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Two neglected origins of inequality: hierarchical power and care work

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Two neglected origins of inequality: hierarchical power and care work

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Abstract

Are wages really a good proxy of the value of labour? Or, alternatively, do they largely reflect socio-institutional embedded practices of current societies according to which a manager deserves to be paid more than a nurse? This paper studies the determinants of wage remuneration and wage distribution focusing on two neglected origins of inequality: hierarchical power and care-work. Our contributions include, first the construction of a new synthetic indicator able to capture and quantitatively assess the distribution of power across occupations; second, the development of an indicator able to fine grained account for care jobs; third, the econometric estimation of the determinants of wage levels and wage distribution contrasting our new proxies for occupational attributes of care and power versus the benchmark Mincer equation and the routine task index. Our results downplay the role of the accustomed routine task index in determining the wage remuneration and prove the role of the socio-institutional embeddedness of wage determination, rooted on hierarchical positions and largely discarding the role of essentiality in the executed job activity.

JEL classification: J3, J5, M54.

Keywords: Wage determination, social classes, labour-process, managerial functions, care jobs.

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1 Introduction

Drawing upon an alternative perspective to the mainstream approach, which interprets the value of labour as dependent on worker's productivity and scarcity, this study confronts with the standard routinization narrative and proposes a novel conceptualization of the determination of wage levels and their distributions. By exploiting a unique match between the ICP (Indagine Campionaria delle Professioni) – equivalent to the American O *NET - and the Italian labour force survey (RCFL-ISTAT), we study the dynamics of individual wage level and inequality in Italy during the period 2013-2017.

So far, the extant literature has mostly attributed individual wage inequality to the skill-biased/routine-biased nature of technological change (Autor and Dorn, 2013), although increasing evidence is questioning the technology-driven origin of inequality, underlining the presence of multiple channels of interaction (Mishel, 2022). The need of accounting for alternative, deep and persistent unexplained motives behind wage inequality trends has diverted the attention of scholars towards other possible factors that could impact on the determination of wages, departing from a neoclassical approach based on the assumption of perfectly competitive labour markets able to reward individuals for their skills and productivity. Alternative candidates to explain wage levels and their dynamics are socio-institutional dimensions embedded into occupational class structures (Penissat et al., 2020; Goedemé et al., 2021), the rise of the care economy (Dwyer, 2013; Folbre, 2021), and the weakening of labour market institutions (Stansbury and Summers, 2020).

This paper studies the determinants of wage remuneration and wage inequality focusing on two distinct dimensions: hierarchical functions and care-work. Two are the key motivations, both related to the need to rediscover important and partly forgotten origins of inequality. First, highlighting the role of decision-making power as a relevant driver of wage dynamics, vindicating a basic tenet of the classical theory (i.e., Smith, Ricardo, Marx) according to which value capture tends not only to reflect the control over the means of production, but also the ability to influence the organizational structure of production processes (Stainback et al., 2010). Second, the underevaluaton of care-based activities and jobs (England, 2005) as an element that may help explaining the downward pressure on wages, particularly in occupations where women predominate and various elements of vulnerability tend to add up (e.g., precarious contracts, marginalized conditions of workers).

Our contribution is manifold. First, we provide two novel indicators, one capturing the degree of organizational power characterizing each occupational profile; while the other accounting for the relative importance of care activities. Second, we investigate whether

these two dimensions, power and care, play a role in explaining the dynamics of wages, both on average and along their distribution. In so doing, we test the robustness of the traditional indicators, i.e., the level of education and the Routine Task Index (RTI), commonly used to test the 'routinization hypothesis' (Acemoglu and Autor, 2011), once elements explicitly referring to the role of power and care activities are included. Our findings show that the (non) essentiality[1] of work does play a very important role in affecting wages. Managerial, supervisory and coordination functions, usually presented as unproductive functions according to Marxian scholars (Duménil and Lévy, 2011; Paitaridis and Tsoulfidis, 2012), do increase the wage rate, and in turn inequality across workers. On the contrary, care work activities present a negative penalizing effect, that turns to be higher for low paid occupations consistently with the literature on this topic (England et al., 2002). In addition, we do find that the role of the routine task index, deemed to be the most important determinant of wage inequality according to a technological and task driven approach (Autor et al., 2003), loses its sign consistency in our econometric estimations, once accounting for organizational power and care activities.

The remainder of the paper is structured as follows: in Section 2 and 3 we discuss alternative theories on the value of labour and origins of inequality therein, comparing the mainstream versus the Marxian and feminist approach; in Section 4 we present the empirical analysis, first building new indicators applied to the Italian labor force data; and then performing the econometric estimation. Section 5 interprets our findings and Section 6 concludes the paper.

2 The origins of inequality in the mainstream

Theoretically founded on the notion of "human capital", the neoclassical economic literature has primarily interpreted wages as the positive returns obtained from previous investments in education, labour experience and tenure (Card, 2001, for a review).

The theoretical contribution of labor economists like Becker (1962) and Mincer (1974) defined human capital as the main building block required to explain, in a causal way, the determination of individual wages. The so-called Mincer equation, or human capital earnings function, became the "workhorse of empirical research on earning determination" (Lemieux, 2006, p.3). The reasons behind this success are essentially related to its parsimonious specification and the possibility of interpreting the equation as an invest-

[1] Here we refer to the notion of essentiality vs non essentiality further discussed in Section 2, on the basis of the Marxian distinction.

ment function. At the same time, given its simple setting, several limitations have been identified. While some of them can be easily addressed (as for instance the non-linear effect of specific explanatory variables), others reflect the evolution of the labor market and the changing composition of the workforce. Indeed, the explanatory power of the Mincer equation in assessing the main factors contributing to the variance of earnings in the US was very strong during the 60s and 70s, the ascent decade of educational attainments in western societies, but progressively weakened over time. The role of penetration of ICT technologies, and in general the manifestation of the third industrial revolution in workplaces, progressively lead economists to move from the human capital theory of wage remuneration toward the role exerted by technological driven factors behind wage remuneration. The so called *routinization hypothesis*, put forward in Autor et al. (2003), became the new source of wage determination. This turn was prompted by the emerging job polarization of the US labor market and the progressively weakening role of educational attainments to get wage increases (Clark et al., 2017). However, notwithstanding variations in the drivers of wage determination, the main assumption in the neoclassical stream of labour economics has been recently clearly stated by Autor (2022):

> "what workers earn in a market economy depends substantially, though not exclusively, on their productivity–that is, the value they produce through their labor. Their productivity depends in turn on two things: first, their capabilities (concretely, the tasks they can accomplish); and second, their scarcity." (Autor, 2022, p.3)

Indeed, according to such research stream, the determination of wage and the ensuing origin of inequality are mainly a market-based problem, wherein forms of deviation from optimality conditions in wage remunerations are mainly due to biases. Such *biases*, at the beginning derived from 'wrong' educational attainment and skill mismatch with a rising demand for college-educated workers (Tinbergen, 1974; Katz and Murphy, 1992), such that the *skill-biased* technical change theory was deemed as the dominant inequality explanation. The bias has then gradually moved to job tasks and technological-based factors according to the *routine-biased* or *task-biased* technical change theory (Acemoglu and Autor, 2011), primarily attributed to the rise of computer adoption until the Great Recession, while recently revamped by the robotization age (Restrepo, 2023). In a nutshell, technological-driven factors are seen as responsible for the modification of the composition of the occupational structure, leading to polarization and disappearance of the middle part of occupational categories, but also for the polarization in wages. More recently, with

the growing diffusion of AI, complementary but also unpredictable effects induced by technological adoption have been strongly advocated (Acemoglu et al., 2022).

Despite more complex empirical settings and a refinement of the theoretical framework, the main assumptions behind this stream are not far from the Mincerian equation, as they always resort to labour market dynamics to explain the determinants of wage, and ultimately to relative comparative advantage of occupations/skills/tasks. A somehow related stream of literature enriches the routinization hypothesis accounting for the growing fragmentation of international production and ensuing diffusion of offshoring practices as additional drivers of income inequality (see, among others, Antràs et al. (2006); Grossman and Rossi-Hansberg (2008); Criscuolo and Garicano (2010)). According to this literature, offshoring hurts disproportionally medium and low-skill ccupations, as the latter are considered the more 'offshorable', hence amplifying the routine-biased impact of technology. However, while the routinization hypothesis was somewhat "working" until the beginning of the 2000s to explain polarization, the trends of labour markets in the last twenty years tell us a different story rather than polarization: overall, a generalised wage compression and an increasing portion of bad jobs have been spurring, to such an extent that nowadays several contributions have called for decent, or alternatively, good jobs (Kalleberg, 2016).

Another stream of literature has highlighted the role of institutions in shaping capital labor relationships affecting, in particular, workers bargaining power and, hence, wages (Card and DiNardo, 2002). In this context, increasing evidence is questioning the technological origin of inequality and is putting forward the hypothesis of a policy-led wage compression strategy (Mishel, 2022), intentionally pursued by a series of labour market reforms in advanced capitalist economies (Baccaro and Howell, 2017; Howell, 2021) to tame labour power (Stansbury and Summers, 2020). However, empirical models still fall short in accounting for the effects of asymmetric positioning in labour markets, and for the relative degree of bargaining power held by different actors.

Granting space to monopsony rather than competitive labour markets, the wage setting power of firms has been recently acknowledged to be a crucial line of advancement for labour economics (Card, 2022). Although the notion of "Great Resignation" has gained momentum during the pandemic especially in U.S. (Fuller and Kerr, 2022), high quit rates are common during periods of shock and fast recoveries (Hobijn, 2022). Moreover, micro-level evidence shows that the the elasticity of labour supply to wages is small, in terms of quit rates, particularly for low wage workers (Naidu and Carr, 2022). At the same time,

the labour share over total income has been decreasing because of the poor adjustment of real wages to inflation both in European countries and U.S. (Araki et al., 2023). These stylized facts hint at the low tightness in labour markets and, more generally, at institutional weaknesses in preventing distributional shocks (Stiglitz and Regmi, 2023). In particular, the role of big employers in setting prices and gain profit margins (Weber and Wasner, 2023), the adoption of secret agreements among firms to reduce wage growth and limit external mobility of workers (Card, 2022; Manning, 2013) are clear manifestation of employers' market power. At the opposite, labour power has retrenched, with non-unionized and precarious jobs increasing very fast, usually recording lower wages and worse working conditions (Shierholz et al., 2023). Recent evidence has shown that declining workers' power (due to declining unionization and reduction in labor protections) contribute to explain the evolution of the American economy and the significant drop in the labor share (Stansbury and Summers, 2020; Card et al., 2023).

3 Two neglected origins of inequality

According to the Marxian perspective, the first limit of the human capital theory is that it fails to consider the relation between capital and labour, neglecting the presence of a class conflict within society (Wright, 2005). Rather than being equal to their marginal productivity, the wage workers can earn (manage to earn) in the labor market is mainly the result of power relations. In this framework, individual labour productivity does not exist as a quantitative term to be valued against the income (the share of income) that goes to the worker.

Human capital theory and its definition of wages, which stems from the unfold of neoclassical economy (Picchio, 1992), has therefore turned into a theoretical tool that allows an ex-ante rationalization of the ex-post persistent wage inequality observed in labor markets, in the name of return to education and marginal productivity (Folbre, 2012). Along these lines, a feminist critique to the human capital theory essentially stresses the lack of attention devoted to the role of the social reproduction necessary to raise, feed and reproduce the labour power meant to ensure the functioning of capitalism (Federici, 2021).

Empirically, among the emerging trends observed in labor markets of advanced economies, the most difficult evidence to explain through a standard Mincerian equation regards not only the soaring inequality at the top (Piketty and Saez, 2003), but also the persistent gender- and race-wage gaps. Both divides cannot be interpreted only in terms

of workers' individual characteristics (Dwyer, 2013). Indeed, most empirical studies that account for race and gender earnings disparity are still grounded on a human capital perspective, trying to explain such disparities (divides) in terms of education attainment, professional careers of different workers subgroups, changing market returns to skills (Blau and Kahn, 2020), jobs' characteristics and family contexts. This is clear in the approach to gender economics put forward by Goldin (2006, 2014).

3.1 Attributes of labour in the Marxian perspective

Beyond work being "routine vs non-routine", or "complementary vs substitute of technology", or high vs low educated, what other attributes might characterize the labour activity and its remuneration?

Marx distinguishes between *productive* and *unproductive labour*: the first is defined as dependent wage labour that allows capitalists to accrue value; the second is, either, a labour activity not directly connected to value generation, but meant to obtain capital valorization, such as managerial, supervisory and controlling activities, or, alternatively unwaged labour, not productive at the scope of capital accumulation and value generation, but necessary for social reproduction. Despite a still open debate on the empirical and theoretical characterization of this category (Himmelweit and Mohun, 1977; Mohun, 2006; Vogel, 2013), within the large spectrum of unproductive labour, two dichotomous functions can be identified:

- managerial functions, highly remunerated, useful for capital expansion and valorization;
- care functions, badly remunerated, but essential for the satisfaction of societal needs.

Characterizing the nature of managerial and supervisory functions has always been complex, since managerial jobs contain attributes both of the working class and of the capitalist class (Wright, 2015), up to the point that it has been defined as the *contradictory located class*. When referring to managerial activities, Marx acknowledges their scope to govern social and economic processes:

> "The labour of supervision and management is naturally required wherever the direct process of production assumes the form of a combined social process, and not of the isolated labour of independent producers. However, it has a double nature. On the one hand, all labour in which many individuals cooperate necessarily requires a commanding will to coordinate and unify

the process. (...) This is a productive job, which must be performed in every combined mode of production." (Marx, 1992, Vol. III, 23,383)

However, this type of activities turns out to be into being largely unproductive:

"One part of the labour of superintendence merely arises from the antagonistic contradiction between capital and labour, from the antagonistic character of capitalist production, and belongs to the incidental expenses of production in the same way as nine-tenths of the "labour" occasioned by the circulation process." (Marx, 1992, Vol. IV/3, 505. cf. IV/2, 355–6).

The complex nature of managerial functions is the origin of an important class contradiction (Vidal, 2019) as, from the one hand, they perform productive tasks when involved in coordinating activities (such as planning), that can increase the efficiency of the process, but, on the other hand, they also perform unproductive work, largely enforcing discipline and control over workers, and ensuring the valorization of capital. This mirrors the contradiction faced by workers who must operate between the push of managers to "empower" them, and the underlying risk of alienation. Both types of tensions, originate in the inherent contradiction and conflict characterizing the relations and forces of production (Vidal, 2022). Indeed, a lively theoretical debate on the role of managers, their role in different archetypal organizational forms of production (Dosi et al., 2021), and the effects for capitalism deriving from their increasing growth (Sheikh and Tonak, 1994; Paitaridis and Tsoulfidis, 2012), is still at the center of the literature.[2]

When coming to the remuneration of managerial functions, looking at the US from 1964 to 2000, Mohun (2006) observes that supervisory workers saw a large increase in their wage share, especially after the 1979, and that this rise was mainly unrelated to their employment growth, differently from the case of production workers. Complementary, Bivens and Kandra (2022) have reported that the CEO-to-worker compensation ratio reached 399-to-1 in 2021 since 1965 in large, listed multinational corporations.

3.2 Attributes of labour in the feminist perspective

The main critique of the feminist approach to the Marxian theory of value is the neglect – or the under-evaluation – of the social reproduction sphere (Mezzadri, 2021), not only

[2] According to the circulation process theory, a huge bulk of activities in capitalist organization is not related to the production of value by means of surplus extraction, namely valorization. 'Nine-tenths' of activities are instead performed at the scope of increasing value of the existing capital, or making this value to be expanded (Duménil and Lévy, 2011).

as instrumental to the reproduction of labour power, but also as a potential "terrain of working-class struggle" (Dalla Costa and James, 1972, p.45).

Indeed, the recognition of the "necessity" of this function can be found in Marx as well, where he discusses about the "maintenance" of the working class:

> "the maintenance and reproduction of the working-class is, and must ever be, a necessary condition to the reproduction of capital. But the capitalist may safely leave its fulfilment to the labourer's instincts of self-preservation and of propagation. All the capitalist cares for, is to reduce the labourer's individual consumption as far as possible to what is strictly necessary." (Marx, 1992, Vol.1,p.572)

Starting from the contributions of England (1992), the literature on care jobs has extensively exploited the information contained in the American Dictionary of Occupations to identify "nurturant jobs", whose definition has been then progressively refined to include all workers providing a face-to-face service aimed at developing the human capabilities of the recipient, therefore, beyond healthcare activities directed toward physical and mental health, but also including cognitive and emotional activities (England et al., 2002). At the beginning, the least relational-based and skilled occupations, as cleaning and preparing food, were excluded (Duffy, 2005), a choice further revised because of an emerging class and race bias behind the distinction between relational and purely reproductive tasks (Glenn, 1992; Roberts, 1997). Nowadays, the literature on care jobs has in most cases integrated this double dimension of care activities, accounting for both their nurturant and reproduction content (Dwyer, 2013; Budig et al., 2019).

With the progressive commodification of part of domestic labor through public and private supply, and the expansion of the tertiary sector, care work has been an increasingly relevant object of investigation (England, 2005). Moreover, the importance of essential jobs has got renewed attention during the pandemic phase (Lancet, 2020; Bahn et al., 2020). Although the increasing role of the sector is nowadays largely acknowledged even by the projection of the Bureau of Labor Statistics in terms of most demanded occupations in the next ten years,[3] there is large evidence confirming that care work is generally underpaid (Hebson et al., 2015).

The presence of a care wage penalty, usually assessed looking at the behaviour of the dummy/categorical variable that identifies care jobs both on cross-sectional and longitudinal data, is now a rather rock solid evidence in the empirical literature analyzing wages

[3] https://www.bls.gov/ooh/most-new-jobs.html.

and their determinants. This negative effect tends to diminish, but never cancels out once more sophisticated econometric regression models are estimated accounting for a wide range of controls, such as educational entitlements and individual characteristics (Barron and West, 2013), occupational social closure mechanisms (Weeden, 2002; Lightman, 2017), gender segregation (England et al., 2002), institutional differences and welfare regimes (Budig and Misra, 2010; Ferragina and Parolin, 2022).

At the opposite end, managerial functions and activities done by the top-level hierarchies in firms and organizations tend to be progressively better paid and appropriating benefits larger than those they create for shareholders (Goergen and Renneboog, 2011), extracting rents from their managerial power (Bivens and Mishel, 2013).

Given the relevance that these two main attributes of labour, in a nutshell power and care, have in the debate and functioning of labor markets, in the following section we will focus on the empirical detection of managerial functions and care work, to understand their effects upon wage remuneration for Italian workers. What in fact remains an open question is what determines the value of labour, here intended as the market value of labour transferred into wages.

4 Empirical analysis

4.1 Data

The main datasource is constituted by two integrated datasets, the ICP (Indagine Campionaria delle Professioni, 2012) and the Italian Labour Force Survey (RFLC).

The ICP (Italian survey on occupations) is a survey conducted by the National Institute for Public Policy Analysis (INAPP) in collaboration with the Italian National Statistical Institute (ISTAT), following the methodology of the American O*NET (Gallo and Lorè, 2006). It represents an important empirical tool for all those scholars engaging in the debate on challenges related to the world of labour.[4]

The survey provides a detailed overview about tasks, functions and operations conducted by each occupation. This information is retrieved by interviewing 16,000 Italian workers that should represent the whole set of Italian occupations. To ensure the statistical representativeness of the sample, a quite complex and multi-step sampling strategy

[4]Several scientific articles relying on this database have been published in recent years, investigating for instance the impact of new technologies (Cirillo et al., 2021) and the socio-economic vulnerabilities of the Italian workforce in face of the pandemic (Cetrulo et al., 2020b; Bonacini et al., 2021).

is adopted. 797 independent samples are generated from an initial matrix providing information on the distribution of occupations (in terms of number of employees) across five-digit sectors. Each sample refers to a specific five-digit occupation and is populated by firms (stratified by region and size class) belonging to the cluster of sectors where the probability of finding such an occupation is above an ex-ante threshold. Firms are randomly extracted from the ISTAT company-level register. The ICP information is then collected according to a two-step procedure. First, firms are contacted by phone to verify the presence of a specific occupational category at five-digit level. Granted the latter, on average, 20 workers per each occupation are interviewed by means of 1-h lasting CAPI (computer-assisted personal interview).[5]

Our second source of data, the Italy labour force survey (RFLC), with data covering the period between 2013 and 2017, contains a vast set of information on the Italian workers, both in terms of labor market variables (wage, employment status, type of job contract, 4-digit occupation, sector) and socio-demographic characteristics of the workers (education, age, gender, region). The RFLC constitutes an annually repeated cross-section survey, conducted by the National Institute of Statistics (ISTAT) three times per year with a quarterly frequency. Around 250 thousand families resident in Italy are interviewed, corresponding to a total of about 600 thousand individuals across 1,400 Italian municipalities. Each individual is interviewed only four times in two subsequent quarters, at year t, and in the corresponding quarters at year t + 1, making unfeasible a panel treatment of the data.

4.2 Indicators of Job Anatomy and Care Work

As previously discussed, mainstream labour economics has mostly focussed on skill and routine-task intensity to explain wage dynamics and distribution. In general, routine activities have been interpreted as a penalizing factor for wages, while non-routine activities resulted to be a premium factor (Acemoglu and Autor, 2011). So far, less attention has been paid to the role of managerial functions, intended as an expression of power and unbalanced relations of production, and not simply as the outcome of a technical division of labour. On the contrary, growing attention has been devoted during the pandemic to the persistent wage penalty observed in care jobs (ILO, 2023). Nevertheless, the two dimensions have been only rarely analyzed through a tentative unified framework (Kilbourne et al., 1994; England et al., 1994), leaving the interpretation of wage inequality mainly in

[5]This section draws upon Cetrulo et al. (2020a).

terms of skills and tasks, and largely neglecting the role of authority and essential needs in shaping the "value" of labour, transferred into wages.

To achieve this goal, we rely on two novel indicators based on a peculiar data-driven approach. Starting from tasks and functions performed during the working activity, we are able to detect managerial functions and power relations, on the one hand, and care work on the other hand. We start with the "Job Anatomy" indicator which is computed as the arithmetic sum of the five factors that characterize the Italian occupation structure, according to the analysis provided in Cetrulo et al. (2020a), such that $Job\ Anatomy_k = \Sigma_{n=1}^{5} Factor_{nk}$, with $k = 1, ...508$ occupations at 4-digit.

This indicator derives from an inductive empirical strategy performed in a previous study where the most important traits of Italian occupations at 4-digit were identified through a factor analysis (Cetrulo et al., 2020a). Five main factors - whose label will be listed below - emerged as the ones able to capture most of the occupational heterogeneity observed in the survey. Interestingly, the most relevant factor in terms of variance explained - Power - hinted at dimensions usually neglected in labor economics, as the endowment of power intended both as the exercise of hierarchical control and supervision but also in terms of higher degree of autonomy in performing tasks and planning. This factor emerged to be highly concentrated in the first ISCO group (Legislators, managers and entrepreneurs). The second factor - Cognitive and manual dexterity - revealed a hidden level of complexity, emerging even in standardized contexts such as manufacturing jobs, because of the need of continuously solving unexpected problems, adapting and dynamically selecting tools of work (Pfeiffer and Suphan, 2015). Further relevant factors attained at the level of ICT skills, under-diffused and rather concentrated among scientific and professional jobs; collaborative and horizontal work organization practices - defined as Team - only weakly adopted; and Creative that seems to be mainly a feature on the one hand, of scientists and intellectual workers and, on the other hand, of crafts.[6]

The proposed indicator, therefore, offers a composite measure of the anatomy of the Italian occupation structure, both underlining elements usually neglected in mainstream theory and expanding the discourse on labor moving from the skilled/unskilled duality and routine-based definition of tasks to a more complex understanding of the role of organizations, knowledge and hierarchical structures. Moreover, given the highest relevance of Power, among the five factors, in explaining the overall variance across occupations,

[6]Further details on the five factors and the empirical strategy adopted in Cetrulo et al. (2020a) are presented in the Appendix.

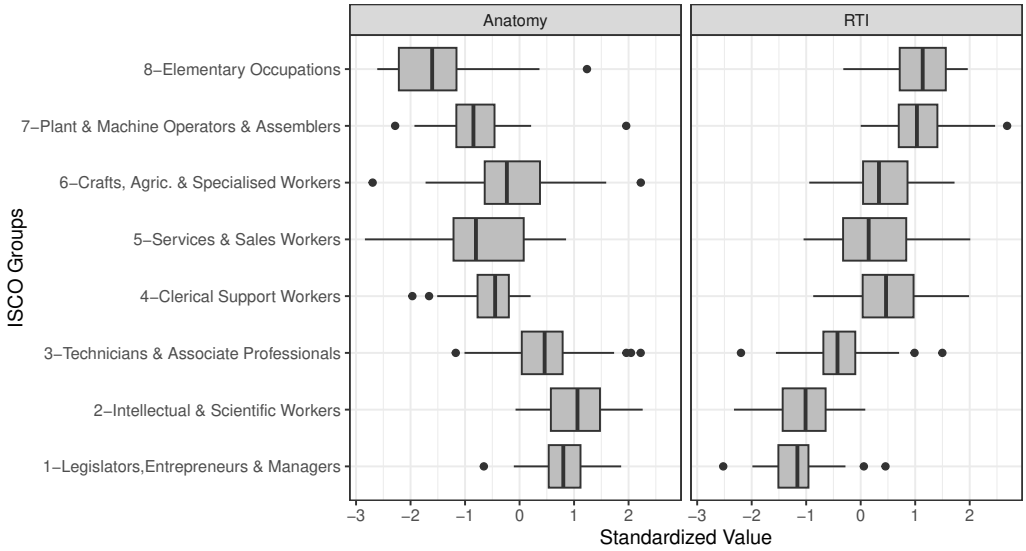


Figure 1: Job Anatomy and RTI indicators by ISCO groups

the anatomy indicator will follow more closely this factor dynamics, with nevertheless a further enrichment due to the counterbalancing effects of the other factors included.

Considering the novelty of our indicator, we confront its own distribution with respect to the Routine Task Index, built following Autor et al. (2003), currently considered the benchmark indicator to explain labour market trends.

Figure 1 compares the intensity of both indices for each macro-occupational group. Our indicator looks to be more clearly decreasing along the occupational structure, except for the class of Service & Sales Workers which shows an extremely low indicator of Job Anatomy. In contrast, the RTI shows a more homogeneous dynamics across categories. The Job Anatomy indicator reflects predominantly the role of organizational power exerted versus supervised people and over the production process, but also the autonomy of intellectual and scientific workers. In fact, as further explained in the Appendix, it is an indicator capturing at the same time attributes of autonomy in doing the job, attention required by the task executed, knowledge endowment hinting in this sense at different models of learning regimes. In this respect, it is more nuanced and comprehensive with respect to the RTI, insofar it encompasses a wider set of attributes of the labour process.

Functions related to the execution of managerial authority and control, as discussed in the previous section, more neatly characterize top occupational categories, with a modest confidence interval, confirming the concentrated nature of managerial and command-and control functions only among specific occupations. Notably, the indicator, differently from

the RTI, even reaches negative values for the lower categories, signaling the lack of power and command-and-control functions.

The Care Job variable corresponds to a dummy variable that identifies occupations that can be deemed as "care jobs". The variable is equal to 1 if taking care of others, a task described in the ICP, is a prevalent attribute of a given occupation. The intensity of this task is measured through a specific question (number G.29) of the ICP database, where workers are asked how important it is to provide personal assistance, medical attention, emotional support, or personal care to others (colleagues, clients, patients). We adopt the prevalence-based approach, whereby all jobs in which the importance of this activity is greater than 60 out of 100 are defined as "care jobs". This methodology results to be effective in identifying a quite heterogeneous, beyond sheer sectors, but consistent set of occupations in which the caring activity is indeed the main characteristic (see Table 1). According to the table, caring professions are concentrated in Health, Education and Social Services, confirming the appropriateness of the strategy adopted. Notably, the female share is over-represented when compared to the remaining occupations. This approach, applied to the Italian occupational structure for the first time according to our knowledge, is theoretically and empirically consistent with the tradition of feminist studies on the topic that has been briefly sketched in previous sections.

In line with the literature and national statistics, within the set of care jobs we find professions characterized by different socio-economic status, including both highly paid and badly paid jobs. Table 2 shows top and bottom paid occupations in caring activities in Italy. Top paid occupations, all in the health sector, are notably characterized by a below average female representation in care jobs, while at the opposite, bottom paid occupations are female-segregated occupations, with shares of female workers over the total workforce peaking at 90%. We start therefore understanding some patterns, that we will better analyze in the following, namely a potential non-trivial relationship between both the Job Anatomy and Care Job indices and wage levels, together with the impact of gender segregation within care jobs on remunerations.

4.3 Estimation strategy

By means of the ISCO code classification at 4-digit level, we can link the information of ICP with the Italian labour force survey, merging data on wage, gender, age, experience in the labour market, geographical location and job contracts. Having constructed our two

Caring Jobs	Description	Care variable (A)	% Female (2016 Data)
HEALTH			
2314	Vets	73,14	51,7
2315	Pharmacists	82,5	69,5
2411	General practitioners/Doctors	98,75	45
2412	Specialists in medical therapies	97,72	49
2413	Specialists in surgical therapies	94,04	32
2415	Dentists, odontologists, stomagologists	86,90	29,3
2416	Specialists in diagnostic imaging and radiotherapy	93,05	41,5
2418	Anaesthetists and resuscitators	93,75	39,2
2533	Specialists in psychological and psycho-therapeutic sciences	75,55	77,7
3211	Nursing and midwifery health professions	92,11	75,5
3212	Rehabilitation health professions	88,43	73,8
3213	Technical health professions - technical diagnostic area	63,93	61,4
3214	Technical health professions - technical care area	72,92	69,5
EDUCATION			
2633	Lower secondary school teachers	67,26	77,9
2641	Primary school teachers	61,36	94,6
2642	Pre-primary school teachers	84,21	99,3
2651	Specialists in the education and training of differently abled persons	72,5	82,9
2654	Guidance/orientation counsellors	69,73	83,8
3215	Prevention technical professions	63,45	60
5442	Child care workers and assimilated professions	86,36	90,4
5485	Officials of penal and re-education institutions	70,23	7,4
SOCIAL, SERVICE, OTHER			
2561	Specialists in religious and theological disciplines	91,25	2,2
3347	Agents and representatives of artists and athletes	73,91	64,6
3413	Tourist animators and assimilated professions	60,71	56,8
3424	Instructors of non-competitive sports disciplines	66,30	47,7
3451	Social workers	93,18	90,6
3452	Social reintegration and integration technicians	96,05	74
3455	Technicians of religious activities and worship	73,80	52
5231	Hostesses, stewards and assimilated professions	80,39	71,2
5232	Tour leaders	76,25	65,6
5487	Lifeguards and assimilated professions	83,33	14,9
6216	Divers and underwater workers	60,29	0
8152	Porters and assimilated professions	65	66,8
8221	Domestic workers and assimilated professions	65	88,8
3217	Technicians of folk (popular) medicine	92,10	65
5443	Personal care workers	92,04	90,5
5484	Firefighters and assimilated professions	81,06	2,3
5311	Qualified professions in health and social services	79,76	82
5423	Astrologers, fortune-tellers and assimilated professions	70,45	77,5
5433	Masseurs and spa operators	82,95	63,5
5441	Company staff and qualified family service personnel	91,66	70,9

Table 1: List of 4-digit care jobs

Well paid care jobs	Poorly paid care jobs
2411-General practitioners	8221 - Domestic workers and assimilated professions
2412-Specialists in medical therapies	5443-Personal care workers
2413-Specialists in surgical therapies	5311-Qualified professions in health and social services
3213-Technical health professions - technical diagnostic area	2642-Pre-primary school teachers
2418-Anaesthetists and resuscitators	5442-Child care workers and assimilated professions

Table 2: List of top and bottom five care jobs by wage level

indices, we implement OLS and quantile regression estimations of the wage levels on an independently pooled cross-section from 2013 to 2017.

We start running a baseline Mincerian wage equation (Lemieux, 2006) including education, experience, experience squared and the age cohort. We then add, after controlling for socio-demographic characteristics and job-contracts categories, one by one, the three additional indices on the organization of the world of work. We run an augmented Mincerian equation, first including the RTI, and then we add the Job Anatomy and the Care Job indicators, also allowing for an interaction term between Care Job and the dummy variable indicating workers' gender.

To detect the relationship between our explanatory variables and our dependent variable, we start presenting a battery of conditional descriptive evidence on wage distribution. Figure 2 shows the distribution of wages by gender, education level (distinguishing four titles), RTI, Job Anatomy, Care Jobs, and Care Jobs by gender.

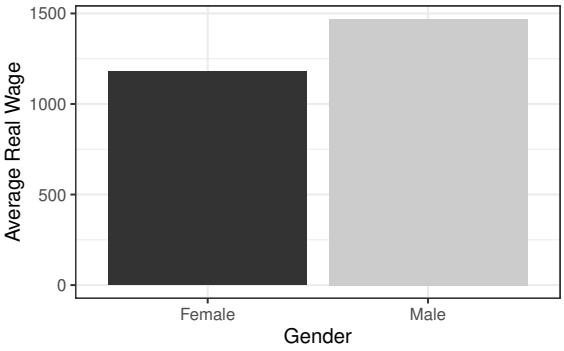
From the descriptive evidence of, one variable at the time, conditional dependence, we do find a wage premium for men, an increasing wage dynamics by education level, a decreasing wage dynamics by increasing deciles of RTI, while at the opposite, an increasing wage dynamics by increasing deciles of Job Anatomy, notably with larger degree of variations across deciles when compared to the RTI. Finally, with respect to the Care Job index, we do not detect a significant wage difference between the two groups, unless we interact the gender dimension.

So far, we have presented univariate average and distribution behaviour of wages vis à-vis our variables of interest. To better assess their relation, we rely on both standard OLS and quantile regressions, as it is key to capture heterogeneities along the distribution of wages. Table 3 shows a synthetic overview of the variables that will be used in the multivariate regression setting.[7]

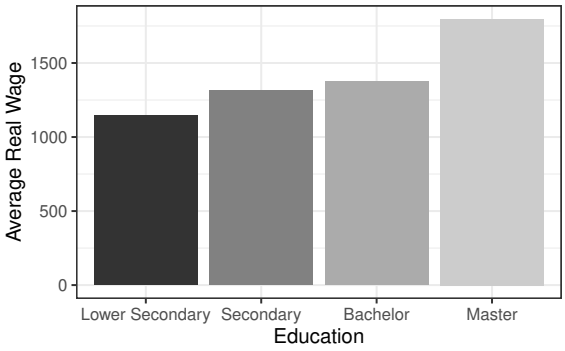
[7] An expanded version of Table 3 is provided in the Appendix.

Figure 2: Average wage conditional values over the period 2012-2017

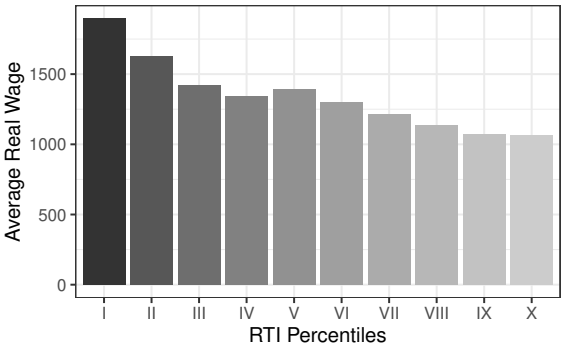
(a) Average wage by gender



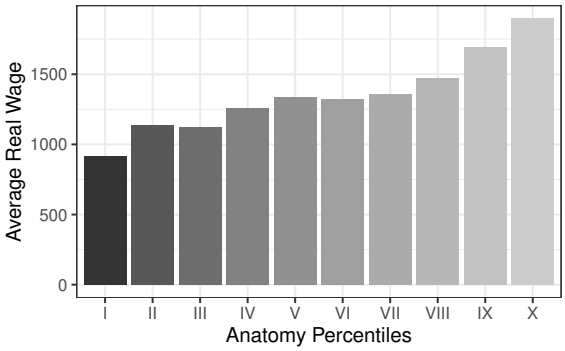
(b) Average wage by education



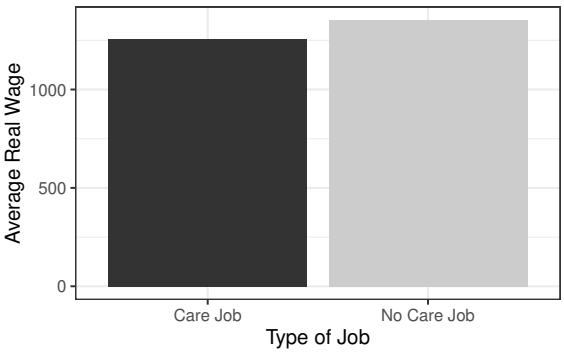
(c) Average wage by RTI



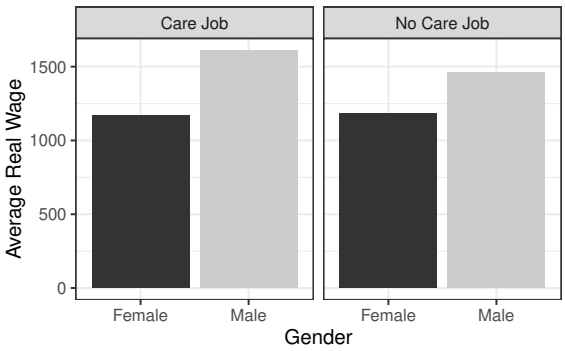
(d) Average wage by Job Anatomy



(e) Average wage by Care Jobs



(f) Average wage by Care Jobs and gender



Variable	
Dependent variable	
Log Monthly Wage	Log value
Occupation attributes	
Routine Task Index	Standardized value
Job Anatomy Index	Standardized value
Care Job index	Dummy variable
ISCO Occupational groups (I-VIII)	Dummy variable for each group
Socio-demographic individual characteristics	
Gender of the worker (female/man)	Dummy variable
Civil state of the worker (married/unmarried)	Dummy variable
Year of experience in the labor market	Years
Age cohorts (15-35, 36-50, over 50)	Categorical variable
Level of education (Lower Secondary, Secondary, Bachelor, Master)	Categorical variable
Job contract (permanent, temporary, autonomous)	Categorical variable
Additional control variables	
Geographical areas	Categorical variable
Sectors at 2-Digits (Nace 1-18)	Dummy variable for each sector
Time	
Years	Categorical variables for years

Table 3: Synthetic list of variables

The estimated OLS model is specified as follows:

$$Wage_{i,t} = \alpha + \beta Education_{i,t} + \boldsymbol{\delta}\mathbf{X}_{i,j,2012} + \boldsymbol{\gamma}\mathbf{Z}_{i,t} + \eta Year + \epsilon_{i,t} \quad t = 2013, .., 2017$$

where $Wage_{it}$ is expressed as log wage, i are individuals and t are the years of the pooled cross-sectional database (2013-2017). $Education_{i,t}$ is the level of education of the worker i at time t. $\mathbf{X}_{i,j,2012}$ is the vector of explanatory variables related to jobs specific characteristics (RTI, Job Anatomy and Care Job indicators) observed in the ICP wave of 2012 for each 4-digit occupation (with $j = 1, ..., 508$). $\mathbf{Z}_{i,t}$ are control variables related to individual socio-economic and geographical attributes (gender, civil state, age, experience in the labor market, job contract, geographical area, sector, ISCO group), $Year$ are time dummies included to allow for different intercepts across the time periods under study.

To appreciate the relative fitness of our econometric model, we start with its simplest specification with education as key variable, then adding the Routine Task Intensity (RTI) variable and progressively including the other explanatory variables, according to the following model specifications:

- *Model 0*: Log-Wage OLS model with education and control variables;
- *Model 1*: Model 0 with RTI;

- *Model 2*: Model 1 with Job Anatomy;
- *Model 3*: Model 2 with Care Jobs and an interaction variable for Care Jobs and Gender.

As illustrated in Table 4, the signs and significance of the control variables go in the expected direction in all models, and the specification looks to be robust to the insertion of additional explanatory variables. Socio-demographic and contractual characteristics, coherently with the previous evidence, show a wage penalty for women when compared to men, and for temporary and autonomous workers when compared to permanent employees. On the contrary, being married and being over 50 years old bring about a wage premium.

When referring to our variables of interest, education consistently turns out to be positive and increasing in all model specifications, while the RTI loses its sign consistency. Indeed, it moves from a negative and statistically significant coefficient in the base model (Model 1) to a positive and statistical significant coefficient in Models 2 and 3 where Job Anatomy first (Model 2) and Care jobs (Model 3) then, are included. In other words, once we better account for the content of the entire set of occupations at 4-digit, the negative effect of routinized tasks measured by the RTI seems to be cleared out by the power dimension of labour attributes (proxied by Anatomy) and the nurturant and reproductive tasks (identified through the Care Jobs indicator). Moreover, it is important to underline that the model already controls for the characteristics of the eight ISCO groups, ensuring that the information captured by our occupations attributes is somehow transversal across macro occupational groups and not exclusively driven by a single class. Thus, the changing behaviour of the RTI variable raises some doubts on the driving forces behind its presumed penalizing effect on wages. It confirms, on the contrary, the necessity to take on board other pivotal attributes of the labor process, that are not limited to tasks' repetitiveness, but also pertain to the exercise of power, the endowment of autonomy and knowledge, as well as the type of needs jobs are aimed to satisfy.

Moving to the Care Jobs variable, it presents a negative and statistically significant association with wages, while the interaction between Care Jobs and Gender, despite showing a negative coefficient, does not show any significant relationship. While signs of the regression model are all coherent with the descriptive statistics on the conditional wage distributions (apart from RTI, as explained above), no information is provided about the explanatory power of alternative model specifications. We therefore proceed with testing exclusion restrictions on the variables we have progressively included in our econometric

	Model 0	Model 1	Model 2	Model 3
Secondary Level	0.0626***	0.0617***	0.0605***	0.0603***
	(0.0021)	(0.0021)	(0.0021)	(0.0021)
Bachelor	0.1183***	0.1197***	0.1143***	0.1193***
	(0.0046)	(0.0046)	(0.0046)	(0.0047)
Master	0.2110***	0.2080***	0.2049***	0.2023***
	(0.0032)	(0.0032)	(0.0032)	(0.0033)
Female	-0.2435***	-0.2396***	-0.2339***	-0.2306***
	(0.0018)	(0.0018)	(0.0018)	(0.0020)
Married	0.0236***	0.0234***	0.0237***	0.0237***
	(0.0018)	(0.0018)	(0.0018)	(0.0018)
Tenure	0.0121***	0.0120***	0.0118***	0.0116***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Tenure squared	-0.0002***	-0.0002***	-0.0002***	-0.0002***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Not Employed	-0.1292***	-0.1289***	-0.1288***	-0.1287***
	(0.0148)	(0.0148)	(0.0148)	(0.0148)
35-50 Years Old	0.0595***	0.0595***	0.0601***	0.0606***
	(0.0024)	(0.0024)	(0.0024)	(0.0024)
Over 50 Years Old	0.0740***	0.0749***	0.0761***	0.0762***
	(0.0030)	(0.0030)	(0.0030)	(0.0030)
Temporary Job Contract	-0.0981***	-0.0993***	-0.1003***	-0.1017***
	(0.0034)	(0.0034)	(0.0034)	(0.0034)
Autonomous Job Contract	-0.1412***	-0.1441***	-0.1440***	-0.1450***
	(0.0101)	(0.0101)	(0.0101)	(0.0101)
RTI		-0.0285***	0.0058**	0.0082***
		(0.0016)	(0.0021)	(0.0021)
Anatomy			0.0391***	0.0390***
			(0.0017)	(0.0017)
Care Jobs				-0.0328***
				(0.0050)
Care Jobs x Female				-0.0008
				(0.0054)
Constant	7.5679***	7.5231***	7.5277***	7.5284***
	(0.0102)	(0.0105)	(0.0105)	(0.0105)
SECTORAL DUMMIES	YES	YES	YES	YES
ISCO DUMMIES	YES	YES	YES	YES
GEOGRAPHICAL AREA DUMMIES	YES	YES	YES	YES
TIME DUMMIES	YES	YES	YES	YES
R-squared	0.4560	0.4569	0.4584	0.4587
Number of observations	283,854	283,854	283,854	283,854

* p<0.05; ** p<0.01; *** p<0.001

Table 4: OLS regression models (2013-2017 data)

model. Consistently with the OLS treatment of data, we compute in Table 5 the F-statistics that essentially compares the Sum of squared residuals (or the R-squared) of the restricted and unrestricted models.[8]

Assumption	F Test
Model 0 nested in Model 1	F (1, 283815) = 391.05 prob > F = 0.0000
Model 1 nested in Model 2	F (1, 283814) = 833.28 prob > F = 0.0000
Model 2 nested in Model 3	F (2, 283812) = 72.77 prob > F = 0.0000

Table 5: F Test of Log-wage OLS Models 0,1,2,3

In all tests reported in Table 4, we reject the null hypothesis. This result confirms that including the Job Anatomy and distinguishing for Care Jobs index improves the fitness of a model aimed at identifying wage determinants. Moreover, the instability of the RTI coefficient for what concerns the direction of its impact confirms the importance of building a more comprehensive estimation model to better assess the potential impact of the variables under study.

Given, however, the features of an OLS regression model, a set of robustness checks is required to verify, in particular, the linearity and normality assumptions of the estimated model. The assumption of a linear relation between the dependent variable and the explanatory variables is inspected through a graphical descriptive analysis that highlights a potential non-linear relation, especially around the tail of the distribution. The hypothesis of residuals' normality - required for testing the hypothesis - is rejected both through graphical analysis (comparing the density of residuals) and statistical tests (inter-quartile range test that identifies many severe outliers and the Shapiro Wilk test that rejects the assumption of normality).[9] Given these results, we move to a different empirical setting that allows us to account for such violations of the linearity and normality assumptions (Hao and Naiman, 2007). More precisely, considering the potential heterogenous impact that our key explanatory variables - namely the RTI, Anatomy and Care Jobs - can play on the

[8]The F-test is computed as follows: $F = \frac{(SSR_r - SSR_{ur})/q}{SSR_{un}/(n-k-1)}$ with SSR_r and SSR_{ur} equal to the sum of squared of residuals of the restricted (Model 0 with respect to Model 1; Model 1 with respect to Model 2; Model 2 with respect to Model 3) and unrestricted model (respectively Model 1, Model 2, Model 3), where n is the number of observations, k is the number of explanatory variables and q corresponds to the number of exclusion restrictions that will be tested under the Null Hypothesis $H_0 = \beta_{k+q-1} = 0, ..., \beta_k = 0$ (Jeffrey, 2012, p.145-147).

[9]All the post-estimation graphs are illustrated in Figure 6 in the Appendix. The outputs of the tests are available upon request.

different quantiles of the wage distribution, we proceed with a quantile regression model to verify the behaviour of our indicators along the distribution, simultaneously computing several quantile coefficients (at .05th, .25th, median, .75th and .90th).[10]

As emerged from Table 6, we detect an increasing value along the wage quantile for the Job Anatomy indicator, meaning that the role of power attributes increases more the wages at the top. In contrast, the negative effect of Care Job decreases along the distribution and gets positive for the upper quantiles, starting from the 75th one. The RTI seems to have a more positive effect at the bottom, then decreasing along the distribution until losing statistical significance at the very top of the distribution (90th quantile). Going to the interaction between Care Jobs and Gender that was not significant in the linear econometric setting, an interesting and varying pattern emerges now. In fact, while at the bottom of the distribution, it shows a positive impact suggesting that being a female worker and performing a Care Job may partially reduce the gender and care penalty with respect to other female workers or male care workers located in the same wage quantile, once we go up along the distribution, then the interaction becomes negative highlighting the presence of social closure mechanisms within Care Jobs that bound with gender discrimination.

To better verify whether this variation in coefficients values corresponds to a statistically significant difference across quantiles, we proceed with the Wald test where, for each variable of interest, we can compute the difference between its coefficients estimated in any pair of quantiles. In the vast majority of cases, we reject the hypothesis of inter-quantile equality, further supporting the choice of this empirical setting.[11] We also perform a graphical investigation on the potential different impact of the key variables, providing descriptive evidence on the behaviour of the estimated coefficients along the wage distribution.

Figure 3 shows the plots of key variables' coefficients. First, we observe that the red lines located within the ticker line, that in turn represents the estimated 95% confidence interval, are always not horizontal, suggesting that a change of the variable does not imply the same impact on the different quantiles of our response variable. For instance, the Anatomy coefficient shows an upward sloping curve, highlighting a scale shift that widens the wage scale, while the Care Jobs coefficient records both a location and scale shift as it moves from negative to positive values and becomes more upward sloping at the upper tails. On the contrary, the Female coefficient shows always a negative and non-horizontal trend especially at the bottom of the distribution, where the female wage

[10]The bootstrap method is used to estimate coefficients' standard errors.

[11]More detailed tables showing the F-statistics for each test are available in the Appendix.

	.05th Quantile	.25th Quantile	.50th Quantile	.75th Quantile	.90th Quantile
Female	-0.3771***	-0.2382***	-0.1854***	-0.1728***	-0.1780***
	(0.0054)	(0.0018)	(0.0011)	(0.0013)	(0.0020)
RTI	0.0322***	0.0076*	0.0075***	0.0081***	0.0036
	(0.0046)	(0.0030)	(0.0023)	(0.0025)	(0.0028)
Anatomy	0.0375***	0.0365***	0.0418***	0.0468***	0.0483***
	(0.0056)	(0.0020)	(0.0015)	(0.0019)	(0.0018)
Care Jobs	-0.0535*	-0.0481***	-0.0383***	0.0145***	0.0730***
	(0.0097)	(0.0049)	(0.0039)	(0.0055)	(0.0054)
Care Jobs x Female	0.0899*	0.0614***	0.0195***	-0.0581***	-0.1096***
	(0.0099)	(0.0055)	(0.0032)	(0.0045)	(0.0052)
Constant	7.2964***	7.2970***	7.5688***	7.7545***	7.8849***
	(0.0116)	(0.0127)	(0.0078)	(0.0061)	(0.0104)
Control Variables	YES	YES	YES	YES	YES
R-squared	0.3041	0.2798	0.2589	0.2745	0.3083
Number of observations	283,854	283,854	283,854	283,854	283,854

* p<0.05; ** p<0.01; *** p<0.001

Table 6: Quantile regressions for Log-wage Model 3 (2013-2017 data)

penalty records the highest values, then decreasing and getting flatter at the very top. The RTI records a downward sloping line, implying a restriction of the wage scale with a more rapid decline at the top of the distribution. Furthermore, being female and performing a Care Job also shows an interesting shift, as the coefficient moves from being positive to radically fall below zero as the wage quantile increases. Moreover, all the figures include the 95% confidence interval estimated through an OLS regression model (marked with the dotted lines), whose gap with the quantile estimation confirms the necessity to proceed with such empirical setting.[12]

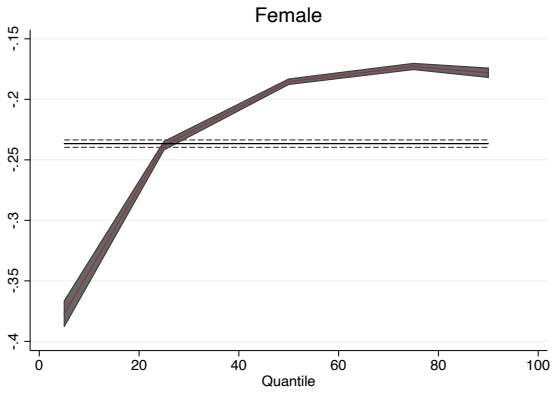
5 Interpretation of the results

The wage equation estimation provides interesting results with respect to the literature that builds on the 'routinization hypothesis' (Autor et al., 2003). In a standard Mincerian equation setting, the degree of routinization of job activities penalizes wages; however, when the two neglected origins of inequality are introduced, namely the Job Anatomy indicator, a proxy for hierarchical roles, and the Care Job indicator, a proxy for essential jobs, the standard RTI index loses its sign consistency. Along the wage distribution, the

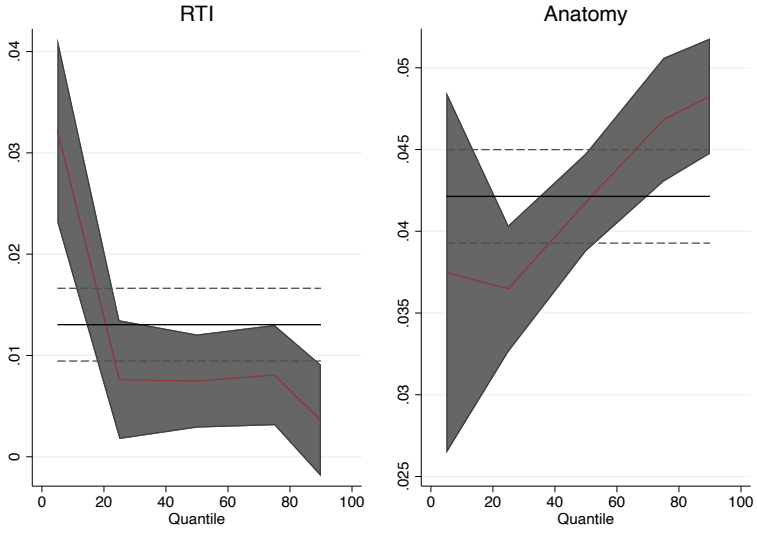
[12]The use of a log response variable slightly weakens the interpretability of the graphical behaviour of coefficients because of the higher approximation of a normal distribution. Complementary plots of the quantile coefficients estimated on income levels are available upon request.

Figure 3: Quantile coefficients (econometric model on 2013-2017 data)

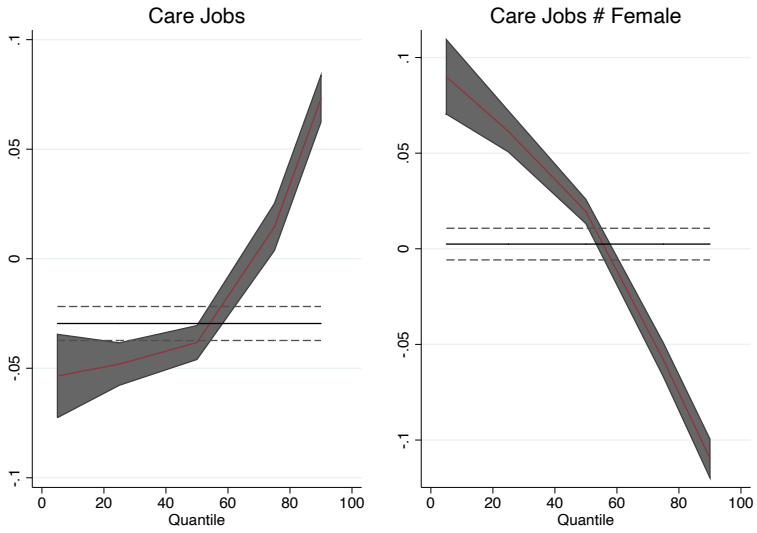
(a) Gender



(b) Labour attributes coefficients



(c) Care Jobs and interaction with Gender



Job Anatomy index positively affects wages, with increasing coefficients for higher quantiles, representing an inequality-enhancing factor. At the opposite, the Care Job index negatively affects wages, with decreasing levels along the wage distribution, turning to be another inequality-enhancing factor.

Our results add new evidence on the relationship between wages and two neglected attributes of work, and their impact on inequality, namely power and care. The few previous attempts to assess the role played by managerial functions and basic needs satisfaction in affecting occupational remunerations were in the direction of including, within the broader category of social skills (England, 1992), both power, belonging to the sphere of authority and having a positive impact on wages, and care, belonging to the sphere of nurturant skills, negatively affecting wages (Kilbourne et al., 1994; England et al., 1994).

As shown by our analysis, accounting for these attributes is crucial as it allows to better capture the overall variance of wages, when compared to the mainstream approach based on the RTI index. Why it is so? First, this result derives from the inner information that are inbuilt in the Job Anatomy index. The index is in fact deriving from a combined top-down/bottom-up approach, sequencing the wide set of information contained in the ICP. The procedure is rather different when compared to the RTI which is instead constructed selecting specific variables, then aggregated into occupations. At the opposite, our indicator, firstly, defines broad theoretical categories of attributes of labour, then goes back to a multiple variable selection process, and finally extracts synthetic components according to a factor analysis (for further details, see the Appendix). Such factors are then re-aggregated at the occupational level. This procedure allows to endogenously elicit the relevant attributes of occupations. Among them, the ones referring to power, autonomy and knowledge are the most relevant to explain not only occupations heterogeneity, but also wage variability.

Beyond methodological considerations, there are also theoretical ones to put forward. The indicator captures information related to knowledge and hierarchical positions inside the workplace, according to the view that the latter are hierarchical organizations, characterised by an asymmetric distribution of knowledge and power (Coriat and Dosi, 1998). These elements draw upon the capability-based theory of the firm (Dosi et al., 2021), that neatly identifies such dimensions as the building blocks of the establishment and evolution of organizational units. In this respect, the indicator also represents the micro-level counterpart of a Contemporary Class Analysis framework (Pitts, 2022), in so far it captures the so-called "technical composition" of labour. Our empirical approach

contributes to overcome the fictitious controversy between micro- and macro-level class schemes (Grusky and Weeden, 2001). It paves the way for a new characterization of the world of work encompassing both the "material" and "procedural" view of the labour process, but also the hierarchical functions and positions covered by occupations, which go beyond the individual exercise of control and authority, and crystallize into collective hierarchically-structured workplaces. In this setting, from the bottom-up, we are able to empirically identify and neatly distinguish that the upper categories, like managers, record a wage-premium largely attributable to the *exclusive* exercise of power in their working activities, rather than to their skills, or individual productivity, or the knowledge they possess. Such positive and highly significant impact of performing an occupation characterized by a high degree of power and authority over people, and organizations therein, is consistent with empirical estimates showing increasing inequality at the top, due to soaring remunerations for managers (Piketty and Saez, 2003; Mishel, 2022). Such trends are coherent with a dynamic class-based analysis to detect the sources of wage inequality (Cetrulo et al., 2022), but also with the evolution of capitalism progressively turning into a managerial capitalism (Lévy and Duménil, 2018).

Second, concerning the Care Job indicator, although the wage penalty of essential workers is a well-known consolidated phenomenon, new evidence is presented here on the specific case of Italy where the wage penalty turns to be particularly severe. A lively discussion on the mechanisms behind the "care penalty" has spurred in the literature (England and Folbre, 1999; England et al., 2002). The first explanation goes under the heading of "devaluation theory", according to which female segregated jobs are devaluated in the labor market because of the historical, cultural and socio-economic subordination of women in society. The main idea is that "the value of labour is gendered" (Magnusson, 2009, p.87), therefore those skills normally considered as inner female abilities tend to be undervalued in the market (as in the case of nurturant skills). Given that taking care of others is identified as an innate instinct, biologically related to women because of motherhood (England, 2005), these jobs are badly evaluated and therefore poorly remunerated. The hypothesis of devaluation is usually tested looking at the sign and statistical significance of the female occupational segregation's coefficient in wage regressions. A similar channel relates to the neoclassical justification of "compensating differentials", according to which lower wages are due to the intrinsic rewards that care workers get in taking care of other people, ending in the trap of the "prisoner of love" dilemma (Folbre, 1995). The debate of "love against money" is also raised to stress the risk of "commodification" of

Care Jobs, made explicit by a the resistance to pay for activities that are intended as emotional, according to the idea that work is performed out of love or out of money, but not the two at the same time (Folbre and Nelson, 2000).

Gender segregation is a channel we are able to test, given the interaction term between female and the Care Job indicator, providing a not trivial result. By means of the quantile approach we also provide some insights on the role of social closure mechanisms and ex-post different bargaining power of care workers. Indeed, the quantile regression analysis shows a given stratification of the wage penalties in caring activities. As documented, caring activities, if conducted from a low- versus a high-wage worker have a different effect for their pay. This consideration confirms the role played by occupational barriers (Weeden, 2002) in affecting wage inequality, even if in the case of care work these mechanisms strongly intertwine with a gender segregation dynamics.

6 Conclusions

Two neglected origins of inequality in the mainstream approach are certainly the dimension of power and the essentiality of job tasks performed by workers. Indeed, no specific attention is provided in wage regression models to the hierarchical positioning covered by an individual, such as the span of control exercised by the functions embedded in each occupation and the type of needs it can satisfy, particularly when coming to services, whereby satisfied needs might be essential, such as health and education. Those attributes are quite unanimously neglected by market-based approaches on the determination of the labour value, but new evidence is emerging also thanks to the use of occupational data and labour force statistics. For instance, Cetrulo et al. (2020a) have advanced along these lines of reasoning, tracing back to knowledge and power the two essential attributes shaping heterogeneity across occupational categories, while the role of Care Jobs has been more widely investigated in feminist studies (England, 2005).

Are then wages really a good proxy for the value of labour? Or, alternatively, do they largely reflect socio-institutional embedded practices of current societies, according to which a manager deserves to be paid more than a nurse. The goal of this paper is to investigate the determinants of wage remuneration and wage inequality focusing on two opposite dimensions: hierarchical functions and care-work. Our contributions include, first the construction of a new synthetic indicator able to capture and quantitatively assess the distribution of power across occupations; second, the development of a new indicator

able to fine grained account for care jobs; third, the econometric estimation of the determinants of wage levels and wage inequality contrasting the new proposed indicators versus the standard Mincer equation, and the routine task index. Our results downplay the role of the accustomed routine task index in determining the wage remuneration and prove the role of the socio-institutional embeddedness of wages, rooted on hierarchical positions and largely discarding the role of essentiality in the executed job activity.

Through an empirical analysis on the Italian labor force data from 2013 to 2017 linked to the ICP, we offer a novel look at the determinants of the value of labour as proxied by wages, beyond the understood narrative of the latter reflecting individual productivity, labour supply, skills and routinization of the job content. We show that two fundamental attributes, such as power and care, usually neglected in empirical studies, play a very important role in affecting wages, both positively and negatively. While managerial and supervisory functions do increase the wage rate and inequality across workers, care work activities present a negative penalizing effect, that result to be higher for low paid occupations, which in turn tend to be more female segregated, therefore increasing inequality. These results confirm consolidated stylized facts observed in contemporary labor markets, such as the soaring and uninterrupted growth of inequality at the top of the wage distribution, and the under-evaluation of the role of essential workers performing caring activities.

Indeed, the growing share of managers and their specific location in the class structure, confirm the influential role they play in advanced economies, underlining the necessity of looking at the mechanisms through which they capture value added and build their socio-economic status. On the contrary, if compared to other workers in the service sector, care workers result to be particularly weak in terms of bargaining power and unable to capture any value added in the sector where they are employed (Folbre et al., 2023). This lack of power may depend on different factors, starting from the devaluation of female segregated job.

Further investigation should be directed towards an enriched identification of care work. First, the complexity and heterogeneity of contexts in which (paid and unpaid) care work is performed requires the analysis of data beyond labour force surveys, looking at time use and distribution of care activities within household (Anxo et al., 2011). In addition, the quantification of its value cannot be resolved with individual labour productivity, but calls for the definition of legal-institutional boundaries, like a minimum wage, able to rise compensation for the lower echelon of the wage distribution.

The explosion of the COVID-19 pandemic and the interest in essential workers prospected a watershed moment in terms of public policies. However, economic and working conditions of care workers worldwide have not improved, but rather worsened (ILO, 2023). This signal that social reproduction is the locus of an important crisis of modern capitalism (Bhattacharya, 2017), that Fraser (2022) defines "cannibal" because of the continuous extraction of resources from essential activities towards inessential ones. Studying systematically the mechanisms and the extent to which this extraction takes place represents future avenues of research.

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Technical Appendix

The appendix is structured as follows: the first section contains additional information on the construction of the Anatomy and RTI indicators. Their components are presented and analysed in a comparative perspective. The second section provides a more detailed overview on the variables used in the empirical analysis. An expanded version of the OLS regression models is included to illustrate the impact of ISCO groups, and the OLS post-estimation descriptive analysis follows. The section ends with two tables providing the test statistics of the inter-quantile coefficients difference.

6.1 The construction of the Job Anatomy Indicator

In this section, we briefly clarify how the Job Anatomy indicator has been defined and we also provide further descriptive evidence of the differences between the components of Routine Task Index and the ones that constitute our own indicator (listed in Table 7). Let us start from illustrating the procedure developed in Cetrulo et al. (2020a) to identify the main traits of the Italian occupation structure. Granting on the rich amount of information contained in the ICP, a multi-step process was followed. At first, 100 questions of interest were selected from the entire questionnaire and assigned to three main domains of interest: 1) Knowledge and Learning; 2) Digital Skills; and 3) Work Organisation. The choice of these domains of interest was guided by the willingness to link from a theoretically perspective the evolutionary theory on the nature of organizations (Coriat and Dosi, 1998) and the labour process theory (Thompson, 1995). Then, the 100 variables (questions) were analysed in order to exclude both those showing higher degree of overlapping information and those with very small variance across occupational groups (suggesting the presence of a systematic bias). The last step - preliminary to the empirical analysis - was therefore the identification of the 25 variables of interest. The final set of variables was then further inspected through the estimation of the KMO Test, the Fligner non parametric test and the Alpha Conbrach test. The factor analysis was performed with the aim of exploiting the heterogeneous distribution of our variables within the entire set of occupations at 4-digit, identifying the hidden factors behind their emerging correlations. The number of factors was set consistently with the outcomes of the parallel analysis ($n* = 5$), the post analysis on Kaiser's criterion (eigenvalue>1) and the share of total variance explained. Different methods of extraction were adopted (Minimum residuals, unweighted least squares, principal axis), all delivering the same result. Moreover, the oblique rotation

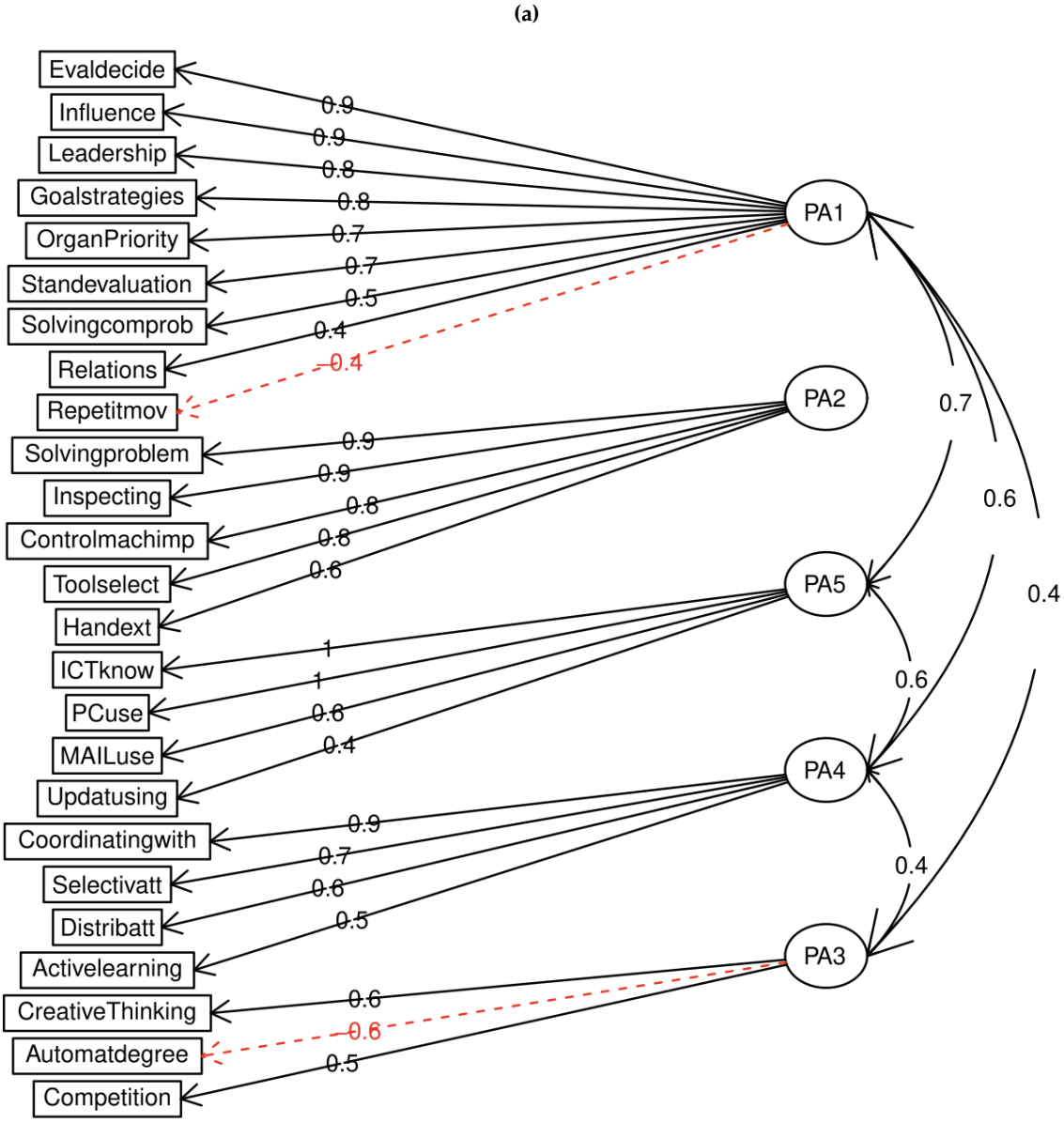
method was adopted to allow for correlation among factors. According to the analysis presented in Figure 4, 5 factors emerged as the main traits of Italian occupations: 1) Power ($PA1$) ; 2) Cognitive and Manual Dexterity ($PA2$); 3) ICT Skills ($PA5$); 4) Team ($PA4$) and 5) Creative ($PA3$). The internal composition of each factors in terms of dominating variables informed their labelling, as can be appreciated in the diagram below that illustrates graphically the outcome of the factor analysis. It is remarkable that while attributes related to authority and autonomy are rather concentrated in the first factor, the knowledge endowment of labour disseminates in different factors, supplying a complex picture of its possible features (from ICT knowledge to Problem solution and Creative Thinking).

Figure 5 and Figure 6 better illustrate the behaviour of our indicators and subcomponents, allowing for both a within and between ISCO groups comparison. As shown by the box-plots, Anatomy seems to follow mainly the pattern of Power, still capturing some degree of knowledge endowment (contained for instance in ICT skills) that record higher intensity in the scientific and technical occupations. On the contrary the trend of RTI highlights, consistently with its construction, those ISCO groups located at the bottom of the classification, characterized by stronger degree of routine manual and routine cognitive tasks.

RTI	
Routine Cognitive	Repeating the same task; Being accurate and exact; Structured vs unstructured work
Routine Manual	Pace determined by the speed of the equipment; Controlling machines and process; Spend time making repetitive movements
Non Routine Manual Physical	Operating vehicles, mechanized devices or equipment; Manual dexterity; Spend time using hands to handle, control or feel objects, tools; Spatial orientation
Non Routine Cognitive Analytical	Analyzing data and information; Thinking creatively; Interpreting information from others
Non Routine Cognitive Interpersonal	Establishing and maintaining personal relationships; Guiding, directing and motivating subordinates; Coaching, developing others
Anatomy	
Power	Evaluate and Decide; Goals and Strategies; Organizing Priorities; Leadership; Influence; Solving Complex Problems; Standard Evaluation; Relations
Cognitive and Manual Dexterity	Solving Problems; Tool Selection; Repetitive Movements; Automation Degree; Hands Dexterity; Control Machine Importance; Inspecting
ICT Skills	Update and Use; PC Use; ICT Knowledge; Mail Use
Team	Distributed Attention; Selective Attention; Active Learning; Coordinating with Others
Creative	Creative Thinking; Competition; Automation Degree (negative loading)

Table 7: Components of RTI (Autor et al., 2003) and Anatomy (Cetrulo et al., 2020a)

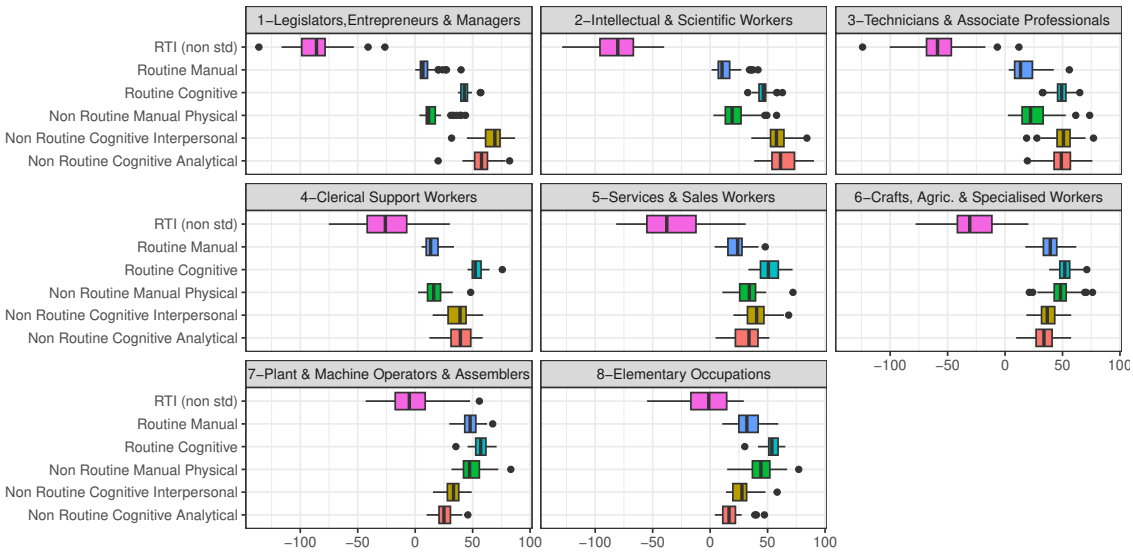
Figure 4: Factor Analysis from Cetrulo et al. (2020a)



Notes: Circles represent the factors (descending order in terms of variance explained). The lines connecting factors on the right and variables on the left report the variables' loadings, red dotted lines pinpoint a negative contribution of the variable to the factor (negative loading). The arrows that link the factors represent between factors correlation.

Figure 5: Job Attributes components across ISCO groups

(a) RTI components across ISCO Groups

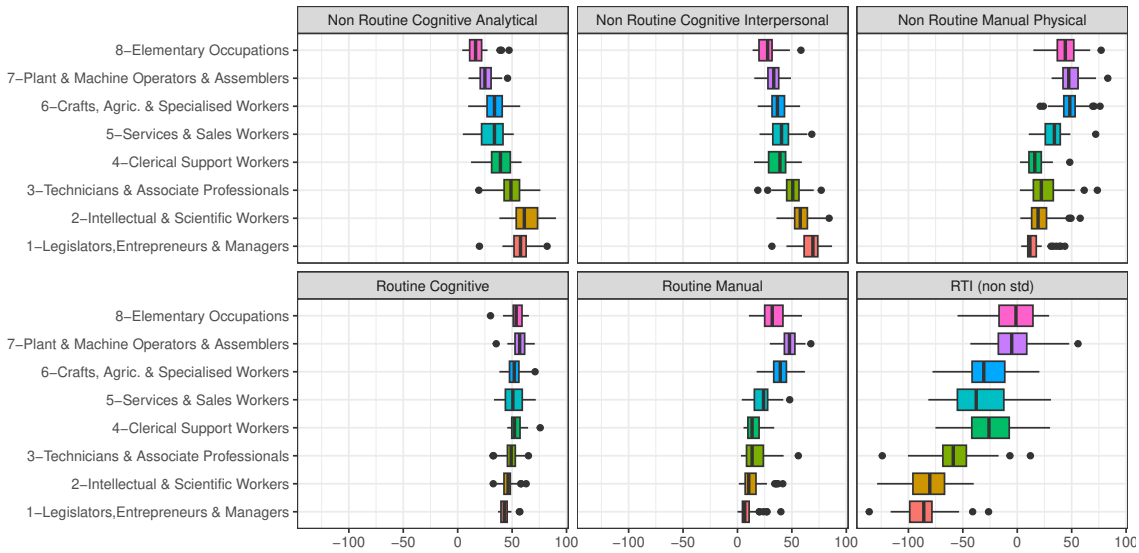


(b) Anatomy components across ISCO Groups

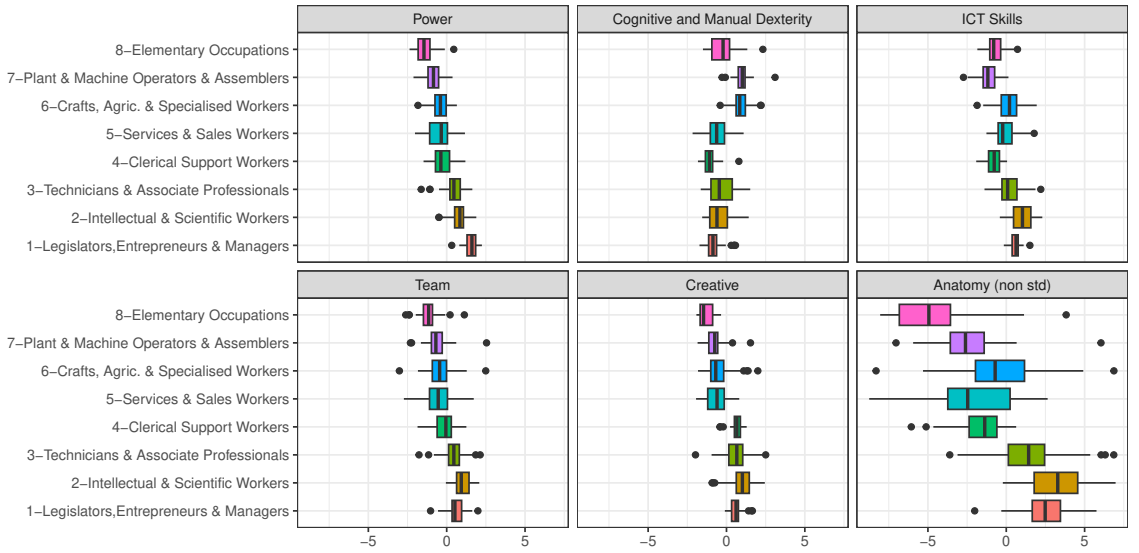
Notes: To improve the readability of the graph and comparative descriptive analysis, the variable Anatomy and RTI are not standardized, while the other variables are all expressed in their original 4-digit value.

Figure 6: Job Attributes components across ISCO groups

(a) RTI components across ISCO Groups



(b) Anatomy components across ISCO Groups



Notes: To improve the readability of the graph and comparative descriptive analysis, the variable Anatomy and RTI are not standardized, while the other variables are all expressed in their original 4-digit value.

6.2 Empirical analysis: variables and additional results

Variable	Description	Value
Dependent variable		
Log Wage	Log of monthly wage	Log value
Occupation attributes		
RTI	Routine Task index	Standardized value
Job Anatomy index	Sum of the five factor scores	Standardized value
Care Job index	Care jobs (Dummy variable)	1 = the job belongs to care jobs, 0 = otherwise
Socio-demographic individual characteristics		
Female	Gender of the worker (Dummy variable)	1 = female, 0 otherwise
Married	Civil state of the worker (Dummy variable)	1 = married, 0 otherwise
Experience	Year of experience in the labor market	Years
Age	Age cohorts (Categorical variable)	1 = 15-35 years old, 2 = 36-50 years old , 3 = over 50 years old
Education	Level of education (Categorical variable)	1 = Lower Secondary, 2 = Secondary, 3 = Bachelor, 4 = Master
Job Contract	Type of job contract (Categorical variable)	1 = Permanent, 2 = Temporary, 3 = Autonomous
ISCO Occupational groups		
Legislators,Entrepreneurs & Managers	Dummy	1 = ISCO 1, 0 otherwise
Intellectual & Scientific Workers	Dummy	1 = ISCO 2, 0 otherwise
Technicians & Associate Professionals	Dummy	1 = ISCO 3, 0 otherwise
Clerical Support Workers	Dummy	1 = ISCO 4, 0 otherwise
Services & Sales Workers	Dummy	1 = ISCO 5, 0 otherwise
Crafts, Agric. & Specialised Workers	Dummy	1 = ISCO 6, 0 otherwise
Plant & Machine Operators & Assemblers	Dummy	1 = ISCO 7, 0 otherwise
Elementary Occupations	Dummy	1 = ISCO 8, 0 otherwise
Geographical variables		
Geographical Area	Categorical variable	0 = North-Western Italy, 1= North-Eastern, 2 = Central Italy, 3 = Southern Italy
Sectors		
Agriculture	Dummy	1 = NACE 1, 0 otherwise
Mining and Quarrying	Dummy	1 = NACE 2, 0 otherwise
Manufacturing	Dummy	1 = NACE 3-9, 0 otherwise
Electricity Gas Water & Waste	Dummy	1 = NACE 10, 0 otherwise
Construction	Dummy	1 = NACE 11, 0 otherwise
Wholesale Transport & Accomodation	Dummy	1 = NACE 12, 0 otherwise
Information & Communication	Dummy	1 = NACE 13, 0 otherwise
Financial & Insurance Act	Dummy	1 = NACE 14, 0 otherwise
Real Estate Activities	Dummy	1 = NACE 15, 0 otherwise
Professional Scientific Support Activities	Dummy	1 = NACE 16, 0 otherwise
Public Administration, Education & Human Health	Dummy	1 = NACE 17, 0 otherwise
Art & Other Services	Dummy	1 = NACE 18, 0 otherwise
Time		
Year	Time Dummies	2013, 2014, 2015, 2016, 2017

Table 8: List of variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Log Wage	288,595	7.12006	.4545852	3.178054	9.903487
Care	408,809	.143605	.3506891	0	1
Anatomy (std)	408,809	-.4067268	1.033055	-2.837449	2.259064
RTI (std)	408,809	.1993532	.8357253	-2.521913	2.686469
Education Level	408,809	1.987603	.9940494	1	4
Female	408,809	.4372115	.4960425	0	1
ISCO Groups	408,809	4.694579	1.945415	1	8
Married	408,809	.6220827	.4848674	0	1
Tenure	400,186	13.46694	11.26924	0	73
Tenure Squared	400,186	308.3537	432.2631	0	5329
Not Employed	408,809	.0786284	.2691582	0	1
Age classes	408,809	2.140122	.7080064	1	3
Job Contract	408,809	1.573236	.8472181	1	3
Geografical Area	408,809	2.432273	1.171665	1	4
Sector	408,809	7.13043	3.383025	1	12
Area	408,809	2.432273	1.171665	1	4
Time	408,809	2014.992	1.42373	2013	2017

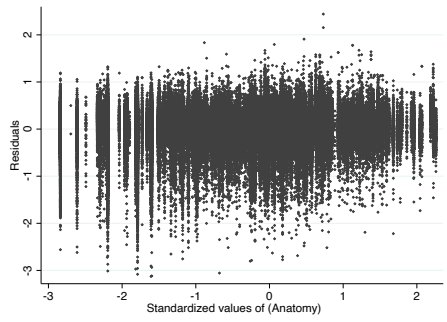
Table 9: Summary Statistics

	Model 0	Model 1	Model 2	Model 3
Secondary Level	0.0626***	0.0617***	0.0605***	0.0603***
	(0.0021)	(0.0021)	(0.0021)	(0.0021)
Bachelor	0.1183***	0.1197***	0.1143***	0.1193***
	(0.0046)	(0.0046)	(0.0046)	(0.0047)
Master	0.2110***	0.2080***	0.2049***	0.2023***
	(0.0032)	(0.0032)	(0.0032)	(0.0033)
Female	-0.2435***	-0.2396***	-0.2339***	-0.2306***
	(0.0018)	(0.0018)	(0.0018)	(0.0020)
II Digit	-0.3711***	-0.3594***	-0.3646***	-0.3568***
	(0.0071)	(0.0071)	(0.0071)	(0.0072)
III Digit	-0.4799***	-0.4543***	-0.4683***	-0.4646***
	(0.0071)	(0.0072)	(0.0073)	(0.0073)
IV Digit	-0.5741***	-0.5365***	-0.5401***	-0.5446***
	(0.0072)	(0.0075)	(0.0075)	(0.0075)
V Digit	-0.6823***	-0.6289***	-0.6177***	-0.6166***
	(0.0074)	(0.0080)	(0.0080)	(0.0081)
VI Digit	-0.6585***	-0.6097***	-0.6287***	-0.6291***
	(0.0074)	(0.0079)	(0.0080)	(0.0080)
VII Digit	-0.6065***	-0.5407***	-0.5499***	-0.5519***
	(0.0074)	(0.0083)	(0.0083)	(0.0083)
VIII Digit	-0.8480***	-0.7773***	-0.7633***	-0.7648***
	(0.0077)	(0.0086)	(0.0086)	(0.0086)
Married	0.0236***	0.0234***	0.0237***	0.0237***
	(0.0018)	(0.0018)	(0.0018)	(0.0018)
Tenure	0.0121***	0.0120***	0.0118***	0.0116***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Tenure squared	-0.0002***	-0.0002***	-0.0002***	-0.0002***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Not Employed	-0.1292***	-0.1289***	-0.1288***	-0.1287***
	(0.0148)	(0.0148)	(0.0148)	(0.0148)
35-50 Years Old	0.0595***	0.0595***	0.0601***	0.0606***
	(0.0024)	(0.0024)	(0.0024)	(0.0024)
Over 50 Years Old	0.0740***	0.0749***	0.0761***	0.0762***
	(0.0030)	(0.0030)	(0.0030)	(0.0030)
Temporary Job Contract	-0.0981***	-0.0993***	-0.1003***	-0.1017***
	(0.0034)	(0.0034)	(0.0034)	(0.0034)
Autonomous Job Contract	-0.1412***	-0.1441***	-0.1440***	-0.1450***
	(0.0101)	(0.0101)	(0.0101)	(0.0101)
RTI		-0.0285***	0.0058**	0.0082***
		(0.0016)	(0.0021)	(0.0021)
Anatomy			0.0391***	0.0390***
			(0.0017)	(0.0017)
Care Jobs				-0.0328***
				(0.0050)
Care Jobs * Female				-0.0008
				(0.0054)
Constant	7.5679***	7.5231***	7.5277***	7.5284***
	(0.0102)	(0.0105)	(0.0105)	(0.0105)
SECTORAL DUMMIES	YES	YES	YES	YES
GEOGRAPHICAL AREA DUMMIES	YES	YES	YES	YES
TIME DUMMIES	YES	YES	YES	YES
R-squared	0.4560	0.4569	0.4584	0.4587
Number of observations	283,854	283,854	283,854	283,854

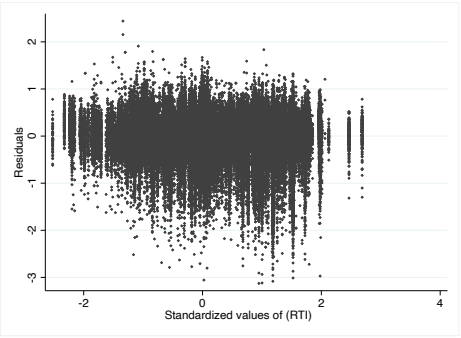
Table 10: OLS regression models (2013-2017 data)

Figure 7: Post-estimation of the OLS Model 3

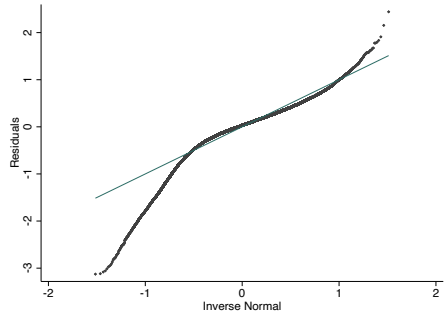
(a) Scatter Plot of Residuals and Anatomy



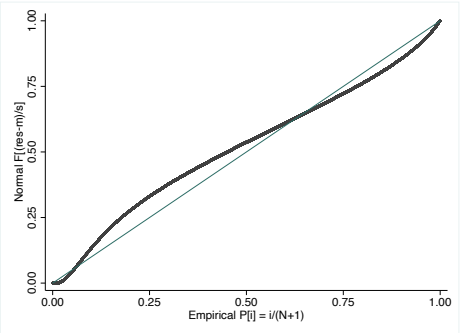
(b) Scatter Plot of Residuals and RTI



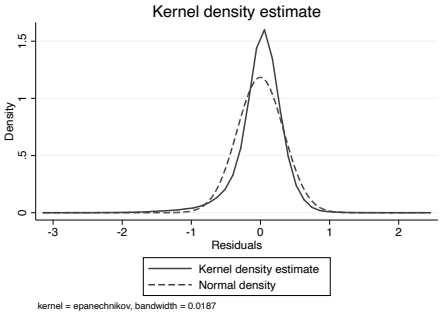
(c) Qnorm Plot



(d) Pnorm Plot



(e) Kernel density



Interquantile difference	Female	RTI	Anatomy	Care Jobs	Care Jobs and and Female
.05th Quantile - .25th Quantile = 0	Rejected (***)	Rejected (***)	Accepted	Accepted	Rejected (**)
.05th Quantile - .50th Quantile = 0	Rejected (***)	Rejected (***)	Accepted	Accepted	Rejected (***)
.05th Quantile - .75th Quantile = 0	Rejected (***)	Rejected (***)	Rejected (*)	Rejected (***)	Rejected (***)
.05th Quantile - .90th Quantile = 0	Rejected (***)	Rejected (***)	Rejected (*)	Rejected (***)	Rejected (***)
.25th Quantile - .50th Quantile = 0	Rejected (***)	Accepted	Rejected (***)	Rejected (***)	Rejected (***)
.25th Quantile - .75th Quantile = 0	Rejected (***)	Accepted	Rejected (***)	Rejected (***)	Rejected (***)
.25th Quantile - .90th Quantile = 0	Rejected (***)	Accepted	Rejected (***)	Rejected (***)	Rejected (***)
.50th Quantile - .75th Quantile = 0	Rejected (***)	Accepted	Rejected (***)	Rejected (***)	Rejected (***)
.50th Quantile - .90th Quantile = 0	Rejected (**)	Accepted	Rejected (***)	Rejected (***)	Rejected (***)
.75th Quantile - .90th Quantile = 0	Rejected (**)	Rejected (*)	Accepted	Rejected (***)	Rejected (***)

* p<0.05; ** p<0.01; *** p<0.001

Table 11: Test on quantile coefficients (synthetic version)

Table 12: Test on coefficients inter-quantile difference

	Female	RTI	Anatomy	Care Jobs	Care Jobs and and Female
.05th Quantile - .25th Quantile	F(1,283812) = 1414.25 Prob >F = 0.0000	F(1,283812) = 30.38 Prob >F = 0.0000	F(1,283812) = 0.06 Prob >F = 0.8118	F(1,283812) = 0.43 Prob >F = 0.5111	F(1,283812) = 6.49 Prob >F = 0.0108
.05th Quantile - .50th Quantile	F(1,283812) = 1778.22 Prob >F = 0.0000	F(1,283812) = 24.74 Prob >F = 0.0000	F(1,283812) = 0.94 Prob >F = 0.3313	F(1,283812) = 3.44 Prob >F = 0.0636	F(1,283812) = 39.53 Prob >F = 0.0000
.05th Quantile - .75th Quantile	F(1,283812) = 2365.13 Prob >F = 0.0000	F(1,283812) = 22.47 Prob >F = 0.0000	F(1,283812) = 4.92 Prob >F = 0.0266	F(1,283812) = 69.93 Prob >F = 0.0000	F(1,283812) = 171.83 Prob >F = 0.0000
.05th Quantile - .90th Quantile	F(1,283812) = 1972.08 Prob >F = 0.0000	F(1,283812) = 34.91. Prob >F = 0.0000	F(1,283812) = 4.90 Prob >F = 0.0268	F(1,283812) = 195.76 Prob >F = 0.0000	F(1,283812) = 295.69 Prob >F = 0.0000
.25th Quantile - .50th Quantile	F(1,283812) = 802.52 Prob >F = 0.0000	F(1,283812) = 0.01 Prob >F = 0.9197	F(1,283812) = 11.94 Prob >F = 0.0005	F(1,283812) = 14.63 Prob >F = 0.0001	F(1,283812) = 236.85 Prob >F = 0.0000
.25th Quantile - .75th Quantile	F(1,283812) = 1866.95 Prob >F = 0.0000	F(1,283812) = 0.10 Prob >F = 0.7573	F(1,283812) = 46.80 Prob >F = 0.0000	F(1,283812) = 280.64 Prob >F = 0.0000	F(1,283812) = 1409.26 Prob >F = 0.0000
.25th Quantile - .90th Quantile	F(1,283812) = 567.94 Prob >F = 0.0000	F(1,283812) = 3.04 Prob >F = 0.0813	F(1,283812) = 32.08 Prob >F = 0.0000	F(1,283812) = 489.30 Prob >F = 0.0000	F(1,283812) = 825.41 Prob >F = 0.0000
.50th Quantile - .75th Quantile	F(1,283812) = 107.51 Prob >F = 0.0000	F(1,283812) = 0.30 Prob >F =0.5864	F(1,283812) = 15.49 Prob >F = 0.0001	F(1,283812) = 399.96 Prob >F = 0.0000	F(1,283812) = 1368.13 Prob >F = 0.0000
.50th Quantile - .90th Quantile	F(1,283812) = 10.19 Prob >F = 0.0014	F(1,283812) = 2.91 Prob >F = 0.0880	F(1,283812) = 12.67 Prob >F = 0.0004	F(1,283812) = 466.53 Prob >F = 0.0000	F(1,283812) = 541.69 Prob >F = 0.0000
.75th Quantile - .90th Quantile	F(1,283812) = 7.55 Prob >F = 0.0060	F(1,283812) = 5.24 Prob >F = 0.0221	F(1,283812) = 1.02 Prob >F = 0.3125	F(1,283812) = 205.35 Prob >F = 0.0000	F(1,283812) = 133.13 Prob >F = 0.0000