Job Stability and Gender Perspectives: Application of a Logistic Regression Model

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ABSTRACT - Several changes have been taking place in the labour market since the 1970s that have created the right climate to spur organisations and workers to demand greater flexibility in employment. In this context, temporary employment has been the focus of many research papers and temporary contracts have been used as a tool to achieve labour flexibility. In order to understand the situation in Andalusia (Spain), this paper aims to identify the decisive factors in permanent employment. To this end, starting hypotheses will be defined about the decisive factors in permanent employment and the positive or negative significance of their influence; the starting hypotheses will then be tested empirically using a logistic regression model on a sample population of wage earners in Andalusia. In the second stage, given that the ratio of temporary contracts is much higher among women, the variable 'gender' is likely to be decisive in the construction of the regression model, therefore the decisive factors for permanent employment in Andalusia will be evaluated separately for men and women, in order to calibrate the impact of gender on job stability. Finally, based on the estimated probabilities of having a permanent job depending on gender, the degree of labour discrimination faced by women in the Andalusian labour market will be analysed.

Introduction

Many researchers have examined the decline of standard labour relations, in other words, the model of employment in which the worker has a clearly defined employer, works full time throughout the financial year under the supervision and premises defined by the employer, enjoys certain legal and social benefits, and finally, expects this working situation to continue indefinitely (Muckenberger, 1989; Schellenberg and Clark, 1996; Vosko, 1997).

The changes that have been taking place in the labour market since the 1970s have created the right climate in many countries to spur organisations and workers to demand greater flexibility in employment. Researchers in this area define nonpermanent employment as contingent work, in other words, jobs in which the worker does not have an indefinite contract, either implicit or explicit, or in which the minimum limit of two hours' work could vary at any time (Connelly and Gallagher, 2004).

Temporary employment is possibly the most common form of contingent work in the labour market, which is why it has been the focus of many research papers in the field of labour relations. Temporary contracts have been used as a tool to achieve labour flexibility, which is why they are more commonly found in countries with strict labour relations - such as Spain, France or Italy - in comparison with labour markets that are less tightly regulated, such as the United Kingdom or the United States (Brown and Sessions, 2003; Brown and Sessions, 2005).

In order to understand the current labour market situation in Spain, we have to go back around three decades. At the end of the 70s and early 80s, the situation was extremely worrying, with unemployment rates reaching over 20% of the working population. This sparked the need to implement flexibility measures when hiring workers in order to promote job creation. As a result

of the new legislative framework provided by the labour reforms introduced in the 1980s, the presence of temporary contracts increased from 8% of all contracts in 1984 to 33% in 1994, and in a short space of time Spain had one of the highest rates of temporary employment in Europe.

Subsequent reforms introduced between 1994 and 2002 attempted to change this trend, by applying measures aimed at increasing job stability, mainly by restricting the facilities granted to employers previously in terms of temporary contracts and reducing certain methods of dismissal. In spite of these policies, currently, the ratio of temporary contracts in Spain is still one of the highest in the European Union[1]. In an attempt to remedy this situation, on the 9th June 2006, a Royal Decree Reform Act was passed for the labour market, which chiefly aimed to reduce temporary contracts and promote stable employment. To this end, certain measures were established that promote the application of permanent contracts and reduce certain business contributions. The effects of these latest reforms will only become clear over the next few years.

Certain authors specify that there is no rational reason to prefer a temporary contract, since a permanent contract offers all the advantages of a temporary one with the added bonus that the worker is able to prolong the working relationship for as long as she or he wishes (Brown and Sessions, 2005). However, this argument is not shared by the scientific community as a whole. García and Rebollo (2005) suggest two basic points of view in relation to temporary contracts. On the one hand, they can be viewed as a previous step before moving onto other more stable situations (Booth, Francesconi and Frank, 2002; Varejao and Portugal, 2002), especially among younger job-seekers, who are looking to gain experience. On the other hand, the temporary link with a company does not always have to be imposed and in some cases it can be the free choice of the individual. However, the latter alternative is fairly improbable in the case of Spain, given that temporary contracts are somewhat detrimental from an economic point of view in this country (Jimeno and Toharia, 1993; De La Rica, 2004; García and Rebollo, 2005).

Whatever the case may be, the segregation between employees with stable contracts and those with temporary contracts creates a significant dualism in the Spanish labour market, as pointed out by several authors (Bentolila and Dolado, 1994; Saint Paul, 1996; Toharia, 2002). As if they were two different models, according to García and Rebollo (2005), there are two clearly sectors in the labour market. On the one hand, a primary sector characterised by workers with permanent contracts who have a strong influence on collective bargaining processes. This group enjoys job stability, high salaries and opportunities for internal promotion. And on the other hand, there is a secondary sector, made up of workers with temporary contracts, limited salaries, low internal mobility and who are excluded from bargaining processes.

Another characteristic feature of the Spanish labour market is that the ratio of temporary to permanent contracts varies a great deal from region to region. Hence, in the fourth quarter of 2006, regions such as Andalusia, Extremadura and Murcia recorded figures of over 40% temporary employment, whereas in Catalonia and La Rioja, three out of every four wage earners had a permanent contract. This regional variation could be the result of several factors: heterogeneity in the composition of the workforce, production specialisation, different levels of productivity, labour costs, etc.

Given the impact of temporary work in the Spanish and Andalusian labour markets (Andalusia - 46.4% temporary contracts - has the highest ratio of any of Spain's autonomous regions), this paper aims to identify the decisive factors in permanent employment. To this end, firstly, a review will be provided of previous research in this area; starting hypotheses will be defined about the decisive factors in permanent employment and the positive or negative significance of their influ-

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[1] Hence, in Q4 2006, 33.8% of salaried workers had temporary contracts, although these figures conceal a marked gender inequality, since this percentage drops to 32.0% among men and increases to 36.2% among women

ence; the starting hypotheses will then be tested empirically using a logistic regression model on a sample population of wage earners in Andalusia taken from the National Institute of Statistics Active Population Survey. In the second stage, given that the ratio of temporary contracts is much higher among women (36.2% in Spain and 49.2% in Andalusia) than among men (32.0% and 44.6%, respectively), the variable 'gender' is likely to be decisive in the construction of the regression model[2], therefore the decisive factors for permanent employment in Andalusia will be evaluated separately for men and women, in order to calibrate the impact of gender on job stability. Finally, based on the estimated probabilities of having a permanent job depending on gender, the degree of labour discrimination faced by women in the Andalusian labour market will be analysed.

Temporary vs. permanent contracts: empirical background

The pairing temporary/permanent employment has been studied from various angles. Many authors have focused on analysing the harmful effects of temporary employment: lack of stability and opportunities for professional development (Farber, 1999; Arulampalam and Booth, 1998), demotivation and staff turnover (Purcell et al., 1999), dissatisfaction, fewer opportunities for training and lower wages (Booth, Francesconi and Frank, 2002; Aronsson et al., 2002, Nollen, 1996; Segal and Sullivan, 1997)[3], less job security, lower health and safety standards (Quinlan, Mayhew and Bohle, 2001), insecurity and concern about the future (Purcell, 2000; Sengenberger, 1995).

More in keeping with the objectives of this paper, another area of research has focused on determining the variables associated with temporary or permanent employment. Dolado et al. (2002) performed regression analysis for Spain, confirming that **age** is negatively associated with temporary employment. These conclusions are coherent with the trinomial logistic model (in which the reference category, being unemployed, is compared with the situation of temporary and permanent wage earners) created by Morris and Vekker (2001), who concluded that individuals between the age of 16 to 24 are less likely to sign a permanent contract and more likely to have temporary employment. Furthermore, the probit analysis performed by Dolado et al. (2002) confirms that there is a lower incidence of temporary employment among older wage earners. Similar results were obtained in studies performed by Nollen (1996), Farber (1997, 1999), Segura et al. (1991) and Álvarez Aledo (1996).

Training is also negatively associated with temporary employment, as confirmed by Dolado et al. (2002) in a study comparing wage earners who gained a secondary education and those with a lower level of education. Brown and Sessions (2005) arrived at similar conclusions using permanent employment as the point of reference. They applied probit analysis to a sample of close to 9000 wage earners and concluded that every year an individual remains within the education system increases his/her chances of gaining permanent employment. Other authors have obtained empirical evidence in this respect, including Nollen (1996), Farber (1997, 1999), Álvarez Aledo (1996) and Segura et al. (1991), confirming that temporary contracts are much more frequent among uneducated workers in comparison to other educational categories.

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[2] According to a group of gender researchers, new non-standard working methods merely contribute to the perpetuation of gender inequalities, since historically atypical labour relations (outside the regulations of full-time permanent employment) have always been linked (and continue to be so) with women (Fudge, 1991; Armstrong, 1996; Spatler-Roth and Hartmann, 1998; Vosko, 2000; Fudge and Vosko, 2001)

[3] The study carried out by Brown and Sessions (2003) quantifies the difference between the salaries earned by permanent and temporary employees, giving a figure of 13%. Some researchers in Spain have obtained similar results (Jimeno and Toharia, 1993; Alba-Ramírez, 1994). Furthermore, Brown and Sessions (2003) point out that salary discrimination affects women more than men regardless of whether the contract is permanent or temporary

Marital status is another variable that certain researchers had attempted to link with the type of contract signed by the wage earner. Segura et al. (1991) claim that temporary contracts are more common among single people than the married population, in line with the results obtained by Morris and Vekker (2001) for a sample of women. According to these authors, being married increases an individual's chances of having a permanent contract and reduces the chances of having a temporary contract.

However the link between marital status and contract type does not always manifest itself as expected, since Laird and Williams (1996) and Golden (1996) found that the proportion of married women in the labour market is positively linked to levels of temporary employment.

Cranford et al. (2003) state that the role taken on by women, taking care of the everyday and generational needs of their families, causes them to choose part-time or temporary employment of their own free will. Consequently, it can be expected that the presence of **children in the home**, especially little children, or another dependent relative, will increase the frequency of temporary contracts among the female population. This hypothesis was tested by Morris and Vekker (2001) on a sample of women with children under the age of 18 still living at home, concluding that this variable reduces the probability of having a permanent contract, increasing the possibilities of temporary employment.

The **type of work undertaken** is also linked to the type of contract signed by the wage earner, in the sense that jobs that require a higher degree of skill, and which are therefore more difficult to fill with qualified staff, must be duly compensated, among other things with greater job stability, in other words the offer of a permanent contract. The probit model developed by Brown and Sessions (2005) confirms this link among professionals, and with even greater intensity among management positions.[4] Dolado et al. (2002) examined at this same area and noted that temporary contracts are less frequent in qualified positions.

Another interesting variable when studying this issue is the **sector or industry**. The probit model created by Dolado et al. (2002) reveals that temporary contracts are negatively associated with employment in the public sector, a similar conclusion to the findings obtained previously by Segura et al. (1991). Furthermore, the study performed by Dolado et al. (2002) concludes that there are fewer temporary contracts in the industrial sector and the services industry, and a higher percentage in the construction industry. Breaking it down even further, Segura et al. (1991) found a higher incidence of temporary employment in construction, agriculture, commerce and financial institutions.

Research has also been conducted into the influence of **nationality** and **parttime work,** although not to the same extent as for other variables. In relation to the first variable, Morris and Vekker (2001) demonstrated that non-US wage earners were less likely to have a permanent contract and more likely to have a temporary one. In relation to the second variable, the analysis conducted by Brown and Sessions (2005) concluded that permanent employment is negatively linked with part-time work.

And finally, one of the fundamental variables in this research project, which has purposefully been left until last, is the **gender** of the wage owners. The increasing integration of women into the workforce in recent decades is irrefutable, although this situation masks considerable diversity that exists at different levels and in different forms (Bradley et al., 2000). Certain authors such as Standing (1989) believe that there is no such thing as fairness in the labour market, and that women tend to cluster at the very lowest levels, occupying positions with the lowest salaries, which are the least

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[4] The authors already confirmed this hypothesis in a previous study together with the positive association between temporary contracts and smaller companies (25-100 employees) and the inverse relationship between the variable studied and the presence of trade union representation (Brown and Sessions,2003)

secure and with the worst professional expectations[5]. This fact is borne out by official statistics: as indicated previously, at the end of 2006 the rate of temporary employment among women in Spain was more than four percentage points higher than among men; furthermore, 11.9% of women work part-time in comparison to just 4.1% of men; or to cite another example, one out of every five women works in unskilled employment (as opposed to 11.9% of men), whereas only five out of every one hundred women occupy management positions (8.4% among men). Studies that have analysed the relationship between gender and labour relationships have concluded that women are more likely to have a temporary contract than men. The probit analysis conducted by Brown and Sessions (2005) confirms that permanent employment is positively linked with the male gender. These results are coherent with the findings of Dolado et al. (2002), who confirm that being a female wage earner in the private sector increases the probability of having a temporary contract. This effect is even more marked in the case of public employment.

The research of Booth et al. (2001) is particularly relevant for the purposes of this paper, since these authors performed separate multinomial logistic regression studies for men and women. The conclusions of this research showed that women who occupy skilled positions (professionals, specialists and teachers) are more open to the idea of having a temporary contract than men. Furthermore, in comparison with the male population, these authors noticed that the probability of women having a temporary contract is higher in public administration and charity organisations. Finally, having young children is also a discriminatory factor, since the regression models obtained confirm that in such a family context the chance that a woman will have a temporary contract is higher than for men.

Research hypotheses

The above bibliographic review shows which variables are linked, in different markets, with the type of contract signed by wage earners, as well as the foreseeable influence (positive or negative) of each relationship. Taking these previous studies as a point of reference, the main working hypotheses to be tested in relation to temporary contracts in the Andalusian labour market are as follows:

- o Hypothesis 1. Gender, age, level of education, family structure, nationality and labour-related aspects are decisive factors when determining the probability of gaining permanent employment.
- o Hypothesis 2. The above-mentioned factors have a different impact depending on gender.
- o Hypothesis 3. All things being equal regarding the other variables, women in Andalusia have fewer chances of gaining permanent *employment than men.*

Empirical study

Methodology: binary logistic regression model

The methodology used to achieve our research objectives is based on the binary logistic regression model, a specific type of dichotomous response regression model[6]. This statistical tech-

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[5] Krahn (1995) claims that the probability that women will remain in non-standard employment (including self employed, part-time and temporary work) is higher in comparison with men

nique determines the probability of the occurrence of an event - having a permanent contract in this case - compared to the probability of the occurrence of the opposite event.

Sample

In order to analyse which factors determine permanent employment in Andalusia, a sample population was obtained from the microdata file of the Active Population Survey (EPA) for Q4 2006. In order to avoid the problem of oversensitivity of the model, which can occur when an excessively high number of observations are considered, 1628 records were selected: 929 Andalusian men and 699 Andalusian women[7].

The sample was then divided in two. The first part, comprising 80% of the observations, was used to train the model, and the second part, containing the remaining 20% of observations, was used for model validation. The comparison between the percentages of success in both stages indicates the general validity of the model and detects possible overtraining. The division of the sample into two sub-samples was conducted in a random manner, although the initial structure regarding contract duration and gender was maintained.

The variables included in the model were taken from the EPA's anonymised microdata file. In some cases, new variables had to be created in order to reflect the most important aspects of each subject's family structure, and in other cases, a certain degree of recoding had to be applied in order to simplify the study or adapt the content of the original data to the objectives pursued in this paper. The coding and frequency of the variables included in the regression model are shown in table 1.

As a prelude to regression analysis, the degree of association was measured between each pair of independent variables, chosen by a coefficient in each case, depending on the nature of the

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[6] The most common way of presenting this model is:

$$\frac{p}{1-p} = e^{\beta_0 + \sum_{i=1}^{k} \beta_i X_i}$$

The first member of this equation is called the odds ratio (OR) and represents the relative probability of the researched event as opposed to non-occurrence. Hence, an OR with a value of x would indicate that it is x times more likely that an individual will have a permanent contract as opposed to a temporary one. From this point of view, the interpretation of the model coefficients is simple. Once the variable Xj has been chosen along with the other independent variables, in the event of any unitary increase in this predictor, relationship between the odds ratios will be calculated as follows:

$$\Delta \frac{p}{1-p} = e^{\beta_j}$$

Hence, if $\beta_j > 0$, the increase in the odds ratio will be greater than 1, which indicates an increase in the probability of occurrence of the researched event. Just as in any statistical model, logistic regression can test several hypotheses in order to determine its validity both in global and individual terms. Global analysis evaluates as a whole the possibility that the investigated phenomenon really can be modelled using the chosen type of expression, whereas individual analysis - in which validity is subject to the global analysis performed - examines the appropriateness of including each of the variables in the model considered. In this paper, the Hosmer-Lemeshow goodness-of-fit index was used as a global measurement, and the Wald test was applied for individual analyses.

[7] These amounts were chosen by configuring the gender composition of the EPA sample on the one hand and the number of independent variables of each of the estimated models on the other, taking a ratio of about 85 observations per variable in the case of women and 115 in the case of men, which are sufficient values to be able to maintain the freedom of the model at a reasonable level. The selection of these observations was made by sampling the original EPA file , restricting the sample to Andalusian individuals over the age of 16 engaged in salaried employment during the reference period, and by sampling proportionally by gender and contract duration

variables (nominal or ordinal). The maximum value has been found to be between Occup1 and Leduc (0.669). These values do not seem to indicate significant evidence of colinearity.

Table 1 - Explanatory variables: coding and frequency

Variable and coding	Name	Frequency				
		Value 0	Value 1	Value 2	Value 3	Value 4
AGE (0: 16-25; 1: 26-40; 2:41-55; 3: 56 or over)	*Age5*	419	704	448	57	----
GENDER (1: male; 0: female)	*Gend1*	699	929	----	----	----
NATIONALITY (1: Spanish; 0: foreign)	*Nat1*	56	1572	----	----	----
LIVES WITH PARTNER (1: Yes; 0: No)	*Livp*	600	1028	----	----	----
LEVEL OF EDUCATION (0: primary education; 1:secondary education; 2: higher education)	*Leduc*	255	993	380	----	----
OCCUPATION (1: unskilled; 2: skilled, operational work; 3: skilled, administrative work; 4 : highly skilled)	*Occup1*	----	302	717	350	259
SECTOR/INDUSTRY (0: agriculture; 1: industry; 2: construction; 3: services)	*Sect1*	90	192	213	1133	----
NUMBER OF CHILDREN IN THE HOME (0: none; 1: one; 2: two; 3: three; 4: four)	*Chil*	998	337	263	29	1
WORKING DAY (1: full-time; 0: part-time)	*Fpar1*	182	1446	----	----	----

Source: Authors' own calculations.

NB: the variable *Chil* indicates the number of children under the age of 15 living with the person interviewed.

Results analysis

The analysis was conducted in two stages: in the first stage, considering both sub-samples (men and women) as a single sample, the aim was to analyse which variables or factors determine job stability among Andalusian wage earners, with particular emphasis on gender, since if this factor is significant, the separate estimation of probabilities for men and women is justified, which is the second objective of this research paper.

General model

Table 2 shows the results of the estimation using logistic regression of the factors that determine the chances of gaining permanent employment in Andalusia. Firstly, it should be pointed out that the comparison statistic applied to evaluate the validity of the model as a whole indicates that there are sufficient reasons to accept the validity of the model[8], in other words, to confirm that the fact of whether a wage-earner has a permanent contract or not can be satisfactorily explained by the set of variables considered in this paper. This general model shows that the regression coefficients for age, the level of skill required for the occupation, working full time and the number of children under 15 living in the home, provide positive results, thereby contributing to permanent employment. Hence, the older the individual, the higher the skill level required for the job performed, the number of children living in the home and the fact that the individual works full time,

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[8] The Hosmer-Lemeshow test, used for this purpose, presents the following results: Chi-Squared: 9.230; Sig. 0.323

the greater the probabilities of having a permanent job. However, the coefficients for the variables gender, nationality and the agriculture and construction industries are negative, which suggests that being a woman, foreign, or working in these two economic sectors decreases the individual's possibilities of finding permanent employment, increasing the probability of having a temporary contract[9].

Table 2 - Logistic Regression: factors that determine permanent employment in Andalusia and the odds ratio confidence intervals

	Variables in the model				Odds ratios95% C.I. for OR		
	B	S.D.	Wald	p	OR	Lower	Upper
Age5	0.0595	0.0063	88.9376	0.0000	1.0613	1.0483	1.0745
Gend1(1)	-0.3840	0.1528	6.3182	0.0120	0.6812	0.5049	0.9189
Nat1(1)	-0.7761	0.3535	4.8214	0.0281	0.4602	0.2302	0.9200
Occup1	0.4005	0.0790	25.6737	0.0000	1.4925	1.2783	1.7426
Fpar1	1.3679	0.2099	42.4576	0.0000	3.9269	2.6024	5.9257
Chil	0.1674	0.0833	4.0379	0.0445	1.1823	1.0041	1.3920
Sect1			59.1200	0.0000			
Sect1(1)	-1.5949	0.3454	21.3167	0.0000	0.2029	0.1031	0.3994
Sect1(2)	-0.0489	0.2246	0.0474	0.8276	0.9523	0.6132	1.4788
Sect1(3)	-1.3271	0.2642	25.2359	0.0000	0.2653	0.1581	0.4452
Constant	-2.7344	0.3606	57.5015	0.0000			

Source: author's own calculations.

NB: the variable sector/industry is linked to the industrial sector, therefore the coding would be as follows: Sect1(1), agriculture; Sect1(2), construction; Sect1(3), Services.

In spite of everything, the impact of each of the significant variables on the probability of gaining permanent employment differs substantially from one variable to another, as indicated in the confidence intervals analysis for the corresponding odds ratios (see table 2). Hence, each year that passes in relation to the variable *age* only slightly increases the odds ratios (approximately 6% of the value of the previous year), which is a minimal increase in the probability of gaining permanent employment. The effect is much more intense in relation to the variable *gender*. In this case, the OR for women is 68.12% compared with the OR recorded for men, which reveals the difficulty women have accessing jobs with greater stability[10]. Furthermore, being *foreign* is also a major obstacle to accessing a permanent contract: 46.02% relative probability in comparison to Spanish-born citizens. The OR for the variable *occupation* (1.4925 with a confidence interval of between 1.2783 and 1.7426) suggests that jobs that require a greater degree of skill also offer greater job stability. As expected, the most intense effect is observed when comparing part-time workers with people who work *full time*, with an increase of almost four points in the OR. A similar occurrence, although with less intensity, is observed when analysing the influence of the presence of *children* in the home: for every child under the age of 15 in the home, the relative probability of having permanent employment increases by 18%. Finally, the *sector or industry* in which the individual works also plays an important role in the type of contracts signed: taking industry, agriculture and construction as the points of reference, the ratios are much lower (20.29% in the first case and 26.53% in the

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[9] All these results are significant at 1%. For this level of significance, the logistic regression model indicates that there is a series of variables that are neither positively or negatively associated with job stability: having or not having a spouse, the educational level of the wage earner, and the fact that the individual works in the services industry in comparison with the industrial sector

[10] Even in terms of confidence intervals, even though the upper limit for the ratio evaluated is slightly above 90%, the fact that the lower boundary of this same ratio is around 50% cannot be ignored In other words, the probability of a woman having a permanent contract, in comparison with a man, is 91.89% in the best case scenario, dropping to 50.49% in the worst case scenario

second), which shows that the probability of having stable work in these sectors is much lower than in the industrial sector. This situation - when compared to the services sector, which has a ratio of 95% - shows that the chances of having permanent employment in this sector are practically the same as in the industrial sector[11].

The final step in this first research stage analyses the model's generalisation capacity, by comparing the correctly classified observations in both the training and generalisation stages. Hence, in the training stage, corresponding to the construction of the model, 73.37% of the individuals cons idered were classified correctly, knowing their real situation beforehand. There were, however, considerable differences between the percentages corresponding to permanent (48.03%) and temporary contracts (87.01%), which suggests that the latter are easier to identify. In the generalisation stage, once the model coefficients were estimated, individuals were presented for classification with previous information about their real situation. The results obtained were better than expected in the training stage (77.23% of the global model, 50.88% for permanent contracts and 91.47% for temporary contracts) both in global terms and for each of the groups, which reveals the general validity of the estimated model.

Gender model

Given that the variable gender proved to be decisive in the construction of the general model, the second research objective was to compare the regressions corresponding to the male and female population, thereby calibrating the impact of gender on job stability. The results of the Hosmer-Lemeshow test (Chi Squared: 8.930; Sig. 0.348), in relation to the model corresponding to the male population once again confirmed that the variables considered were sufficient in order to explain the type of contract, at least in terms of determining the characteristics that affect it.

Table 3 presents the results obtained from the logistic regression model for the male population sample. The main difference from the general situation relates to the presence of children in the home. This variable, which showed a positive association in the global model, has no influence when considering just the male population.

Furthermore, analysis of the odds ratios shows that the effect of the significant variables on permanent employment differs in certain cases from the global model. Firstly, the type of working day has more of an influence on job stability among men in comparison to the collective as a whole (4.76 in comparison to 3.92). Secondly, and in the opposite direction, the importance of nationality as a decisive factor of job stability is considerably lower among men: an odds ratio of 0.2186 compared to 0.4602 for the general model. For the other variables, differences are insignificant, indicating that age, the level of skill required for the job and the economic sector do not display specifically different behaviour for the male collective in the determination of the type of contract to which they have access.

Just as with the global analysis, the model's generalisation capacity for the male population is adequate, obtaining similar classification percentages to the general model[12], with only exception of a small decrease in the number of correctly classified individuals in the generalisation stage regarding the total number of individuals with a permanent contract[13].

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[11] It should be noted that the logistic regression model explains the relationship between variables, which does not necessarily have to be causal. For example, the positive association between the presence of children in the home and permanent employment does not imply that the former is a source of job stability and the relationship might even be present in the opposite direction

[12] Training stage: 74.97% for the male population as the whole; 49.19% for men with a permanent contract and 87.88% for temporary contracts. Generalisation stage: 76.88%, 45.16% and 92.74%, respectively

[13] At any rate, the figures in themselves and the scant differences between the training and generalisation stages indicate that the evaluated model is sufficiently valid in general and is not predetermined by the specific observations used in its

Table 3 - Logistic regression: factors that determine permanent employment in the Andalusian male population and odds ratios confidence intervals

	Variables in the model				Odds ratios 95% C.I. for OR		
	B	S.D.	Wald	p	OR	Lower	Upper
Age5	0.0562	0.0085	44.0292	0.0000	1.0578	1.0404	1.0755
Occup1	0.5219	0.1269	16.9292	0.0000	1.6853	1.3143	2.1610
Fpar1	1.5603	0.4362	12.7915	0.0003	4.7600	2.0243	11.1930
Sect1			50.3354	0.0000			
Sect1(1)	-1.3314	0.3939	11.4251	0.0007	0.2641	0.1220	0.5716
Sect1(2)	0.0256	0.2703	0.0090	0.9244	1.0260	0.6040	1.7428
Sect1(3)	-1.3774	0.2908	22.4338	0.0000	0.2522	0.1427	0.4460
Nat1(1)	-1.5206	0.5243	8.4102	0.0037	0.2186	0.0782	0.6108
Constant	-2.8537	0.5500	26.9170	0.0000			

Source: authors' own calculations.

NB: the variable sector/industry is linked to the industrial sector, therefore the coding would be as follows: Sect1(1), agriculture; Sect1(2), construction; Sect1(3), Services.

Focusing now on the group of women studied, the Hosmer-Lemeshow test confirms the validity of the model (Chi squared: 5.475; Sig. 0.706). The variables that are really associated with permanent contracts are summarised in table 4, which reveals that the main difference as regards to the situation of men focuses on two variables[14]: on the one hand, the presence of children in the home is related in this case with having or not having a permanent job; on the other hand, nationality, which was a relevant factor when determining job stability among men, does not influence this aspect among the female population.

As in the previous analyses, in order to determine the effect of each explanatory variable on the dependent variable, the estimated odds ratios and their associated confidence intervals were considered (see table 4). Firstly, of particular importance is the fact that the presence of children in the home is directly associated with the probability of having a permanent contract. Furthermore, comparison of the odds ratios for the common variables between the logistic regression models for men and women reveals, in general, fairly similar values; therefore, from variable to variable, there are no significant differences in the way in which the different circumstances affect the type of contract. The only exception, apart from the aforementioned presence of children in the home, can be observed in terms of the sector or industry in which the individual works, since the probability of having permanent employment in agriculture (always in relative terms in comparison to industry) is substantially lower among women than men (OR=0.2641 for men and OR=0.0802 for women) and slightly lower in the services industry (1.03 as opposed to 0.8218).

To bring this section to a close, it should be pointed out that the classification percentages of the training and generalisation stages are slightly different to those obtained in the other two models analysed[15]. Furthermore, significant improvements were observed in the generalisation stage in comparison to the training stage, both for permanent and temporary employment. Moreover, substantial differences were observed in the number of correctly classified individuals according to the type of contract in favour of temporary contracts, just as with the model applied to the male population, which indicates that the profile of a temporary female worker is easier to predict than

construction

[14] It should be emphasised that the construction industry was excluded from this analysis, given that the number of women employed in this sector is very low and that all those present in the sample had a permanent contract, which would significantly distort the coefficient estimation associated with this level

[15] Training stage: 71.92% for the female population as a whole; 54.81% for women with a permanent contract and 82.27% for temporary contracts. Generalisation stage: 80.15%, 68.00% and 87.21%, respectively

that of a woman with a permanent job. Just as with the other two logistic regression models, these results confirm that the model evaluated is sufficiently valid in general and is not predetermined by the specific observations used in its construction.

Table 4 - Logistic regression: factors that determine permanent employment among the Andalusian female population and odds ratios confidence intervals

|	Variables in the model				Odds ratios 95% C.I. for OR		
	B	S.D.	Wald	p	OR	Lower	Upper
Age5	0.0666	0.0098	46.5539	0.0000	1.0689	1.0486	1.0896
Occup1	0.2817	0.1063	7.0196	0.0081	1.3254	1.0761	1.6325
Fpar1	1.4364	0.2521	32.4603	0.0000	4.2055	2.5658	6.8932
Chil	0.3439	0.1313	6.8585	0.0088	1.4104	1.0904	1.8244
Sect1			11.3621	0.0034			
Sect1(1)	-2.5234	0.8056	9.8109	0.0017	0.0802	0.0165	0.3889
Sect1(2)	-0.1963	0.4201	0.2183	0.6403	0.8218	0.3607	1.8721
Constant	-3.2485	0.5708	32.3951	0.0000			

Source: authors' own calculations.

NB: the variable sector/industry is linked to the industrial sector, therefore the coding would be as follows: Sect1(1), agriculture; Sect1(2), construction; Sect1(3), Services.

Gender discrimination in the Andalusian labour market

The previous analyses evaluated the influence of the variables studied in this research paper on the type of contract signed by wage earners in Andalusia, placing specific emphasis on the variable gender. This last section makes a graphic comparison between the situation of men and women. For this purpose, for each of the individuals surveyed, regardless of their gender, the probability of having a permanent contract was calculated according to the logistic regression models obtained (see graph 1).

Graph 1. Probability of having permanent employment according to a gender
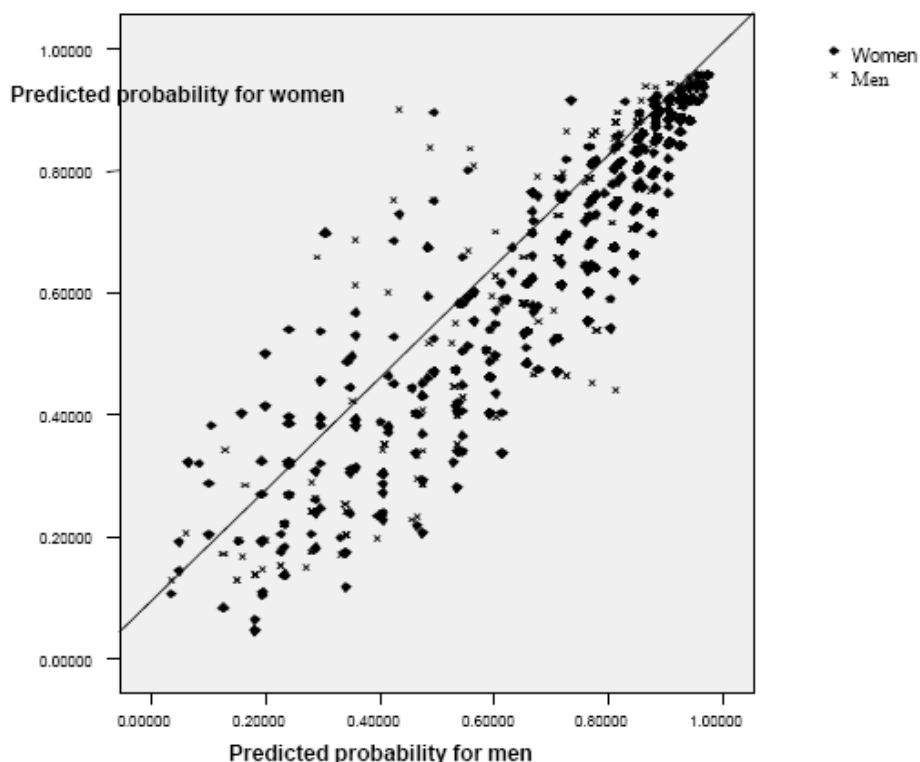
Source: authors' own.

If the employability of men was similar to that of women, each and every one of the points should be located on the diagonal, where both probabilities are equal. When this does not occur, the location of each point indicates which gender offers greater opportunities for permanent employment: men when the point is lower than the diagonal or women when it is higher. This graph clearly shows that when the other variables are constant, being a man offers greater expectations for stable employment than being a woman. Furthermore even in cases in which being a woman is a competitive advantage in terms of job stability, the probability of having permanent employment is very high for both sexes (top right-hand corner of the graph), so in actual fact this advantage is relative.

In order to quantify the content of the graph, the observations were classified into two criteria: the real gender of each individual and that which, in terms of probability, would offer greater prospects of having permanent employment. For this second criterion, three possibilities were taken into account: man, woman, or irrelevant. Here, the term irrelevant refers to situations in which the difference in the probability of accessing permanent employment is less than 0.05. The results shown in table 5 confirm that the possibilities of finding permanent employment are in general much higher for men. In fact, only 49 (7.1%) of the 688 women interviewed and 26 (3.5%) of the 727 men interviewed would have a better chance of finding permanent employment as women. However, 412 of the women interviewed, representing 59.9% of the total, would have a much greater chance as men.

Table 5 - Probabilistic comparison of employability in terms of the real gender of the individual interviewed and the preferable gender to access permanent employment

Real	Preferable			
	Irrelevant	Male	Female	Total
Male	307	394	26	727
Female	227	412	49	688
Total	534	806	75	1415

Source: authors' own.

Discussion

The research aims of this paper are: on the one hand, to determine which factors affect the probability of having a permanent job contract among wage earners in Andalusia, which had the highest rate of temporary employment of any autonomous region in Spain at the end of 2006; and on the other hand, to evaluate the impact of gender on job stability.

In order to achieve these objectives, firstly a logistic regression model was applied, indicating that the probability that a wage earner has of getting a permanent contract increases with age, the level of skill required for the position, full-time employment and the number of children living at home. It was also confirmed that being a woman, being foreign and working in agriculture or construction reduces the possibilities of finding permanent employment. Our results practically confirm the approach of the first hypothesis: gender, age, some characteristics of family structure, nationality and labour-related aspects are as being decisive factors in determining the probabilities for permanent employment. Our conclusions are similar to previous results in the field background.

Given that gender is a decisive variable in the logistic regression model, the model coefficients were then estimated for the male and female populations. The most significant results were:

on the one hand, that having or not having children living at home does not alter the possibilities of finding permanent employment among Andalusian men, whereas it does influence job stability for women; and, on the other hand, that being a Spanish national - a factor that contributed to permanent employment among the male population - does not show any influence among the female population. This result confirms our second hypothesis.

Finally, from the perspective of gender, a graphic estimation was generated of the probability of each individual interviewed having a permanent job contract, regardless of gender and maintaining all the other variables constant. The evidence obtained confirms the expectations in the hypothesis 3: being a man in Andalusia offers greater prospects for permanent employment; hence any legislative measures taken to promote equality among men and women will be welcome in order to redress this situation.

There are two limitations for this study. Firstly, we focus on only one region; therefore our results cannot be generalized to other regions where the labour conditions can be different from the situation in Andalusia. Second ly, the study is based on selfreported cross-sectional data, which hinders causal inferences. Nevertheless, these restrictions will be a target for future for research. Despite these limitations our study yields valuable new information about the decisive factors identifying permanent employment and its combined associations regarding gender.

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