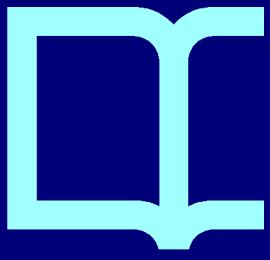

Internet use and job satisfaction

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Abstract

Does the use of Internet for professional purposes foster job satisfaction? We argue that Internet use affects well-being at work in an indirect manner: it mediates the effect of some important work characteristics on job satisfaction. Specifically, we focus on six main dimensions previously investigated in the literature – income, education, occupation type, autonomy, time pressure and social interactions – and we develop new hypothesis on how Internet use interacts with these factors. To test these hypotheses, we use data on more than 60,000 workers from the European Working Conditions Survey (EWCS), and estimate a bivariate ordered probit econometric model. The results point out that Internet technologies enhance job satisfaction by improving access to data and information, creating new activities and opportunities, and facilitating communication and social interactions. However, the results also suggest that these positive effects are skewed. Workers in some specific occupations, and with higher income and education levels, tend to benefit relatively more from the Internet *vis-a-vis* workers in other sectors that are more weakly related to ICTs activities.

Key words: job satisfaction; subjective well-being; work organization; Internet use; EWCS data; bivariate ordered probit model

JEL codes: D03; I31; J28; M15; O30

1. Introduction

During the last two decades, information and communication technologies (ICTs) have diffused rapidly, transforming substantially the nature of many jobs as well as creating new occupations (Bresnahan et al., 2002). Internet technologies, in particular, have by now become a fundamental working tool in several professions. Examples of the pervasiveness of Internet technologies abound. Workers can now use e-commerce to buy and sell goods and services; carry out financial transactions through online banking; search information, access data and organize databases; manage human resources; and communicate with other colleagues and external partners through e-mail, Skype, Intranet, social media and online customer services.

Despite the widespread diffusion and great relevance of Internet technologies, however, there is still limited knowledge about the impacts that these have on workers' well-being. Specifically, does Internet use for professional purposes affect job satisfaction, and if so how? The literature on job satisfaction has extensively investigated a variety of factors that explain why some employees report higher subjective well-being than others (see e.g. surveys in Souza-Poza and Souza-Poza, 2000; and Erdogan et al., 2012). In particular, extant research points out the relevance of income earnings and career prospects (Clark and Oswald, 1996; Lohmann, 2015), education and skill levels (Green and Zhu, 2010), work organization and practices (Scandura and Lankau, 1997; Askenazy and Caroli, 2010; Salvatori, 2010), as well as employee-specific personal factors such as age, civil status and gender (Clark, 1997). However, it is noteworthy to observe that no study has until now explicitly investigated the relationships between Internet use and job satisfaction.

This paper studies this relevant and unexplored question. The general idea that we investigate is that Internet modifies the way in which existing working tasks are carried out, and it affects work organization and practices. Hence Internet use *interacts* with other work characteristics previously studied in the literature, strengthening, or attenuating, their effect on job satisfaction.

Specifically, we posit that Internet use at work can have four distinct types of effects on workers' well-being. First, it provides users with unprecedented opportunities to access data and information. Second, Internet technologies have also led to the emergence of new activities and services, and hence to the rise of brand new occupations, with consequent new opportunities for skilled workers. Third, Internet use for professional purposes may lead to time saving effects, so that workers can perform time consuming and repetitive tasks in a more efficient manner than

they did before. Finally, Internet enables distance communication among workers through a variety of cheap and powerful tools, which provide unprecedented opportunities for internal communication and leadership, and facilitate the information flow between managers and employees (Castellacci and Tveito, 2016).

To investigate this general idea, we focus on six main conceptual dimensions previously studied in the job satisfaction literature – income, education, occupation type, autonomy, time pressure and social interactions – and for each of them we develop a specific hypothesis on how Internet use mediates the effect of that work characteristic on well-being. To test empirically these hypotheses, we use data from the latest two waves of the European Working Conditions Survey (EWCS), referring to the years 2005 and 2010 respectively, which provides a rich variety of information on more than 60,000 workers across European countries. The econometric analysis of this dataset faces a potential selection bias issue, since the main explanatory variable of interest (intensity of Internet use) is arguably not exogenous and randomly assigned, but it depends on some employee- and work-specific characteristics (Forman, 2005). For this reason, we specify a bivariate ordered probit model (Sajaia, 2008), with a first equation estimating the determinants of Internet use, and a second equation focusing on the relationships between Internet use and job satisfaction.

The econometric results provide support for the general idea that Internet use fosters job satisfaction by improving access to data and information, creating new activities and opportunities, and facilitating communication and social interactions. Further, the results also indicate that these positive effects are not equally distributed among different occupations and groups of workers. In fact, employees in some specific occupations, and particularly those with higher income and education levels, tend to benefit relatively more from Internet technologies *vis-a-vis* workers in other occupations that are more weakly related to ICTs activities.

The paper is organized as follows. Section 2 briefly reviews extant literature; section 3 develops the theoretical hypotheses; section 4 presents the data and econometric methods; section 5 outlines the results; and section 6 points out the main conclusions of the work.

2. Literature

The literature on the factors that affect job satisfaction is extensive. A substantial amount of empirical research has investigated a number of work-related characteristics and employee-specific factors that may explain why some workers are more satisfied with their job than others (Erdogan et al., 2012).

One first important dimension refers to income and career prospects. The wage of a worker is obviously an important rewarding factor. Several empirical studies have found a positive relationship between income earnings and job satisfaction (Sousa-Poza and Sousa-Poza, 2000; Clark, 2005; Pichler and Wallace, 2009). However, extant research also indicates that the relative importance of wage *vis-à-vis* other determinants of job satisfaction is relatively small (Salvatori, 2010). A more important factor than the absolute level of income earnings is workers' subjective perception of their wage level, which is in turn affected by how the wage level compares to that of other workers within the same company and/or occupation type (Easterlin, 1974; Diener et al., 1995; Clark and Oswald, 1996). Furthermore, job satisfaction is not only affected by financial characteristics and rewards at present, but also by future prospects, and in particular job security and prospects for career advancement (Hackman, and Oldham, 1976; Sousa-Poza and Sousa-Poza, 2000; Clark, 2009; Pichler and Wallace, 2009).

Another central factor affecting job satisfaction is workers' human capital and education level. On the one hand, a higher education level increases the chances that an employee will have a higher wage level and a more interesting and rewarding job. On the other hand, however, various empirical studies have found that – after controlling for income earnings – the correlation between education level and subjective well-being at work is actually negative (Clark and Oswald, 1996; Sousa-Poza and Sousa-Poza, 2000; Salvatori, 2010). The reason for this is that when an individual invests more time in education and human capital formation, her aspirations and expectations about the desired job will also be higher, and it will therefore be more likely that the worker will feel more critical and less satisfied with her actual working conditions. In particular, empirical research indicates that overqualified workers report significant lower levels of job satisfaction than others (Belfield and Harris, 2002; Jürges, 2003; Green and Zhu, 2010). By contrast, feelings of competence provide personal satisfaction (Hackman and Oldham, 1976), and on the job training, which fosters workers' ability to master and manage complex working tasks, is typically reported to be important for job satisfaction (Pichler and Wallace, 2009).

The analysis of the determinants of work-life satisfaction also has to consider that there exists a great variety of occupation types, which in turn affect the array of tasks that workers must perform and the working environment that characterizes different sectors of the economy. Specifically, the distinction between white collar and blue collar work has important implications for job satisfaction and its determinants. In general, white collar employees report higher levels of well-being than blue collar workers (Pichler and Wallace, 2009; Lopes et al., 2013). Physical and safety conditions are typically better in white collar occupations (Sousa-Poza and Sousa-Poza, 2000). Further, white collar work is often characterized by less monotonous and repetitive working tasks (Pichler and Wallace, 2009), as well as greater skill variety, namely the degree to which a job involves a variety of different tasks that require the use of a number of distinct skills (Hackman and Oldham, 1976).

Another important factor pointed out in the literature is autonomy. Research shows that when workers perform their tasks in an autonomous manner and without being strictly dependent on their boss, other colleagues and/or external partners, they are typically more motivated and satisfied (Hackman, and Oldham, 1976; Sousa-Poza and Sousa-Poza, 2000; Pichler and Wallace, 2009; Lopes et al., 2013). For instance, self-employed workers have been found on average to report higher levels of job satisfaction than employed workers (Belfield and Harris, 2002; Clark, 2009; Pichler and Wallace, 2009).

Further, the literature also highlights the importance of the time dimension, namely the time that workers have available to perform their tasks and the pressure that they are subject to. In general terms, job satisfaction is negatively related to the number of working hours that an individual has to work per week (Clark and Oswald, 1996; Salvatori, 2010; Lopes et al., 2013). Long work days also lead to a worse work–life balance, which in turn affects subjective well-being (Scandura and Lankau, 1997; Gallie and Russell, 2009). In addition to the amount of working time, work-life satisfaction is substantially affected by the pace of work itself: working under pressure, having frequently tight deadlines, and not having enough time to carry out daily tasks are obviously negative factors for workers' well-being. In particular, Lopes et al. (2013), using the European Working Conditions Survey (EWCS) for 15 EU countries, find that workers who report not having enough time to complete their tasks report a lower level of job satisfaction; and Pichler and Wallace (2009), using the European Quality of Life Survey (EQLS), find that job

satisfaction is on average lower for those workers who frequently have to comply with tight deadlines.

However, working life is not only about tasks, effort and outcome: a significant aspect of daily working life is related to employees' social interactions with their colleagues, boss and external partners. Research shows the relevance of having good relationships and a positive social environment at work. A high degree of internal cohesion, i.e. strong commitment to team work and membership to an organization, is important to foster employees' creativity and well-being (Clark, 2009; Hüsleger et al., 2009). Further, an active participation of employees in decision-making (so-called "participative safety", see Hüsleger et al., 2009), is also important and it increases the trust in the leadership and management of the organization (Sousa-Poza and Sousa-Poza, 2000; Helliwell and Huang, 2005). By contrast, bad social relationships – e.g. characterized by conflicts, discrimination and harassment – are obviously factors that hamper well-being at work.

Last but not least, the study of the determinants of job satisfaction has to take into account a number of personal characteristics that differ substantially among workers, even for employees that belong to the same organization and perform similar tasks. Typical individual-specific variables that have been taken into account in the literature as control factors are in particular gender (Clark, 2005; Clark, 2009; Pichler and Wallace, 2009; Salvatori, 2010), age (Clark and Oswald, 1996; Lopes et al., 2013), health conditions (Lévy–Garboua et al., 2007; Salvatori, 2010) and civil status (Clark, 2005 and 2009; Salvatori, 2010).

3. Hypotheses

How does Internet use affect job satisfaction? Our main argument is that the use of Internet *per se* does not have any direct impact on work-life satisfaction; rather, Internet use affects job satisfaction in an indirect manner by mediating the relationships between work characteristics and well-being at work noted in the previous section. Specifically, we argue that these indirect effects can be summarized into four distinct channels (Castellacci and Tveito, 2016).

1. Information access. One of the main characteristics of Internet is that it provides users with unprecedented opportunities to access data and information. This can have several important

effects in work-life: it enables more rapid and efficient acquisition and absorption of external knowledge; it provides more systematic information on inputs available in the market (e.g. machines, raw materials; specialized services); it presents opportunities to improve the quality of work; and it increases employees' knowledge stock and skill level. Examples of Internet-related services that lead to this information-enhancing effect abound: search engines; online scientific journals, patient journals, and other specialized resources for professionals; data archives and big data; online education and professional training courses (MOOC).

2. New activities. The Internet has also led to the rise of a variety of new activities and services that did not exist before, and hence to the emergence of brand new occupations. The bulk of the newly created jobs are in IT industries where Internet-based services are designed and managed, such as development, design and coding; or in social media and blogs platforms. Internet services have however led to new activities in other sectors too (e.g. collaborative consumption services such as Uber and Airbnb; applications for health or educational/professional purposes). An important point here is that Internet-driven structural change, while creating new opportunities and jobs in some sectors, has at the same time made other occupations obsolete and less competitive (Bresnahan et al., 2002). Skill-bias structural change leads therefore to increasing polarization, so that it is reasonable to expect positive effects on job satisfaction in those sectors of the economy that benefit the most from new ICT-based opportunities, and negative impacts in other industries.

3. Time saving. Another important effect of Internet use is that it leads to time saving effects and thus productivity gains. For instance, firms using e-commerce can screen the market and purchase and/or sell goods and services more rapidly and efficiently than they did in the past; they can smoothly manage financial transactions through online banking; they can quickly access data and organize databases; and they can more efficiently manage human resources and other internal and external administrative tasks. We will argue below that this time-saving effect is potentially relevant for job satisfaction, to the extent that workers can perform time consuming, annoying and repetitive tasks in a more efficient manner, and hence free some of their working time for other more rewarding and interesting activities.

4. Communication tools. A fourth and well-known characteristic of Internet is that it enables distance communication among workers through a variety of cheap and powerful tools, such as for instance e-mail, Skype meetings and video conferences, Intranet, social media for work, and online customer services. These communication tools provide increasing opportunities for internal communication and leadership, facilitate the information flow between managers and employees, and enable communication with, and feedback from, the clients. Potential effects of Internet-based communication platform on job satisfaction are that they may create a greater sense of participation and organizational commitment, and also make it possible to carry out some working tasks in a more autonomous and more flexible way.

We will now use these four general effects to outline specific impacts of Internet use in relation to the main determinants of job satisfaction previously investigated in the literature. For each of the key factors noted in the previous section, we will point out a specific hypothesis on how the use of Internet mediates the effects of that factor on job satisfaction.

Income. As noted in the previous section, income earnings have in previous research been found to be positively correlated to well-being, given that the wage level (and an increase of this) represents an important way to reward workers, motivate them and enhance their job satisfaction. We argue that Internet use strengthens this positive relationship. It is reasonable to expect that workers that actively use Internet as a major working tool typically belong to occupations (or organizational functions) that have on average higher wage levels than others. These workers typically perform tasks that are closely related to the production and diffusion of ICT general purpose technologies, and work in organizations and sectors that face positive demand conditions and rising market opportunities (Bresnahan et al., 2002). We therefore expect to find a stronger impact of income earnings on job satisfaction for workers in these high-opportunities ICT-based occupations, where Internet technologies represent a main working tool, and a correspondingly lower effect for workers that do not actively need to use Internet to perform their daily tasks.

Hypothesis 1: *Internet use strengthens the positive effect of income on job satisfaction*.[1]

Education and skills. Extant empirical literature points out a negative relationship between workers' education level and their job satisfaction, the reason being that highly educated workers are more likely to have higher expectations about their job and so more easily be disappointed of their actual working conditions. We claim that Internet use moderates this negative relationship. As noted above, in fact, Internet makes it easier to access information, learn new things, and get additional on-the-job professional training. These information access and learning effects will arguably increase workers' well-being, foster their feelings of competence and ability to master working tasks (Venkatesh and Speier, 1999), and hence attenuate their dissatisfaction with actual working conditions.

Hypothesis 2: *Internet use attenuates the negative effect of education on job satisfaction*.

Occupation type. According to previous empirical studies (see section 2), workers in white-collar occupations on average report higher job satisfaction than employees in blue-collar activities. We expect Internet use to make the positive relationship between white-collar work and subjective well-being stronger. The reason is similar to that put forward above in relation to hypothesis 1 (income effects). Internet is not used to the same extent by workers in different occupations, but it is more intensively used in white collar occupations and tertiary activities (Bresnahan et al., 2002; Salanova et al., 2004). These are also the types of jobs that have better working conditions and more rewarding job characteristics. An active and skilled use of Internet as a working tool in white collar occupations strengthens opportunities and outcomes for workers in these sectors. By contrast, in blue collar occupations characterized e.g. by physical work, Internet is not yet a major working tool, and it is therefore less likely that it has important effects on job satisfaction.

[1] If we consider subjective well-being in more general terms, rather than only work-life satisfaction as done here, a different argument may be that Internet use tends to increase material aspirations, thus making it more difficult for individuals to achieve the desired level of income and wealth (Lohmann, 2015). This mechanism, which we do not consider in this work, would therefore imply a negative effect of Internet use on the relationship between income and subjective well-being.

Hypothesis 3: *Internet use strengthens the positive effect of white-collar occupation on job satisfaction.*

Autonomy. Research in this field shows that job satisfaction is enhanced when workers can carry out their daily tasks in an autonomous and independent manner, e.g. being able to decide upon their working schedule, finding own solutions to problems, and having tasks that are not closely dependent upon their managers or external partners. We hypothesize that Internet use strengthens the positive relationship between autonomy and job satisfaction. Internet technologies do in fact enable and facilitate new work practices (e.g. telework) where workers have a higher degree of autonomy of working tasks and greater flexibility in their working schedule (Askenazy and Caroli, 2010). Internet can also be used as a powerful source to get access to information and external knowledge, which often increases the worker's ability to find own solutions to complex tasks. Further, employees having management responsibilities can also use Internet-based tools to carry out their leadership tasks in a more effective and autonomous way and hence increase their job satisfaction.

Hypothesis 4: *Internet use strengthens the positive effect of autonomy on job satisfaction*.

Time pressure. Employees that have excessive workloads, little available time and strong time pressure (e.g. because of frequent and tight deadlines or short delivery times) typically report lower job satisfaction than other workers. We posit that Internet may attenuate the negative effect of time pressure on well-being at work. This is because of the time-saving mechanism noted above. One of the central strengths of Internet technologies is that they enable to perform working tasks in a much more efficient and more rapid manner than before. The use of e-commerce, online banking, search engines and Intranet portals, for example, make it possible to carry out purchase, marketing, sales and human resource management activities in a systematic and faster way. These time-saving mechanisms are potentially relevant for workers' well-being, if employees can reduce the time they spend on time consuming, annoying and repetitive tasks, and correspondingly allocate more time to other more rewarding and interesting activities (Van der Doef and Maes, 1999; Dolan et al., 2008; Askenazy and Caroli, 2010).

Hypothesis 5: *Internet use attenuates the negative effect of time pressure on job satisfaction.*

Participation and social interactions. Workers that have good relationships with their colleagues and with their organization's management report in general a stronger feeling of organizational commitment and a greater job satisfaction. We argue that Internet use strengthens the positive relationship between participation and social interactions, on the one hand, and well-being at work, on the other. The reason for this is that Internet-based communication platforms – such as Intranet, Skype meetings, video conferences, and social media at work – may enable and facilitate social interactions at the workplace, and particularly so in large and complex organizations in which workers are not co-located. These ICT-based devices facilitate communication and informal interactions between workers of the same organization, improve the information flow between managers and employees, and also create new channels to have closer contact with external agents such as suppliers, users and clients (Pincus, 1986; Hendriks, 1999; Moqbel et al., 2013). These new communication channels provide therefore increased opportunities to strengthen the employees' sense of participation and organizational commitment, which are important for their feelings of well-being at work.[2]

Hypothesis 6: *Internet use strengthens the positive effect of participation on job satisfaction.*

4. Data and methods

4.1 Data and indicators

The empirical analysis makes use of data from the European Working Conditions Survey (EWCS), which is a large scale survey of workers in European countries (for previous works using this data source, see Green and McIntosh, 2001; Lopes et al., 2014; and Martin and Omrani, 2015). We use data from the two most recent waves of the survey, referring to the years 2005 and 2010 respectively. We include all workers older than 16, and whose place of residence is in

[2] Brooks (2015) finds that when social media are used at work for personal use, rather than as a platform to exchange work-related information, their use leads to lower performance and job satisfaction. Further, it has been shown that an excessive use of ICTs in spare time is negative for work-life balance (Boswell and Olson-Buchanan, 2007).

the European Union countries (including also Norway and Switzerland). The final sample contains 63,748 workers. Respondents in the 2005 survey are not the same as those in 2010 wave, so that the dataset cannot be analysed as a panel but rather as a pooled cross-section.

Table 1 presents the list of indicators that we use in the empirical analysis, the corresponding EWCS survey questions, and some descriptive statistics. Table 1 groups the indicators into some main categories corresponding to the major conceptual dimensions of interest previously noted in sections 2 and 3. These are: job satisfaction (the dependent variable of the study); Internet use (the main explanatory variable of interest); work characteristics (income and career prospects, education and skills, occupation type, autonomy, monotonous work and repetitive tasks, time pressure, participation and social interaction); and personal characteristics (gender, age, health, civil status).

< Table 1 here >

4.2 Econometric methods

The main objective of the econometric analysis is to investigate how workers' job satisfaction (dependent variable) is affected by their use of Internet for professional purposes. As noted in the previous section, we argue that the key relationship of interest is not a direct effect of Internet use on job satisfaction (which has little conceptual interest), but rather a set of indirect effects: Internet use mediates the relationships between work characteristics and job satisfaction. These indirect effects will be tested in our analysis by means of a set of interaction variables. These interaction effects will test the six hypotheses outlined in the previous section.

An important issue that has to be taken into account in this econometric analysis is that the main explanatory variable of interest, Internet use, is arguably not an exogenous and randomly assigned variable, but it is in turn dependent on a set of work-related and personal characteristics. To illustrate this, table 2 compares the means of the indicators in our empirical analysis for two groups of workers, those that report high use of Internet and those that do not actively use Internet at work. Table 2 shows that for most of the indicators the two groups are substantially (and significantly) different from each other. In particular, workers that report above-average Internet use are more likely to be in high-skilled white collar occupations (such as legislators, senior officials and managers, professionals and technicians), and they have higher education and

skill level than other workers. In short, this means that when we estimate the relationship between job satisfaction and Internet use we have to take into account this sample selection pattern.

< Table 2 here >

To take this issue into account, we adopt a two-equation econometric approach. The first step is a selection equation that investigates the factors explaining why some workers have higher Internet use intensity than others, whereas the second equation studies the relationship between job satisfaction and Internet use (plus a set of control factors). The econometric model is the following:

$$INT_{itc} = \alpha + \Sigma_k [\beta^k WC^k_{itc}] + \Sigma_k [\gamma^k PC^k_{itc}] + \psi Z_{tc} + \sigma_{itc} \quad (1)$$

$$JS_{itc} = \mu + \eta INT_{itc} + \Sigma_k [\pi^k WC^k_{itc}] + \Sigma_k [\rho^k (INT_{ij} * WC^k_{itc})] + \Sigma_k [\varphi^k PC^k_{itc}] + \varepsilon_{itc} \quad (2)$$

where INT denotes internet use, JS job satisfaction, WC the set of work characteristics, PC the vector of personal characteristics, Z is a peer effect included as instrumental variable (see below), and σ and ε are the error terms of the two equations. The subscripts *i*, *t* and *c* indicate the individual worker, time period and country respectively. The subscript *k* indicates the k^{th} variable in the vectors of work and personal characteristics.

In equation 1, two main variables account for work-related characteristics (WC), i.e. occupation type and education level, since it is reasonable to expect that workers in high-skilled white collar occupations are more likely to actively use Internet as a central working tool (Bresnahan et al., 2002). Among the personal characteristics (PC) that may affect intensity of Internet use, equation 1 controls for workers' age, gender and health conditions. Finally, to improve identification of the model, we include a vector of additional variables Z that are not included in equation 2 and that are uncorrelated with the error term of the second equation. We include two variables in the Z vector. The first one is the average level of computer infrastructures in each country, which supposedly facilitate and foster Internet adoption by firms and a consequent active use of it for professional purposes by individual workers (Forman, 2005). We measure this variable as the

share of households in each country that report having at least one personal computer in their home (source: Eurostat and OECD statistics). This variable is a so-called *peer effect*, based on the idea that the intensity of Internet use of each individual worker will partly depend on the overall level of ICT infrastructures in the country (in line with models of ICT adoption and diffusion). We take lagged values of this variable (two years before each survey period) in order to ensure that it predates the outcome variable and it is thus uncorrelated with common shocks (see discussion of this point in Angrist and Pischke, 2009: 192-197). Second, we also include in the vector Z the variable company size (measured by the number of paid workers in the local establishment), given that previous research indicates that larger organizations are more likely to use Internet as an instrument of internal communication between teams and establishments that are physically distant from each other (Forman, 2005).

In equation 2, we include among the regressors a large number of work-related and personal characteristics that have previously been studied in the job satisfaction literature (for a full list and definition of these variables, see table 1). Further, we add a set of interaction effects between internet use and each work characteristic, which test the six hypotheses put forward in section 3. The vector of estimated coefficients ρ does therefore represent the results of these hypotheses tests.

We estimate the two equations simultaneously as a recursive bivariate probit model. The recursive bivariate probit is a model with correlated disturbances, in which the dependent variable of the first equation (INT) appears on the right-hand-side of the second equation (Monfardini and Radice, 2008). As noted above, the model is identified through the inclusion of the instrumental variable Z in equation 1. We have estimated this model in two ways to assess robustness. First, we have estimated it as a bivariate ordered probit model (Sajaia, 2008), since the dependent variables in the two equations are defined as categorical indicators. Then, we have tried to redefine the two dependent variables as dummy indicators, and estimated the same model specification through a bivariate probit model. The next section will present results for both of these estimation methods.

5. Results

5.1 Baseline results

We will first present regression results for the baseline model that does not include any interaction variable in equation 2, and then discuss the results of the model specification with interaction effects. Tables 3 and 4 present these baseline results. As indicated at the bottom of these tables, the LR and Wald tests indicate the error terms of the two equations are correlated, and hence confirm it is appropriate to estimate them simultaneously through a recursive bivariate probit model.

Table 3 reports the baseline results for equation 1, where the dependent variable is the intensity of Internet use (measured as categorical indicator in regression 1.1, and as dummy variable in column 1.2). As expected, the workers' education level is positively and significantly related to their intensity of Internet use for professional purposes. A higher education level does in fact increase the probability that a worker is employed to carry out skilled and advanced tasks in which Internet is a main working tool (Bresnahan et al., 2002). Relatedly, the dummy variable for high-skilled white collar occupations is also positive and significant, confirming that workers in skilled tertiary occupations are more likely to actively use Internet as a main professional instrument. The other two occupation variables have also a positive, though lower, estimated coefficients (the reference category is the group of unskilled blue collar occupations, which on average use Internet much less frequently than others). Further, the estimated coefficient of the company size variable is positive and significant, in line with extant research suggesting that larger organizations are more likely to adopt Internet early, and to use it as an instrument of internal communication between teams and establishments that are not co-located (Forman, 2005).

Next, a set of personal characteristics also turn out to be significant in the regressions. Age has a negative coefficient (younger workers are more used to work with digital technologies). Gender has a positive coefficient (male workers more likely to actively use Internet for professional purposes). Health is also important: the sick leave variable indicates that workers that have had health issues in recent months report on average a lower intensity of Internet use at work. Finally, the results in table 3 also point out a positive relationship between the (lagged) computer access variable and Internet use at work. As noted in the previous section, the interpretation of this is

that the average level of computer infrastructures in each country is a pre-condition that fosters Internet adoption by firms and a consequent active use of it for professional purposes by individual workers (Forman, 2005).[3]

< Table 3 here >

Table 4 shifts the focus to the equation of main interest (equation 2), which estimates the determinants of job satisfaction (measured as categorical indicator in regression 2.1, and as dummy variable in column 2.2). The first variable reported in the table is Internet use. In a model without interaction effects, this variable tests for a direct correlation between use of Internet for professional purposes and job satisfaction. The coefficient is positive and not significant in regression 2.1, and negative and significant in column 2.2. This correlation is therefore not robust in the estimations. Furthermore, as noted in previous sections, we do not regard this direct effect of Internet use on job satisfaction as conceptually interesting, and we rather argue that Internet is relevant in an indirect manner, namely it mediates the effect of work characteristics on job satisfaction. This will be discussed further below. Before we discuss the relevant interaction effects, let us first look at the baseline regression results for the main explanatory and control variables included in equation 2.

First, income earnings *per se* do not have a significant effect on work-life satisfaction. However, the perceived income variable (measuring the extent to which workers report they are satisfied with their wage level) is positively and significantly correlated with job satisfaction. The other two variables included in the model as part of the same conceptual dimension – job security and career prospects – are also positively related to job satisfaction. In line with previous research, these results indicate the importance of perceived income and career prospects as important factors that motivate workers and spur their well-being at work (Clark and Oswald, 1996; Sousa-Poza and Sousa-Poza, 2000; Clark, 2009; Pichler and Wallace, 2009).

[3] The coefficient of the computer access variable is small, and it is not significant at conventional levels in regression 1.2. We think the reason for this is its correlation with the time dummy variable. The latter (negative and significant) indicates the existence of a clear increasing time trend in Internet use for professional purposes, namely workers on average reported a higher use of Internet at work in the 2010 survey than in the previous survey period. However, it is reasonable to argue that an analogous time trend has characterized the growth of computer infrastructures too. In fact, when we insert in the regression model both of these variables, time dummy and computer access, the latter is weakly significant; by contrast, when we omit the time dummy, the computer access variable has a stronger and more significant effect on Internet use.

The next set of variables measure education and skill-related effects. The indicator of workers' education level is negative (as expected on the basis of previous studies) but not significant. The negative sign suggests that highly educated workers are more likely to have higher expectations about their job and so more easily be disappointed of their actual working conditions. The other variables in this dimension corroborate this interpretation. Employees that consider themselves overqualified for the job report on average lower satisfaction at work. On the other hand, workers that feel they would need further training (i.e. feeling themselves not enough qualified for the tasks they perform) report lower job satisfaction. On the whole, these findings indicate that the key aspect to foster well-being is not the education and skill-level *per se*, but rather the extent to which workers' skills match those that are required to perform their daily working tasks (Hackman and Oldham, 1976; Belfield and Harris, 2002; Jürges, 2003; Green and Zhu, 2010).

Regarding the three dummy variables accounting for the type of occupation, these confirm that white collar workers have typically better working conditions and higher well-being than blue collar workers (Pichler and Wallace, 2009; Lopes et al., 2013). This effect is stronger and more significant for workers in high-skilled white collar occupations (i.e. the top three standard occupational categories in the ISCO classification: senior officials and managers, professionals and technicians, and legislators).

Shifting the focus to the variables measuring autonomy, the regression results confirm that workers that have greater autonomy to apply their own ideas, choose their working partners, and organize their working schedule in a flexible manner are on average more satisfied than other workers in the sample (Belfield and Harris, 2002; Clark, 2009; Lopes et al., 2013).

Further, the variables accounting for the time pressure dimension do also turn out to be important and in line with extant research. In particular, we do not find job satisfaction to be affected by the number of working hours *per se*, but rather by the extent of time pressure that the work is subject to, e.g. measured by its pace (frequency of tight deadlines), available time to complete tasks, and the work-life balance that the worker reports to have (Scandura and Lankau, 1997; Gallie and Russell, 2009; Pichler and Wallace, 2009).

The sixth relevant work-related dimension that is considered in the regression model includes indicators of participation and social interactions at work. In line with previous research, we find that workers that report to have support from their organization's management and good relationships with their colleagues feel more committed and contempt at work; whereas

employees that experience discrimination report significantly lower levels job satisfaction (Sousa-Poza and Sousa-Poza, 2000; Helliwell and Huang, 2005; Clark, 2009; Hüsleger et al., 2009).

Further down, table 4 also reports the estimated coefficients for some relevant personal characteristics that are included in the model as control variables. Neither the gender nor the age variable turns out to be significant in the regressions. On the other hand, safety and health conditions are significantly correlated with well-being. Finally, the civil status dummy variables indicate that individuals that have a partner (or a spouse) report above-average levels of job satisfaction.

< Table 4 here >

5.2 Results of hypotheses tests

We then test the six hypotheses previously outlined in section 3 by adding a set of interaction variables in equation 2. We first include each of these interaction effects alone, and then insert all of them jointly in the regression model. After this iterative process, we retain those interaction variables that are estimated with greater precisions, and disregard those that do not contribute to the explanatory power of the model. We hereby focus the discussion of the results on the set of relevant interaction variables for each of the six hypotheses.

When assessing the regression results for the interaction effects, it is important to note that in discrete choice econometric models the relevance and significance of interaction variables must be evaluated by looking at their marginal effects, whose calculation is however more complex than it is the case for marginal effects of individual variables (Ai and Norton, 2003). To circumvent this issue and calculate the estimated marginal effects for each interaction variable, we focus on regression 2.2 (bivariate probit model), and proceed in two steps. First, we calculate the *adjusted prediction* (predicted probability that an employee is satisfied with her job) for the two values of the Internet use dummy (high-use and low-use) and the two values of the dummy variable measuring the work characteristic considered in each hypothesis. The interaction of these two dummies generates four possible combinations. Secondly, we compute the marginal effect of the interaction variable as the difference between the adjusted predictions of the two contrasting cases: (i) low-Internet use and low job satisfaction; (2) high-Internet use and high job

satisfaction. The difference in adjusted predictions for these two polar cases measures the effect on the dependent variable (probability that an employee is satisfied with her job) of a joint (discrete) change of the two dummies that compose the interaction variable, which is precisely the marginal effect of the interaction variable.[4] The estimated predicted probabilities and related marginal effects – which represent the results of our hypotheses tests – are reported in table 5.

< Table 5 here >

Hypothesis 1: Income. The two interaction variables that we have retained in the model are those relating to income earnings and perceived income. Both of them have positive marginal effects, indicating that the active use of Internet in higher income groups of workers increases the probability that the workers are satisfied with their job by around 7-10%. This positive marginal effect provides support for the first hypothesis, according to which Internet use strengthens the positive relationship between income and job satisfaction. As noted in section 3, the interpretation of this result is that workers that actively use Internet as a major working tool typically have on average higher wage levels than others, and work in organizations and sectors that, due to their relatedness to ICT general purpose technologies, face positive demand conditions and rising market opportunities.

Hypothesis 2: Education. In this dimension, we find two interaction effects to be particularly important: the one for education level and the one for the learning variable. Both of them have positive and large marginal effects. Specifically, the former variable indicates that highly educated workers that make active use of Internet are nearly 25% more likely to be satisfied with their job. In line with hypothesis 2, this finding confirms that Internet use moderates the negative relationship between education and job satisfaction. And the interaction effect for the learning variable suggests that the reason for this is that Internet makes it easier to access information and learn new things. These information access and learning effects contribute to increase workers' well-being, enhance their feelings of competence, and hence attenuate their dissatisfaction with actual working conditions.

[4] The use of adjusted predictions to compute marginal effects in discrete choice models is discussed in Zelner (2009), Greene (2010) and Williams (2012). For a recent application and example, see Castellacci (2015).

Hypothesis 3: Occupation type. Two interaction effects turn out to be important and provide support for this hypothesis. The first is the one between Internet use and high-skilled white collar occupations, which has a positive and strong estimated marginal effect: workers in these occupations and which also actively use Internet for professional purposes are 27% more likely to report above-average job satisfaction. The second is the interaction between Internet use and blue collar occupations, which, conversely, has a negative and strong marginal effect (indicating that the active use of Internet in blue collar occupations does actually lead to lower well-being). Taken together, these two interaction effects confirm the hypothesis that Internet use makes the positive relationship between white-collar work and subjective well-being stronger. The interpretation of this finding is that an active and skilled use of Internet as a working tool in white collar occupations strengthens opportunities and outcomes for workers in these sectors.

Hypothesis 4: Autonomy. Results in table 5 provide support to the idea that there is a joint effect of Internet use and autonomy of work on job satisfaction. The two interaction effects that we have selected to show this pattern are those with the autonomy variable and with the own ideas variable respectively (both of which have a positive estimated marginal effect around 8-9%). This indicates that Internet use strengthens the positive relationship between autonomy and job satisfaction, as outlined by hypothesis 4. The reason for this, we have argued above, is that Internet facilitates the implementation of new work practices in which employees have a higher degree of autonomy of working tasks, and greater flexibility in their working schedule. Internet does also spur the access to information and external knowledge, which may then increase workers' ability to find own solutions to complex tasks.

Hypothesis 5: Time pressure. The proposition formulated in section 3 is that Internet use may attenuate the negative effect of time pressure on well-being at work, due to time-saving effects that digital technologies typically provide. However, the two marginal effects reported in table 5 reject this hypothesis. The interaction between Internet use and the pace variable turns out to be negative (instead of positive as expected); and the interaction effect relating to the available time variable is also negative. Hence, we do not find time-saving effects of Internet to improve job satisfaction as expected. One possible reason for this is that the extent to which a worker is under

time pressure does depend on how the work is organized and the type of objectives and delivery times that the organization has. Internet use *per se* will arguably not be able to change these structural features of the occupation, at least not in the short term. If workers who are under time pressure intensively use Internet as a major working tool, this may even turn out to decrease their job satisfaction. For instance, it is our daily experience that when the work is subject to tight deadlines and pressure, the use of e-mail may not work as a time-saving device but rather as a tool to increase the working pressure further.[5]

Hypothesis 6: Participation and social interactions. The two interaction effects that we have retained in the model to test this hypothesis are those for the variables management support and colleagues, respectively. Both of them have positive marginal effects, although the size of the latter interaction effect is small. The findings corroborate the idea that Internet use strengthens the positive relationship between participation and social interactions, but they do also point out that this interaction effect is much stronger for management support than for the relationships with peers and colleagues. The interpretation of this mechanism is that Internet-based communication platforms facilitate social interactions at the workplace, and in particular contribute to improve the information flow between managers and employees, which in turn fosters transparency and social trust in the organization. These new communication channels provide therefore increased opportunities to strengthen the employees' sense of participation and organizational commitment, which are important for their feelings of well-being at work.

6. Conclusions

The paper has investigated the channels through which the use of Internet for professional purposes affects job satisfaction. The main idea presented in the study is that the effects of Internet on well-being at work are indirect. Job satisfaction is determined by a variety of work characteristics, and the use of Internet can mediate the effect of some of these characteristics on workers' well-being. Specifically, we have focused on six main dimensions previously investigated in the literature (income, education, occupation type, autonomy, time pressure,

[5] In line with this argument, Green and McIntosh (2001), using data from the European Survey on Working Conditions (EWCS), found that work intensity is higher in jobs that use computers more frequently.

social interactions), and for each of these we have developed a new hypothesis on how these factors interact with Internet use, and how these interaction effects shape well-being at work.

To investigate these hypotheses, we have used data from the latest two waves of the European Working Conditions Survey (EWCS), referring to the years 2005 and 2010 respectively, which provide a rich variety of information on more than 60,000 workers across European countries. Considering that the main explanatory variable of interest, Internet use, is in turn determined by a set of work and personal characteristics, we have adopted a simultaneous equation approach and estimated a bivariate ordered probit econometric model. This is a two-equation model, where the first is a selection equation that investigates the factors explaining why some workers have higher Internet use intensity than others, whereas the second equation studies the relationship between job satisfaction and Internet use. The econometric results provide support for most of the hypotheses that we have tested. In general, the findings corroborate the idea that the effects of Internet on job satisfaction are indirect, i.e. they work in interaction with some important work characteristics.

More specifically, two variables play a crucial role according to our results: the workers' education level and their occupational category. Both of these variables turn out to be central in our analysis, since they have a threefold impact on job satisfaction. First, they affect the intensity of Internet use, given that workers with higher education level and employees in high-skilled white collar occupations are more likely to actively use Internet as a main professional tool. Second, they are among the main (direct) determinants of job satisfaction. Third, their interaction with Internet use fosters well-being at work. As noted in the paper, though, these two interaction effects have a different conceptual underpinning. For the education variable, the role of Internet use is linked to information access and learning effects. For the occupation variable, the interaction variable basically indicates a polarization effect: Internet technologies tend to benefit relatively more high-skilled workers in white collar occupations, and much less so employees in blue collar jobs.

The results also highlight the important role of the income variable. Income earnings – and how these are perceived by workers – represent a relevant determinant of job satisfaction. And the use of Internet as a central working tool reinforces this positive effect, since as noted above it is more concentrated in occupations and sectors where workers have on average higher skills and wage levels, and better career prospects. In summary, these findings support the idea that the rise of

Internet technologies has led to a rapid process of structural change, in which workers in some specific occupations, and with higher income and education levels, have improved further their job satisfaction *vis-à-vis* workers in other sectors that are more weakly related to ICTs activities.

Finally, the econometric results also point out the role of three other variables, which represent different aspects of work organization: autonomy, time pressure, and social interactions at work. The baseline results confirm the (direct) role of these variables as main determinants of job satisfaction. However, the related interaction effects provide mixed support to the idea that Internet use fosters well-being by interacting with work organization features. On the one hand, we do not find support for the hypothesis that time saving effects of digital technologies can contribute to alleviate employees' work pressure. This is arguably due to the fact that we are working with pooled cross-sectional data, and we are therefore not able to compare workers over time (we suspect that time-series data would make this time-saving effect much more visible). On the other hand, we do find support for the hypotheses related to the other two interaction effects, the one for autonomy and the one for participation and social interactions. Although these estimated effects are not large, they do on the whole support the idea that new Internet-based communication platform can enhance job satisfaction by creating a greater sense of participation and organizational commitment, and by making it possible to carry out working tasks in a more autonomous and more flexible way.

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Table 1: Indicators: definitions and descriptive statistics

Variable	Survey question	Obs	Mean	Std. Dev.	Min	Max
Job satisfaction	On the whole, are you satisfied with working conditions in your main paid job? Three categories: Not satisfied; Satisfied; Very satisfied.	63,748	2.06	0.65	1	3
Internet use	Does your main paid job involve using internet, email for professional purposes? Seven categories: from 'Never' to 'All of the time'.	63,515	2.82	2.27	1	7
Income and career prospects						
Income earnings	Net monthly income earnings from main job. Three categories: below the country mean; at the country mean; above the country mean.	54,316	2.00	0.85	1	3
Income (perceived)	Are you well paid for the work that you do? Five categories: from 'Strongly disagree' to 'Strongly agree'.	62,844	3.03	1.16	1	5
Insecurity	Do you agree you might lose the job in the next 6 months? Five categories: from 'Strongly disagree' to 'Strongly agree'.	59,496	2.17	1.23	1	5
Career prospects	Does your job offers good prospects for career advancement? Five categories: from 'Strongly disagree' to 'Strongly agree'.	61,380	2.69	1.22	1	5
Education and skills						
Education	What is the highest level of education or training that you have successfully completed? Seven ISCED codes: from 'pre-primary education' to 'second stage of tertiary education'.	63,567	3.39	1.26	0	6
Training needs	1 if worker states s/he needs further training to cope well with the duties.	62,878	0.12	0.33	0	1
Overqualification	1 if worker states the demands are too low in relation to his/her skills.	62,878	0.32	0.47	0	1
Learning	1 if worker states his/her main paid job involves learning new things.	63,051	0.70	0.46	0	1
Training	1 if worker states s/he has undergone some training activities during the past 12 months.	63,442	0.32	0.47	0	1

Occupation type						
White collar-skilled	1 if worker is working in the top three standard occupational categories (legislators, senior officials and managers, professionals and technicians and associate professionals)	63,102	0.38	0.49	0	1
White collar-unskilled	1 if worker is working in the 4 and 5 ISCO codes (clerks and service workers and shop and market sales workers)	63,102	0.27	0.44	0	1
Blue collar-skilled	1 if worker is working in the 6 and 7 ISCO codes (skilled agricultural and fishery workers and craft and related trades workers)	63,102	0.15	0.36	0	1
Blue collar-unskilled	1 if worker is working in the 8 and 9 ISCO codes (plant and machine operators and assemblers and elementary occupations)	63,102	0.20	0.40	0	1
Autonomy						
Own ideas	You are able to apply your own ideas in your work. Five categories: from 'Never' to 'Always'.	62,965	3.63	1.37	1	5
Autonomy	1 if worker states s/he is able to choose the order of tasks, methods of work and speed or rate of work.	63,517	0.66	0.47	0	1
Problem solving	1 if worker states his/her main paid job involves solving unforeseen problems on his/her own.	63,153	0.82	0.39	0	1
Supervision	Number of people supervised. Three categories, from 'none' to '10 or more'.	63,045	1.22	0.52	1	3
Flexible time	1 if worker states his/her working hours are entirely self-determined.	63,235	0.16	0.36	0	1
Self-assessment	1 if worker states his/her main paid job involves self-assessing the quality of his/her own work.	62,553	0.74	0.44	0	1
Work quality	Your job gives you the feeling of work well done. Five categories: from 'Never' to 'Always'.	63,090	4.25	0.92	1	5
Employee	1 if worker employment status is employee	63,637	0.84	0.36	0	1
Working partners	You have a say in the choice of your working partners. Five categories, from 'Never' to 'Always'.	57,903	2.33	1.56	1	5

Monotonous work and repetitive tasks						
Monotonous	1 if worker states his/her main paid job involves monotonous tasks.	62,898	0.44	0.50	0	1
Rotating	1 if worker states his/her job involves rotating tasks between him/herself and colleagues.	62,932	0.45	0.50	0	1
Time pressure						
Pace	Your job involves working at very high speed and with tight deadlines. Seven categories: from 'Never' to 'All of the time'.	62,842	3.71	1.89	1	7
Available time	1 if worker states s/he has enough time to get the job done.	63,260	0.90	0.30	0	1
Working hours	How many hours do you usually work per week in your main paid job?	62,006	38.60	11.95	1	106
Work-life balance	Do your working hours fit in with your family or social commitments outside work? Four categories: from 'not at all very well' to 'very well'.	63,376	3.08	0.79	1	4
Participation and social interactions						
Management support	Your manager helps and supports you. Five categories, from 'Never' to 'Always'.	54,895	3.71	1.29	1	5
Colleagues	Worker agree s/he has very good friends at work. Five categories, from 'strongly disagree' to 'strongly agree'.	61,052	3.91	0.97	1	5
Discrimination	1 if worker states s/he has been subject to discrimination (on the basis of his/her gender, sexual orientation, or disability) during the last 12 months.	63,265	0.06	0.24	0	1
Personal characteristics						
Gender	1 if worker is male	63,748	0.49	0.50	0	1
Age	Age of worker	63,748	41.80	11.75	16	89
Safety	1 if worker think his/her health or safety is at risk because of his/her work	62,456	0.29	0.45	0	1
Health	Number of days absent because of health problems. Six categories: from 'never' to '50 days or more'.	62,176	0.85	1.39	0	5

Partner and children	1 if worker is living with spouse/partner and son/daughter under 15	63,009	0.32	0.47	0	1
Partner and no children	1 if worker is living with spouse/partner and without son/daughter	63,009	0.35	0.48	0	1
Single and children	1 if worker is living without spouse/partner and with son/daughter under 15	63,009	0.06	0.23	0	1
Single and no children	1 if worker is living without spouse/partner and without son/daughter	63,009	0.27	0.44	0	1

Table 2: High- versus low-intensity of Internet use: results of Wilcoxon Mann-Whitney test

Variables	Internet use	Mean	z
Job satisfaction	Low	2.000	-38.340***
	High	2.218	
Income earnings	Low	1.861	-60.096***
	High	2.348	
Income (perceived)	Low	2.923	-37.918***
	High	3.304	
Insecurity	Low	2.238	20.115***
	High	2.013	
Career prospects	Low	2.497	-62.355***
	High	3.178	
Education	Low	3.106	-86.712***
	High	4.077	
Training needs	Low	0.107	-19.633***
	High	0.164	
Overqualification	Low	0.318	-3.211***
	High	0.332	
Learning	Low	0.632	-62.515***
	High	0.883	
Training	Low	0.259	-49.275***
	High	0.460	
White collar-skilled	Low	0.274	-85.727***
	High	0.640	
White collar-unskilled	Low	0.263	-7.271***
	High	0.291	
Blue collar-skilled	Low	0.201	52.343***
	High	0.035	
Blue collar-unskilled	Low	0.262	65.427***
	High	0.033	
Own ideas	Low	3.502	-34.241***
	High	3.957	
Autonomy	Low	0.614	-36.710***
	High	0.767	
Problem solving	Low	0.779	-37.841***
	High	0.908	
Supervision	Low	1.164	-41.166***
	High	1.355	
Flexible time	Low	0.151	-5.353***
	High	0.168	
Self-assessment	Low	0.710	-23.112***

	High	0.800	
Work quality	Low	4.225	-6.797***
	High	4.313	
Employee	Low	0.838	-6.596***
	High	0.859	
Working partners	Low	2.176	-37.480***
	High	2.691	
Monotonous	Low	0.466	23.856***
	High	0.362	
Rotating	Low	0.451	-0.422
	High	0.453	
Working hours	Low	38.440	-2.457
	High	39.005	
Pace	Low	3.624	-19.528***
	High	3.932	
Available time	Low	0.905	10.444***
	High	0.877	
Work-life balance	Low	3.044	-20.711***
	High	3.185	
Management support	Low	3.635	-20.220***
	High	3.902	
Colleagues	Low	3.884	-8.248***
	High	3.958	
Discrimination	Low	0.057	-4.625***
	High	0.066	
Gender	Low	0.503	8.474***
	High	0.466	
Age	Low	42.114	11.221***
	High	40.999	
Safety	Low	0.329	36.532***
	High	0.183	
Health	Low	0.849	-6.476***
	High	0.842	
Partner and children	Low	0.317	-4.907***
	High	0.337	
Partner and no children	Low	0.353	3.218***
	High	0.340	
Single and children	Low	0.059	2.769***
	High	0.054	
Single and no children	Low	0.270	0.255
	High	0.269	

Legend: High (Low): workers with above (below) median intensity of Internet use. ***: 1% signif. level

Table 3: Regression results: equation 1. Dependent variable: Internet use. Baseline results (without interaction variables).

	(1.1) Bivariate ordered probit	(1.2) Bivariate probit
	Coef. (Robust SE)	Coef. (Robust SE)
Education	0.229*** (0.009)	0.423*** (0.028)
White collar-skilled	1.433*** (0.035)	1.430*** (0.046)
White-collar-unskilled	1.093*** (0.035)	1.142*** (0.045)
Blue collar-skilled	0.129*** (0.041)	0.075 (0.061)
Company size	0.062*** (0.008)	0.075*** (0.010)
Age	-0.003*** (0.001)	-0.004*** (0.001)
Health	-0.006 (0.007)	-0.022** (0.009)
Gender	0.128*** (0.020)	0.097*** (0.025)
Computer access	0.004*(0.003)	0.003 (0.003)
Year 2005	.-0.094* (0.055)	.-0.116* (0.067)
Observations	35,856	35,856
LR test of independent equations	7077.20***	
Wald test of rho=0		5.571**

Constant and country dummies included. Robust standard errors in parentheses. Significance levels: *10%; **5%; ***1%. Dependent variable in regression 1.1: Internet use (categorical). Dependent variable in regression 1.2: Internet use dummy (1 if worker reports use of Internet for half of her working time or more; 0 if worker reports use of Internet for less than half of her working time).

Table 4: Regression results: equation 2. Dependent variable: Job Satisfaction. Baseline results (without interaction variables).

	(2.1)	(2.2)
	Bivariate ordered probit	**Bivariate probit**
	Coef. (Robust SE)	Coef. (Robust SE)
Internet use	0.003 (0.017)	-0.411*** (0.159)
Income earnings	-0.016 (0.015)	0.012 (0.035)
Income (perceived)	0.261*** (0.011)	0.540*** (0.036)
Insecurity	-0.128*** (0.009)	-0.138*** (0.012)
Career prospects	0.150*** (0.010)	0.242*** (0.014)
Education	-0.017 (0.012)	-0.048 (0.043)
Training needs	-0.081** (0.033)	-0.204*** (0.047)
Overqualification	-0.047** (0.022)	-0.131*** (0.030)
Learning	0.024 (0.025)	0.074** (0.034)
Training	0.023 (0.023)	0.043 (0.034)
White collar-skilled	0.083* (0.049)	0.178** (0.066)
White collar-unkilled	0.062 (0.038)	0.167*** (0.049)
Blue collar-skilled	-0.033 (0.035)	0.035 (0.045)
Own ideas	0.054*** (0.009)	0.125*** (0.032)
Autonomy	0.042* (0.022)	0.036 (0.030)
Self-assessment	0.027 (0.024)	0.038 (0.033)
Flexible time	0.227*** (0.046)	0.127* (0.072)
Working partners	0.023*** (0.008)	0.019 (0.040)
Problem solving	-0.037 (0.028)	-0.042 (0.038)
Supervision	-0.027 (0.021)	-0.008 (0.046)
Work quality	0.203*** (0.013)	0.167*** (0.016)
Employee	-0.165*** (0.062)	-0.043 (0.089)
Monotonous	-0.144*** (0.021)	-0.161*** (0.029)
Rotating	-0.029 (0.021)	-0.063** (0.030)
Pace	-0.036*** (0.006)	-0.136*** (0.030)
Working hours	0.000 (0.001)	0.000 (0.001)
Available time	0.135*** (0.035)	0.262*** (0.041)
Work-life balance	0.289*** (0.015)	0.249*** (0.019)
Management support	0.093*** (0.009)	0.328*** (0.030)
Colleagues	0.144*** (0.012)	0.279*** (0.031)

Discrimination	-0.275*** (0.046)	-0.396*** (0.053)
Gender	-0.011 (0.023)	0.021 (0.032)
Age	-0.001 (0.001)	0.000 (0.001)
Safety	-0.417*** (0.025)	-0.564*** (0.030)
Health	-0.067*** (0.007)	-0.080*** (0.009)
Partner and children	0.057** (0.026)	0.097** (0.036)
Partner and no children	0.051* (0.026)	0.099** (0.037)
Single and children	0.028 (0.045)	0.063 (0.063)
Year 2005	-0.065*** (0.022)	-0.060* (0.031)
Observations	35,856	35,856
LR test of independent equations	7077.20***	
Wald test of rho=0		5.571**

Constant and country dummies included. Robust standard errors in parentheses. Significance levels: *10%; **5%; ***1%. Dependent variable in regression 2.1: Internet use (categorical). Dependent variable in regression 2.2: Internet use dummy (1 if worker reports use of Internet for half of her working time or more; 0 if worker reports use of Internet for less than half of her working time). In regression 2.2 we use the following explanatory variables as dummies: Income earnings (1 if worker's net monthly income earnings are higher than the country mean); Income perceived (1 if worker agrees s/he is well paid); Education (1 if worker has tertiary education); Own ideas (1 if worker is able to apply her own ideas); Working partners (1 if worker has a say in the choice of her working partners); Supervision (1 if worker has employees under her supervision); Pace (1 if job involves working at very high speed/tight deadlines for half of the working time or more); Management support (1 if worker reports her manager helps and supports her); Colleagues (1 if worker agree s/he has very good friends at work).

Table 5: Results of hypotheses tests: estimated marginal effects of interaction variables

Interaction variable	Predicted probabilities and marginal effect		Test of hypothesis
Income earnings * Internet use	Pr (Internet = 0; Income earnings = 0)	0.224	
	Pr (Internet = 1; Income earnings = 1	0.324	
	Marginal effect	**+0.100*** **	H1
Income (perceived) * Internet use	Pr (Internet = 0; Perceived income = 0)	0.232	
	Pr (Internet = 1; Perceived income = 1)	0.306	
	Marginal effect	**+0.074*** **	H1
Education * Internet use	Pr (Internet = 0; Education = 0)	0.173	
	Pr (Internet = 1; Education = 1)	0.420	
	Marginal effect	**+0.248*** **	H2
Learning * Internet use	Pr (Internet = 0; Learning = 0)	0.166	
	Pr (Internet = 1; Learning = 1)	0.293	
	Marginal effect	**+0.126*** **	H2
White collar-skilled * Internet use	Pr (Internet = 0; White collar-skilled = 0)	0.155	
	Pr (Internet = 1; White collar-skilled = 1)	0.430	
	Marginal effect	**+0.275*** **	H3
Blue collar-skilled * Internet use	Pr (Internet = 0; Blue collar-skilled = 0)	0.302	
	Pr (Internet = 1; Blue collar-skilled = 1)	0.044	
	Marginal effect	**-0.258*** **	H3
Own ideas * Internet use	Pr (Internet = 0; Own ideas = 0)	0.210	
	Pr (Internet = 1; Own ideas = 1)	0.299	
	Marginal effect	**+0.089*** **	H4
Autonomy * Internet use	Pr (Internet = 0; Autonomy = 0)	0.209	
	Pr (Internet = 1; Autonomy = 1)	0.286	
	Marginal effect	**+0.077*** **	H4
Pace * Internet use	Pr (Internet = 0; Pace = 0)	0.279	
	Pr (Internet = 1; Pace = 1)	0.237	
	Marginal effect	**-0.042*** **	H5
Available time * Internet use	Pr (Internet = 0; Available time = 0)	0.262	
	Pr (Internet = 1; Available time = 1)	0.250	
	Marginal effect	**-0.013*** **	H5
Management support * Internet use	Pr (Internet = 0; Management support = 0)	0.222	
	Pr (Internet = 1; Management support = 1)	0.285	
	Marginal effect	**+0.063*** **	H6
Colleagues * Internet use	Pr (Internet = 0; Colleagues = 0)	0.238	
	Pr (Internet = 1; Colleagues =1)	0.262	
	Marginal effect	**+0.024*** **	H6

Significance levels: ***1%.