

Determinants of the job satisfaction of PhD holders: an analysis by gender, employment sector and type of satisfaction in Spain

Abstract

We analyze the determinants of job satisfaction of PhD holders in Spain. Specifically, we consider overall job satisfaction as well as basic and motivational satisfaction, following Herzberg's typology (based on Maslow's hierarchy of needs). Using representative data for Spain's PhD population, drawn from the Spanish Survey on Human Resources in Science and Technology (2009), we report an analysis by gender and the institutional sector (university and non-university) in which employees work. We employ OLS regressions to identify the determinants of basic and motivational satisfaction in the workplace and an ordered logit model for overall job satisfaction. Results do not allow us to confirm Herzberg's factor differentiation for Spanish PhD holders, since the factors of basic motivation (including salary or working conditions – needs of 'safety') have a bearing on all types of job satisfaction (and not solely on the basic satisfaction of PhD holders). Our results do not show any significant differences by gender. However, it seems that meeting these 'basic' needs is less important for the job satisfaction of PhD holders working in universities. The results seem reasonable in a Southern European country where the monetary conditions of the labor market are worse than those in other developed countries.

Introduction

Spanish doctorate holders (PhDs)¹ enjoy better economic conditions in the labor market both in terms of rates of employment and earnings (Benito, Gil and Romera, 2014; European Commission, 2007). Unemployment in Spain among PhD holders is, on average, 4.3% compared to 16.0% among university graduates and 25.7% among the active population (INE, 2013); while PhD holders on average earn 60% more than those who have finished secondary school education and roughly twice as much as those who only finished compulsory education (INE, 2010).

However, job satisfaction has been shown to depend not solely on earnings, but on a number of non-monetary factors, including job stability, promotion opportunities, conciliation between labor and family life, self-fulfillment, etc. (Vila, 2000). In addition, several changes have occurred in Spain that may affect the labor conditions of PhD holders and, therefore, their job satisfaction. Firstly, Spain has experienced a growth rate above OECD countries in the number of doctorate holders (Benito, Gil and Romera, 2014). Secondly, Spanish universities have been submitted to legal and socio-economic changes that have toughened the access and tenure of doctorate holders to university positions (Beltramo et al. 2001; Cruz-Castro and Sanz-Menendez, 2005; Sanz-Menendez, Cruz-Castro and Alva, 2013). Finally, Spain has suffered a very important economic crisis since 2008, which has reduced significantly the budgets of universities and public administration where most of doctorate holders work (Benito, Gil and Romera, 2014; Cruz-Castro and Sanz-Menendez, 2015).

¹ Following international standards, the term “Doctorate Holders” will be used to refer to individuals with level 8 of qualification according to the International Standard Classification of Education proposed by UNESCO (2011).

The importance of job satisfaction is twofold: on the one hand, employees maximize their well-being; on the other, it is associated with increased productivity and organizational commitment, lower absenteeism and turnover as well as with greater organizational effectiveness (Ellickson and Logsdon, 2001). Job satisfaction can be measured either objectively or subjectively. Objective measures typically refer to the position attained in the hierarchy and, especially, the salary level (for a review, see Canal-Domínguez and Wall, 2013); subjective measures ask workers about their degree of satisfaction in several areas related to their job. In this article we adopt this second approach based on Maslow's typology of job satisfaction and Herzberg's subsequent revision (Maslow, 1943, 1954; Herzberg et al., 1959; Herzberg, 1968).

Maslow famously established a hierarchy of needs (in the shape of a pyramid): from top to bottom, they comprise esteem, affection, safety, and physiological needs. Maslow stressed that the basic levels (safety and physiological needs) have first to be met before the individual can start to crave the higher level needs (although he was at pains to clarify that the levels are interrelated). Additionally, he showed that esteem comprises two levels: a lower one which includes the need for the respect of others, status, and recognition; and a higher one (that of self-actualization) which comprises the need for self-respect, mastery, self-confidence, independence and freedom.

Herzberg (1968) incorporated an additional dual approach whereby not having job satisfaction does not mean a worker is dissatisfied, but rather has no satisfaction. Thus, failing to fulfill the lower order needs in Maslow's pyramid generates dissatisfaction, but achieving them does not serve as a motivator. Rather motivation is achieved when higher-level needs (related to the job itself) are satisfied. Herzberg defined the factors related to working conditions as 'hygiene'

factors, which in turn are related to the work environment and which may result in job dissatisfaction. These needs have to be satisfied before higher-level needs emerge and affect motivation. Thus, personnel policies should focus on the satisfaction of higher-level needs (once those of the lower levels have been fulfilled) in order to increase individuals' motivation.

Herzberg taxonomy still has considerable influence on job satisfaction studies. Recent attempts by Hagedorn (2000) to build a theoretical model in order to explain job satisfaction of faculty members acknowledges (among other variables) motivators and hygiene factors. At the same time, the model also takes into account what she termed triggers variables, defined as significant life events affecting job satisfaction. The influence of changing environment on job satisfaction and job stress has been analyzed in 19 higher education systems by Shin and Jung (2014), concluding that market oriented managerial reforms are the main source of academic stress while the high social reputation of academics in their society and academic autonomy are the source of job satisfaction.

More recently, an empirical study by Bentley et al (2015) examine job satisfaction from an international and comparative perspective through the Hagedorn's theoretical model. Their results for 19 countries show that available time for research and institutional resources are among the variables with positive incidence on academic's job satisfaction in most countries. Authors interpret these results associated to recent changes in university systems and the pressure for universities around the world to do more with fewer resources. On the other hand, the positive effect of available time for research in job satisfaction, coincide with the "taste for science" (Roach and Sauermann, 2010) found in previous studies examining the preference for research in those PhD holders working in academia.

In this study, we analyze the determinants of job satisfaction among PhD holders in Spain. Specifically, we consider overall job satisfaction, and we also look at satisfaction in terms of Herzberg's dual-factor theory of basic (hygiene) and higher (motivation) needs levels. We conduct the analysis for the whole sample and also by subsamples of gender and work sector (university and non-university).

The gender division is based on previous studies analyzing gender differences in job satisfaction in highly educated individuals, which do not reach a clear consensus. While some studies found that few or no significant difference exist between male and female faculty (Smith and Plant, 1982; Ward and Sloane, 2000), other studies claim differences in both directions (Bender and Heywood, 2006; Hagedorn, 1998; Oshagbemi, 1997, 2000, 2001). In addition, for the specific case of Spain, analysis by gender is relevant because the number of female doctorate holders has undergone a progressive increase from the 1990s, and differences in job satisfaction are reported (Canal-Dominguez and Wall, 2013).

With regards to the employment sector, we highlight the following. Firstly, OECD-Knowinno (2013) shows that the likelihood to work as a researcher (or in a job related to doctoral studies) is higher in the university sector than in other sectors. This difference is specially marked in the Spanish case where the odds to work as researcher is 19.2 times higher for those working at the university than for those in the business sector. Likewise, the probability to hold a job related to doctoral studies is also 9.1 times higher among those working at the University than in the business sector. Secondly, although the University sector concentrates the higher share of PhD employees in the labor market, all non-university sectors (industry, government and nonprofit organizations) represent approximately 58% of total employed. Moreover, this figure will probably increase in the future, especially in the business sector, given the limited capacity to

absorb doctorate holders by university and public organizations (Cruz-Castro and Sanz-Menendez, 2005, 2015). It has to be pointed out that the role of private R&D spending may be a major driver of highly qualified jobs. Thus, Benito and Romera (2013) indicate that a 1% increase in the R&D spending leads to a 3.7% increase in highly qualified jobs. According to this, non-academic jobs are important not only for Spain, where doctorate holders employed at the business sector are still a small proportion of total doctorate holders, but for the EU countries in general, where doctoral programs are looking for a better matching with industry needs.

The study we report here is, we believe, of value for a number of reasons. First, as it is shown in the next section, few studies to date specifically consider the job satisfaction of PhD holders, apart from a line of research that examines the job satisfaction of faculty members. Second, unlike most of the research in this field, [the survey used in this study](#) includes many responses related to job satisfaction (a total of thirteen [items](#), in fact). This is a highly relevant point given that job satisfaction has been shown to be a complex concept comprising several dimensions. [Indeed, Oshagbemi \(1999, 2006\) and Sabharwal and Corley \(2009\) suggest that multiple-item scales are preferable to single-item scales in the case of job satisfaction.](#) Finally, we divide the sample into several groups so as to obtain a better understanding of the determinants of the job satisfaction of different types of employees. Finally, results are also relevant and have implications in terms of human resource policies. Thus, from all the variables, the ones that are really relevant are those related to the labor market. In particular, Herzberg's distinction is not so clear: [Factors that are defined as basic needs \(especially wages\) are relevant in all types of job satisfaction, and not only on the basic ones as expected from the Herzberg's model.](#) Notwithstanding, the factors related to the basic needs are less relevant among university staff. Likewise, there are minor differences in the determinants of job satisfaction between men and women.

The determinants of the job satisfaction of PhD holders

The majority of studies analyzing job satisfaction adopt a wide-angled focus with few examining PhD graduates in isolation. Moguerou (2002) and Bender and Heywood (2006) analyze job satisfaction – defined as a categorical response to a general question about the feelings an individual has for their job – in the United States. The authors consider the same data sample: the Survey of Doctorate Recipients (SDR) in the United States, which contains 35,000 individuals with a PhD in the sciences ('hard' and social) and engineering. Both studies report a U-shaped age profile for job satisfaction (especially among males).

The gender analyses conducted by Moguerou (2002) and Bender and Heywood (2006) show that female PhD graduates enjoy greater job satisfaction than men. This result is in line with what has been referred to as the 'paradox of the contented female worker', whereby it is argued that higher levels of job satisfaction among women are related to their lower expectations (see Clark, 1997; Bender et al., 2005).

A specific analytical framework seems to be associated with the job satisfaction of academics. Thus, Sabharwal and Corley (2009), in a review of 14 studies, report that the majority show male faculty members as having higher levels of overall job satisfaction than female faculty members, particularly as regards benefits and salary received and opportunities for promotion. [Considering age and gender, Sloane and Ward \(2001\), who analyze academics in Scotland, report a negative effect of being female among academics younger than 35 but a positive effect among an older cohort. In a previous analysis, also conducted in Scotland, Ward and Sloane](#)

(2000) show that gender (being a man) only has a bearing on promotion prospects. However, Kifle and Desta (2012) report that no consensus is reached on gender job satisfaction among academics.

Moreover, in the analysis of faculty members, different discipline areas have to be taken into consideration, since there are different attitudinal and behavioral patterns that are shaped by their distinctive epistemology, organizational commitments, and member social relationship (Xu, 2008). Also when disciplines are considered results are not conclusive with regards to gender. Thus, while some empirical evidence did not find differences in job satisfaction in male and female faculty by disciplines (Hagedorn, 2000) other studies show discipline as an important predictor of male and female job satisfaction (Sabharwal and Corley, 2009; Canal-Dominguez and Wall, 2013). Thus, the literature shows that the effect of gender on job satisfaction may vary among different contexts.

Moguerou (2002) emphasizes job security both for men and women –defined in terms of the temporary nature of a job– as an important predictor of job satisfaction. However, Bender and Heywood (2006) report just the opposite for those who work in the business sector. Within this same framework of analysis, Oshagbemi (2006), who considers university instructors in the United Kingdom, shows that although length of employment in higher education does not correlate with job satisfaction, the longer an individual has been employed at their current university the higher their level of job satisfaction.

Moguerou (2002) reports that the number of hours worked has a positive effect on the job satisfaction of males (especially those employed in the industrial sector) but a negative effect on females. However, Bender and Heywood (2006) report no effect of the number of hours

worked for the whole sample, being positive only for those working for the Government. Likewise, earnings increase the job satisfaction of all those interviewed in both analyses.

Finally, studies that consider the sector in which PhD holders work show that this factor affects levels of job satisfaction and that some of the determinants of job satisfaction may vary according to their discipline (Sabharwal and Corley, 2009). Likewise, in their study for the United States, Bender and Heywood (2006) show a slightly higher level of job satisfaction among those working in the university as opposed to a non-academic sector. This positive effect is also reported by Moguerou (2002) in his subsample of those holding PhDs in science and engineering from the whole sample used by Bender and Heywood (2006). As Moguerou (2002) pointed out, PhD graduates are expected to be more satisfied if they develop the expected work for PhD holders. In a sectoral analysis that considers individuals working at the university and elsewhere, as the one developed here, we should expect higher levels of satisfaction, especially in the case of motivational satisfaction.

In the case of Spain, Cruz-Castro and Sanz-Menéndez (2005) find that Spanish PhD graduates not working in a University value job stability. Canal-Domínguez and Wall (2013), using a previous wave (2006) of the survey used in this study, create an indicator of job satisfaction based on the responses of PhD holders to questions about intellectual challenge, contribution to society and social status. The authors show that, in contrast to private sector jobs, working in the public sector or for non-profit institutions increases the level of satisfaction of both male and female PhDs. Likewise, in line with international evidence, women express higher degrees of satisfaction. Moreover, age and having a permanent contract have a positive effect on employee satisfaction. However, the presence of over-education or over-qualification creates dissatisfaction, again in line with international evidence. The latter is also true for seniority.

Finally, civil status has a bearing on satisfaction: compared to single women, married women are more satisfied than married men, whereas the opposite is the case for widows or divorced women. In this context, Di Paolo (2016) considers the specific case of Catalonia (a Spanish region) and shows that compared to faculty members PhD recipients working in other sectors (public or private) are more satisfied with their earnings but they have a lower level of non-monetary satisfaction.

Data and Econometric Strategy

The database used for this study is the second edition of the Survey on Human Resources in Science and Technology (2009), conducted by the Spanish National Statistics Institute (known as INE) in coordination with OECD, UNESCO and Eurostat. The Survey is part of a major effort to examine and compare careers, international mobility, and satisfaction of doctorate holders across different countries. According to the INE (2009), the main objective was to develop the analysis of human resources engaged in research, and to this end, doctorate holders, below 70 years were identified as statistical unit.

The survey provides exhaustive information about PhD holders from Spanish doctoral programs, which were grouped in six scientific disciplines: agricultural science, natural sciences, engineering and technology, medical science, humanities and social sciences, in public and private institutions, and who were resident in Spain between 1990 and 2009. For every Spanish region an independent sample was designed to obtain a better representativeness of the national population of doctorate holders (INE, 2009). The final sample was composed by 4,123 doctorate holders. The nature of the data is cross-sectional i.e. compare individuals in a single point of time, taking December 2009 as date of reference.

As discussed in the introduction, Maslow and Herzberg's typology is used to analyze the self-perceived level of satisfaction expressed by respondents in the sample. The survey includes 13 questions that enquire about self-perceived levels of satisfaction with various aspects of work. Accordingly, two composite scales were constructed to proxy two dimensions of satisfaction, namely basic (or 'hygiene, in Herzberg's terms) and motivational satisfaction. Both constructs follow previous studies based in Herzberg taxonomy (Bentley et al. 2015; Hagedorn, 2000). Basic satisfaction captures lower order levels of need in Maslow's pyramid and is associated with extrinsic factors of the job, including physiological needs (salary and fringe benefits in our questionnaire) and safety (labor stability, work location, and labor conditions). Motivational satisfaction considers the following variables: Career opportunities, Intellectual challenge, Responsibility, Level of autonomy, Contribution to society, Social status and Work-life balance. These items are related to higher order needs in Maslow's pyramid, and refer to membership and recognition as well as self-actualization. Each of these items is assessed with a Likert-type scale, ranging from 1 – no satisfaction, to 4 – highly satisfied. Thus, each satisfaction category is a composite scale calculated as the arithmetic mean of the variables each one includes.

In order to validate the internal consistency of this construct we compute Cronbach's alpha. In the case of basic satisfaction, this composite scale was 0.68; in that of motivational satisfaction, the scale reliability was 0.73. These values are considered as being acceptable in the literature (Malhotra, 2010). In addition to these composite scales, the survey included a question about overall job satisfaction, which is also considered in our analysis. This variable takes values ranging from 1 to 4, in correspondence with the individuals' perception of job satisfaction according to the following scale: none, low, medium and high level of satisfaction.

The survey includes information about several individual characteristics of PhD holders as well as information about doctorate training and labor conditions. In order to identify the determinants of basic, motivational and total satisfaction in PhD holders we consider five categories of variables related to individual characteristics, current labor conditions, doctoral training, academic job related characteristics and region of residence (input/output relationships are shown in Figure 1).

(Insert Figure 1)

As shown in Table 1, men are more satisfied than women in terms of their overall job satisfaction, although this difference is not statistically significant. Men are also more satisfied in relation to all the elements making up the scale of basic satisfaction (except in the case of salaries where male and female levels are the same). In the case of motivational satisfaction, when the differences are statistically significant, men are more satisfied in terms of career opportunities and job autonomy. By employment sector, PhD holders working in the university are more satisfied in relation to most elements of both basic and motivational satisfaction. In contrast, those working outside the university have higher levels of satisfaction only in relation to salary and fringe benefits (basic satisfaction) and responsibility (motivational satisfaction). Our analysis also considers gender by employment sector. In universities, men are more satisfied in terms of basic satisfaction but levels of motivational satisfaction are more similar in both genders. Men employed outside the university are more satisfied than women in terms of their basic job satisfaction, but we find hardly any differences in terms of their motivational satisfaction.

(Insert Table 1)

We use three measures of job satisfaction: two correspond to the scales created to assess basic and motivational satisfaction (as previously described), and one is derived from a specific question concerning overall job satisfaction in the questionnaire. In the former cases, being continuous variables, both indexes are arithmetic means of different variables. We propose Ordinary Least Squares regression to identify the determinants of basic and motivational satisfaction in the workplace. In addition, considering the ordered response for the overall job satisfaction variable, an ordered logit model is estimated in line with the literature (Bender and Heywood, 2006; Ward and Sloane, 2000). We propose the following estimations (see equations 1 to 3):

$$Job\ Sat. = B_0 + B_1IC_{i1} + B_2LC_{i2} + B_3DT_{i3} + B_4RR_{i4} + \varepsilon_i \quad (1)$$

$$Job\ Sat. (Non\ University) = B_0 + B_1IC_{i1} + B_2LC_{i2} + B_3DT_{i3} + B_4RR_{i4} + \varepsilon_i \quad (2)$$

$$Job\ Sat. (Uni.) = B_0 + B_1IC_{i1} + B_2LC_{i2} + B_3DT_{i3} + B_4AE_{i4} + B_5RR_{i5} + \varepsilon_i \quad (3)$$

Job satisfaction is analyzed for the total sample of PhD holders (1), PhD holders working in the non-university sector (2) and PhD holders working at universities (3). Each equation is estimated by gender and for the three different types of job satisfaction (overall, basic and motivational). On the right side of the equations, explanatory variables are represented by elements from different vectors corresponding to the following categories: IC (individual characteristics), LC (labor conditions), DT (doctoral training), AE (academic employment), and RR (Spanish region of residence). Table A1 in the Appendix A shows the descriptive statistics of the variables.

Results

Tables 2 to 4 show the determinants of the job satisfaction of Spanish PhD holders. In each table, the analysis considers the determinants of overall, basic and motivational satisfaction by gender. Table 2 considers the entire sample, Table 3 includes only those working in universities, and Table 4 those employed elsewhere. As stated above, for overall satisfaction we consider ordered logit estimations, taking “low level of satisfaction” as the base for comparison, whereas our analyses of the determinants of basic and motivational satisfaction follow OLS estimations.

Table 2 shows the results for the whole sample. In the case of individual characteristics, only one of the variables is significant (married men)—and then at the 10% significance level—in one of the six regressions. *The negative sign may be associated with the lack of promotion or work-life balance. However, it is hardly significant, as mentioned before and, in general, we can conclude that the variables related to individual characteristics are not significant in determining job satisfaction. The same is true for doctoral training variables. Thus, the job satisfaction of PhD holders seems not to be related to experiences before their incorporation into the labor market (which may have occurred much earlier).*

However, most labor conditions have a bearing on job satisfaction: thus, the higher the wage level, the higher the level of overall, basic and motivational satisfaction in both men and women employees. Likewise, having a permanent contract increases all types of satisfaction, whereas the number of hours worked reduces them. The other variables condition job satisfaction to a lesser extent. Thus, having a full-time job increases overall and basic satisfaction in female employees. A close relation between the job performed and the PhD holder’s studies increases overall and motivational satisfaction, while a weak relation reduces basic and motivational

satisfaction (although only for males in the case of basic satisfaction). We find that a mismatch between the job performed and the PhD holder's qualifications reduces all types of satisfaction in men (as well as motivational satisfaction in the case of women). The institution in which an employee works and the existence of an educational mismatch have hardly any impact on job satisfaction. Finally, some regional variables are significant (results available upon request).

To sum up, some labor conditions have a bearing on job satisfaction (with the expected sign): a higher wage level, having a permanent contract, working fewer hours, and being employed in a job that is related to the field of specialization all relate positively to job satisfaction. In the case of these factors, we find no differences by type of job satisfaction or gender. Indeed, only a few variables present different outcomes by gender: the mismatch between qualifications and job is especially relevant among men, whereas having a full-time job is significant only for females. Thus, the job satisfaction of PhD holders is very much related to the direct conditions they face at work, and not to their previous experiences in life (individual, school and family characteristics as well as doctoral training). Finally, there are hardly any differences between the types of satisfaction (overall, basic or motivational) for those variables expected to have a particular bearing on basic satisfaction (i.e., those related to income and basic needs, such as type of contract, hours worked, and workday). However, the variables most closely associated with motivational satisfaction have hardly any impact on basic motivation.

The results in Table 3 consider only those PhD holders working in universities. As for the whole sample, individual and doctoral training variables are not statistically significant. In the case of labor conditions, we obtain the following outcomes: the influence of wages is less clear in the case of the university sector (especially in relation to overall and motivational satisfaction); a permanent contract has a positive effect on both male and female satisfaction in the case of

overall and basic satisfactions; the number of weekly hours worked reduces all kinds of satisfaction, but only for men; and a full-time job is significant especially in the case of basic satisfaction. The relationship between the job and doctoral studies is positively significant only in the case of a close match (and especially in the case of male PhD holders). No effect of education/qualification mismatch is found, given that this is unlikely among PhD holders employed in universities. As for those variables related to the job position held, being a professor increases all types of satisfaction among male PhD holders. Additionally, being a supervisor of a Master's or PhD thesis increases the motivational satisfaction of men. As for the whole sample, residence in certain regions is also found to be significant.

Results for PhD holders not working in universities are shown in Table 4. Here again the estimations show few differences with respect to the previous analyses in the case of individual characteristics and doctoral training. Labor conditions, however, are more relevant. The results in Table 4 show that wages have a similar bearing on satisfaction to that described for the whole sample. As such, this variable is more relevant than for those employed in the University sector: low wages significantly reduce the three types of satisfaction among men and women. High wages increase satisfaction (especially in the case of male PhD holders). A permanent contract increases (especially overall and basic) satisfaction. A full-time job also increases job satisfaction (above all basic satisfaction) for women. However, this variable is statistically significant with a negative sign (although at 10%) for men. This may be related to the fact that dissatisfied female employees find easier to leave their actual jobs than equally dissatisfied male employees (Sanz de Galdeano, 2002). As above, the number of hours worked reduces satisfaction. The closeness of the relationship between a worker's doctoral studies and the job performed is again significant; yet, it mainly increases levels of motivational satisfaction. Our results for the educational and qualification mismatch confirm, to some extent, those found for

the total sample: overqualified women have lower levels of motivational satisfaction, whereas overqualified men have lower levels of basic and overall satisfaction. [However, results are significant at a very low level.](#) As for the institution in which PhD holders work, only men in non-profit organizations show higher levels of motivational satisfaction. For non-university employees, some regional variables are also significant.

Conclusions

In the study we analyzed the determinants of job satisfaction among PhD holders in Spain. Satisfaction is defined in overall, basic, and motivational terms following Herzberg's typology. We carried out our analysis for the whole sample as well as for subsamples based on gender and work sector (university or elsewhere).

The analysis has revealed several interesting results. [With regards to basic and motivational satisfaction,](#) when the whole sample is considered, the variables that can be related to basic motivation (salary, type of contract and workday) have a bearing, with the expected signs, on both basic and motivational job satisfaction (as well as overall satisfaction). However, the variables that can be related to motivational satisfaction affect mainly this type of job satisfaction. As such, it seems that the differentiation between basic and motivational satisfaction in Spain is not so clear in the case of the former, since wages and labor stability increase all three types of job satisfaction among Spanish employees. This is perhaps a reasonable finding in a Southern European country² where, according to European Commission (2007), [monetary conditions of researchers lie below wages of Northern Europe and Nordic](#)

² Spain, Portugal, Italy and Greece are usually the countries included in economic and social studies referred to Southern Europe (see Guillén and Pavolini, 2015).

countries, and where labor relations are not as ‘sophisticated’, to use the terminology of Purcell and Sisson (1983). Yet, these factors related to basic needs do not seem to be so relevant for PhD holders employed in universities.

In fact, university reforms — and especially the 2001 University Law (named *Ley Orgánica de Universidades* or LOU) — shaped PhD labor market bringing widespread discontent among senior and particularly junior researchers. The LOU established a requirement for national accreditation for faculty members, which implied a mechanism that enforce PhD holders to develop evidence of quality progress in teaching and research, putting more pressure on both competencies. As this study did not compared job satisfaction by age cohorts, this constitute an interesting line of research for the future. These type of changes may have an impact on PhD holders’ satisfaction as Shin and Jung (2014) show for different university systems. In addition, there was a sharp increase in the number of graduates together with a lack of capacity of the public universities to absorb this increasing flow (Cruz-Castro and Sanz-Menendez, 2005). This increase generates more pressure on the supply side of the market on both university and non-university sectors. In the case of universities, the system is constrained by increasing budget deficits, reducing his capacity to create new jobs position. On the non-university systems, figures for Spain reveal a mismatch between doctorate holders training and market demands, as Garcia-Quevedo, Mas-Verdú and Polo (2012) point out, demand of doctorate holders at industry is limited by poor knowledge about the potential value added by this type of employees. The evolution of the PhD labor market, then, helps to explain the results obtained in this research. Given the deterioration of working conditions in a large number of PhD graduates, it seems adequate that factors related to ‘basic satisfaction’ are relevant for all types of satisfaction. This result is also consistent with the work of Cruz-Castro and Sanz-Menendez (2005), who showed

that PhD holders employed in the private sector indicated job stability as an important factor of satisfaction (traditionally reported by the public sector staff).

With regards to gender, our results do not reveal any significant differences, except for the motivational variables of PhD holders employed at the university. This is due to the absence of significant differences in the labor market by gender for PhD holders in Spain. Thus, no relevant differences are observed in terms of sector of activity, whether the job is related to the doctoral studies, if the job is full time or part time as well as the number of worked hours (INE, 2009). Likewise, with regard to the wages, differences are very small as well. Our sample wage is divided into four levels, being the average value level for men 2.8 and 2.5 for women. In addition, as the INE (2010) shows, women's salary represent 96.5% of that of men's in the education sector, and 93.6% in the public sector (the two sectors of activity where 82% of our PhD holders are employed). Thus, it seems reasonable that labor market factors have a similar effect on both groups by gender in respect to their main labor conditions. These results are consistent with Cruz-Castro and Sanz-Menendez (2013), who found no significant differences by gender when analyzed the time to tenure in academic labor market in Spain.

Results show some differences by working sector. Thus, our subsample of university employees presents a clearer differentiation between the factors related to basic and motivational satisfaction. Among these workers, moreover, we find that wage levels have a minor impact on their satisfaction, while variables related to mismatch are not significant (as expected among PhD holders working at the University). Certain 'motivational variables' related to status and mastery, such as being a professor or a PhD advisor, are found to increase male motivational satisfaction (as well as basic satisfaction in the case of being a professor). However, among PhD holders not working at a university, wages are relevant for all types of satisfaction (as they

are for the whole sample). The rest of the variables (personal and related to training), in common with the other sample, are hardly significant.

Finally, results show that job satisfaction of PhD holders is very much related to the direct conditions they face at work, and not to previous experiences in life. As expected, they prefer higher wage levels and less working hours. Likewise, other factors positively related to job satisfaction relate to ‘basic’ or ‘hygiene’ needs, such as having a permanent contract and a full-time job. The implications of the results are quite clear. In order to increase the job satisfaction of PhD holders in Spain, not only ‘sophisticated’ human resource management policies (e.g. motivational policies) are required, but also salary and other labor variables related to basic satisfaction, such as to guarantee permanent contracts with full-time employment. This seems to be strongly influenced by the reduction of probabilities to work at the public research system, traditionally considered as the first option for PhD graduates. Given the public sector constraints, public policies should try to improve industry capacity to employ PhD holders, contributing to produce better matching between doctoral programs and the jobs offered by firms.

In addition, motivational policies are also required. Once a permanent position is guaranteed PhD holders want to develop a professional career within the institution they work. Thus, career opportunity plans should be available to retain the best in the company. In this context, and especially for those employed outside the university, firms should be aware of the presence of educational mismatch and mainly mismatch qualification, since they reduce individual’s satisfaction. Likewise, companies should not recruit PhD holders if they need less educated individuals. Future evolution of the PhD job market without considering the factors that increase job satisfaction may lead to reduce the supply of doctorates. For university staff,

actions related to motivational satisfaction seem to be more relevant, especially for male employees. Thus, to retain individuals to this type of work seems crucial investing in factors related to motivational satisfaction. As reported before, gender differences are only observed for the motivational variables of PhD holders employed at the university. Therefore, human resource management should consider most personnel policies indicated above for both male and female employees. Finally, regional location should be taken into consideration, since job satisfaction is also conditioned by the place where PhD holders work.

This study has some limitations. Firstly, we use cross-section data instead of a panel. Thus, some of the results may be conditioned to the specific economic circumstances at the time of the interview. Secondly, we develop a quantitative analysis that shows the effect of some independent variables on the dependent ones. The reasons behind these relationships cannot be always answered with our data and would require further analysis. However, we believe that our analysis helps to understand the determinants of PhD holders in Spain, which may be similar to the ones in other Southern European countries.

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