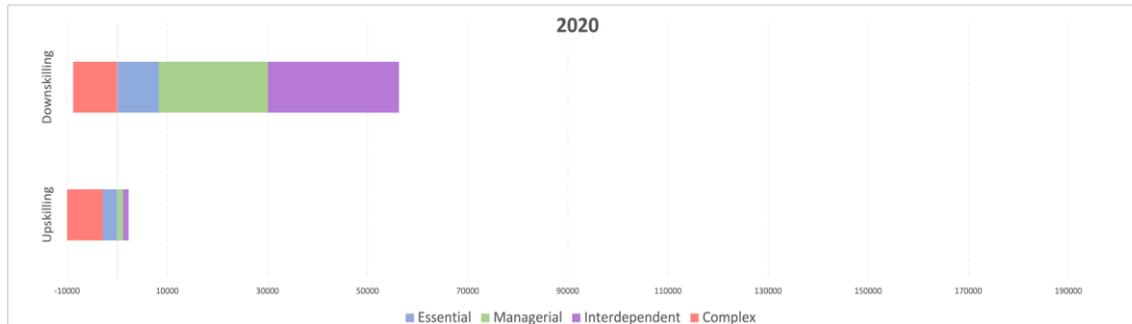
1. Newly activated jobs during the pandemic are largely in elementary occupations and occupations in bottom part of the hierarchy.
2. Complex firms look to have seen cessations larger than activations. An important disclaimer is that cessations are largely due to two main reasons: contract expiring and retirement

Hiring and firing strategies by clusters



Pre-pandemic times (2016-2019):

1. The downskilling event is more widespread across Italian firms and largely pertains to lower-level clusters;
2. The upskilling event



Pandemic times (2020):

1. Complex firms in general seem to have reduced the number of new jobs activated while jobs ceased have increased.
2. In general, new activations have been recorded in Managerial and Interdependent clusters