WHICH COMPETENCIES DO FIRMS REWARD?

Empirical evidence on Italian employees

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(May 2015)

(Preliminary version - comments welcome)

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Abstract

Institutional setting of wage level provides elements which explain the minimum contractual wage. Firms can add supplementary wage premium according to specific circumstances. This paper focus on whether firms reward, in addition to minimum wage, distinctive competencies and if so, which competencies. Searching for an answer we first distinguish between skills and competencies, and then separate the threshold from the distinctive level of competencies. Second, we decompose competencies in two cluster groups: soft and technical competencies. Third, the latter can be distinct into two domains relating respectively to digital and non-digital technical competencies. Fourth, the digital domain has two components, namely, technologies based on rules and algorithm execution and technologies for pattern recognition and complex communication. Drawing on over 3,600 interviews with a stratified sample of Italian employees and controlling for a wide array of covariates (firm size, sectors, occupations, working and contractual conditions, education and industrial relations), we estimate a five simultaneous equation system by 3SLS in conjunction with the bootstrap method. The results show that a positive relationship between wage premium and distinctive competencies emerges only with respect to 3 out of 4 competency components, precisely the soft competencies, the non-digital technical competencies and the component of digital technologies for patterns recognition and complex communications.

Key words: Wages, Competencies, Technologies

JEL CODE: J31, J24, J.81, O33

Decompose separate

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1. Introduction

At the micro level, several studies document that the performance of successful companies is increasingly influenced not only by investments in some tangible assets, namely, industrial technologies based on microelectronics, but also intangible assets, mainly organizational capital and innovative managerial practices (Brynjolfsson and Hitt, 2000, 2003; Brynjolfsson et al., 2002; Black and Lynch, 2004; Bloom et al., 2014).[1] The changes associated with these new assets not only increase but also alter the content of competencies required in terms of managing new technologies, confronting the diagnostics of situations and resolving problems, knowing how to work in teams and being able to communicate and interact with colleagues. Lester and Piore (2004) note that 'analytical processes' - typical of a stationary ergodic milieu - are at work when the alternative outcomes are well understood and can be clearly defined and distinguished from each other, while the 'interpretative processes' - archetypal of non-ergodic stochastic environments - are activated when possible outcomes are unknown, i.e., when the task is precisely to create the results and determine their properties. The two processes are somewhat opposed, but the distinctive competence is in integrating these two processes, namely, thinking of them independently but managing them simultaneously. This overturns the structure of the competencies requested of job-holders, increasing the incidence of cognitive and social dimensions of work activities (the so-called soft component, which refers to a cluster or a group of distinguishing and deep organizational behaviours) at the expense of organizational behaviours linked to the practical dimensions of work (often called the hard component). Wages should mirror this new nature of work, but few attempts have been made to capture precisely which qualitative aspects of working competencies the modern firm rewards.

In a traditional organization, a typical employee has a contractual relationship whereby he receives a monthly salary (or an hourly wage) in exchange for showing up on time and doing as told (Prendergast, 2011: 113). The penalty for failing to follow detailed and specific orders depends on the institutional collective bargaining arrangements, generally constituted by one or more official rebukes followed by removal from the job and then layoff. In addition, management may resort to implementing intrinsic and extrinsic rewards to align employee performance with the firm's requirements. Measurements of individual

[1] Investments in organizational capital, coherent with the nature of ICT, have given rise to the WCM (World-Class Manufacturing) movement, whose canons provide for two relevant changes: on one side, business process reengineering aimed at introducing functions instead of processes, a pull-system based on products already sold instead of a push-system based on ex ante anticipated demands, and human resource empowerment instead of hierarchy; on the other side, abandoning three traditional management techniques: respectively, standard costing in favour of activity-based costing, management-by-objectives in favour of activity-based management, and finally, traditional planning and control in favour of activity-based budgeting. All these novelties have been incorporated in a new technological tool called Enterprise Resource Planning (ERP). See Leoni (2013) for an analytical review of these changes and the related literature.

performance may concern output (very difficult to implement in the great majority of cases) or inputs (precisely organizational behaviours), i.e., expressed or acted competencies compared to requested competencies. The two ways of conceptualizing incentives constitute the divide between traditional and modern human resource management.

Requested competencies are intended as a worker's expected behaviours, which depending on the circumstances - especially in an unstable and changing economic environment - are neither easily foreseeable nor describable. Implicit in these circumstances is that employees are paid independently (to a large extent) of *what* they do: they are paid according to *how* they do it, how they follow - in a certain way - generic and non-precise orders or more specifically how they diagnose circumstances, how they select the actions to be undertaken and how they activate appropriate organizational behaviours.

A number of theoretical models have been developed to explain how firms should design remuneration schemes to motivate workers to implement cooperative, autonomous and performing behaviours (Prendergast, 1999, 2011), aligning their behaviours to the firm's goals. Nevertheless, few attempts have been made to conjecture whether modern firms make some distinction - in the field of organizational behaviour - between technical and soft competencies, and/or between cognitive and non-cognitive competencies, and if they reward one of the two dimensions more, over and above conventional indicators of the complexity of the job held, educational achievement[2] and the threshold level of competencies needed to carry out activities just well enough to keep the job. To our understanding, this requires looking beyond mainstream explanations, i.e., pay for performance in agency theory and standard neoclassical theory.

Very little attention has been paid to scrutinizing the impact of workplace innovation, or more precisely, high performance workplace practices (HPWPs) on the competencies requested of workers and their pay. These new work practices include job-rotation, employee involvement, self-managed teams and the reduction of hierarchical levels, which conversely give rise to an increase in shop floor discretion and autonomy, and in developing competencies informally. To the extent that it is true, competencies became an endogenous variable with respect to pay, as competencies are affected by HPWPs. Since the latter have a significant impact on productivity (Leoni, 2013), it is unlikely that workers involved in these

[2] In modern workplaces, educational reputation has considerably reduced. At least three different authoritative sources support this evaluation: i) the results of the international PISA (Programme for International Student Assessment) and IALS surveys (International Adult Literacy Survey) according to which education investments being equal, cognitive skills, knowledge and operational competencies appear to be inconsistent with the test scores of educational institutions; ii) the results of the accredited Heckman studies (2000, p. 4), according to which the preoccupation with cognition and academic 'smarts' as measured by test scores «are based on fundamental misconceptions about the way socially useful skills embodied in persons are produced ... [test scores that tend to exclude] ... social skills, self-discipline and a variety of non-cognitive skills that are known to determine success in life»; iii) empirical evidence according to which educational wage premia have generally decreased over time (Naticchioni et al., 2008, 2010) due to the obsolescence of knowledge transmitted to students and to educational mismatch (Cainarca and Sgobbi, 2012).

new forms of organization do not receive any benefits. Bauer and Bender (2002), Black et al. (2004) and Osterman (2006) provide positive evidence in this direction (that is, a win-win solution), even if Cappelli and Carter (2000) find that wage premia associated with HPWPs disappear when controlling for human capital.

At the same time, competencies are not only influenced by HPWPs but also by psychological capital, which psychologists denote as those personality traits (assumed quite long-lasting) and those personal characteristics (assumed quite malleable, affected by contingent factors such as, for example, HPWPs) that contribute to an individual's productivity (Goldsmith et al., 1997; Bowles et al., 2001). Unfortunately, this is generally treated by economists as an unobservable aspect of individual-specific heterogeneity and as such is included among omitted variables or expressed by preference parameters such as time preference, risk aversion and, more recently, social preferences (Borghans et al., 2008b).

The scarce studies focusing on one or a subset of the abovementioned wage determinants do not combine all the variables in question into a unifying framework (i.e., job complexity, technologies and competencies as well as managerial practices and worker personality traits). The present work attempts to bridge this gap and empirically test a wage function on a particularly rich database of Italian employees, also taking into account the role of industrial relations in determining wage levels. The paper is structured as follow: a brief review of the empirical literature is presented in section 2 as well as our research hypotheses, while the database and model for the empirical analysis are discussed in section 3. The empirical variables are examined in section 4 and the results in section 5, where we also discuss some econometrical issues. Some final considerations are presented in section 6.

2. A critical examination of empirical literature and our research hypotheses

In this section, we critically summarize the main literature and at the same time propose our research hypotheses in relation to the factors that affect wages, namely: i) job complexity, ii) computer use as technological capital-in-use, and iii) competencies, also considering their endogenous nature. Industrial relations will receive due attention.

2.1 Institutional factors and industrial relations: job complexity, job evaluation and base pay

In institutionalized labour markets (such as those in Europe, and especially Germany, France and Italy), the labour-wage exchange is governed by general laws inspired by the concept of fairness and is agreed in detail with the main social actors (trade unions and employer associations). Collective bargaining has gradually established a system of remuneration based

on job complexity, on the specifics of each industry and ultimately on the size of the company,[3] recognizing the practical impossibility of identifying and measuring - in the factory production system - the contribution of each worker to the firm's output.[4] The scientific management approach to organization and management implies that product standardization enables designing a stable, long-linked production line that can be segmented into sequential tasks and duties. These tasks and duties can be then grouped into jobs for selected and supervised workers who are paid for those specifically requested tasks.

Referring to the Italian institutional context, Article 2095 of the Civil Code prescribes that a worker employed by a firm must be classified into one of the following four categories: manager, professional (cadre), white-collar worker and blue-collar worker. The same law refers to the National Collective Labour Agreement (CCNL) of each industry - signed by the social partners (employers' confederations and workers' trade unions) - to analytically determine the job classification level (according to a hierarchical ranking) and the economic pay evaluation of each grade. The latter reflects job complexity and constitutes the base pay, which corresponds to the national (industry) minimum wage laid down by law for employers in several industrialized countries. The collective agreements are binding only for signatory members of the (employer) organizations (Italy is unique in Europe in this respect)[5] and also provide for biennial automatic seniority allowances, granted as a percentage of base pay based on the expected increase of abilities and competencies acquired by workers through learning-by-doing, learning-by-using and learning-by-interacting mechanisms.

Hence, the framework of an industry-wide labour contract signed by the trade unions and employers' industrial federations, following a rather formalized procedure, consists of a matrix where the rows are the levels of complexity of the jobs estimated on the industry average (i.e., the basic requirements of professional training, technical skills and education, and the expected tasks) associated with their economic evaluations (wages), while the columns are the professional group job descriptions with the contents of activities of each organizational area (administrative, technical, financial, etc.). The metric seeks to attribute equal pay to equal work, recognizing a triple value to equality, namely: i) equivalence of tasks and responsibilities according to the different professional profiles along the same row; ii) equivalence of pay in accordance with the differences between the levels, justified by the

[3] In a given industry most of the time there are more than one collective agreement, signed by trade unions and different employer associations. The latter (differently from trade union) are usually based on size of the member firms (artisanal enterprises, small and medium-size enterprises, and medium and large enterprises) each of them claims to have specific peculiarities that are used in making the choice at which employer association to affiliate themselves.

[4] Even when Hay's methodology is used to characterize job content and descriptions, Hay points are allocated to tasks and duties rather than to individual skills and competencies, and thus give no credit to individual performance.

[5] For firms not belonging to business associations, the Civil Code stipulates that the company must provide a 'fair' wage, which tends to be treated by jurisprudence - in cases of recourse to the courts to determine remuneration - as equivalent to national collective work contracts.

different complexities and responsibilities; and finally iii) equivalence with respect to the external labour market[6].

National industry-wide agreements also govern a set of other elements such as working hours, overtime and overtime premium, shift work and enhanced rates of pay to recompense the greater burden on workers, wage supplements for risky and unpleasant jobs, training, temporary contracts and finally a system of adjusting pay to the cost of living. The nominal salary is annually protected for the duration of the validity of the national contract against the national inflation rate, linking the growth rate of the latter to the former.

Both firms and trade unions consider such an instrument as essential. The former because it reduces transaction costs in managing the workforce, which would multiply in the presence of individual negotiations and provides certainty on labour costs with respect to competitors. The latter because it allows employees to monitor the correspondence between pay and the contents of employee performance while granting certainty on the possible way to access higher steps (career path) since the professional content of the various steps are specified in advance. For both parties, job classification levels and the related wages constitute the equilibrium point of a negotiation between the parties characterized by strong idiosyncratic factors. Thus, our hypothesis in relation to wage levels:

H1: The worker's remuneration level depends on the technological and organizational complexities of the job or position held. This implies paying for the job rather than for the person who happens to hold the job. Job complexity is defined by the job classification level, by industry and firm size, and a set of other working and contractual conditions.

Such a system may not cover all the complexities of work activities, tasks and responsibilities inherent in the various companies in a given industry. Indeed, each individual firm can consider the remuneration associated with each skill level/grade as the minimum wage adding a supplement to job-based pay (unilaterally or through individual bargaining or firm level integrative bargaining: see *infra*), a type of wage premium according to some contingencies. Hereinafter we investigate to which extent and under which circumstances workers receive wage premia.

[6] Wages in Italy are regulated by more than 600 national industry-wide agreements even if around a hundred of these only concern the transport sector. Worth noting nonetheless is that the statistics on 80 national industry-wide agreements monitored by the Central Institute of Statistics to produce the remuneration dynamics cover 80% of employees.

2.2 Other institutional variables

2.2.1 Working and contractual conditions, and individual characteristics

As they are widely debated, albeit with some exceptions, we here only briefly outline the five sets of control variables generally used in literature to explain individual wages.

The first set relates to different working conditions ranging from several hours of work during a given unit of time (which controls for overtime and part-time work), different types of employment contracts (open-ended and temporary), positions that involve high risk and discomfort, and shift work. Particular attention is at times paid not so much to the duration of training as to the time it takes for a worker to attain (formally and informally) the necessary expertise to efficiently carry out the job requirements. The expected signs of these variables are fairly deducible, in line with the theory of equalizing differences of Smithian origin.

The second set refers to individual characteristics such as gender (or skin color) to control for and measure genuine discrimination as a negative prejudicial perception of others (see Becker, 1957).[7]

The third set concerns schooling, according to which differences between the wages of individuals should reflect differences in the return necessary to defray the costs of acquiring knowledge associated with different levels of education. The point of divergence with respect to theory concerns two aspects: on one hand, the difference between knowledge acquired and competencies enacted (the former being a necessary but not sufficient condition for the latter), on the other, the equilibrium condition subsumed in matching the required knowledge and the knowledge utilized by the worker in a precise job context. According to the empirical results of Allen and van der Velden (2001) for the Netherlands, Bauer (2002) for Germany and Cainarca and Sgobbi (2012) for Italy, overeducated workers suffer a wage penalty as each year of education in an overeducated position yields a lower return than that of workers occupying positions that match their education. De Grip et al. (2008) and Leoni and Gritti (2014) argue that the prolonged non-utilisation of excess knowledge is likely to lead to this knowledge becoming rusty over time. Conversely, undereducated workers should benefit from an expansion and enrichment effect because they daily deal with problems and relationships that go beyond their level of competencies, challenging their competency frontier, which should be rewarded.

[7] With reference to gender, Gneezy et al. (2003) and Niederle and Westerlung (2007), for example, argue that women tend to be less effective than men in a competitive environment (e.g., performing worse than men) whereas they perform relatively better in a non-competitive environment. These results are usually attributed to a combination of distaste for competition and a lower level of confidence in their relative abilities. To the contrary, Kuhn and Villeval's (2013) recent experimental study obtained a zero causal effect of team environment on women's absolute and relative task performance. If this is the case, lower wages for women cannot but be ascribed to negatively perceived (or not at all appreciated) personality traits (presumed or actual) by chauvinistic leading male managers and employers.

The fourth set concerns the cost of living in different geographic areas. Under national collective bargaining that establishes nominal wage values by industry according to the principle that equal job complexity correspond to an equal nominal salary, the level of prices at consumption assessed at the local level may markedly differ and give rise to different real wages. We expect that the differential in real wages that workers experience in different local areas has some influence on the recruitment and reward policies of firms to the extent they want to attract more applicants from different geographic areas and discourage labour turnover, as well as on the spatial mobility of workers.

The fifth set relates to the number of dependent children. The social security system grants employees a family allowance for each dependent child, conditional on a threshold family income. In addition to this supplement, there are also tax deductions. The combination of these institutional elements should determine - *ceteris paribus* - different levels of individual net monthly salaries.

2.2.2 Unions and firm-level integrative collective wage bargaining[8]

Literature widely recognizes that union power at the firm level has an influence on wage levels and the wage structure, made explicit through collective bargaining, and that the degree of this influence depends on the industrial relations system (the social, political, legal, institutional and economic environment in which the unions operate). When controlling for the collective bargaining taking place at the firm level, those studying the effects of industrial relations on wages or wage differentials do not obtain univocal results. For example, Osterman (2006) finds that unionized establishments pay higher wages to core (non-managerial) employees involved in high performance workplace practices (HPWP). To the contrary, Black et al. (2004) consider union interaction effects in the presence of profit sharing, non-manager meetings and non-manager self-directed work teams, and find that unionized establishments that adopt HPWPs pay higher wage premia to managers and supervisors, but not to production workers.

The Italian context - which is quite similar to the German - is characterized by a two-step collective bargaining process: wages are first collectively negotiated at the national level

[8] According to the Bank of Italy estimates (D'Amuri and Giorgiantonio, 2014: 14) the supplementary company-level bargaining in 2010 involved 21 percent of firms. This percentage is higher in manufacturing than in services and increases with firm size. In addition, company-level bargaining is much more widespread in the presence of trade unions (25.5 per cent, against 2.8). Finally (ibidem: 12), the share of wages in excess of the minimum of the total remuneration amounted on average (in the period from 2002 to 2012) to 10.5 percent, higher among employees (12.4 percent) than workers (9.5 percent); this percentage increases with company size and is higher in the manufacturing industry (11.1 percent) than in services (9.7 percent). With reference to a sample of manufacturing firms located in the most industrialized part of the country, Cristini et al. (2005: 179-181) report that those without company-level bargaining provide higher rent sharing than those with bargaining, which the authors explain with the firm strategy of discouraging the formation of union representation and thus preventing a likely request for company-level bargaining that could concern not only rent sharing but other issues such as training or outsourcing and the employment consequences.

in each industry (as described in section 2.1). At the firm (or territorial) level, a second collective bargaining process *may* take place (as illustrated in footnote 8)[9] that can concern several issues including wage premia, which *may* be subject to certain circumstances. Regardless of industry-wide collective agreements, Bauer and Bender (2002) and Sgobbi and Cainarca (2015) find a positive general effect on wages in the presence of work councils or unions at the firm level but do not investigate the matter in detail. Dell'Aringa et al. (2005) analyse the role of organizational settings, pay policies, bargaining and industrial relations in defining within-firm wage differentials in four different EU countries (Belgium, Ireland, Italy and Spain) and find that decentralized bargaining becomes non-significant once employees and firm characteristics are controlled for. Wage inequality is detected in all cases where second level bargaining (i.e., the decentralized level) is additional to the main level (i.e., the centralized level). One interpretation, in the authors' opinion, could be that employers are able to anticipate the effects of main level bargaining when further negotiations take place within the firm.

Cristini and Leoni (2007) derive an estimable wage equation on the assumption of two-level bargaining, efficiency wages and union power. Theoretical literature on wage determination in the presence of bargaining and efficiency wages finds that the wage premium is higher when unions are able (and have enough power) to bargain on a broad set of issues, primarily on effective productivity incentive mechanisms. Finally, Origo (2009) - in a framework of performance related pay on productivity and wages - finds that productivity effects (i.e., incentive effects) are higher in low-unionized firms, while wage effects are higher in high-unionized firms.

Our hypothesis rests on a combination of these latter results, we thus expect that:

H2: Union power and its ability to contribute to implementing effective performance incentive schemes is correlated with firm size and consequently the union effect on wages is higher in large firms than in small firms.

2.3 Technological capital-in-use, new division of labour and wage premia

The supply-demand-technology paradigm has become the most widely accepted theoretical framework to explain the patterns observed in wage premia. According to this theory, the diffusion of new information and communication technologies (ICT) has given rise to skill-biased technological change. The labour market demands more and more high-skilled workers using computers at the expense of low-skilled workers, increasing the wages of the

[9] However, this is not compulsory.

former and reducing those of the latter (Krueger, 1993; Caroli and Van Reeneen, 2001). Some authors (Dunne and Schimtz, 1995; Doms et al., 1997; Haskel, 1999) stress the *quality* of labour on the demand side, arguing that technologically advanced establishments pay higher wages and employ a greater proportion of skilled workers. Bresnahan (1999) and Bresnahan et al. (2002) qualify the argument by stressing that wage differentials and the skill composition of the labour force are affected by advances in ICT only if and when coupled with organizational changes in the workplace. Aghion and Howitt (2002) provide a theoretical model in which the introduction of General-Purpose Technologies (GPTs) by itself does not explain changes in short-run wage differentials but only in conjunction with the different degrees of adaptability of workers to new jobs or tasks. Thus, the uneven diffusion of computer use and ICTs among workers alone cannot provide an exhaustive explanation for the large differentials observed in labour compensation. For example, Borghans and Weel (2004) find that people using pens at work earn more than the average; more precisely, writing long and short documents, performing advanced mathematical procedures and using computers at a high level of complexity entail a positive effect on wages. The education and occupation variables only partly explain individual heterogeneity.

Other studies however cast doubt on the traditional hypothesis, linking education to technologies by reversing the causation: highly paid workers are generally more competent and are consequently more likely to be employed in the use of advanced technologies. For example, DiNardo and Pischke (1997) show that much of the impact of computer usage on wages disappears once the correlation of computer use with unobserved individual heterogeneity is considered. This indicates that controls for individual abilities are important, albeit difficult to identify.

Generally, concomitant information on individual characteristics, competencies and computing skills is almost always absent or is very limited. Green et al. (2001) and Dickerson and Green (2004) distinguish between the different levels of complexity of computing skills, providing evidence of their positive impact on wage premia. Moreover, they show that the DiNardo and Pischke (1997) criticism does not appear to hold when there is a fuller description of job attributes and individual skills available in the data. Indeed, the coefficients of some skills, such as writing or reading short documents, become small and non-significant once the set of controls is considered. Nonetheless, they find that high-level communication and the use of computers at a high level of complexity retain their significance and positive relation with wages even after considering control variables such as education, experience or responsibility and a set of generic skill variables.

These types of studies have two limitations. The first relates to the fact that in econometrically testing for the possible presence of a wage premium for computer use, the

threshold (or basic) level is not distinguished from the distinctive (or very complex) level of digital devises used. Since the former is already included in the job description of industry-wide labour contracts and as such is already captured and evaluated in the contractual minimum wage, research should concentrate on the latter, to test the hypothesis of whether the enterprise has some advantage in providing a payment premium against the risk of losing an employee who manages very advanced digital technologies with respect to those who manage and use ordinary digital technologies, or more simply to test the hypothesis that firm behaviour is inspired by the criterion of wage fairness, irrespective of the risk of losing a competent worker.

The second limit is constituted by the fact that new technologies do not constitute a homogeneous monoblock. Some authors such as Autor et al. (2003), Levy and Murname (2004), and Brynjolfsson and MaAfee (2014) offer a polarised conceptualisation of the nature and role of new technologies. On one side of the spectrum they place robotics, numerically controlled machines, flexible manufacturing system, computer integrating manufacturing system, computerized inventory control and automatic transcription, which not only substitute - following the 'if-then-do' logic - routine tasks (based on rules and algorithm execution), displacing those workers that earlier engaged in these activities, but - insofar as these new technologies are technically sophisticated - their utilization (or better, working with them) has been made so user-friendly that they do not necessary require highly skilled and competent workers. These workers work in a condition theorized by Polanyi (1966) according to which "[they] do not know how to do many of the things [they] do".

On the other side of the spectrum they place technologies such as data visualization, analytics, high-speed communications, conceptualization and adaptation of ERP (Enterprise Resource Planning) and rapid prototyping (through CAD/CAM), which not only augment the contributions of workers involved in solving ill-posed problems and responding appropriately to unanticipated contingencies by reconfiguring software programs and consequently the functioning of the technological artefacts, but also stimulate people to work to expand more abstract and data-driven reasoning. All this increases the value of these jobs as they draw on the human abilities of pattern recognition and complex communication, which require very skilled and competent workers.

Brynjolfsson and McAfee (2014) note that the key aspects are not only the competencies of those in both groups working with digital technologies, but rather the high skills and competency level required by the broad changes in work organization that digital technologies make possible (or enable and support). Indeed, ICT are powerful tools to reinvent and reorganize production activities alongside processes, new decision rights, new information flows and other aspects of organizational capital to obtain an advancement from

the technologies, which requires radically different and generally higher levels of competencies. However, we argue that the latter fall into the category of work not so much connected in some way to ICT but rather soft and technical competencies involved in achieving daily results, implementing business process reengineering and dealing with new work practices. We examine this specific cluster of competencies below.

In relation to our aims, we look at these technologies not as artefacts but as technological capital-in-use in the sense of Orlikowski (1992) and Aghion and Howitt (2002), according to whom sophisticated digital tools become relevant only to the extent that they are considered in conjunction with the competencies of workers to manage their complexity.

As a consequence, we maintain Autor and al.'s (2003) hypothesis and expect that:

H3: a) Firms confer a wage premium to very competent workers capable of managing - at the distinctive level - technologies for pattern recognition and complex communication.

b) Firms have a lesser propensity to pay a wage premium to over-competent workers to deal with advanced technologies based on rules and algorithm execution as they are increasingly user-friendly.

2.4 Distinctive level of soft and technical competencies

The worker's mastery of a distinctive competency constitutes a strategic asset for the firm. A distinctive competency is such when its performance is above the average, that is, above the threshold level of competency usually associated with the minimum acceptable level of work to carry out tasks, duties and responsibilities designed and embedded in what above has been called job complexity in the national collective industry-wide labour agreement.

By virtue of the superior performance of a competent worker, the firm benefits from awarding a wage supplement if wanting to prevent the worker leaving, thus reducing labour turnover costs (Stiglitz, 1974) or if not wanting to compromise the worker's morale (Akerlof, 1982, Akerlof and Yellen, 1990) or even if not wanting to reduce the worker's efforts (Shapiro and Stiglitz, 1984) and thus his/her productivity.

In an economic environment that is subject to substantial changes, soft skills (problem solving and interpersonal competencies) are more valuable than technical skills.

Competencies at work refer to a different construct than that of skills. The latter refers to the abilities (or work capacity) that a worker possesses, regardless of the particular job or position to which s/he happens to be assigned at any point in time. The term is usually associated with knowledge and attitudes (SKAs), and the underlying construct denotes the potentiality linked to a set of attributes of the individual employee. The former instead are

organizational behaviours enacted in a given context (workplace) by a worker, that is, the actual performance of a potentially talented worker. Organizational behaviours are observable and measurable, and their distinctive level denotes competencies linked to a distinctive performance. According to McClelland (1993: 7) - the father of the competency movement - "in the job-competency approach, analysis starts with the person-in-the-job, makes no prior assumptions as to what characteristics are needed to perform the job well, and determines from open-ended behavioural event interviews which human characteristics are associated with job success". Spencer and Spencer (1993) re-conceptualize the idea arguing that first organizational behaviours are context sensitive and second they are attributable to the intrinsic characteristics of an individual, which constitute good predictors of performance and as such are employable in both employee selection and in the assignment of workers to different roles. In not doing so, firms risk selecting and training mediocrity, which implies an organization's current average level of performance.

The international debate that has developed within the OECD[10] appears to have reached a consensus around the distinction between soft (or transversal, or key) and technical competencies.[11] Based on this distinction, we deal with them separately.

Soft competencies refer to activities such as problem diagnosis and problem solving, interpretation and decoding (i.e., autonomy in executing work), taking decisions (i.e., managerial autonomy), professional communication, personal interrelationship, team working. A characteristic of these competencies is that they are applicable to all workplaces, regardless of industry or company size. They are labelled as 'key' because they concern behaviours that are crucial for firm survival and growth in a non-ergodic environment, namely, in a context of constant change, high volatility and substantial uncertainty.

Technical competencies refer to mastery of a body of job-related knowledge (which can be operational, professional or managerial), described sometimes in terms of formal education level and at other times as equivalent mastery acquired through work experience or informal learning. Work activities may concern production of goods or services and may be carried out in plants or offices.

Given that base pay is institutionally and contractually linked to a given job complexity, management may reward workers (aside from and in addition to distinctive competencies in the use of digital technologies) with a wage premium for the distinctive competencies enacted for the aforementioned set of economic reasons. Hence:

[10] See the DeSeCo (Definition and Selection of Competencies) project promoted since 1997: OECD, (2002) http://www.deseco.admin.ch/bfs/deseco/en/index/02.parsys.34116.downloadList.87902.DownloadFile.tmp/oecddesecostrategypaperdeelsaedcericd20029.pdf

[11] See Ryken and Salganik (2000, 2001, 2003).

H4: Firms recognize a wage premium to workers showing a distinctive level of soft and technical competencies.

The reason for maintaining the two competencies separate is to enable verifying whether firms reward them differently. Figure 1 provides a picture of the structure of the work competencies considered.

< Figure 1 approximately here >

2.5 Endogeneity

Five underlying channels may affect and weaken the exogeneity of the variables concerning the two domains, i.e., the use of digital technologies and work competencies. First, schooling and training; second, repeatedly exercising discretion and independence on one side and innovative work practices on the other, which can stimulate the development and acquisition of a higher level of competency; third, psychologists have produced considerable empirical evidence on the link between personality traits, organizational behaviours and performance; forth, competencies may reinforce each other, and finally, the higher the wage level, the greater the encouragement to develop own competencies.

In terms of the first channel, education and training may transfer to students bodies of disciplinary knowledge that are a crucial and tangible ingredient of competencies. The non-linearity between the knowledge transferring and acquiring process on one side, and between knowledge and competency on the other, renders the expected outcome of these variables on distinctive competency formation uncertain in both domains.

As to the second channel, literature documents that high performance work practices (HPWPs)[12] are largely used in the modern firm (namely WCM),[13] and that they are associated with an improvement in organizational performance due to the high rate of reflexivity involved in these practices. Psychology literature (McAdams and Pals, 2006; Proudfoot et al., 2009; Boyce et al., 2013) reinforces the argument by asserting the existence of a mediator between HPWPs and competencies constituted by personal characteristics, which represent the malleable component of an individual (and consequently, forgeable by HPWPs). A further reason for the aforementioned link is that HPWPs usually include a system of economic incentives to align own behaviours with the needs, goals and priorities of the organization (Spencer and Spencer, 1993: 86; Black et al., 2004). Green et al. (2001) and Leoni (2012) provide evidence of the influence of HPWPs on the development of soft competencies. Nonetheless, consensus on this channel is not unanimous. Cappelli and Carter

[12] Such as worker involvement, job rotation, suggestion system, information sharing, extensive consultation of employees and discretional activities.
[13] For an overview of the WCM (world-class manufacturing) characteristics see Leoni (2013).

(2000) find evidence that HPWPs are associated with higher wages for manufacturing production workers, although their results weaken when controls for human capital are included. Handel and Gittleman (2004) instead find that the practices they consider tend not to have detectable effects on the wages of workers. In the face of such contrasting results, it appears difficult to have an a priori expectation on the influence of HPWPs on malleable component of individual characteristics, and consequently on both components of the two domains.

As to the third channel, the idea of treating personality traits as specific and (nearly) time-invariant elements of the individuals themselves has been consolidated in psychology literature. Guion (1991: 335), for example, identifies these in «ways of behaving or thinking, generalizing across situations, and enduring for a reasonably long period of time»". Traits are seen as internal psychological structures or properties that relate to behavioural regularities, that is to say, adult personality traits are likely to change slowly and only with prolonged exposure to psychologically salient environmental and social factors. The link between (long-lasting) personality traits, organizational behaviours, performance and salary has been empirically investigated by psychologists (albeit not without flaws and weaknesses in the methodology used: see Goldsmith et al. (1997) and the literature hitherto reviewed), unlike economists who have largely ignored this aspect (Heckman 2000, 2006; Heckman and Kautz, 2012). Bowles et al. (2001) and Edwards (1976) are amongst the few pointing out that employers in low-skill labour markets positively evaluate traits such as docility, dependability and persistence, even more that cognitive abilities. Personality traits are generally measurable with three alternative tools: i) the *Big Five* factors (openness to experience, conscientiousness, extraversion, agreeableness and neuroticism: McCrae and Costa, 1987), ii) the Rotter scale (1966) for the internal-external locus of control and iii) the Rosenberg scale (1965) as a self-esteem indicator. According to psychology literature, expectations with regard to the sign of the estimated coefficients in a regression model depend not so much on specific empirical factors but mostly on their size, in the sense that traits that tend to identify workers driven by strong self-referential beliefs may disregard (or discredit) the Delphic maxim 'nothing in excess' and the Socratic dictum 'know thyself', which may induce excessively extolling what they are and not paying attention to the opinion of others. These critical remarks, in the same vein as Heckman and Kautz's maxim (2012: 457) according to which "too much of a good thing can be bad" could explain the overturning of the relation - from positive to negative - with respect to competencies. In this respect, we hypothesize that personality traits may not have a univocal effect on both digital and work competencies as even when positive, but possessed in massive doses, they may tend to reflect

mental and cultural rigidity, giving rise to competencies that are not really appreciated by the firm.

The forth channel arises from the debate on life-long learning that highlights that soft competencies are 'key' competencies because they are of a higher, superior class and ascribable to the epistemological concept of meta-competencies that involve cognitive processes of a higher order (Montedoro, 2004, p. 49; Leoni, 2012). With reference to our context, we claim that holding a *distinctive* level of one component of competencies may *induce* a learning process in an individual through both the *know-why* mechanism discussed by Lundall and Johnson (1994) and the *inquiry* mechanism up against error (intended as a mismatch of outcomes to expectations) investigated by Argyris and Schoen (1996) as prompting self-reflectiveness of thought. As such, they are assimilable to Bateson's deutero-learning (1972).

Last but not least, economic theory suggests that economic variables, similarly to the level of wage incentives, are a powerful tool to stimulate workers to align their behaviours to firm expectations. Hence, we expect that the higher the wage level, the greater the encouragement to develop own competencies.

In what follows, we test our main hypotheses: base pay linked to job complexity and to some work contingencies, rewarding a distinctive level of competencies practised (above the threshold level) both in the use of computerized technologies and in soft and technical competencies, and finally, the role of supplementary bargaining on wage pursued by workers' representatives.

3. Database and model for the empirical analysis

3.1 The database

In this study, we use the ISFOL database[14] but here provide only some generic information (for a detailed description we refer the reader to Leoni (2006)). The dataset is the result of a CAPI survey carried out in Italy in 2004 on a stratified sample of private sector employees (excluding workers in the construction and agricultural sectors). Our aim is to focus on non-managerial workers, since managers' earnings are very likely the result of personal bargaining linked to outcome measures through some stock option formula and other reward systems (see Hallock and Murphy, 1999) for which no information is available. The number of observations is 2,372 representing 7.038 million salaried workers.

The questionnaire consists of 10 sections: A) working position in the firm context; B) general aspects of the interviewee's work; C) the organization's characteristics; D) ability,

[14] ISFOL is an Italian governmental institute charged with the professional training of workers.

commitment and work effort; E) task discretion and variety; F) the formation of competencies; G) expressed competencies in work activities; H) remuneration, working hours and industrial relations; I) the work situation 5 years ago; J) personal interviewee data. The most innovative part concerns the activities that the job entails, from which we construct measures of the level of competencies based on organizational behaviours actually activated, that is, expressed competencies (supply side), and a detailed list of digital technologies used by workers (white and blue collar).

3.2 The empirical model and econometric strategy

Based on the institutional elements analysed in section 2.1, the (log) level of stable monthly contractual wages (*lcw*), net of fiscal and social contributions and random volatile components for worker i^{th}, at a given time *t*, can be specified - in a first approximation - as:

$$lcw_i = \alpha + \beta_g Industry_{i,g} + \gamma_k Occupation_{i,k} + \phi\, Size_i + \omega\, WCC_i + \xi_i \qquad (i = 1, \ldots N) \qquad [1]$$

where *WCC* is the working and contractual conditions, deponent *g* identifies industry-wide agreements applied by firms to their employees and *k* identifies job classification levels; $\xi_i \sim(0, \sigma^2)$.

Using compensating earning differentials literature as an analogy, [1] can be reformulated as [2] to assess the above-mentioned idiosyncratic elements and to test our hypotheses, taking into account the endogeneity of some explanatory variables. For the sake of simplicity, subscripts *i*, *g* and *k* are omitted. In a compacted form, we have a system of equations, where the j-*th* equation is:

$$y_j = X_j \beta_j + Y_j \gamma_j + u_j \qquad j=1, \ldots J \qquad [2]$$

where *y* is a vector of the dependent variable, X_j is a matrix of the exogenous variables, Y_j is a matrix of the endogenous variables, β_j and γ_j are the coefficient vectors and u_j is a vector of the disturbances terms of the j-*th* equation. By rendering [2] explicit in terms of our hypothesis we obtain:

$$\begin{aligned} lw = {} & \alpha_1 + \beta_1 FC + \beta_2 OCC + \beta_3 WCC + \beta_4 LC + \beta_5 IWC + \beta_6 DWB + \\ & + \beta_7 DL\_ICT\_ws + \beta_8 DL\_ICT\_of + \beta_9 DL\_SC + \beta_{10} DL\_TC + u_1 \end{aligned} \qquad [2a]$$

$$DL\_ICT\_ws = \alpha_2 + \gamma_1 SCH + \gamma_2 TR + \gamma_3 JA + \gamma_4 HPWPs + \gamma_5 PT + \\ + \gamma_6 DL\_ICT\_of + \gamma_7 DL\_SC + \gamma_8 DL\_TC + \gamma_9 lw + u_2 \quad [2b]$$

$$DL\_ICT\_of = \alpha_3 + \theta_1 SCH + \theta_2 TR + \theta_3 JA + \theta_4 HPWPs + \theta_5 PT + \\ + \theta_6 DL\_ICT\_ws + \theta_7 DL\_SC + \theta_8 DL\_TC + \theta_9 lw + u_3 \quad [2c]$$

$$DL\_SC = \alpha_4 + \varphi_1 SCH + \varphi_2 TR + \varphi_3 JA + \varphi_4 HPWPs + \varphi_5 PT + \\ + \varphi_6 DL\_ICT\_ws + \varphi_7 DL\_ICT\_of + \varphi_8 DL\_TC + \varphi_9 lw + u_4 \quad [2d]$$

$$DL\_TC = \alpha_5 + \phi_1 SCH + \phi_2 TR + \phi_3 JA + \phi_4 HPWPs + \phi_5 PT + \\ + \phi_6 DL\_ICT\_ws + \phi_7 DL\_ICT\_of + \phi_8 DL\_SC + \phi_9 lw + u_5 \quad [2e]$$

where u_1 - $u_5 \sim(0, \sigma^2)$ and $cov[u_1 - u_5,] \neq 0$, and where *lw* stands for the log of stable net monthly nominal earnings, *FC* for firm characteristics, *OCC* for occupations (proxies for job classification levels), *WCC* for working and contractual conditions, *CL* for cost of living in the local area, *IWC* for other individual worker characteristics (education, gender and dependent relatives), *DWB* for decentralized wage bargaining, *DL_ICT_ws* and *DL_ICT_of* for a distinctive level of competencies respectively in the use of digital technologies of workshops and offices, *DL_SC* and *DL_TC* for a distinctive level respectively of soft and technical competencies, SCH for schooling, TR for duration of training, JA for job autonomy, HPWPs for high performance work practices and PT for personality traits.

Depending on whether dealing with exogenous or endogenous variables, or with errors uncorrelated among equations, the estimator is respectively OLS, SUR and 3SLS. All estimates are carried out with weights, where the weightings are intended inversely proportional to the probability of being sampled to control for sample selection bias, thus obtaining unbiased estimators of the population characteristics. Since the information is cross-sectional, to test for homoskedasticity, we apply the Bruesch-Pagan/Cook-Weisb test, and in case of failure, the vce(robust) technique; the SUR estimator imposes homoscedasticity and we therefore first allow the errors to be heteroscedastic by using the bootstrap prefix and then test for independence of errors across equations resorting to the Bruesch-Pagan test. In case of failure, we pass to 3SLS in conjunction with the bootstrap method to estimate standard errors.

4. The variables[15]

This section describes the exact construction of the empirical variables used in the econometric estimates.

[15] For an analytical description of variables used in this empirical study the reader is invited - for reasons of space - to refer to the questionnaire at www.isfol.it .

4.1 Dependent variables

The dependent variable is the logarithm of the average net monthly nominal wage, including extra hours but excluding additional months (such as 13th and 14th month salaries, which are relatively common in some European countries) and other occasional premia. This continuous variable corresponds to the following question: "*What is (on average in the months from January 2004 to the last received* [at time of interview: late spring of 2014]*) your monthly net pay (i.e., the actual amount in your wage slip) including overtime (excluding the 13th and/or 14th month or other occasional rewards)?"*

An alternative dependent variable is constituted by the real wage logarithm, which is the log of the nominal wage minus the log of the cost-of-living index, measured at the regional level. For further details on the latter, see below.

4.2 Independent variables

The explanatory variables of Model [2a] include:

Firm characteristics variables

Size. We consider the logarithm of the number of firm employees.

Industry. These are fourteen dummy variables; we consider extra-agricultural private sectors, excluding the construction industry, as out of sample survey.

Ownership. This dummy is equal to 1 when the firm is an entirely foreign firm operating in Italy.

Occupation

Having decided to exclude managers, the eight dummy variables concern the different occupational classes based on the English Standard Occupational Classification (SOC). These are not perfectly equivalent to job classifications in national contracts but the high disaggregated level we use here compared to other studies (Lucchetti et al. 2004, for example) renders these very good proxies.

Working and contractual conditions

Several working and contractual conditions are bargained at the industry-wide level, proxied by the following variables:

Working hours. This is a continuous variable and refers to normal weekly working hours; we consider the logarithm.

Temporary contract. This dummy is equal to 1 when the employee has an atypical and temporary contract.

Risky and unpleasant job. This categorical variable indicates the frequency (from never or a negligible amount of time to all or nearly all the time) in relation to a combination of two sets of information: being exposed to the risk of serious injury at work and to excessive noise, bad weather, heat or cold, as perceived by the employee.

Shift. This dummy indicates whether the employee frequently works shifts.

Learning. Training activities may be carried out formally and informally. Unfortunately, the latter is not separately accounted for either in the firm or in individual accounts. We make use of an alternative measure, precisely three dummies to indicate a long (> 24 months), medium (6 - 24 months) and short (< 6 months) period of time spent learning to do the job well.

Cost of living in different geographic areas

This information is provided by a Bank of Italy study (Cannari and Iuzzolino, 2009), which shows nine estimates at purchasing power parity for 20 Italian regions, referring to the year 2006. On average, the cost of living is around 16-17% less in southern regions than in northern regions, a difference that increases to 25% with respect to the most expensive region (Lombardy) and the least expensive regions (Molise and Basilicata). Among the nine estimates provided by the Bank of Italy study, our choice falls on the 9th definition (*ibidem*: 34), since it lends itself most to our purpose.

Individual worker characteristics

Gender. The dummy is equal to 1 if the employee is female, 0 otherwise.

Education. We include two dummy variables that take into consideration the education qualification achieved by the employee, one for a high school diploma and the other for degree and postgraduate education.

Over/under education. This refers specifically to educational mismatch measured as the number of excess or lacking years with respect to the requested level. It combines the disequilibrium into a single job-worker mismatch continuous variable, constraining the coefficient to take a unique value and having a linear relationship with competencies. This means that for an overeducated worker (whose years of overeducation take a negative value), this represents wasting competencies. The opposite applies to the undereducation effects: they positively foster competencies. Educational matching implies that this variable takes value 0 (zero), which implies safeguarding against the decline of competencies due to their continuous utilization.

Dependent relatives. A social security allowance is granted to parent employees in relation to their dependants and the family income. When both husband and wife work, it is usually claimed by the former and is paid by the employer in the monthly salary, who is then

reimbursed by INPS (National Institute for Social Security), offsetting the amount against the social security contributions they are liable for. In addition to this supplement, there are also tax deductions, which are generally taken advantage of in equal parts when both spouses work. We assume that respondents have included family allowance and tax deduction benefits in the average monthly salary. However, as there is also a threshold and scaling family income level, it could be that for the same number of children, the social security benefits are lower or even zero, thus leaving the significance of the estimated coefficient undetermined.

Decentralized wage bargaining

Union power at the decentralized level. This categorical variable measures the influence perceived by respondents of the role of unions in defining premia or incentives, individually or collectively, corresponding to the following question: "*To your knowledge, are there any bargaining activities in your workplace between the employer (or management) and union representatives? If yes, do you think the union is highly influential (i.e., has a lot of power) in setting collective premia and extra allowances over minimum pay, and individual and group incentives? The possible response is: yes/no".*

Qualitative information does not allow making an immediate comparison across firms and time. To overcome this problem - at least in part - we interact this variable with the number of employees dimension in order to incorporate a sense of union representative bargaining power in the variable used. The underlying hypothesis is that union influence goes hand in hand with union density, which is in turn correlated with firm dimension.

Distinctive level of competencies in the two domains (technologies and organizational behaviours)

The database provides two sets of information relating to respectively the use of digital technologies and enacted organizational behaviours.

Distinctive level of technological capital-in-use for production of goods and services, and for creative office activities (pattern recognition and complex communication). The information concern different types of uses of digital technologies in response to the following question: "*Can you indicate which of the following technological tools you normally use in your daily work*?" We focus our attention on the least trivial 9. The factor analysis enabled extracting 2 constructs, the first in using computerized technologies in a workshop or plant for production of goods or services, the second in office technologies for creative intellectual activities (that is, for pattern recognition

and complex communication).[16] The two synthetic bundles are multiplied by an organizational behaviour (identified on a Likert scale from 1 to 7; for details, see the subsequent analysis of competencies) concerning the level of competence enacted in the use of digital technologies. In this way, we transform the semantic concept of using or not using technologies (which is a simple dichotomic condition) into competencies in dealing with technologies with different levels of mastery and efficacy.

Moreover, to avoid a potential overlap with the occupation variable (which refers to the threshold level of skills and knowledge that a given job requires to be barely effective), we redefine the two bundles following Spencer and Spencer's (1993: 15) suggestion: specifically, for each variable (namely *D_ICT_ws* and *DL_ICT_of*) we rescale its distribution attributing value zero up to the average value of the variable (the turning point), maintaining the right part of the distribution. It thus assumes the meaning of *distinctive* competencies in interacting with digital technologies and takes the form of a piecewise linear variable.

Distinctive level of soft and technical competencies. The definition of competencies we use is associated with organizational behaviours, specifically - in this case - to a subjective measure of 43 listed activities (regardless of the use of digital technologies) measured with a Likert scale from 1 to 7, to detect the frequency - ranging from 'rarely' to 'practically nearly always' - with which organizational behaviours, when required, are enacted in an effective and efficient manner. The items represent various dimensions of work activities such as (see Ashton et. al., 1999): (i) cognitive/intellectual (writing, reading, calculation, problem solving, control, planning); (ii) interpersonal (communication, teamwork, supervision); (iii) physical (effort, endurance, manual ability); (iv) knowledge (technical, specialized, IT); (v) motivation/self-startedness (reliability, motivation, ability to take independent action); (vi) attitudes/work conditions (organizational effort, autonomy, discretionality, responsibility, variety). Prior to applying the factor analysis, we follow Ashton et al.'s suggestion (*ibidem*, p. 56) to categorize items into two broad areas, one in relation to soft competencies (which involves 14 items) and the other in relation to technical competencies (the remaining 29 items).

The factor analysis, as applied to respondent data on the first set of organizational behaviours, enabled extracting 4 common factors whose underlying constructs allowed identifying the following soft competencies: (i) problem solving (through an in-depth

[16] See Leoni (2006) and the methodological appendix available at www.isfol.it regarding the implementation of all factor analyses we refer to in this paper. The material is also available on request from the corresponding author.

analysis of complex problems, the solution to problems, the identification of errors and thinking about solving problems); (ii) communication/social interaction with customers (i.e., providing advice and customer care, or selling a product or service) and (iii) communication/social interaction with subordinates (i.e., effectively managing subordinates, giving instructions or training subordinates); finally, (iv) teamwork (joining in a team effort, helping other team members, attentively listening to colleagues). The theory according to which not a single but a bundle of competencies can affect productivity and consequently wages, suggests creating a synthetic index, pursuable by weighting factors with relative variances. We created a bundle that we call *soft competencies*. The distinctive level was calculated as mentioned above, that is, we rescaled the distribution of the variable attributing value zero up to the average value of the factorial variable (the turning point), maintaining the right part of the distribution. It thus assumes the meaning *distinctive* or superior or differentiating soft competencies (DL_SC) and takes the form of a piecewise linear variable.

The construction of the *distinctive level of technical competencies* was pursued in a similar and complementary way to soft competencies: we applied a factor analysis to the remaining 29 items, extracting 3 factors (precisely: (i) reading, understanding and writing documents, (ii) work autonomy and (iii) planning and work organization), and created a synthetic index and generated the distinctive level of such technical competencies (DL_TC).

4.3 Instrumental variables of the four distinctive competencies of the two domains

The distinctive level of the variables of the two domains (technologies and organizational behaviours) requires the instruments, once identified, to be calibrated to this condition.

As instrumental variables we make use of the following:

Schooling. Measured in terms of years of education above the compulsory level. The hypothesis is the traditional one, according to which education is a prerequisite to learning and developing competencies.

Duration of training relative to specific competencies. This is a categorical variable that takes value 0 for no training, 1 for 1 to 6 months, 2 for 6 to 24 months and 3 for over 24 months of training accumulated in their working lives in a specific field of the four competencies.

Job Autonomy. The degree of autonomy inscribed in a job may positively affect organizational behaviours and developing these. The definition of this variable makes use of the responses to the following 4 questions: in the job held what is (on a 1-7 Likert scale) the range of discretion (i) tout-court, (ii) in determining the time and effort to

execute activities and tasks, (iii) the tasks to be performed and their sequence, and (iv) how to perform the tasks. A factor analysis enabled extracting a unique factor.

HPWPs. High performance work practices that may affect the flexible/malleable component of psychological capital, namely, those personal characteristics that may be sensitive to the work context and thus competency-related, refer to participating in an improvement group (*quality circle*), submitting suggestions (in the twelve months preceding the interview) to improve the individual's work efficiency (*suggestion system*), formal and systematic performance evaluation by the immediate supervisor (*appraisal*), attending meetings (at least every four months) where supervisors/management provided information on company operations to verify and fine-tune technical and work-definition problems (*information*), and finally, participating in meetings (at least once every four months) where, upon request, the individual expressed his or her point of view (*consultation*). Through factor analysis, these five elementary variables were collapsed into a unique component (*HPWPs*), which we use as an instrument in our estimates.

Personality traits (in the strict sense).

According to Ferrer-i-Carbonell and Frijters (2004), these types of variables (traits) constitute the ideal candidates - in a cross-sectional context - to capture *individual fixed effects*. Unfortunately, our dataset does not include the five broad personality dimensions suggested by the Big Five model (nor, for example, Hogan's (1991) longer list), but rather a subset of these items that factor analysis points out - in only one dimension that is statistically significant - as reflecting *sui generis* broad traits capturing on one side self-esteem of sorts, encompassing beliefs (for example, *I feel pride in…; I'm resolute/determined to…*), and on the other, traits very close to a self-made person's internal locus of control (*I constantly and independently update my profession by means of…*).

Table 1 indicates the descriptive statistics of the variables used for our estimates; the manager occupation level is excluded from our study for the aforementioned reasons.

Table 1. Statistical description of the weighted variables used in the estimates

(representing a population of 7.038e+06)

Variables	Obs	Mean	Std. Dev.	Min	Max
Dependent variables:					
• *log of permanent net monthly nominal wage (lw)*	2372	6.958	0.356	4.700	8.517
Independent variables					
Firm characteristics (FC)					
• *Firm size:* log of number of employees	2372	3.781	2.291	0	12.206
• *Industries:*					

Variables	Obs	Mean	Std. Dev.	Min	Max
- food	2372	0.059	0.235	0	1
- textile	2372	0.062	0.242	0	1
- wood	2372	0.007	0.086	0	1
- paper and printing	2372	0.021	0.143	0	1
- chemical and plastic	2372	0.042	0.201	0	1
- non-metallic minerals	2372	0.019	0.139	0	1
- metal products	2372	0.177	0.382	0	1
- automotive	2372	0.034	0.181	0	1
- other manufacturing industries	2372	0.029	0.169	0	1
- wholesale, retail trade and repair of motor vehicles	2372	0.188	0.391	0	1
- accommodation and food service activities	2372	0.058	0.233	0	1
- transportation and storage	2372	0.073	0.261	0	1
- information and communication	2372	0.041	0.198	0	1
- financial and communication	2372	0.037	0.188	0	1
- real estate, rentals, research and other activities	2372	0.150	0.357	0	1
• *Ownership :* Italian/foreign	2372	0.028	0.165	0	1
Occupations (OCC)					
• professionals	2372	0.008	0.091	0	1
• associated professional and technicians	2372	0.023	0.150	0	1
• clerical and secretarial occupations	2372	0.352	0.477	0	1
• crafts and related occupations	2372	0.154	0.361	0	1
• personal and protective service	2372	0.006	0.078	0	1
• sales and customer service occupations	2372	0.080	0.272	0	1
• process, plant and machine operatives	2372	0.230	0.421	0	1
• other occupations	2372	0.144	0.351	0	1
Working and contractual conditions (WCC)					
• Log of working hours	2372	3.651	0.274	1.3860	4.382
• Temporary contract	2372	0.092	0.290	0	1
• Risky and unpleasant job	2372	5.414	3.860	2	14
• Shifts	2372	0.199	0.399	0	1
• Learning					
- long learning time (> 24 months)	2372	0.156	0.363	0	1
- medium learning time (>6 and <24 months)	2373	0.379	0.485	0	1
- short learning time (< 6 months)	2372	0.610	0.487	0	1
Cost of living in different regions (log) (LC)	2372	4.650	0.086	4.444	4.737
Individual worker characteristics (IWC)					
• Gender (M/F)	2372	1.399	0.490	1	2
• Education:					
- Compulsory school	2372	0.488	0.499	0	1
- High school	2372	0.431	0.495	0	1
- Degree + post-graduate studies	2372	0.007	0.839	0	1
- Over/under education	2372	0.014	2.417	-13	11
• Dependent relatives (number of children dependent on father)	2372	0.622	0.859	0	7
Decentralized complementarity wage bargaining (DCWB)					

Variables	Obs	Mean	Std. Dev.	Min	Max
• union influence	2372	0.276	0.571	0	3.484
• union influence*log number of employees	2372	1.600	3.732	0	39.337
Distinctive level of competencies					
• ICT capital-in-use for production of goods and services in workshop (DL_ICT_ws)	2372	0.025	0.281	0	8.161
• ICT capital-in-use for creative intellectual activities (DL_ICT_of)	2372	0.034	0.367	0	8.600
• Soft competencies (DL_SC)	2372	2.335	4.405	0	24.272
• Technical competencies (DL_TC)	2372	1.642	2.906	0	14.979
Instruments					
• Duration of training in:					
- digital technologies, conditioned to DL_ICT_ws > 0	2372	0.005	0.102	0	3
- digital technologies, conditioned to DL_ICT_of > 0	2372	0.006	0.110	0	3
- soft competencies, conditioned to DL_SC > 0	2372	0.075	0.352	0	3
- technical competencies, conditioned to DL_TC > 0	2372	0.090	0.394	0	3
• Job autonomy, conditioned to:					
- DL_ICT_ws > 0	2372	0.243	1.835	0	20.039
- DL_ICT_of > 0	2372	0.191	1.707	0	20.039
- DL_SC > 0	2372	4.717	6.914	0	21.843
- DL_TC > 0	2372	5.125	7.076	0	21.843
• HPWPs, conditioned to:					
- DL_ICT_ws > 0	2372	0.021	0.166	0	1.922
- DL_ICT_of > 0	2372	0.016	0.151	0	1.922
- DL_SC > 0	2372	0.337	0.580	0	1.922
- DL_TC > 0	2372	0.359	0.599	0	1.922
• Personality traits, conditioned to:					
- DL_ICT_ws > 0	2372	0.187	1.311	0	11.573
- DL_ICT_of > 0	2372	0.127	1.112	0	11.573
- DL_SC > 0	2372	3.281	4.703	0	11.573
- DL_TC > 0	2372	3.527	4.754	0	11.573
• High school diploma, conditioned to:					
- DL_ICT_ws > 0	2372	0.641e-4	0.008	0	1
- DL_ICT_of > 0	2372	0.003	0.005	0	1
- DL_SC > 0	2372	0.020	0.141	0	1
- DL_TC > 0	2372	0.032	0.176	0	1
• Degree, conditioned to:					
- DL_ICT_ws > 0	2372	0	0	0	0
- DL_ICT_of > 0	2372	0.001	0.033	0	1
- DL_SC > 0	2372	0.006	0.079	0	1
- DL_TC > 0	2372	0.006	0.079	0	1
• ICT capital-in-use for production of goods and services in workshop (DL_ICT_ws), conditioned to:					
- DL_ICT_of > 0	2372	0.005	0.195	0	7.035
- DL_SC > 0	2372	0.426	3.188	0	40.142
- DL_TC > 0	2372	0.336	2.413	0	27.301
• ICT capital-in-use for creative intellectual activities (DL_ICT_of), conditioned to:					
- DL_ICT_ws > 0	2372	0.003	0.094	0	5.977

Variables	Obs	Mean	Std. Dev.	Min	Max
- DL_SC > 0	2372	0.419	3.655	0	44.436
- DL_TC > 0	2372	0.313	2.693	0	30.276
• Soft competencies, conditioned to:					
- DL_ICT_ws > 0	2372	0.426	3.188	0	40.182
- DL_ICT_of > 0	2372	0.419	3.655	0	44.436
- DL_TC > 0	2372	5.020	9.184	0	30.955
• Technical competencies, conditioned to:					
- DL_ICT_ws > 0	2372	0.336	2.413	0	27.301
- DL_ICT_of > 0	2372	0.313	2.693	0	30.276
- DL_SC > 0	2372	9.232	13.164	0	46.495

5. Results of the estimates

Table 2 presents the estimates of the wage models [2a-2e]. The dependent variable is the natural logarithm of permanent net monthly wages in nominal terms. Specifically, equation A - which mirrors model [2a] - does not pass the Breusch-Pagan/Cook-Weisberg test of constant variances among residuals, signalling the presence of heteroskedasticity. Equation B takes into account the endogeneity of competencies [2a-2e] but the SUR estimator - which imposes homoscedasticity among the residuals of each equation of the system - provides results that do not pass the Breusch-Pagan test of independence of residuals across the 5 equations of the system. Equation C draws on 3SLS, supplemented with the bootstrap method, which simultaneously takes into account the non-independence of residuals among the 5 equations of the system and the heteroskedasticity of residuals within each equation; given these properties, it provides the most reliable results. A glance at the three estimates indicates relatively stable coefficients, in spite of different estimators, which conform to the a priori expectations.

Firm characteristics

To take into account the institutional contractual aspects, equation C incorporates variables controlling for industry and occupation. The disaggregation level of the industry's collective national labour contracts is a little higher than we can control for and thus some degree of distortion remains in the estimates. With reference to the default industry (other manufacturing industry), all workers seemingly earn similar salaries, except those in information and communications, and financial and insurance industries, who receive a wage premium ranging from 16-17 percent. Firm size gives rise to a further wage premium, very likely linked to productivity deriving from economies of scale.

When controlling for a wider set of factors and endogeneity (cfr. i*nfra*), the traditional belief that foreign firms pay - *per se* - higher salaries compared to national firms is no longer tenable, unless their claimed greater efficiency and better organization rewards workers through one or more channels we control for.

Occupations

The hierarchical ranking of the job classifications reflects the expected signs. The extent of the shift of coefficients from top and bottom (relative to the default class, the lowest in the order: other occupations) is lower with respect to institutional differences that can be observed when looking at the levels of job classification parameters of several national labour contracts.[17] This casts some doubt on the (very difficult) political line to pay the same salary for equal jobs across the economic system, since several workers in the same occupational class officially earn the same salary but perform tasks, duties and responsibilities that require different and additional competencies, captured in our estimates by other specific independent variables. If this is the case, it means that the additional competencies are indirectly recognized but as a detrimental and not an adjunctive element of salaries linked to the position's occupational class.

Working and contractual conditions

The variables referring to working hours and temporary contracts have the expected sign; the former also indirectly controls for overtime and part-time hours, the latter showing a penalty of around 9 percent. Contrary to expectations, the dummies indicating whether the employee frequently works shifts and holds a risky and unpleasant job appears to be non-significant. Holding a position that incorporates low learning time entails a lower wage profile.

Cost-of-living for workers living in different regions

The estimates show an elasticity coefficient of around 0.4. This value is rather distant from the unity, which would correspond to the neoclassical hypothesis of perfect rationality (and perfect geographic mobility) of the behaviours of economic agents. Disparity in cost-of-living transforms an equal nominal salary for equal jobs (whatever its allocation: in the Lombardy or Basilicata region) into an unequal salary for the same jobs. Should this be a temporary situation, it would be compatible with the rationale of mainstream labour market theory, provided we observe migrations of workers from lower real wage areas (northern regions) to higher real wage areas (southern regions). Since the migration flow is in the opposite direction, due to different employment opportunities between the two areas, one would be tempted to conclude that the negative externalities of moving from one area to

[17] The parametric scale that is on average observed in various industry-wide labour contracts goes from 100 for the lower occupational level up to 170-200 for the highest occupational level (managers excluded).

another constitute the main factor hindering the functioning of the labour market. This interpretation could be valid if prepared to disregard other important factors that influence individual choices such as social norms, values linked to relational networking, sense of belonging to a community, and so forth. This comes close to Solow's (1990) view, according to which the labour market is a non-market, in the sense that it is not a market as others (goods or financial assets), but rather a social institution, whose functioning depends on how much is considered mutually acceptable by the single economic agents and social parties involved in the exchange.

Individual worker characteristics

As far as education is concerned, the shift coefficient increases by 16-17% as the education level increases in relation to the default variable (the lowest in the order: compulsory school). Educational mismatch plays the hypothesized role, namely, the undereducation condition increases competencies and consequently wages, while overeducation exposes a worker to a prolonged non-utilization of accumulated knowledge, which may become obsolete over time, subsequently reducing competencies and wages.

The child effect is statistically significant and shows a 5% increase for a dependent relative.

Table 2 - Results of the estimates of permanent net monthly nominal wages

	Equation A		Equation B		Equation C	
	Weighted LS		Weighted SUR		Weighted 3SLS	
	Coeff.	P>|t|	Coeff.	P>|x| (boot-strap)	Coeff.	P>|z| (boot-strap)
Dependent variables	**log of permanent bet monthly wage (lw)**					
Independent variables						
Firm characteristics (FC)						
• Firm size: log of number of employees	0.020	***	0.019	***	0.020	***
• Industries:						
- food	0.029		0.026		0.026	
- textile	0.034		0.034		0.034	
- wood	-0.059		-0.059		-0.059	
- paper and printing	0.024		0.028		0.028	
- chemical and plastic	0.044		0.044		0.044	
- non-metallic minerals	0.025		0.004		0.004	
- metal products	-0.007		-0.005		-0.005	
- automotive	0.040		0.041		0.041	
- wholesale, retail trade and repair of motor vehicles	0.012		0.018		0.018	
- accommodation and food service activities	-0.040		-0.038		-0.038	
- transportation and storage	0.013		0.016		0.016	
- information and communication	0.169	***	0.168	***	0.168	**
- financial and communication	0.159	***	0.166	***	0.166	***

	Equation A		Equation B		Equation C	
	Weighted LS		Weighted SUR		Weighted 3SLS	
	Coeff.	P>|t|	Coeff.	P>|x| (boot-strap)	Coeff.	P>|z| (boot-strap)
- real estate, rentals, research and other activities	-0.003		-0.003		-0.003	
• Ownership: Italian/foreign	0.087	***	0.089	***	0.089	
Occupations (OC)						
• professionals	0.256	***	0.248	***	0.248	***
• associated professional and technicians	0.230	***	0.225	***	0.225	***
• clerical and secretarial occupations	0.147	***	0.150	***	0.150	***
• crafts and related occupations	0.083	***	0.082	***	0.082	***
• personal and protective service	0.132	*	0.117	*	0.117	
• sales and customer service occupations	0.054	**	0.054	**	0.054	
• process, plant and machine operatives	0.112	***	0.115	***	0.116	***
Working and contractual conditions (WCC)						
• Log of working hours	0.480	***	0.477	***	0.478	***
• Temporary contract	-0.093	***	-0.089	***	-0.090	***
• Risky and unpleasant job	0.2e-3		0.2e-3		0.2e-3	
• Shifts	0.017		0.021		0.021	
• Learning						
- high learning time (> 24 months)	-0.024		-0.023		-0.023	
- low learning time (< 6 months)	-0.069	***	-0.070	***	-0.071	***
Cost of living in different regions (log) (LC)	0.414	***	0.421	***	0.420	***
Individual worker characteristics (IWC)						
• Gender (M/F)	-0.178	***	-0.171	***	-0.171	***
• Education:						
- high school	0.165	***	0.161	***	0.161	***
- degree + specialization	0.178	***	0.169	***	0.170	***
- educational mismatch	0.016	***	0.015	***	0.015	***
• Dependent relatives (number of children dependent on father)	0.052	***	0.050	***	0.050	***
Decentralized complementarity wage bargaining (DCWB)						
• union influence	0.071	***	0.069	***	0.070	**
• union influence x log number of employees	-0.011	***	-0.011	***	-0.011	**
Distinctive level of competencies:						
• ICT capital-in-use for production of goods and services in workshop (DL_ICT_ws)	-0.018		-0.014		-0.017	
• ICT capital-in-use for creative intellectual activities (DL_ICT_of)	0.043	***	0.045	***	0.046	***
• Soft competencies (DL_SC)	0.9e-0	**	0.001	***	0.001	*
• Technical competencies (DL_TC)	0.003	***	0.003	***	0.003	***
Constant	3.294	***	3.259	***	3.261	***
Dependent variables	**ICT capital-in-use for production of goods and services (DL_ICT_ws)**					
Independent variables						
• High school			-1.059	**	-1.059	
• Degree+specialization			Omit			
• Duration of training in ICT for workshop			0.234	***	0.234	

	Equation A		Equation B		Equation C	
	Weighted LS		Weighted SUR		Weighted 3SLS	
	Coeff.	P>|t|	Coeff.	P>|x| (boot-strap)	Coeff.	P>|z| (boot-strap)
• Job autonomy			-0.181	***	-0.181	**
• HPWPs			0.308	***	0.308	
• Personality traits			-0.209	***	-0.209	
• ICT capital-in-use for creative intellectual activities (DL_ICT_of)			0.129	***	0.128	
• Soft competencies (DL_TC)			-0.060	***	-0.060	
• Technical competencies (DL_SC)			0.203	***	0.203	**
• Log of permanent net monthly wage			0.394	***	0.394	
• Constant			0.7e-4		0.9e-3	0.7e-4
Dependent variables	**ICT capital-in-use for production of goods and services (DL_ICT_of)**					
Independent variables						
• High school			-0.326	***	-0.327	
• Degree+specialization			2.027	***	2.027	**
• Duration of training in ICT for workshop			0.147	***	0.147	
• Job autonomy			0.003		0.003	
• HPWPs			0.053		0.053	
• Personality traits			-0.022		-0.022	
• ICT capital-in-use for production of goods and services (DL_ICT_ws)			1.313	***	1.313	
• Soft competencies (DL_TC)			-0.012	**	-0.012	
• Technical competencies (DL_SC)			0.193	***	0.193	*
• Log of permanent net monthly wage			-0.254	***	-0.254	
• Constant			-0.1e-3		-0.1e-3	
Dependent variable	**Soft competencies (DL_SC)**					
Independent variables						
• High school			0.088		0.089	
• Degree+specialization			0.992		0.991	
• Duration of training in soft competencies			-0.438	***	-0.437	
• Job autonomy			0.278	***	0.280	**
• HPWPs			0.528	***	0.528	
• Personality traits			0.617	***	0.617	***
• ICT capital-in-use for production of goods and services (DL_ICT_ws)			0.435		0.439	
• ICT capital-in-use for creative intellectual activities (DL_ICT_of)			0.466	***	0.465	
• Technical competencies (DL_TC)			0.136	***	0.137	***
• Log of permanent net monthly wage			2.354	***	2.354	***
• Constant			0.012		0.012	***
Dependent variable	**Technical competencies (DL_TC)**					
Independent variables						
• High school			0.037		0.036	
• Degree+specialization			1.426	***	1.425	
• Duration of training in soft competencies			-0.182	*	-0.182	
• Job autonomy			-0.011		-0.011	
• HPWPs			-0.507	***	-0.0507	**

	Equation A		Equation B		Equation C	
	Weighted LS		Weighted SUR		Weighted 3SLS	
	Coeff.	P>|t|	Coeff.	P>|x| (boot-strap)	Coeff.	P>|z| (boot-strap)
• Personality traits			0.215	***	0.215	**
• ICT capital-in-use for production of goods and services (DL_ICT_ws)			-0.168		-0.167	
• ICT capital-in-use for creative intellectual activities (DL_ICT_of)			0.514	***	0.513	***
• Soft competencies (DL_SC)			0.174	***	0.174	***
• Log of permanent net monthly wage			2.058		2.058	***
• Constant			0.008	***	0.008	***
Number obs.	2372		2372		2372	
Weighted population	7.038e+6					
F-test	64.24					
Prob>F	0.000					
R^2	0.542					
Log of net permanently monthly wage						
RMSE			0.243		0.243	
• R^2			0.541		0.542	
• Chi^2			2816.5		2812.3	
• *P-value*			0.000		0.000	
ICT capital-in-use for production of goods and services (DL_ICT_ws)						
RMSE			0.173		0.173	
• R^2			0.623		0.623	
• Chi^2			3946.9		3947.1	
• *P-value*			0.000		0.000	
ICT capital-in-use for creative intellectual activities (DL_ICT_of)						
RMSE			0.163		0.163	
• R^2			0.803		0.803	
• Chi^2			9722.9		9722.9	
• *P-value*			0.000		0.000	
Distinctive level of soft competencies (DL_SC)						
RMSE			2.562		2.562	
• R^2			0.967		0.967	
• Chi^2			69727		69727	
• *P-value*			0.000		0.000	
Distinctive level of technical competencies(DL_TC)						
RMSE			1.687		1.687	
• R^2			0.972		0.972	
• Chi^2			82090		82084	
• *P-value*			0.000		0.000	
Breusch-Pagan test: Chi^2 (6)	173.95		60.06			
P-value	0.000		0.000			

Notes: Default variables: industries: wholesale and retail trade + car repair shops; occupations: elementary and service occupations; education: primary school, secondary school and vocational school; learning: medium learning time.
Statistically significant: * at the .10 level; ** at the .05 level; *** at the .01 level.

Decentralized complementarity wage bargaining

The traditional parabolic pace of trade union power with respect to firm size in extracting higher wages is confirmed. It is not possible to discard the idea that a collective efficiency wage component pursued by employers may also underlie the wage premium agreed between these and workers' representatives (Cristini and Leoni, 2007). Having controlled for employee and firm characteristics, our results - which refer to the role of workers' representatives at the decentralized level - contrast with those obtained by Dell'Aringa et al. (2005) while they conform with Cristini and Leoni's (2007) and Origo's (2009) estimates.

Distinctive level of competencies in technological capital-in-use and organizational behaviours

Our estimates confirm that three of the four core competencies held and enacted by workers are explicitly, tangibly and economically recognized by firms, namely, ICT capital-in-use for creative intellectual activities, soft competencies and technical competencies. The distinctive competence that clearly manifests but is not economically recognized relates to ICT capital-in-use for production of goods and services for workshops, very likely made explicit by blue-collar workers. A possible explanation could be that in this workplace category - due to the will of the workers themselves and the management - a collective perspective tends to prevail, which would lead the agents to recognize and accept (explicitly and/or implicitly) an element of meritocracy where access opportunities are open to all (as in the case of soft and technical competencies). In the direct production of goods and services, the opportunity to work with the use of sophisticated technologies is likely to be reserved for the few whose distinctive competencies could be integrated, in terms of wages, with technical and transversal competencies.

The results are robust even after testing for the endogeneity of the 4 variables in question.

5.1 Endogeneity of competencies

The endogeneity analysis shows a network of relationships that together confirm the hypothesis explained in the models [2b-2e], with some exceptions (see Figure 2 for a synthesis of these results).

< Figure 2 approximately here >

First, the competencies tend to influence each other, even if in a non-symmetric and incomplete way. Competencies in the use of production technologies appear isolated, influenced only by technical competencies of a behavioural nature. Second, only the two competencies derived from organizational behaviours receive positive feedback from the

wage level. Third, the variables behind the distinctive competencies have very positive roles, even if it less than expected. In particular, personality traits influence both organizational competencies, and job autonomy contributes to developing soft competencies and those relating to ICT deployed in workshops and plants for the production of goods and services, while training and high school diplomas do not play any role. Unexpectedly high performance work practices deflate technical competencies, a result that merits a further and specific in-depth analysis.

Making an account of the explicative power of the set of variables regarding to institutional setting, included differential cost of living in different regions, individual worker characteristics and role of workers' representatives, compared to that concerning distinctive competencies, comes out an 87 percent for the first and a 13 percent for the second. The relationship is very close to what Bank of Italy, namely D'Amuri and Giorgiantonio (2014) assert in their statistic prose (see footnote 8) as average amount of wage attributable respectively to national industry-wide agreements and to supplementary wage premia individually or collectively bargained at firm level.

6. Conclusions and final considerations

To conclude, we can assert that the estimates confirm (regardless of the institutional setting and related control variables) the existence of wage premia for a distinctive level of enacted competencies, namely, in the two specific domains, the use of digital technologies and organizational behaviours. In terms of the first domain, a wage premium is associated with only one ICT component, precisely ICT capital-in-use for creative intellectual activities; in the second domain, it concerns both competencies (soft and technical).

The coefficients we estimated can scarcely be interpreted - to our understanding - as shadow prices of particular attributes (Lucas, 1977), unless one assumes that markets equilibrate sufficiently rapidly so that one can abstract from disequilibria. Schultz (1975: 829) cautioned us not to err in not distinguishing between the analytical property of a theory (Walrasian theory, in Lucas' case) and the fact that human beings are not always in equilibrium and the further fact that they do not regain equilibrium instantaneously. It follows that wages at any given moment can be more appropriately interpreted along a Schumpeterian tradition (Bowles et al., 2001) as capturing some 'disequilibrium rents': for example, some attitudes differing in kind, not referable to mere rational economic behaviours, or even a portion of the economic return of schooling that Schultz (1975: 843) himself attributes to the individual ability to deal with disequilibria, to the extent that abilities such as, for example, different degrees of risk aversion, the degree of self-directedness or self-confidence are enhanced through education.

The general framework used in the wage function estimation in this work contributes - in our opinion - to overcoming the gap between economic theories, psychological theories and sociological theories around the question of wages, and to reconsidering the determinants of wage gains in a broad and unifying perspective. The results of our study show that the components, which in labour economist terminology are defined as strictly non-economic, non-observable and are therefore treated as omitted variables - such as soft competencies and the underlying factors such as personality traits and organizational designs, which redefine and further develop the competencies required of workers - play an unexpectedly important role. Should our results be confirmed by more detailed analyses that are information-rich in organizational and psychological capital, then these should not be neglected in designing either workplaces or national policies in terms of training the workforce, nor in the strategies of actors in charge of contractual wage negotiations, be they on a national industry level or decentralized at the workplace level.

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Fig. 1 Structure of work competencies

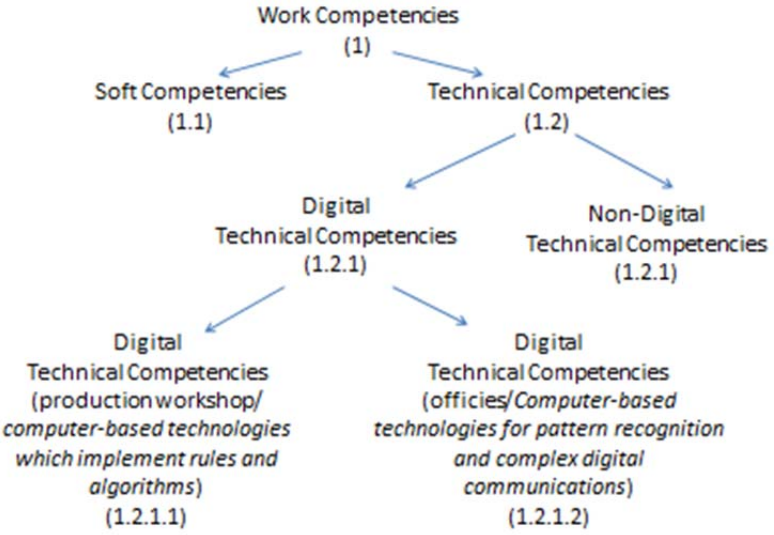
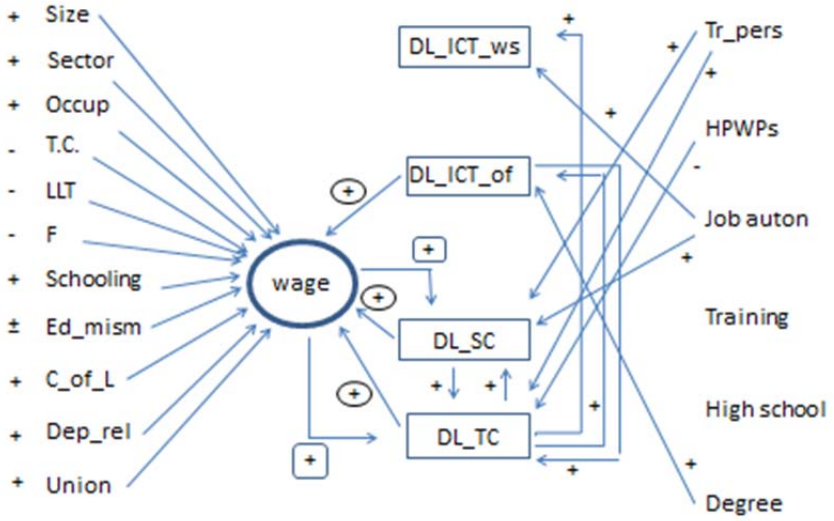


Fig. 2 Wage determinants



Source: table 2