The impact of technological and organizational changes on motivations to work hard: European evidence

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Abstract

Some recent studies underline a positive impact of Information and Communication Technologies (ICT) and of new work practices on firms' productivity. But as is well known in the principal-agent literature, agents are predisposed to shirk, so, in order to obtain productivity gains firms need to provide workers with sufficient incentives and to encourage motivations. Our econometric results are obtained with data at the individual level collected in the Euro-zone countries of the 2005 wave of the EWCS (European Working Conditions Survey). Our main results indicate that offering the access to Internet to workers permits to create an enriching work environment that positively influences intrinsic motivations of workers. These intrinsic motivations, are crowded in when the firm provides positive incentives and crowded out when the firm resorts to monitoring or time pressure. In addition, in the whole population, the use of Internet is positively correlated with the team spirit that can generate shame if the level of effort is insufficient and should lead to a highest level of employees' effort. Concerning reciprocity, the results underline a positive link of Internet use on the feeling of being well paid for the work done.

Keywords: Internet use; intrinsic and extrinsic motivations; identity

JEL classification codes: O33 ; J81 ; L22

1 Introduction

The fast diffusion of Information and Communication Technologies (ICT) in firms, allowed notably by the declining price for its use, seems to favor the productivity of the firm. Several works present evidence supporting a positive effect of ICT on productivity at the firm level (Greenan and Mairesse, 2000, Licht and Moch, 1999, Lichtenberg, 1995). Moreover, the diffusion of ICT has been combined with changes in the organizational structure of firms with the increasing use of so called high performance work organization (Lindbeck and Snower, 2000, Osterman, 2000). Recent empirical studies underline that ICT combined with workplace reorganization have positive and significant effects on productivity at the firm level (Bertschek and Kaiser, 2004, Black and Lynch, 2001, Bresnahan et al., 2002, Brynjolfsson and Hitt, 2000). Another analysis of Aral et al. (2007) shows that ICT use furthers information diffusion in networks of workers and strengthen the productivity and the performance of individuals.

To obtain these productivity gains and to assure their competitiveness, firms need to provide the proper incentives and motivations for workers. Thanks to these incentives and motivations the firm can solve the problem of shirking and can manage the creation and transfer of knowledge. However, the problem of shirking is complicated in the context of wide technological and organizational changes. The diffusion of ICT associated with workplace reorganization involves a change from a "Tayloristic" work organization, characterized by task specialization, pyramidal hierarchical structure, and centralization of responsibilities, to a "Holistic" organization with multi-tasking, job rotation, decentralization of decision-making, team work, total quality management, more flexibility for the employer and greater communication between workers. Consequently, the relationships between employers and employees have changed. As workers became more versatile (Lindbeck and Snower, 1996, 2000) and more autonomous (Caroli et al., 2001) contracts became more incomplete and the evaluation of workers' performance more difficult.

As it is well known in the principal-agent literature, since workers know their own ability levels while employers may not, it is costly to measure their performance, and since they prefer leisure to effort, agents are predisposed to shirk. Consequently, they can choose the actions that are not in the best interest of the employer. The firm exists in a large part to provide the proper incentives to obtain the optimal provision of workers' effort when the information on

workers' performance is costly[1]. In order to reduce the agency problem, the principal can use monitoring, compensations and/or promotions. This principal-agent view can be extended with motivations, largely neglected by the economic literature. These motivations, widely analyzed by organizational psychologists, can be substitutes of incentives and can consequently affect effort. Building on Frey (1997), Minkler (2003, 2004) introduced both incentives and motivations in the analysis of the provision of effort at work. Moreover, Akerlof and Kranton (2005) formalize the impact of incentives and motivations in workers' utility to provide a high or a low level of effort according to their initial motivations so as to align their preferences with those of their employers. Moreover, a recent issue of *The American Economic Review* gives pride of place to "work incentives, motivation, and identity" in its columns (Akerlof and Kranton, 2008, Besley and Ghatak, 2008, Prendergast, 2008).

In this paper, we analyse the consequences of Internet use at work on motivations of workers with the control of the incentives given by firms and the organizational workplace practices. Firms need to manage efficiently their relationships with workers in order to solve, at least partially, agency problems and beyond, to favour the creation and transfer of knowledge, which are necessary for firms' productivity and competitiveness. Our econometric results are obtained with data at the individual level collected in the Euro-zone countries of the 2005 wave of the EWCS (European Working Conditions Survey). To conduct an evaluation of the correlations of Internet use with different indicators of motivations, we use, first, ordered Probit regressions with our indicators of motivations as outcome equations including the incentive system of firms, the organizational workplace practices, a number of individuals controls like age, education, tenure and firm's characteristics like size. Second, by applying maximum simulated likelihood estimation techniques, we estimate a multivariate ordered Probit model that permits to evaluate the effect of Internet use on the probability of workers of being intrinsically or extrinsically motivated, taking into account the potential correlations between workers' motivations.

Our main results about Internet use and motivations, suggest that by giving the possibility to use Internet at the workplace, the firm creates an enriching work environment that influences positively intrinsic motivations of workers. This is also the case for the subsample of insiders

[1]This cost can result from the costly evaluation of performance (Calvo and Wellisz, 1978), the unobservability of worker performance (Holmstrom, 1982) or the opportunism of team members under revenue-sharing (Alchian and Demsetz, 1972).

who share the preferences of their employers but not the case for the subsample of outsiders who think of themselves not as a part of the firm. The results on incentives are in line with the crowding literature (Frey, 1997, Frey and Jegen, 2001). Thus, the results reveal a crowd out effect due to the direct supervision of workers and of time pressure that can badly influence the provision of the effort by employees. Conversely, positive incentive mechanisms such as career concern strengthen, through the crowd in effect, intrinsic motivations and the level of effort to work, create and transfer knowledge. In addition, in the whole population, the use of Internet is positively correlated with the team spirit that can generate shame if the level of effort is insufficient and should lead to a highest level of employees' effort. But this result does not appear in the subsamples. Concerning reciprocity, the results underline a positive link of Internet use on the feeling of being well paid for the work done in the whole sample and in the subsample of insiders.

The rest of the paper is organized as follows. Section 2 provides some theoretical considerations on the relationships between incentives, motivations and the provision of effort of workers in the context of technological and organizational changes. Section 3 provides a detailed description of the data set we use. Section 4 exposes the empirical framework of our analysis on the ways to induce efficient effort. Section 5 discusses the results, and conclusions are given in the last section.

2 Incentives, motivations and identity in the context of technological and organizational changes

The concept of identity developed by Akerlof and Kranton (2005) embodies the extent to which workers identify with their firm and want to achieve its goal. "Outsiders", who think of themselves not as a part of the firm, can be distinguished from "insiders", who share the preferences of their employers. Workers are risk averse and their overall utility is derived from incentives, motivations and identity. Insiders should act in the firm's best interest so their ideal effort is in line with what expect the firm, while conversely outsiders don't want to work in the interest of the firm. In the context of technological and organizational changes, Internet use by workers is increasing. It, consequently, gives workers more opportunities to shirk, like the use of Internet for personal purpose instead of working.

The principal can invest in incentives in order to induce workers to operate in the interest of

the firm (Jensen and Meckling, 1976, Prendergast, 1999). Incentives are provided to workers through two options, a *negative incentive* (monitoring) and a *positive incentive* (wage bonus, promotions). To be effective, the monitoring needs to be combined with penalties when it shows that the work is substandard. The positive incentive option rewards workers for effort by means of monetary incentives like salary revision or bonus. But, as workers exert effort not just to maximize their pay but also to affect future contracts, the firm can also use promotions by acting on the career concerns of workers (Fama, 1980, Holmstrom, 1982). Firms can also use positive incentives like promotions or wage bonus to reward ex-post the effort of workers and to retain workers who developed specific competences thanks to ICT use.

As technological changes increase workers' autonomy, the direct supervision becomes more difficult, so firms need to mobilize innovative modes of monitoring. In the current context of strategies like the just-in-time one, the stress of the time limit can be combined with the authority of the superior.

The standard theory of the firm does not differentiate the different sources of motivation, which are, in the economic view, just the manifestations of underlying preferences (like for the reward associated with performing the task). While economists have offered little in terms of understanding these psychological effects on the level of effort, the concept of motivation has already been analyzed by organizational psychologists. Research on motivations has distinguished two types: intrinsic and extrinsic. Intrinsic motivations are influenced by the work itself. Extrinsic motivation is motivation gained by externally influenced need satisfaction. Following Deci (1971) "*one is said to be intrinsically motivated to perform an activity when one receives no apparent reward except the activity itself*" (p.105). As shown is the crowding theory (Frey, 1997, Frey and Jegen, 2001), incentives can reduce the motivations to undertake an activity and the firm does not have to neglect their effects because it will affect effort (Van Herpen et al., 2005). The cross-pollination by combining social psychology and economics is consequently necessary because the crowding out effect predicts reverse reactions of workers to the one expected in the agency theory.

2.1 Intrinsic motivations

Intrinsic motivations come from within the worker in bond with his job. Workers, who find their work interesting, will enjoy it and can consequently choose to do good work for its

own sake. So they are supposed to be intrinsically motivated. Following Frey (1997), external interventions, that is to say incentives, can increase or "crowd in" intrinsic motivations or, quite the opposite, can diminish or "crowd out" these motivations and beyond affect the provision of effort. In the first, workers feel that their involvement and competence are appreciated by employers (possibilities of promotions). This token of trust favours freedom of actions and so can increase intrinsic motivation and strengthen the provision of effort. In the second, agents perceive that the external intervention, like monitoring, shifts the locus of control from the agent to the principal. As workers become "pawns" to the source of external, they respond by reducing what they has control over, *i.e.* intrinsic motivation (Deci, 1971, Minkler, 2004). Concerning the effect on effort, if the incentives schemes reduce workers' intrinsic motivation more than they induce them to perform, effort provision will decrease.

Following the utility model developed by Akerlof and Kranton (2005)[2], we can argue that intrinsic motivations contribute to the utility agents derive from identity (I_c). The utility agents get from their identity depends, indeed, on unpaid gratifications they retire from the job. Moreover, an employee intrinsically motivated by an enriching work will obtain a higher value than an employee not intrinsically motivated, especially when he or she is an insider.

As technological and organizational changes are associated with greater freedom in organizing one's own work and in diversifying tasks (Caroli et al., 2001, Greenan and Walkowiak, 2005, Lindbeck and Snower, 1996, 2000), it will increase the interest of the job and it can, consequently, boost employee intrinsic motivation. The crowd in effect will be reinforced by the necessity of using reward mechanisms for employees with the competencies needed by the firm in the context of skills upgrade in organization and of high churn rate (Bauer and Bender, 2004). The crowd out effect is more ambiguous. As the introduction of technological and organizational changes imply more autonomy and self-determination, workers should be more subject to control (Bradley, 2000). But the modes of control have changed and the monitoring is no more fulfilled by the supervision of superior, but more by time pressure, so the feeling of being supervised can less oppressive than the one induced by the traditional monitoring.

[2]The overall utility of the worker Akerlof and Kranton (2005) of is: $U(y, e, c) = u(y) - e + I_c - t_c|e^*(c) - e|$ with the utility from income ($u(y)$), effort (e), I_c a constant representing the utility the worker derives from belonging to the category $c = \{N; O\}$, N for insiders, O for outsiders, and $t_c|e^*(c) - e|$ indicates the utility the agent loses from diverging from the ideal effort level of his social category c with t_c measuring the importance of living up to the ideal.

Hypothesis 1. *ICT diffusion should influence positively workers' intrinsic motivations and, thereby, their provision of effort.*

2.2 Extrinsic motivations

Extrinsic motivation comes from outside the person (Frey, 1997, Frey and Jegen, 2001). Thus, we can include both the concept of external pressure of the group and the concept of reciprocity (Minkler, 2004) in this definition.

According to Minkler (2004), "*workers who care about the views of other workers are subject to peer pressure*" (p.870). This external pressure (Kandel and Lazear, 1992) most likely appears in firms that use profit sharing like in teams, because each worker's effort negatively affects all other worker's income or well-being (as shirking requires more effort from others). More broadly, this external pressure exerted by colleagues may occur when workers have a preference for cooperation or for team spirit and can explain what encourages workers to provide a high level of effort (Rob and Zemsky, 2002). Kandel and Lazear (1992) identify shame as a possible explanation of this external impact. This feeling arises when shirkers suffer from letting down their co-workers and from being abandoned and excluded by others (ostracism). As external pressure can be a substitute for direct monitoring, firms need to stimulate the deployment of a team spirit with the formation of groups in which members can identify with one another[3]. If the firm succeeds in infusing this team spirit in the organization, the feeling of shame can replace the use of the external penalties for substandard work to encourage effort.

In line with Akerlof and Kranton (2005), we can argue that the unease felt by the employee when he or she fails to achieve the optimum effort of his social category (t_c) is influenced by extrinsic motivations. The unease feeling may depend on the degree of cooperation between the employees and the feeling of belonging to a team (Rob and Zemsky, 2002). Indeed, the proximity between employees favours peer pressure and, beyond, the development of shame[4].

As network technologies contribute to codify tasks, knowledge and to collect information,

[3]Following Minkler (2004), to favour this team spirit firms can, for example, use quality circles, team meetings, inter-company sport leagues, company picnics,...

[4]"*Shame exists when others observe non-performance and then exert external pressure. In contrast, guilt arises as internal pressure even when one's actions are unobservable*", Minkler (2004, p.870).

they stimulate electronic communications and allow workers to get help more easily from colleagues when it is needed. This way ICT contribute to the creation of a team spirit. Moreover, a member of an organization can easily relay to other members information concerning substandard work and it can, therefore, increase the feelings of shame when the effort is not sufficient. But as the use of ICT may reduce face-to-face interactions and informal contacts (Nie et al., 2002), it can consequently thwart the creation of team spirit and the feeling of shame.

Hypothesis 2. *Technological changes stimulate electronic communications and increase the interdependence of workers, but they reduce face-to-face interactions. Consequently, the global impact of technological changes on external pressure is quite ambiguous.*

Another extrinsic motivation comes from the *reciprocity* between employers and employees. An agent is expected to, at least partly, determine his level of motivation considering the behaviours of others, particularly the employer. Following Akerlof and Kranton (2005), we can argue that the feeling of unease felt by workers when they fail to achieve the optimum effort of the social category (t_c) may also be influenced by the degree of reciprocity between employer and employee. In addition to purely self-interested people, there are a fraction of people who are also motivated by fairness or reciprocity considerations. According to experimental economics like the work of Fehr and Gächter (2000), people cooperate more than predicted by the self-interested model in response to friendly actions and less in response to hostile actions. According to Akerlof and Yellen (1990), in the context of work, reciprocity implies that a fair worker will be honest with an honest employer and will shirk with a dishonest employer (one that fails to provide a good working environment or a good salary).

With the introduction of high performance work systems and ICT, according to Colvin (2006), firms place greater value on employees developing firm specific competencies. Consequently, firms will try to keep such workers in a context characterized by high churn rates (Bauer and Bender, 2004). Furthermore, to obtain optimal effort of workers who develop ICT competences, firms can choose to reward them by providing good working conditions and ambiance and a good salary.

Hypothesis 3. *Technological changes should positively influence the relationships between employers and employees.*

3 Data and variables

We use data from the 2005 European Working Condition Survey (EWCS). The aim of the survey is to provide an overview of the state of quality of work and employment in Europe (Joling and Kran, 2008). The survey is questionnaire-based. It includes the active population of 27 EU Member States and of 3 other countries (Switzerland, Turkey and Norway) who are aged 15 years and over and resident in each of countries.

The basic sample design is a multi-stage, random sampling: in each country, a number of sampling points are drawn with a probability proportional to population size (for a total coverage of the country) and to population density. The target number of interviews is 1000 in all countries except Cyprus, Estonia, Luxembourg, Malta and Slovenia, in which it is 600. Weights (used in our analysis) are constructed in order to ensure that the distribution by region, locality size, gender, age, economic activity and occupation is identical to that of the Labor Force Survey distribution.

As we aim to analyze the impact of Internet use on motivations in interaction with work-place organizational practices, we excluded self-employees and employee in one-person firms. Thus the sample used focuses on the salaried employees in firms or establishments with two or more employees. We also restricted our sample to the countries that belong to the Euro-zone in 2005. The numbers of individuals in the sample is 7285.

A series of questions is devoted to "information and communication technologies" and in particular on Internet use for professional purposes. We also have information on workplace organizational practices such as team work, flexibility of hours, etc. and on incentives present in firms and on workers' motivations.

3.1 Dependent variables

To obtain productivity gains firms need to provide workers with sufficient incentives and to favor motivations. To analyze the links between, Internet use and workers' motivations, given firms' incentives schemes, we construct proxies of the different incentives and motivations from perception of workers about their working conditions[5].

[5]The detailed description of the construction of the proxies for incentives, motivations and identity is available in the Appendix.

As we said before, to study motivations we can distinguish intrinsic motivations from extrinsic ones. On the one hand, in order to test the Hypothesis 1, the intrinsic are caught by a index variable created from various variables capturing what can motivate intrinsically workers through the enrichment of work (like applying own idea, feeling of doing useful work, feeling of work well done, ...). As these ICT usage are qualitative variables, a multiple correspondence analysis followed by a cluster-analysis is performed. The cluster-analysis permits to group individuals in classes that are the most homogeneous as possible according to their similarities with respect to all variables[6]. The hierarchical clustering method we perform use the Ward index to measure the distance between two classes[7]. The number of classes retained is four and are classed increasingly in order to be estimates with an ordered probit.

On the other hand, for the extrinsic motivations we test Hypothesis 2 by capturing external pressure with the one variable, the possibility to get assistance from colleagues if the worker ask for it as a proxy of team spirit. Finally, we test our Hypothesis 3, the reciprocity between employers and workers, with two dummies characterizing the feeling of being well paid for the work done and the fear of losing the job that implies a bad working environment.

3.2 Distinction between insiders and outsiders

To distinguish insiders and outsiders to see if offering the use of Internet to employees has a different connection with motivations depending on the social category of workers. According to Akerlof and Kranton (2005), we can distinguish the two social categories of employees by using the degree of loyalty of workers towards their firm or how much they are proud to be working for their firm. Despite the shortcomings of the concept because "*[...] these responses do not tell us why workers feel this way. Perhaps firms invest in identity. Perhaps workers select organizations that share their values. Perhaps workers adopt their firms' values to minimize cognitive dissonance*" (p. 22), it corresponds to the framework they build where identity is a part of workers' utility.

From this point of view, in order to distinguish the two populations of workers, we use the following item: "I feel myself 'at home' in this organisation. (1) Strongly disagree; (2)

[6]The classification was based on the coordinates of individuals on the axes we obtain with a multiple correspondence analysis (MCA). We retain the maximum number of axes of the calculated by the MCA.

[7]The choice of the number of classes has been determined according to three rules: Je(2)/Je(1) and pseudo T-squared of Duda and Hart (1973) and pseudo-F of Calinski and Harabasz (1974).

Disagree; (3) Neither agree nor disagree; (4) Agree; (5) Strongly agree.". If the employee agrees or strongly agrees with the statement, he or she is considered as an insider, otherwise the employee is considered as an outsider. In our data, nearly 60% of employees can be considered as insiders and so 40% as outsiders.

3.3 Independent variables

Our measures of Internet use at work is the frequency of Internet use for professional purpose (a variable that has values from 0 to 4).

In order to capture the monitoring scheme defined by the firm, we use a proxy that measure if the pace of work is dependent on the direct control of boss. Moreover, as we we said before, time pressure can replace the direct supervision. Thus, in order to control for this time pressure, we introduce two proxies, the fact to work at very high speed or to tight deadlines[8]. To measure positive incentives, we consider a variable that measures the use of extra payment link with performance and a variable that measures promotion possibilities defined by good prospects for career advancement.

In order to capture as much as possible the workplace organizational practices we introduce the following control variables: flexible work hours; flexibility of days worked; rotating tasks; team work; frank discussion with the boss; meeting precise quality standards; training; job quality environment index, repetitive work[9].

As in Van Herpen et al. (2005), we introduce in our empirical analyzes different control variables concerning numerous aspects of workers, of their job and of the firm. The EWCS survey provides information on the worker, including the gender, the age, that he or she is in couple or not, the highest level of education attained, the income decile; the time commuting and the perception on work/life balance[10].

The survey also provides information on each worker's job and on the firm in which he or she works. More precisely, we have information on the occupation (nine groups based

[8]These variables are coded: 1. Never; 2. Almost never; 3. Around 1/4 of the time; 4. Around half of the time; 5. Around 3/4 of the time; 6. Almost all of the time; 7. All of the time.

[9]The detailed description of the construction of the proxies for workplace organizational practices is available in the Appendix.

[10]"Do your working hours fit in with your family or social commitments outside work (1) not at all well or not very well, (2) well or (3) very well?".

on ISCO: Legislators, senior officials and managers; Professionals; Technicians and associate professionals; Clerks; Service workers and shop and market sales workers (reference variable); Craft and related trades workers and skilled agricultural and fishery workers; Plant and machine operators and assemblers; Elementary occupations; Armed forces), the number of hours worked, the fact that the job is full time or not, if the contract is indefinite or not, if the worker as or not management responsibilities and the tenure. Concerning the characteristics of the firm, we introduce the business sector (nine sectors: Industry and agriculture (reference variable); Construct; Trade; Transports and telecommunication; Finance and insurance; Business services; Public administration; Education and health; Other services) as well as the size of the firm (four classes: 2-9 employees (reference variable); 10-49 employees; 50-249 employees; 250+ employees.

In order to take into account the heterogeneity of countries in which individuals work, we also control for the economic situation of each country (unemployment rate, growth rate) and the average level of education obtained from Eurostat.

4 Estimations methodologies of Internet links with motivations

As our measures of intrinsic and extrinsic motivations are ordered qualitative variables, we first estimate ordered Probit models.

The ordered Probit models is characterized by the underlying model:

$$Y^*_{motivation_j i} = \beta'_j \quad X_{internet.i} + \gamma'_j \quad X_{other\_var.i} + \epsilon_{ji}$$

Here, $Y^*_{motivation_j i}$ represents the $j = 1, \ldots, 4$ motivations which captures the latent utility of the individual i that depends on several independent variables X, β, the parameter of Internet use, γ the vector of parameters that captures the influence of other explanatory variables and ϵ_{ji} being an error distributed normally with an average of 0 and variance equal to 1.

Second, in oder to take into account the potential correlations between the j workers' motivation equations, we jointly estimate the motivations with the following system of equations:

$$\begin{cases} Y^*_{intrinsic\_motivation_i} = \beta'_1 \quad X_{internet.i} + \gamma'_1 \quad X_{other\_var.i} + \epsilon_{1i} \\ Y^*_{extrinsic\_motivation_1 i} = \beta'_2 \quad X_{internet.i} + \gamma'_2 \quad X_{other\_var.i} + \epsilon_{2i} \\ Y^*_{extrinsic\_motivation_2 i} = \beta'_3 \quad X_{internet.i} + \gamma'_3 \quad X_{other\_var.i} + \epsilon_{3i} \\ Y^*_{extrinsic\_motivation_3 i} = \beta'_4 \quad X_{internet.i} + \gamma'_4 \quad X_{other\_var.i} + \epsilon_{4i} \end{cases}$$

where i is the worker, X several independent variables, β, the parameter of Internet use, γ the vector of parameters that captures the influence of other explanatory variables and ϵ_{ji} the error terms (with $j = 1 \ldots, 4$). The error terms ϵ_{ji} are distributed as multivariate normal, each with a mean of zero, and variance-covariance matrix with the value 1 on leading diagonal and correlations $\rho_{kj} = \rho_{jk}$ as off-diagonal elements. When the correlation coefficient is 0 the motivations are independent, otherwise they are interdependent.

As the dependent variables in each equations are ordered variables, we use a multivariate ordered Probit model to estimate the equation system estimated with a maximum simulated likelihood estimation technique.

5 Results

The results obtained with the two methods are very similar in spite of the large correlations between motivations as underlined by the ρ coefficients provided by the multivariate ordered Probit model. The Tables corresponding to the ordered Probit model are reported in the Appendix.

5.1 Whole sample

The results obtained with a multivariate ordered Probit model concerning the links between Internet use and motivations of employees for the whole sample are shown in Table 1[11]. The correlation coefficients between motivations presented in Table 1 underline positive correlations between intrinsic motivation and team spirit and the well paid feeling. Team spirit and the well paid feeling are also positively correlated. The fear of losing job is negatively correlated with other motivations.

[11]The results obtained with an ordered Probit model are reported in Table 6 in the Appendix.

Table 1: Mutivariate ordered probit on the whole sample[a]

	Intrinsic motivations	Extrinsic motivations		
		Team spirit	Well paid	Fear of losing job
Frequency of Internet use (0-4)	0.0451***	0.0196*	0.0295**	-0.0100
	(0.0108)	(0.0110)	(0.0125)	(0.0309)
Pace of work dependent on direct	-0.203***	-0.0753**	-0.0353	0.121**
control of boss	(0.0279)	(0.0351)	(0.0303)	(0.0537)
Working at very high speed	-0.0428***	0.0241	0.00928	0.0528***
	(0.0139)	(0.0173)	(0.0130)	(0.0167)
Working to tight deadlines	0.0102	-0.0425***	-0.0534***	0.00797
	(0.00668)	(0.0100)	(0.00889)	(0.00860)
Extra payment link with	0.0516	0.00437	0.00914	-0.0935***
performance	(0.0457)	(0.0413)	(0.0648)	(0.0266)
Good prospects for career	0.198***	0.0429**	0.301***	-0.0291
advancement	(0.0187)	(0.0205)	(0.0397)	(0.0302)
Flexible work hours	0.000590	-0.0171	-0.0171	-0.0124
	(0.0546)	(0.0191)	(0.0491)	(0.0658)
Flexibility of days worked	0.00650	-0.0379	-0.0197	0.0236
	(0.0530)	(0.0864)	(0.0817)	(0.0696)
Rotating tasks	0.0326	0.287***	-0.0410	0.0577
	(0.0353)	(0.0404)	(0.0432)	(0.0381)
Team work	0.0428	0.389***	-0.0624	0.0177
	(0.0514)	(0.0244)	(0.0727)	(0.0416)
Frank discussion with the boss	0.0180	-0.0564	-0.0726	0.102*
	(0.0656)	(0.0625)	(0.0503)	(0.0567)
Meeting precise quality standards	0.247***	0.0757**	0.0323	0.0325
	(0.0429)	(0.0364)	(0.0316)	(0.0906)
Training	0.0770	0.136**	-0.0432	-0.0260
	(0.0847)	(0.0601)	(0.0418)	(0.0529)
Job quality environment index	0.157**	-0.0753	0.190***	-0.170***
	(0.0768)	(0.0623)	(0.0297)	(0.0423)
Repetitive work	-0.0399	-0.0281	-0.0389*	-0.0889
	(0.0268)	(0.0513)	(0.0228)	(0.0653)
Information about health and	0.162***	0.125***	0.155***	-0.0335
safety risks	(0.0215)	(0.0415)	(0.0247)	(0.0338)
Indefinite contract	-0.0473	-0.0103	-0.0486	-0.423***
	(0.0479)	(0.0812)	(0.0876)	(0.0805)
Full time job	-0.0347	-0.0581	-0.345***	-0.0793
	(0.0624)	(0.0768)	(0.0737)	(0.104)
Management capacity	0.127**	0.00527	0.136***	-0.125
	(0.0643)	(0.0807)	(0.0521)	(0.0773)
# hours worked	0.00462	0.00506	0.00245	0.00395
	(0.00334)	(0.00661)	(0.00290)	(0.00429)
Tenure	0.0168	0.00277	0.0184***	-0.0290***
	(0.0106)	(0.00849)	(0.00517)	(0.00717)
Tenure squared/100	-0.0261	0.0128	-0.0420***	0.0512***
	(0.0306)	(0.0172)	(0.0140)	(0.0194)
Male	-0.0867***	-0.0173	0.0516	-0.0226
	(0.0287)	(0.0421)	(0.0651)	(0.0345)
Age	0.00520	-0.0484***	-0.0296	0.0229
	(0.0175)	(0.0118)	(0.0208)	(0.0144)
Age squared/1000	0.0332	0.526***	0.384*	-0.219
	(0.196)	(0.143)	(0.233)	(0.164)
Lower secondary education	-0.0765	0.000504	0.149**	0.0663
(Ref. No or primary education)	(0.0494)	(0.0668)	(0.0703)	(0.0857)

Upper secondary education	0.0431	0.0692	-0.00380	-0.0652
	(0.0311)	(0.0713)	(0.0561)	(0.0651)
Post-secondary education	-0.0428	0.139	0.166*	0.0368
	(0.0655)	(0.104)	(0.0960)	(0.176)
Income band (1-10)	-0.00736	-0.00796	0.0916***	-0.0172
	(0.00866)	(0.00938)	(0.0132)	(0.0206)
Couple	0.0160	0.0821**	0.00282	-0.0554**
	(0.0390)	(0.0385)	(0.0312)	(0.0235)
Work life balance	0.223***	0.123***	0.234***	-0.156***
	(0.0227)	(0.0337)	(0.0476)	(0.0566)
Commuting time (min)	0.000568	0.00179	0.00193	0.000982
	(0.00165)	(0.00127)	(0.00154)	(0.00151)
Occupations	Yes	Yes	Yes	Yes
Business sectors	Yes	Yes	Yes	Yes
Size	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes
cut1	0.286	-1.294***	1.253	-1.156**
	(0.244)	(0.381)	(0.818)	(0.492)
cut2	1.240***	-0.465	2.135***	-0.219
	(0.284)	(0.372)	(0.811)	(0.542)
cut3	2.491***	0.253	2.954***	0.356
	(0.348)	(0.366)	(0.868)	(0.592)
cut4			4.501***	
			(1.003)	
	ρ_12	0.200***	ρ_23	0.0576***
		(0.0383)		(0.0135)
	ρ_13	0.177***	ρ_24	-0.0602*
		(0.0315)		(0.0315)
	ρ_14	-0.178***	ρ_34	-0.0699**
		(0.0259)		(0.0355)
Observations	7285			
Log Lik	-34751			

[a] Robust standard errors in parentheses. Weighted estimations. * significant at 10%; ** significant at 5%; *** significant at 1%, standard error adjusted for 12 clusters (Euro-zone countries) in parentheses.

The results highlight the fact that Internet use is associated with an enrichment of work that shall promote the positive assessment by employees of their work and, therefore, their intrinsic motivation, as underlined by Deci (1971) or Minkler (2004). Intrinsic motivations imply the delivery of the optimal effort without any financial compensation. For the whole sample, higher is the frequency of Internet use higher is the index capturing the intrinsic motivations of workers. Thus, the results provide support to Hypothesis 1 formulated above.

Concerning incentives, the results corroborate the crowding hypotheses (Frey, 1997). Indeed, the results show that monitoring and one of the proxies measuring time pressure reduce intrinsic motivations, that will decrease the effort provide by workers. Conversely, the career concern variable seems to crowd in intrinsic motivations. Monetary rewards don't reveal a

significant effect.

The main results concerning workplace organizational practices, show that measures linked with total quality management such as quality standards are positively associated with the intrinsic motivation. When the environment is of increased quality, the intrinsic motivation is stimulated. The fact of having management responsibilities or a satisfactory work life balance are positively associated with the intrinsic motivation.

Concerning extrinsic motivations, Internet use is positively associated with the proxy of team spirit that can generate an external pressure and thus the feeling of shame recognized by Akerlof and Kranton (2005) as reducing the value of the agent when he or she fails to comply with the interests of the employer. Thus, the results can be used to decide on the ambiguity of links between ICT use and external pressure as formulated in Hypothesis 2 as the results underline a positive link between Internet use and the team spirit. As for the intrinsic motivation, negative incentives as a negative impact on team spirit and positive incentives a positive one. Not surprisingly, working in a team strengthens closed relationships between workers. Rotating tasks, meeting precise quality standards and having information about health and safety risks are also positively linked with the proxy of team spirit. Other explanatory variables reveal that age has a U-shaped effect on team spirit. Living in couple and being satisfied with work life balance also reveal a positive link with team spirit.

Concerning the results about our proxies of reciprocity, it appears that the frequency of Internet use increases the feeling of being well paid but has no effect on the fear of loosing the job. The results partially support the Hypothesis 3 concerning the link between ICT use and reciprocity between employee and employer.

For the feeling of being well paid, time pressure is negatively associated with this variable but career concern is positively associated with this proxy of reciprocity. The quality of the job environment and having information about health and safety risks are positively associated with the feeling of being well paid and the fact of doing a repetitive work is negatively associated with this variable. Workers with management responsibilities also report to be well paid. Tenure has an inversed U-shaped effect.

The fear of loosing the job is strengthened by monitoring and time pressure but reduced when the worker can obtain extra payments. Frank discussion with the boss also strengthens this bad feeling, while the quality of the job environment has a reversed impact. Concerning other variables, it appears that tenure as a U-shaped effect. Having an indefinite contract, living in couple and having a good work life balance permit to thwart this feeling.

5.2 Insiders sample

The results obtained with a multivariate ordered Probit model concerning the links between Internet use and motivations of employees for the subsample of insiders are shown in Table 2[12].

Table 2: Mutivariate ordered probit on the subsample of insiders[a]

	Intrinsic motivations	Extrinsic motivations		
		Team spirit	Well paid	Fear of losing job
Frequency of Internet use (0-4)	0.0719**	0.0278	0.0381**	-0.0477
	(0.0335)	(0.0207)	(0.0153)	(0.0410)
Pace of work dependent on direct control of boss	-0.218***	0.00540	-0.0255	0.197**
	(0.0430)	(0.0356)	(0.0521)	(0.0946)
Working at very high speed	0.00455	0.0190	0.0220	0.0525***
	(0.0137)	(0.0165)	(0.0164)	(0.0186)
Working to tight deadlines	-0.00503	-0.0215**	-0.0539***	0.00537
	(0.0127)	(0.00958)	(0.0175)	(0.0104)
Extra payment link with performance	0.0233	-0.0124	0.0661	-0.102***
	(0.0562)	(0.0519)	(0.0789)	(0.0302)
Good prospects for career advancement	0.114***	-0.0275	0.228***	0.0116
	(0.0126)	(0.0291)	(0.0409)	(0.0444)
Flexible work hours	-0.166**	-0.126***	0.00986	-0.0183
	(0.0796)	(0.0429)	(0.0636)	(0.0622)
Flexibility of days worked	0.00510	-0.0868	-0.0434	-0.0519
	(0.0762)	(0.126)	(0.116)	(0.0836)
Rotating tasks	0.0369	0.354***	-0.0517	0.102*
	(0.0314)	(0.0686)	(0.0576)	(0.0607)
Team work	0.0829	0.349***	-0.0726	0.0305
	(0.0724)	(0.0612)	(0.0532)	(0.0384)
Frank discussion with the boss	-0.0133	-0.00260	-0.0293	0.153***
	(0.0883)	(0.0549)	(0.0527)	(0.0496)
Meeting precise quality standards	0.192***	0.0570	0.0526	-0.0146
	(0.0549)	(0.0525)	(0.0549)	(0.0798)
Training	0.197*	0.164***	-0.0685	-0.0360
	(0.116)	(0.0490)	(0.0557)	(0.0871)
Job quality environment index	0.134**	-0.125	0.115*	-0.211***

[12]The results obtained with an ordered Probit model are reported in Table 7 in the Appendix.

	(0.0535)	(0.0909)	(0.0598)	(0.0371)
Repetitive work	-0.105	-0.0522	-0.0390	-0.0471
	(0.0696)	(0.0325)	(0.0487)	(0.0841)
Information about health and	0.112***	0.192***	0.134***	-0.0724
safety risks	(0.0297)	(0.0426)	(0.0432)	(0.0661)
Indefinite contract	0.0535	0.108	-0.00164	-0.405***
	(0.0566)	(0.0820)	(0.123)	(0.0710)
Full time job	-0.0349	-0.193**	-0.340***	-0.131
	(0.0754)	(0.0777)	(0.0781)	(0.167)
Management capacity	0.0530	-0.129	0.0368	-0.120**
	(0.0964)	(0.0931)	(0.0556)	(0.0588)
# hours worked	0.00389	0.00260	-0.00194	0.00120
	(0.00406)	(0.00825)	(0.00525)	(0.00621)
Tenure	-0.00317	0.00391	0.0139**	-0.0158
	(0.00933)	(0.00933)	(0.00657)	(0.0107)
Tenure squared/100	0.0264	0.0143	-0.0227	0.0132
	(0.0293)	(0.0297)	(0.0196)	(0.0280)
Male	0.0753	-0.0786***	0.0452	-0.0182
	(0.0805)	(0.0299)	(0.0921)	(0.0628)
Age	0.00393	-0.0599***	-0.0329*	0.0110
	(0.00939)	(0.0154)	(0.0199)	(0.0131)
Age squared/1000	0.0578	0.641***	0.404*	-0.113
	(0.0975)	(0.183)	(0.213)	(0.137)
Lower secondary education	-0.0946	0.0868	0.0921	0.118
(Ref. No or primary education)	(0.0985)	(0.0908)	(0.0821)	(0.160)
Upper secondary education	-0.0774	0.141	-0.0350	0.0286
	(0.0544)	(0.0892)	(0.0594)	(0.106)
Post-secondary education	-0.0868	0.130	0.139	0.0549
	(0.0685)	(0.103)	(0.123)	(0.190)
Income band (1-10)	-0.0267	-0.00758	0.0919***	-0.0109
	(0.0185)	(0.00633)	(0.0127)	(0.0236)
Couple	-0.0462*	0.0292	-0.0178	-0.0345
	(0.0265)	(0.0543)	(0.0400)	(0.0449)
Work life balance	0.181***	0.170***	0.169**	-0.136**
	(0.0333)	(0.0440)	(0.0806)	(0.0538)
Commuting time (min)	0.00168	0.00609**	0.00346	0.00216*
	(0.00207)	(0.00279)	(0.00243)	(0.00129)
Occupations	Yes	Yes	Yes	Yes
Business sectors	Yes	Yes	Yes	Yes
Size	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes
cut1	-0.859**	-1.245***	0.477	-1.447***
	(0.371)	(0.462)	(1.047)	(0.527)
cut2	0.187	-0.460	1.375	-0.395
	(0.360)	(0.448)	(1.049)	(0.530)
cut3	1.539***	0.300	2.135*	0.178
	(0.366)	(0.424)	(1.090)	(0.541)
cut4			3.821***	
			(1.261)	
	ρ_12	0.196***	ρ_23	0.0348
		(0.0320)		(0.0213)
	ρ_13	0.140***	ρ_24	-0.103***
		(0.0240)		(0.0306)
	ρ_14	-0.184***	ρ_34	-0.0582
		(0.0314)		(0.0377)
Observations	4704			

Log Lik	-18903

[a] Robust standard errors in parentheses. Weighted estimations. * significant at 10%; ** significant at 5%; *** significant at 1%, standard error adjusted for 12 clusters (Euro-zone countries) in parentheses.

For the subsample of insiders, the effect of Internet use is the same as for the whole sample concerning intrinsic motivations and the feeling of being well paid. Thus, the results support the Hypothesis 1 and partially the Hypothesis 3. Only monitoring reveal a negative crowd out effect and as for the whole sample, the career concern variable seems to crowd in intrinsic motivations. In the context of skills acquisition *via* ICT use, the firm can recognize the value of these skills and can choose to reward workers in order to retain insiders and beyond strengthen their intrinsic motivations and effort.

Concerning other variables, it appears that the flexibility of work hours decrease the intrinsic motivation of insiders. Meeting quality standards and the quality of the job environment has the same positive effects as in the whole population. Having possibilities of trainings reveals also a positive effect. The work life balance keeps the same positive effect as for the whole sample but it appears that living in couple decreases insiders' intrinsic motivations.

For the team spirit, the negative effect of monitoring and the positive effect of career concern have disappeared, but time pressure keeps it's negative effect. Concerning other explanatory variables, the results on the insider subsample show some distinct effect with the whole population. Thus, the flexibility of work hours or having a full time job or a high income decrease the team spirit.

For the feeling of being well paid and the fear of loosing the job, the results are very similar to those obtained on the whole sample. We just need to noticed, for the first proxy of reciprocity, that the effect of having an indefinite contract or management responsibilities or the inverted U-shaped effect of tenure are non significant in this subsample. An U-shaped effect of age has appeared. For the second proxy, rotating tasks and commuting time have a positive effect and the management capacity has a negative effect. The inverted U-shaped effect of tenure is also non significant in this subsample.

5.3 Outsiders sample

The results obtained with a multivariate ordered Probit model concerning the links between Internet use and motivations of employees for the subsample of outsiders are shown in Table 3[13].

Table 3: Mutivariate ordered probit on the subsample of outsiders[a]

	Intrinsic motivations	Extrinsic motivations		
		Team spirit	Well paid	Fear of losing job
Frequency of Internet use (0-4)	0.00873	-0.0172	0.0219	0.0324
	(0.0299)	(0.0246)	(0.0143)	(0.0245)
Pace of work dependent on direct control of boss	-0.152***	-0.138***	-0.0158	0.0295
	(0.0527)	(0.0426)	(0.0605)	(0.0333)
Working at very high speed	-0.0848***	0.0241	0.00796	0.0500*
	(0.0176)	(0.0242)	(0.0129)	(0.0272)
Working to tight deadlines	0.0212	-0.0599***	-0.0525***	0.00630
	(0.0146)	(0.0129)	(0.0165)	(0.0186)
Extra payment link with performance	0.0974*	0.0669	-0.0626	-0.0729
	(0.0529)	(0.0675)	(0.0686)	(0.0589)
Good prospects for career advancement	0.209***	0.0710*	0.301***	-0.0445
	(0.0418)	(0.0383)	(0.0429)	(0.0395)
Flexible work hours	0.132	0.0955	-0.131***	0.00460
	(0.0933)	(0.0597)	(0.0435)	(0.135)
Flexibility of days worked	0.0292	0.00128	-0.0125	0.130*
	(0.0800)	(0.0579)	(0.0640)	(0.0750)
Rotating tasks	0.0686	0.221***	-0.0216	-0.0181
	(0.0651)	(0.0582)	(0.0519)	(0.0811)
Team work	-0.0494	0.432***	-0.114	0.0273
	(0.0477)	(0.123)	(0.0892)	(0.0658)
Frank discussion with the boss	0.0427	-0.125	-0.135***	0.0808
	(0.0882)	(0.106)	(0.0347)	(0.0892)
Meeting precise quality standards	0.340***	0.121	-0.00529	0.104
	(0.0426)	(0.117)	(0.0375)	(0.164)
Training	-0.0387	0.120*	0.0124	-0.0108
	(0.0623)	(0.0674)	(0.0705)	(0.0328)
Job quality environment index	0.133	-0.0619	0.192***	-0.130**
	(0.0995)	(0.0723)	(0.0602)	(0.0566)
Repetitive work	0.0276	0.0144	-0.0240	-0.149**
	(0.0756)	(0.0851)	(0.0589)	(0.0754)
Information about health and safety risks	0.165***	0.0225	0.118***	0.0287
	(0.0505)	(0.0513)	(0.0160)	(0.0313)
Indefinite contract	-0.165***	-0.170	-0.0577	-0.492***
	(0.0504)	(0.160)	(0.0871)	(0.104)
Full time job	0.0953	0.119	-0.219	-0.0977
	(0.114)	(0.113)	(0.174)	(0.204)
Management capacity	0.205*	0.227*	0.192**	-0.0620
	(0.119)	(0.121)	(0.0842)	(0.140)
# hours worked	-0.00202	0.00798	-0.000669	0.0121**
	(0.00463)	(0.00541)	(0.00566)	(0.00474)

[13]The results obtained with an ordered Probit model are reported in Table 8 in the Appendix.

Tenure	0.0404***	-0.0201**	0.0163	-0.0483***
	(0.00821)	(0.00914)	(0.0101)	(0.00892)
Tenure squared/100	-0.0890***	0.0673**	-0.0527	0.103***
	(0.0261)	(0.0265)	(0.0371)	(0.0278)
Male	-0.276***	0.0884	0.0385	-0.0222
	(0.0979)	(0.0548)	(0.0586)	(0.0421)
Age	0.0177	-0.0135	-0.0183	0.0263
	(0.0301)	(0.0132)	(0.0311)	(0.0219)
Age squared/1000	-0.181	0.123	0.221	-0.178
	(0.343)	(0.137)	(0.352)	(0.244)
Lower secondary education	-0.0532	-0.102*	0.234***	0.0245
(Ref. No or primary education)	(0.0571)	(0.0523)	(0.0840)	(0.137)
Upper secondary education	0.193***	-0.0484	0.0429	-0.150***
	(0.0604)	(0.0887)	(0.0787)	(0.0576)
Post-secondary education	-0.0147	0.169	0.113	0.0429
	(0.110)	(0.132)	(0.230)	(0.235)
Income band (1-10)	0.00835	-0.00652	0.0945***	-0.0233
	(0.0126)	(0.0163)	(0.0203)	(0.0207)
Couple	0.104	0.187***	-0.0177	-0.00988
	(0.0904)	(0.0713)	(0.0690)	(0.0654)
Work life balance	0.210***	0.0313	0.194***	-0.142
	(0.0301)	(0.0855)	(0.0343)	(0.0919)
Commuting time (min)	-1.37e-05	-0.00325*	0.00134	-0.00189
	(0.00151)	(0.00194)	(0.00165)	(0.00269)
Occupations				
Business sectors				
Size				
Macroeconomic controls				
cut1	1.126*	-1.490***	1.491**	-1.017
	(0.641)	(0.256)	(0.680)	(0.974)
cut2	2.106***	-0.562**	2.415***	-0.187
	(0.674)	(0.240)	(0.665)	(1.032)
cut3	3.331***	0.155	3.388***	0.423
	(0.657)	(0.273)	(0.743)	(1.104)
cut4			4.772***	
			(0.845)	
	ρ_12	0.182***	ρ_23	0.0261
		(0.0589)		(0.0243)
	ρ_13	0.134***	ρ_24	-0.00916
		(0.0463)		(0.0257)
	ρ_14	-0.140***	ρ_34	-0.0293
		(0.0397)		(0.0307)
Observations	2581			
Log Lik	-15059			

[a] Robust standard errors in parentheses. Weighted estimations. * significant at 10%; ** significant at 5%; *** significant at 1%, standard error adjusted for 12 clusters (Euro-zone countries) in parentheses.

For the subsample of outsiders, Internet use has no effect on both intrinsic and extrinsic motivations. Thus, the results do not support the Hypotheses formulated above. Internet use does not appear as a motivating tool for workers that don't share the preferences of their firm.

Compared with the results obtained on the whole sample, those obtained on the subsample

of outsiders for the intrinsic motivations are quite similar. The results just reveal some effects related to outsiders such as a negative effect of having an indefining contract and an inverted U-shaped effect of tenure. For the extrinsic motivations, there is some differences. For the team spirit, the variable related to the total quality management of the firm (quality standards and having information about health and safety risks) has no effect, unlike what we observe on the whole sample. An U-shaped effect of tenure and a negative effect of commuting time appear. Some negative effects appear in the estimate of the well paid feeling variable. Thus, flexibility of work hours and having frank discussions with the boss have a negative effect. The effects of having a repetitive work, having a full time job and duration of tenure observed on the whole sample have disappeared.

5.4 Sensitivity analysis

We conduct additional sensitivity analyses in order to gauge the robustness of our conclusions[14]. As the results obtained with the ordered probit model are very similar with the multivariate ordered probit model, the sensitivity analyses used are applicated to each motivation independently.

To control for potential selection bias, we estimate an ordered probit selection model on the subsample of Internet users. We also use a method of instrumental variable to address potential endogeneity problems with the frequency of Internet use. We use a two step model. In the first step we estimate the frequency of Internet use through an ordered probit model and we introduce in the second step the predicted value of the frequency of Internet use in the ordered probit models of intrinsic and extrinsic motivations. Results for the whole sample obtained using these two methods are not significantly different from the previous results presented in Table 1.

[14] All the results discussed in this section are not reported here but are available upon request from the author.

6 Conclusion

The large diffusion of ICT associated with the diffusion of high performance work practices since the early 1990s has raised concerns about the impact of these changes on productivity. Some recent studies underline a positive impact of ICT and innovative practices of work on individuals' and firms' productivity. In this context of wide changes, our work seeks to study how the firm can play on motivations through workers' access to Internet to obtain a high amount of effort and to get the productivity effects highlighted in the literature.

Grounded in the economic literature as well as in works initially developed in organizational psychology, we seek to evaluate empirically, in this article, the links between Internet use and motivations given the incentives provided by the firm. Moreover, we introduce workers' identity in the analysis (Akerlof and Kranton, 2005, 2008, Besley and Ghatak, 2008, Prendergast, 2008) in order to see how Internet use influences workers' motivations depending on their identity. We conduct our analysis on a representative sample of individuals working in one of the country of the Euro-zone surveyed in 2005 in the framework of the EWCS. We estimate, first, ordered Probit models on each motivation and, second, a multivariate ordered Probit model that permit to evaluate the effect of Internet use on the probability of workers of being intrinsically or extrinsically motivated, taking into account the potential correlations between workers' motivations. The results obtained with the two methods are very similar in spite of the large correlations between motivations.

The results about Internet use and motivations, show that by giving the possibility to use Internet at the workplace, the firm creates an enriching work environment that influences positively intrinsic motivations of workers. In addition, the use of Internet is positively correlated with the team spirit that can generate shame if the level of effort is insufficient and should lead to a highest level of employees' effort. Following the crowding literature (Frey, 1997, Frey and Jegen, 2001), the results reveal a crowd out effect due to the direct supervision of workers and of time pressure that can badly influence the provision of the effort by employees. Conversely, positive incentive mechanisms such as career concern strengthen, through the crowd in effect, intrinsic motivations and the level of effort to work, create and transfer knowledge. These

results are also observed for the subsample of insiders who share the preferences of their employers. Firms can choose to reward the efforts of employees who acquire new specific skills needed by the firm to be competitive and to retain insiders in the context of high churn rates of skilled people (Bauer and Bender, 2004). Concerning outsiders, it appears that offering the access to the Internet to these workers does not influence their motivations.

Finally, we need to notice that we are conscious of the difficulties to disentangle ICT and innovative work practices in studying what can encourage individuals to work in the interest of the firm. For example, it seems that even if new technologies are put at the service of organizational strategies, the impact on workers' motivations mainly determined simultaneously by ICT and innovative work practice. Further research need to deepen the joint effect of ICT and organizational workplace practices and also the impact on effort, thanks to more detailed data concerning workers' performance.

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Appendix

Table 4: Incentives, motivations and identity

Negative incentives	
Monitoring	
Pace of work dependent on direct control of boss	Equal 1 when pace of work is dependent on the direct control of the boss, 0 otherwise
Time Pressure	
Working at very high speed	(1) Never; (2) Almost never; (3) Around 1/4 of the time; (4) Around half of the time; (5) Around 3/4 of the time; (6) Almost all of the time; (7) All of the time
Working to tight deadlines	(1) Never; (2) Almost never; (3) Around 1/4 of the time; (4) Around half of the time; (5) Around 3/4 of the time; (6) Almost all of the time; (7) All of the time
Positive incentives	
Extra payment	
Extra payment link with performance	Equal 1 when the remuneration includes Piece rate or productivity payments or payments based on the overall performance of a group or other extra payments
Career concern	
Good prospects for career advancement	(1) Strongly disagree; (2) Disagree; (3) Neither agree nor disagree; (4) Agree; (5) Strongly agree
Intrinsic motivation	
Clustering methodology on the following items:	
Apply own idea	(1) Almost never or rarely; (2) Sometimes; (3) Often; (4) Almost always
Feeling of doing useful work	(1) Almost never or rarely; (2) Sometimes; (3) Often; (4) Almost always
Job intellectually demanding	(1) Almost never or rarely; (2) Sometimes; (3) Often; (4) Almost always
Feeling of work well done	(1) Almost never or rarely; (2) Sometimes; (3) Often; (4) Almost always
Opportunity to do what you do best.	(1) Almost never or rarely; (2) Sometimes; (3) Often; (4) Almost always
Learning new things	Equal 1 when the main paid job involves learning new things, 0 otherwise
Can choose the order of tasks	Equal 1 when the worker is able to choose or change the order of tasks, 0 otherwise
Can choose the method of work	Equal 1 when the worker is able to choose or change the methods of work, 0 otherwise
Can choose the speed of work	Equal 1 when the worker is able to choose or change the speed or rate of work, 0 otherwise
Satisfaction	(1) Not at all satisfied; (2) Not very satisfied; (3) Satisfied; (4) Very satisfied
Extrinsic motivations	
Can get colleagues' assistance (Team spirit)	(1) Almost never or rarely; (2) Sometimes; (3) Often; (4) Almost always
Well paid for the work done	(1) Strongly disagree; (2) Disagree; (3) Neither agree nor disagree; (4) Agree; (5) Strongly agree
Fear of losing the job	(1) Strongly disagree; (2) Disagree; (3) Neither agree nor disagree; (4) Agree or Strongly agree
Insider/outsider	
Feel 'at home' in the organisation	(1) Strongly disagree; (2) Disagree; (3) Neither agree nor disagree; (4) Agree; (5) Strongly agree

Table 5: Workplace organizational practices variables

Flexible work hours	The working time arrangements are set by the company with no possibility for changes and the changes of the work schedule occur regularly. The worker is informed about these changes the same day or the day before or several days in advance or several weeks in advance
Flexibility of days worked	Equal 1 when the worker does not work the same number of days every week, 0 otherwise
Rotating tasks	Equal 1 when the job involves rotating tasks between the employee and colleagues, 0 otherwise
Team work	Equal 1 when the job involves doing all or part of the work in a team, 0 otherwise

Frank discussion with the boss	Equal 1 when over the past 12 months the worker has had a frank discussion with the boss about his or her work performance, 0 otherwise
Meeting precise quality standards	Equal 1 when the main paid job involves meeting precise quality standards, 0 otherwise
Training	Equal 1 when over the past 12 months, the worker has undergone training paid for or provided by the employer to improve his or her skills, 0 otherwise. Or over the past 12 months, the worker has undergone on-the-job training (co-workers, supervisors) to improve his or her skills, 0 otherwise
Job quality environment index	Index rated from bad to good quality of envirronement created from a clustering-analysis from the exposion at work to vibrations from hand tools, machinery, ...; noise; high temperatures; low temperatures; breathing in smoke, fumes, powder or dust, ...; breathing in vapours such as solvents and thinners; handling or being in skin contact with chemical products or substances; radiation such as X rays, radioactive radiation, welding light, laser beams; tobacco smoke from other people; handling or being in direct contact with materials which can be infectious
Repetitive work	Equal 1 when the job involves short repetitive tasks of less than 10 minutes, 0 otherwise
Information about health and safety risks	Regarding the health and safety risks related to performance of your job, how well informed would you say you are? (1) Not at all well informed; (2) Not very well informed; (3) Well informed; (4) Very well informed

A Ordered probit results

Table 6: Ordered probit on the whole sample[a]

	Intrinsic motivations	Extrinsic motivations		
		Team spirit	Well paid	Fear of losing job
Frequency of Internet use (0-4)	0.0457***	0.0198*	0.0288**	-0.00990
	(0.0106)	(0.0112)	(0.0118)	(0.0303)
Pace of work dependent on direct control of boss	-0.205***	-0.0742**	-0.0365	0.123**
	(0.0269)	(0.0352)	(0.0309)	(0.0546)
Working at very high speed	-0.0421***	0.0240	0.00897	0.0529***
	(0.0138)	(0.0170)	(0.0127)	(0.0166)
Working to tight deadlines	0.00915	-0.0424***	-0.0532***	0.00770
	(0.00660)	(0.0101)	(0.00890)	(0.00899)
Extra payment link with performance	0.0487	0.00767	0.00944	-0.0986***
	(0.0464)	(0.0408)	(0.0647)	(0.0269)
Good prospects for career advancement	0.196***	0.0426**	0.301***	-0.0288
	(0.0183)	(0.0201)	(0.0400)	(0.0295)
Flexible work hours	0.00142	-0.0177	-0.0169	-0.0110
	(0.0561)	(0.0191)	(0.0485)	(0.0669)
Flexibility of days worked	0.00566	-0.0371	-0.0193	0.0229
	(0.0537)	(0.0865)	(0.0806)	(0.0702)
Rotating tasks	0.0300	0.286***	-0.0411	0.0605
	(0.0355)	(0.0394)	(0.0432)	(0.0380)
Team work	0.0429	0.391***	-0.0628	0.0165
	(0.0506)	(0.0250)	(0.0727)	(0.0424)
Frank discussion with the boss	0.0190	-0.0580	-0.0726	0.103*
	(0.0638)	(0.0604)	(0.0503)	(0.0594)
Meeting precise quality standards	0.246***	0.0750**	0.0343	0.0289
	(0.0443)	(0.0379)	(0.0333)	(0.0902)
Training	0.0764	0.136**	-0.0437	-0.0248
	(0.0847)	(0.0593)	(0.0419)	(0.0521)
Job quality environment index	0.160**	-0.0746	0.186***	-0.169***

	(0.0771)	(0.0601)	(0.0289)	(0.0439)
Repetitive work	-0.0366	-0.0284	-0.0399*	-0.0893
	(0.0270)	(0.0508)	(0.0227)	(0.0647)
Information about health and	0.161***	0.124***	0.156***	-0.0346
safety risks	(0.0220)	(0.0416)	(0.0252)	(0.0342)
Indefinite contract	-0.0468	-0.0113	-0.0502	-0.424***
	(0.0499)	(0.0813)	(0.0900)	(0.0795)
Full time job	-0.0409	-0.0594	-0.339***	-0.0848
	(0.0651)	(0.0740)	(0.0777)	(0.107)
Management capacity	0.131**	0.00561	0.139***	-0.126
	(0.0652)	(0.0817)	(0.0535)	(0.0801)
# hours worked	0.00424	0.00501	0.00270	0.00395
	(0.00343)	(0.00680)	(0.00277)	(0.00418)
Tenure	0.0174*	0.00325	0.0184***	-0.0294***
	(0.0102)	(0.00854)	(0.00527)	(0.00724)
Tenure squared/100	-0.0287	0.0112	-0.0415***	0.0518***
	(0.0295)	(0.0171)	(0.0137)	(0.0197)
Age	0.00642	-0.0482***	-0.0302	0.0230
	(0.0174)	(0.0108)	(0.0198)	(0.0142)
Age squared/1000	0.0181	0.524***	0.389*	-0.218
	(0.196)	(0.132)	(0.223)	(0.164)
Income band (1-10)	-0.0112	-0.00879	0.0939***	-0.0179
	(0.00835)	(0.0106)	(0.0130)	(0.0198)
Couple	0.0210	0.0816**	0.00108	-0.0572**
	(0.0405)	(0.0402)	(0.0287)	(0.0246)
Work life balance	0.223***	0.121***	0.234***	-0.155***
	(0.0228)	(0.0339)	(0.0478)	(0.0569)
Commuting time (min)	0.000533	0.00181	0.00198	0.000971
	(0.00164)	(0.00129)	(0.00156)	(0.00153)
Education level	Yes	Yes	Yes	Yes
Gender	Yes	Yes	Yes	Yes
Occupations	Yes	Yes	Yes	Yes
Business sectors	Yes	Yes	Yes	Yes
Size	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes
cut1	0.310	-1.298***	1.229	-1.156**
	(0.233)	(0.352)	(0.787)	(0.485)
cut2	1.262***	-0.464	2.111***	-0.219
	(0.274)	(0.344)	(0.778)	(0.538)
cut3	2.516***	0.252	2.933***	0.357
	(0.340)	(0.338)	(0.834)	(0.589)
cut4			4.480***	
			(0.967)	
Observations	7375	7375	7375	7375
Pseudo R-squared	0.0806	0.0687	0.109	0.0810
Log Lik	-8406	-8942	-9538	-8124

[a] Robust standard errors in parentheses. Weighted estimations. * significant at 10%; ** significant at 5%; *** significant at 1%, standard error adjusted for 12 clusters (Euro-zone countries) in parentheses.

Table 7: Ordered probit on the subsample of insiders[a]

	Intrinsic motivations	Extrinsic motivations		
		Team spirit	Well paid	Fear of losing job
Frequency of Internet use (0-4)	0.0712**	0.0301	0.0372**	-0.0482

	(0.0317)	(0.0213)	(0.0146)	(0.0410)
Pace of work dependent on direct	-0.223***	0.00423	-0.0267	0.200**
control of boss	(0.0430)	(0.0345)	(0.0520)	(0.0949)
Working at very high speed	0.00439	0.0191	0.0218	0.0528***
	(0.0140)	(0.0160)	(0.0164)	(0.0186)
Working to tight deadlines	-0.00503	-0.0213**	-0.0537***	0.00474
	(0.0126)	(0.00965)	(0.0176)	(0.0108)
Extra payment link with	0.0253	-0.00996	0.0658	-0.109***
performance	(0.0538)	(0.0508)	(0.0785)	(0.0315)
Good prospects for career	0.112***	-0.0296	0.228***	0.0128
advancement	(0.0127)	(0.0288)	(0.0410)	(0.0442)
Flexible work hours	-0.162**	-0.130***	0.0105	-0.0211
	(0.0817)	(0.0434)	(0.0635)	(0.0641)
Flexibility of days worked	0.00614	-0.0859	-0.0430	-0.0495
	(0.0757)	(0.126)	(0.116)	(0.0831)
Rotating tasks	0.0319	0.353***	-0.0524	0.107*
	(0.0322)	(0.0687)	(0.0584)	(0.0622)
Team work	0.0805	0.351***	-0.0720	0.0295
	(0.0735)	(0.0597)	(0.0531)	(0.0396)
Frank discussion with the boss	-0.0135	-0.00375	-0.0294	0.155***
	(0.0873)	(0.0526)	(0.0529)	(0.0517)
Meeting precise quality standards	0.199***	0.0497	0.0563	-0.0204
	(0.0493)	(0.0485)	(0.0580)	(0.0789)
Training	0.192*	0.167***	-0.0703	-0.0321
	(0.114)	(0.0460)	(0.0560)	(0.0887)
Job quality environment index	0.128**	-0.124	0.112**	-0.209***
	(0.0503)	(0.0909)	(0.0547)	(0.0385)
Repetitive work	-0.107	-0.0512	-0.0399	-0.0462
	(0.0727)	(0.0344)	(0.0466)	(0.0843)
Information about health and	0.113***	0.193***	0.134***	-0.0710
safety risks	(0.0289)	(0.0435)	(0.0428)	(0.0665)
Indefinite contract	0.0503	0.109	-0.00312	-0.409***
	(0.0539)	(0.0811)	(0.127)	(0.0662)
Full time job	-0.0268	-0.195**	-0.337***	-0.134
	(0.0771)	(0.0799)	(0.0811)	(0.173)
Management capacity	0.0621	-0.127	0.0381	-0.122**
	(0.0957)	(0.0920)	(0.0571)	(0.0604)
# hours worked	0.00419	0.00207	-0.00167	0.000997
	(0.00433)	(0.00848)	(0.00497)	(0.00596)
Tenure	-0.00260	0.00473	0.0140**	-0.0160
	(0.00942)	(0.00883)	(0.00654)	(0.0107)
Tenure squared/100	0.0253	0.0110	-0.0226	0.0132
	(0.0301)	(0.0273)	(0.0195)	(0.0276)
Age	0.00310	-0.0599***	-0.0331*	0.0115
	(0.0102)	(0.0150)	(0.0189)	(0.0136)
Age squared/1000	0.0643	0.641***	0.405**	-0.117
	(0.103)	(0.176)	(0.203)	(0.143)
Income band (1-10)	-0.0230	-0.0122*	0.0940***	-0.0114
	(0.0162)	(0.00644)	(0.0146)	(0.0252)
Couple	-0.0494*	0.0331	-0.0199	-0.0356
	(0.0253)	(0.0551)	(0.0432)	(0.0478)
Work life balance	0.178***	0.169***	0.169**	-0.137**
	(0.0339)	(0.0441)	(0.0814)	(0.0534)
Commuting time (min)	0.00171	0.00616**	0.00347	0.00215*
	(0.00201)	(0.00284)	(0.00243)	(0.00127)
Education level	Yes	Yes	Yes	Yes
Gender	Yes	Yes	Yes	Yes

Occupations	Yes	Yes	Yes	Yes
Business sectors	Yes	Yes	Yes	Yes
Size	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes
cut1	-0.927**	-1.250***	0.462	-1.441***
	(0.390)	(0.485)	(1.013)	(0.537)
cut2	0.129	-0.457	1.365	-0.387
	(0.365)	(0.469)	(1.014)	(0.537)
cut3	1.484***	0.300	2.127**	0.191
	(0.353)	(0.443)	(1.054)	(0.547)
cut4			3.810***	
			(1.224)	
Observations	4303	4303	4303	4303
Pseudo R-squared	0.0574	0.0791	0.0928	0.0752
Log Lik	-4455	-4907	-5212	-4458

[a] Robust standard errors in parentheses. Weighted estimations. * significant at 10%; ** significant at 5%; *** significant at 1%, standard error adjusted for 12 clusters (Euro-zone countries) in parentheses.

Table 8: Ordered probit on the subsample of outsiders[a]

	Intrinsic motivations	Extrinsic motivations		
		Team spirit	Well paid	Fear of losing job
Frequency of Internet use (0-4)	0.00981	-0.0187	0.0219	0.0329
	(0.0278)	(0.0243)	(0.0138)	(0.0249)
Pace of work dependent on direct	-0.152***	-0.135***	-0.0165	0.0292
control of boss	(0.0482)	(0.0443)	(0.0608)	(0.0334)
Working at very high speed	-0.0816***	0.0239	0.00807	0.0490*
	(0.0191)	(0.0240)	(0.0126)	(0.0273)
Working to tight deadlines	0.0207	-0.0598***	-0.0525***	0.00658
	(0.0147)	(0.0129)	(0.0163)	(0.0189)
Extra payment link with	0.0888	0.0713	-0.0624	-0.0758
performance	(0.0567)	(0.0685)	(0.0693)	(0.0582)
Good prospects for career	0.202***	0.0749**	0.302***	-0.0440
advancement	(0.0394)	(0.0371)	(0.0427)	(0.0382)
Flexible work hours	0.135	0.0950	-0.131***	0.00854
	(0.0950)	(0.0579)	(0.0439)	(0.134)
Flexibility of days worked	0.0216	0.000384	-0.0121	0.131*
	(0.0768)	(0.0604)	(0.0643)	(0.0761)
Rotating tasks	0.0650	0.224***	-0.0212	-0.0189
	(0.0633)	(0.0573)	(0.0516)	(0.0797)
Team work	-0.0435	0.429***	-0.114	0.0280
	(0.0454)	(0.123)	(0.0887)	(0.0657)
Frank discussion with the boss	0.0456	-0.127	-0.135***	0.0823
	(0.0862)	(0.106)	(0.0345)	(0.0899)
Meeting precise quality standards	0.344***	0.121	-0.00548	0.102
	(0.0475)	(0.116)	(0.0371)	(0.163)
Training	-0.0409	0.121*	0.0137	-0.0141
	(0.0650)	(0.0685)	(0.0722)	(0.0325)
Job quality environment index	0.142	-0.0633	0.190***	-0.132**
	(0.0976)	(0.0708)	(0.0625)	(0.0584)
Repetitive work	0.0266	0.0146	-0.0240	-0.149*
	(0.0749)	(0.0838)	(0.0581)	(0.0764)
Information about health and	0.157***	0.0238	0.120***	0.0264
safety risks	(0.0452)	(0.0506)	(0.0162)	(0.0305)

Indefinite contract	-0.160***	-0.172	-0.0586	-0.492***
	(0.0521)	(0.161)	(0.0885)	(0.105)
Full time job	0.0462	0.134	-0.212	-0.103
	(0.108)	(0.105)	(0.181)	(0.203)
Management capacity	0.183*	0.236**	0.195**	-0.0639
	(0.110)	(0.119)	(0.0851)	(0.144)
# hours worked	-0.00249	0.00816	-0.000509	0.0123***
	(0.00480)	(0.00555)	(0.00559)	(0.00460)
Tenure	0.0399***	-0.0196**	0.0162	-0.0486***
	(0.00806)	(0.00860)	(0.0102)	(0.00921)
Tenure squared/100	-0.0899***	0.0668***	-0.0520	0.103***
	(0.0263)	(0.0254)	(0.0368)	(0.0289)
Age	0.0220	-0.0144	-0.0190	0.0268
	(0.0292)	(0.0139)	(0.0303)	(0.0222)
Age squared/1000	-0.226	0.130	0.228	-0.182
	(0.331)	(0.143)	(0.342)	(0.248)
Income band (1-10)	-0.00406	-0.00243	0.0960***	-0.0245
	(0.00942)	(0.0171)	(0.0185)	(0.0193)
Couple	0.110	0.183***	-0.0182	-0.00952
	(0.0987)	(0.0692)	(0.0665)	(0.0648)
Work life balance	0.211***	0.0296	0.195***	-0.140
	(0.0315)	(0.0845)	(0.0342)	(0.0917)
Commuting time (min)	5.00e-05	-0.00322*	0.00137	-0.00190
	(0.00153)	(0.00191)	(0.00167)	(0.00271)
Education level	Yes	Yes	Yes	Yes
Gender	Yes	Yes	Yes	Yes
Occupations	Yes	Yes	Yes	Yes
Business sectors	Yes	Yes	Yes	Yes
Size	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes
cut1	1.251*	-1.513***	1.464**	-1.017
	(0.646)	(0.253)	(0.671)	(0.990)
cut2	2.221***	-0.581**	2.386***	-0.187
	(0.683)	(0.239)	(0.654)	(1.050)
cut3	3.444***	0.133	3.361***	0.422
	(0.663)	(0.276)	(0.728)	(1.121)
cut4			4.750***	
			(0.826)	
Observations	3072	3072	3072	3072
Pseudo R-squared	0.0821	0.0764	0.0948	0.100
Log Lik	-3708	-3847	-4058	-3537

[a] Robust standard errors in parentheses. Weighted estimations. * significant at 10%; ** significant at 5%; *** significant at 1%, standard error adjusted for 12 clusters (Euro-zone countries) in parentheses.