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# Measuring Gender Disparities in Unemployment Dynamics during the Recession: Evidence from Portugal

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## ABSTRACT

We research gender differences in unemployment incidence and persistence during the debt crisis in Portugal. A dynamic random effects probit model is estimated to control for unobserved individual heterogeneity and for the ‘initial conditions’ problem. The estimation uses data from four waves of the Survey on Income and Living Conditions (ICOR) between 2010 and 2013. We find strong evidence of persistence in unemployment, and an indication that men are more prone to endure the negative implications of previous unemployment. Simultaneously, we found evidence of higher probabilities of unemployment for women through a fixed effect that aimed to capture gender discrimination in an unstable labour market. Results suggest that policies to boost employment should accommodate a gender dimension and also have a special focus on the long-term unemployed.

**JEL classification:** C23, C25, J21, J24, J71

**Key words:** unemployment, persistence, unobserved heterogeneity, dynamic random effects models, gender discrimination

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## I. Introduction

Studies of gender gaps for pay and the labour market proliferate in the literature (see, for example, Kunze 2017 for a recent survey) while there only exists a few papers regarding gender differences in unemployment rates (see Azmat et al., 2006, Queneau & Sen, 2008 and Saget, 1999). This paper aims to contribute to this shortage in the literature by studying gender disparities in unemployment incidence and persistence using microdata from Portugal during the debt crisis, as Portugal is one of the countries in the Eurozone that has had to endure most of the drastic sequels of this crisis.

During the crisis, the unemployment rate rose sharply to its highest level of the decade in most European countries as a consequence of the European sovereign debt crisis that hit the Eurozone at the end of 2009. Portugal, like most Southern European countries, experienced a larger increase of unemployment than the EU-28 average (Boeri & Jimeno, 2016), reaching 16.2% in 2013, with disturbing repercussions in the rise of persistent poverty and deprivation<sup>1</sup>.

Looking to the gender differential in unemployment rates during this period of economic crisis, a fall is registered from -2.1 percentage points (p.p.) in 2010 to -0.4 p.p. in 2013. This is consistent with evidence found in Albanesi & Şahin (2017), where the unemployment rate increased more for men than for women during recent recessions, resulting from gender differences in industry distribution, due to the impact of these recessions on the construction and financial sectors, where the majority of the workforce is male.

Previous studies found gender disparities in unemployment rates across countries. Azmat et al. (2006) found that gender gaps in unemployment rates had risen in the past two decades in some European countries, especially when the overall unemployment rate was high, even when the attachment of women in the labour market had simultaneously increased. Jackman (2002) also observed that countries with high unemployment had higher unemployment rates for women. These results reinforce the need to study the possible effect of gender discrimination on the probability of unemployment, especially in the recent high unemployment period as the one faced by Portugal.

Past unemployment may be interpreted by employers as being a signal of lower expected productivity, which eventually turns unemployment into a recurring cycle,

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<sup>1</sup> See Pereira & Weeman (2015) for more on the impact of the Global Financial Crisis in Portugal.

therefore justifying the special interest in studying the effects of previous unemployment experience on the probability of unemployment. Arulampalam et al. (2000) found evidence of the casual effect of an individual's previous unemployment experience on their future labour market condition. Focusing on persistence in the unemployment rate at the country level Queneau & Sen (2008) found evidence that the unemployment rate is more persistent for females than for males.

To summarise, this work focuses on studying the determinants of unemployment assessing the differential in the incidence of unemployment between genders over a period of declining employment in Portugal, while controlling for individual relevant characteristics and unobserved heterogeneity. The causal effect of previous unemployment on current unemployment is studied as well to find out eventual important discrepancies between genders. Altogether, we seek to answer whether there are relevant differences between men and women in the dynamics of the probability of being unemployed during a period of high unemployment, given a set of demographic and socio-economic characteristics. For this purpose, a random effects dynamic probit model is estimated, using data from four waves of the Survey on Income and Living Conditions (ICOR), from 2010 to 2013, provided by the Portuguese Statistics Institute (Instituto Nacional de Estatística – INE). Our results suggest that there is evidence of higher probabilities of unemployment for women, relative to men, despite women having, on average, higher levels of education.

We were also able to find strong state dependence with respect to previous unemployment incidence, during this period of high unemployment in Portugal, and also evidence that unemployment persistence has a higher effect on the probability of unemployment for men.

The main contributions of this research lie with the study of the determinants of the probability of unemployment, during a period of high unemployment in Portugal, especially focusing on unemployment persistence and gender discrimination.

The remainder of this paper is organised as follows. Section II reviews some important past literature on unemployment, discrimination in the labour market, and unemployment persistence, Section III presents the econometric model and Section IV describes the data set, whilst Section V presents our estimates and results. The final section concludes and provides suggestions for further research.

## II. Literature review

### *Gender differences in unemployment*

Possible explanations for the existence of a gender gap in unemployment rates may be identified both in the demand side or the supply side of the labour market.

On the demand side, an important driver may be merely gender discrimination. During the last decades two different approaches to the subject have been considered: taste-based discrimination and statistical discrimination.

Becker (1971) defines taste gender discrimination as a disutility in hiring women which can be modelled by a fixed effect or a discrimination coefficient.

Phelps (1972) was the first to develop a model aimed at explaining statistical discrimination. This type of discrimination occurs simply because employers are unable to observe the true marginal productivity of an individual until they are hired. Employers are left to make a judgment based on evaluation criteria which is a noisy signal of an individual's marginal productivity. Aigner & Cain (1977) find a differential in expected productivity between two groups of people with the same true productivity, which results in the increase of the unemployment rate for women. This could also lead to occupational segregation. For example, if women are perceived as being more likely to leave their job or to perform worse in certain types of occupation (e.g. male-dominant occupations), then a profit-maximizing employer will favour men over women even if both candidates seem equal in all relevant characteristics. Bielby & Baron (1986) found evidence for this particular result, with employers reserving some jobs for men and others especially for women.

On the supply side, human capital accumulation, previous employment status, the number of children, and different personal characteristics may explain the gender gap in unemployment rates.

Azmat et al. (2006) while explaining the cross-country differences in the gender unemployment gap concluded that differences in human capital accumulation were one of the most important factors in explaining the flows from employment to unemployment, and vice-versa. The authors argue that the higher unemployment rates for women are caused by the fact that women have, in general, lower levels of labour market attachment, especially among married women and those with children. Azmat et al. (2006) point out as well that labour market institutions may also impact the relationship between gender differences in human capital and gender differences in unemployment rates.

Saget (1999) documented a higher propensity for women to be unemployed relatively to man, in Hungary, given a set of individual characteristics in a logistic regression. The author states that an important part of this unemployment gender gap is explained by the fact that male and female exhibit meaningful differences in the distribution of occupations and sectors of employment.

The relation between gender gap in unemployment rates and economic performance is reported in the literature by a few authors. Jackman (2002) found that countries with overall low unemployment had very similar unemployment rates for men and women, while countries with high unemployment had higher unemployment rates for women. When considering the business cycle, Albanesi & Şahin (2017) found that the unemployment rate increased more for men than for women during recessions, resulting from gender differences in industry distribution, mostly due to the impact that the recent recessions had on the construction and financial sectors, where most of the workforce is male. They also found that the unemployment gender gap was highly affected by the labour attachment of each gender, and that the recent convergence of unemployment rates was related to an increase in labour attachment of women while, simultaneously, the labour attachment of men had declined. Şahin et al. (2010) also found evidence of higher unemployment rates for men during the recession of 2007, resulting from men being predominant in the most-affected industries, but also from the fact that a higher percentage of men tried to re-join the labour force, but were unable to find a job, and therefore transitioned from an inactive status to an unemployed status.

#### *Persistence in unemployment*

Concerning persistence in unemployment Arulampalam et al. (2000) obtained results consistent with the 'scarring theory' of unemployment, concluding that the previous status of unemployment has implications on future employment. This scarring effect is found in other studies, such as those of Ahmad (2014), Stewart (2007), and Arulampalam et al. (2001). Arulampalam (2001) also found that previous unemployment had a negative impact on wages when individuals re-enter the job market. These effects are usually justified by the fact that past unemployment experience may result in the depreciation of human capital, and therefore raise one's probability of unemployment, and by the fact that past unemployment is seen by employers as being a signal of low productivity.

Some studies (see for instance Elmeskov & MacFarlan, 1993) have also stated that higher than usual unemployment persistence could actually be a result of an increase of

the natural rate of unemployment, and therefore can never fully correct itself to the previous level. The same paper also studies the hysteresis phenomenon as an alternative explanation for the persistence of unemployment. According to this view, the structural unemployment rate depends fully, or partially, on the current unemployment rate. As a result, only un-anticipated demand or supply shocks will alter the equilibrium of the unemployment rate. The authors use the “scarring” effect of unemployment as a source of the hysteresis phenomenon, citing that long periods of unemployment lead to less training opportunities, and to the depreciation of human capital.

Queneau and Sen (2008) analyse unemployment dynamics over the business cycle according to gender in eight OECD countries<sup>2</sup>, using macro data from 1965 till 2002. Based on the results of unit root tests they evaluate empirically the relevancy of alternative theories to explain the unemployment dynamics, namely, the natural rate of unemployment, unemployment hysteresis and the structuralist perspective. They found gender differences in the nature of unemployment dynamics in Canada, Germany and the US with females showing unemployment hysteresis while in Germany and the US male unemployment is dictated by the structuralist perspective and revolves around a natural rate in Canada. The authors found also in general disparities in the degree of persistence of unemployment between males and females.

Because our research focuses on estimating the probability of unemployment during a period of increasing unemployment in Portugal, the analysis of unemployment persistence, is of utmost importance, as it may be a determinant of the current level of unemployment.

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<sup>2</sup> Australia, Canada, Finland, France, Germany, Italy, Japan and the US.

### *Determinants of unemployment*

When hiring, employers need to evaluate both the expected returns of labour, measured as expected productivity, and the risk of their expectations being less than the true productivity.

In his model of signalisation in the labour market, Spence (1973) exemplifies how further investment in education signals to employers that a certain individual has higher ability. The asymmetry in information between the candidate and the employer, as well as the positive association made by employers between higher investments in education and higher ability, turn education into a powerful signal of higher, or lower expected productivity.

This result is empirically confirmed in Arulampalam et al. (2000), where qualifications have statistical significance in determining unemployment incidence.

The increase of the average level of education of women, has contributed to reducing the gender education gap and, in some countries, to even reverse it. Regardless, this similarity in educational levels was not followed by an equal choice of educational field, with women having a larger presence in the areas of education, health and welfare, and humanities and arts, whereas men still dominate engineering, manufacturing, and construction, in OECD countries<sup>3</sup>. One important sub-product of this asymmetry is gender segregation in occupation, which has been suggested to be the main cause of the existing gender pay gap (see, for example, Blau & Kahn, 2017).

Experience also plays an important role in providing valuable information to the employer by signalling whether they would be a good fit to both the company and the job. According to the human capital theory, skills accumulated through experience raise the probability of being employed in the future.

As gender differences in educational levels become less and less relevant, with both men and women attaining similar levels of education, differences in actual experience have narrowed less (. For example, according to Blau & Kahn (1997), women's lower levels of human capital (especially lower levels of full-time experience) explain close to one third of the pay gap. Manning & Swaffield (2005) also found that, despite a virtually non-existent pay gap, in the UK, there has been a significant disparity over the past 10 years when entering the labour market. They conclude that human capital accounts for

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<sup>3</sup> OECD Education database and OECD (2006), *Education at a Glance: OECD Indicators*, OECD, Paris.

half of the difference, mainly through gender differences in on-the-job training and in accumulated experience.

Another aspect that may be important to explain differences in unemployment rates between men and women concerns the existence of young children in the household. When studying the cross-country differences in the unemployment gender gap, Azmat et al. (2006) found that the gender gap in unemployment rates is larger for those who are married, and for those who have young children.

This might result from the fact that women are most likely over-represented in part-time jobs (see Petrongolo (2004)). This job allocation is said to reflect women's preferences, especially their need to combine work with raising children, although in some cases, this part-time employment is involuntary.

The association between fertility and female employment is usually found to be negative, with Kögel (2004) finding that, although there has been a reduction since 1985, this association in OECD countries is still negative. This result can hinder the future employment of women, as they will have lower levels of experience than their male counterparts, and they may suffer more from the scarring effect of unemployment. In fact, the possibility that women of fertile age decide to have children and voluntarily stay out of the labour force, and the general perception that a long maternity would lead to depreciation of the human capital stock and costs in temporary replacement, eventually act as an obstacle for employment.

#### *Unemployment and occupational segregation*

The fact that society perceives some roles as strictly being female or strictly male, has an extremely important impact on creating gender differences, both on the fields of education, as well as chosen economic occupation (see Cejka & Eagly, 1999, or Wright et al., 2015). This aspect contributes to explain educational and occupational segregation (on the supply side) possibly creating a 'snowball' effect if the gender-occupation stereotype is strengthened, which would, most likely, result in increasing statistical discrimination. Therefore, if an occupation is male-dominant, it is likely that some type of discrimination, either taste-based or statistical, might contribute to the higher employment rate among men. An analogous conclusion comes from female-dominant occupations. Consequently, differences in employment rates (and, therefore, unemployment rates) linked to gender must be correlated with prevailing gender segregation in economic occupations.

Another matter that makes occupational gender segregation an important factor when studying gender discrimination, is the fact that gender segregation is thought to be one of the main explanations for the current gender gap in earnings, where women are as well educated as men (Gauchat et al. 2012). Economical inefficiency is also perceived to be a result of the lack of gender representation, which might keep talented individuals from occupying roles where they would be a good fit. This would result in lower overall productivity and economic growth than would otherwise come from unconstrained choices.

### III. The model

Consider the binary dependent variable,  $y_{it}$ , which takes on the value one if the individual  $i$  is unemployed at time  $t$  and zero otherwise, and the following dynamic model assuming that  $y_{i0}$ , the initial condition of  $y_{it}$ , is the value for  $y$  for each individual  $i$  in 2010

$$y_{it} = \mathbf{1}[\mathbf{z}_{it}\boldsymbol{\gamma}^1 + \mathbf{z}_{it}\boldsymbol{\gamma}^2 d_i^f + \rho^1 y_{it-1} + \rho^2 y_{it-1} d_i^f + \varphi_i + v_{it} \geq 0] \quad (1)$$

$$i = 1, \dots, n; t = 1, \dots, T$$

where  $\mathbf{1}[\cdot]$  is the usual indicator function,  $\mathbf{z}_{it}$  is a  $1 \times K$  vector of contemporaneous explanatory variables (such as education, experience, number of children and age),  $d_i^f$  is a dummy variable that equals one if the individual  $i$  is a woman,  $\boldsymbol{\gamma}^1$  and  $\boldsymbol{\gamma}^2$  are  $K \times 1$  vectors of unknown coefficients,  $\rho^1$  is the parameter that quantifies the persistence of unemployment for men,  $\rho^2$  is the parameter that measures differences between genders for the persistence of unemployment,  $v_{it}$  is the idiosyncratic error term and  $\varphi_i$  is the individual unobserved heterogeneity term, constant in time. In this problem  $n$  is large, and  $T$  is small and fixed in time.

Let us now consider that the unobserved heterogeneity term,  $\varphi_i$ , has a component which is not related to gender (like true ability),  $\varphi_{0i}$ , and a fixed effect for women,  $\theta$ . Therefore, we can write  $\varphi_i$  as  $\varphi_i = \varphi_{0i} + \theta d_i^f$ . Consequently, equation (1) becomes

$$y_{it} = \mathbf{1}[\mathbf{z}_{it}\boldsymbol{\gamma}^1 + \mathbf{z}_{it}\boldsymbol{\gamma}^2 d_i^f + \rho^1 y_{it-1} + \rho^2 y_{it-1} d_i^f + \varphi_{0i} + \theta d_i^f + v_{it} \geq 0] \quad (2)$$

From the literature survey, we are aware that the gap in unemployment rates may be caused by taste-based discrimination and/or statistical discrimination. Therefore, it is not restrictive to assume that women would encounter a higher probability of unemployment in occupations where their perceived ability is lower, e.g. on activities that are usually

thought to be reserved for men and, consequently, the fixed effect for women  $\theta$  could also reflect this interesting result. In fact, as we aim to control for true individual ability, a difference between genders in the probability of unemployment should be associated with some type of discrimination. Consequently, this fixed effect aims to capture all types of discrimination that contribute to a possible gender gap in the probability of unemployment, and it is expected to be higher than zero.

In order to estimate (2) we follow Wooldridge (2005) addressing the initial conditions problem by assuming the following specification for the unobserved heterogeneity term,

$$\varphi_{0i} = \alpha_0 + \alpha_1 y_{i0} + \bar{\mathbf{z}}_i \boldsymbol{\alpha}_2 + a_i \text{ where } a_i | y_{i0}, \mathbf{z}_i \sim N(0, \sigma_a^2) \quad (3)$$

where  $\bar{\mathbf{z}}_i$  is a vector that contains the average value, for each individual, for all covariates that vary over time according to Mundlak (1978), while  $\alpha_0$ ,  $\alpha_1$ , and the vector  $\boldsymbol{\alpha}_2$  are unknown coefficients to be estimated. Observe that (3) controls not only the endogeneity caused by the initial conditions problem but also the endogeneity due to a possible correlation of the time varying explanatory variables with the random effect which includes ability.

In conclusion,  $y_{it}$  given  $(y_{it-1}, \dots, y_{i0}, \mathbf{z}_i, a_i, d_i^f)$  follows the dynamic random-effects probit model given by:

$$\begin{aligned} P(y_{it} = 1 | y_{it-1}, \dots, y_{i0}, \mathbf{z}_i, a_i, d_i^f) \\ = \Phi[ \mathbf{z}_{it} \boldsymbol{\gamma}^1 + \mathbf{z}_{it} \boldsymbol{\gamma}^2 d_i^f + \rho^1 y_{it-1} + \rho^2 y_{it-1} d_i^f + \theta d_i^f + \alpha_0 + \alpha_1 y_{i0} \\ + \bar{\mathbf{z}}_i \boldsymbol{\alpha}_2 + a_i ] \quad (4). \end{aligned}$$

#### IV. The data and variables

This paper uses data from four waves of the Survey of Portuguese households on Income and Living Conditions (ICOR) included in the European Union Statistics on Income and Living Conditions - EU-SILC' and was conducted annually from 2010 to 2013. The sample used in the analysis contains all the individuals in the active population observed in the four waves. In addition, for each individual in the sample, the initial condition in model (4) was considered to be the unemployment status in 2010. The final sample resulted in 774 individuals represented by 384 women and 390 men.

The dependent variable is binary and gives the unemployment status of the individual in each year. It is equal to one if he or she was unemployed at the time of the interview. The choice of independent variables was based on the surveyed literature and comprises

attributes of the individual like sex, experience, age, education, and family variables that affect expected productivity like the number of children and the status of employment of the spouse. The information regarding the real number of children for each individual was not available. We used as proxy, for individual  $i$ , the sum of records in the original sample that reported  $i$  as parent. The status of employment of the spouse was included to control for household conditions and was built in a similar way to that of the number of children<sup>4</sup>. In preliminary experiments the marital status was considered instead of the former but turned out to be extremely insignificant from a statistical point of view and for that reason was dropped from the analysis. The experience of the individual is measured as the years of paid work reported at the time of the interview. The age is the number of years that he or she has lived up until the time of the interview. The individual sex is given by the dummy variable *female* which equals one if the individual is a woman and zero otherwise. Concerning the education of the individual we were restricted by the information in the data which provides only the last level of schooling completed by the individual. Therefore, four categories of educational levels – 1st Cycle, 2nd Cycle, secondary education and higher education were considered. After some preliminary studies using this information, the variable that equals 1 if the individual has a diploma equivalent to high school, or higher, was the only that shown to be meaningful to account for the effect of education on the probability of unemployment.

Table 1 identifies the variables used in the study showing their definition and the expected effect in the probability of being unemployed.

Table 1 – Variable definitions and expected effects

Variables	Description	Exp. effect
<i>Unemp</i>	= 1 if unemployed at time of the interview (ILO definition)	—
<i>Unemp(-1)</i>	Lagged value of <i>Unemp</i>	Positive
<i>Female</i>	= 1 if the individual is a woman	Positive
<i>Female</i> × <i>Unemp(-1)</i>	Interaction between sex and lagged unemployment status	Ambiguous
<i>Age</i>	Age of the individual	Positive
<i>Unemp Spouse</i>	Equals 1 if the spouse is unemployed	Ambiguous
<i>Number Children</i>	Number of children of the individual	Ambiguous
<i>Experience</i>	Number of years in paid work	Negative
<i>Higher Educ</i>	= 1 if holds a diploma equivalent to high school or higher	Negative

Notes:

1. Pooled data for 4 waves of the ICOR (2010-2013)

<sup>4</sup> It was not possible to identify the unemployment status of the spouse for 1.4% of the individuals in the sample who were married.

2. Sample size = 3096

The descriptive statistics of these covariates for the entire sample, and for the subsample of women can be seen in in Tables A1 and A2 respectively included in the Appendix.

The raw unconditional probability of being unemployed for each wave is presented in Table 2. This table also displays the distribution of employment status, over the four-year period.

**Table 2 – Distribution of employment status**

Total				
	Wave 1 (2010)	Wave 2 (2011)	Wave 3 (2012)	Wave 4 (2013)
<i>% Unemployed</i>	14%	14%	16%	17%
<i>% Employed Full Time</i>	81%	81%	80%	79%
<i>% Employed Partial Time</i>	5%	5%	4%	4%
Men				
<i>% Unemployed</i>	12%	13%	17%	18%
<i>% Employed Full Time</i>	84%	84%	81%	80%
<i>% Employed Partial Time</i>	4%	3%	2%	2%
Women				
<i>% Unemployed</i>	15%	14%	14%	16%
<i>% Employed Full Time</i>	79%	79%	80%	78%
<i>% Employed Partial Time</i>	6%	7%	6%	6%

Source: INE - ICOR, author calculations

This table shows evidence of a higher female participation in part time employment, for all years. As mentioned in the literature review, some women tend to search and accept jobs that enable them to take temporary leave, or less working hours, in order to take care of children, while men generally search for full-time jobs. The table also shows that 2012 was a turning point for unemployment: up until then, women were the dominant group, whereas in 2012 and 2013 men were the dominant group.

This could be traced to the sectoral composition of job losses in Portugal for this period, as it affected craft, industry, and construction qualified workers the most, as these are male dominant occupations, as can be seen in table A3 in the Appendix.

From Table A4 in the Appendix, we can see that the probability of being unemployed in 2011, conditioned on being unemployed in 2010, was approximately 70% for men and for women. In 2013, this probability increases to values of 81% and 78% respectively for men and women. This suggests an increase of persistence in unemployment, which reinforces the need to study this variable, especially as the unemployment rate was very

high (17% of the active population was unemployed in 2013).

Table 3 shows the distribution of the levels of education to give insight on the expected productivity for both genders, based only on education (excluding other relevant aspects, such as experience and training). From these results we can see that women in the sample have a dominant presence in higher levels of education (high school and college), indicating a higher expected productivity for women based only on education.

*Table 3 – Distribution of levels of education*

	<i>% of women relatively to men</i>			
	<i>Wave 1</i>	<i>Wave 2</i>	<i>Wave 3</i>	<i>Wave 4</i>
	<i>(2010)</i>	<i>(2011)</i>	<i>(2012)</i>	<i>(2013)</i>
<i>%Sixth grade</i>	45%	44%	44%	45%
<i>% Ninth grade</i>	43%	43%	44%	41%
<i>% High school</i>	54%	54%	54%	54%
<i>%College</i>	63%	63%	63%	63%

Source: INE - ICOR, author calculations

Several authors documented a relation between unemployment and labour market attachment (see, for instance, Azmat et al., 2006 and Albanesi & Şahin, 2017). Figures 1.a and 1.b. display the level of labour market attachment for women and men conditioning to age. Here, we consider three levels of attachment to the labour market defined as a function of the experience<sup>5</sup> of the individual given the age: high attachment<sup>6</sup> (bar in the right), average attachment and low attachment (bar in the left)<sup>7</sup>.

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<sup>5</sup> Information regarding level of employment experience was compiled from the amount of years individuals have been in paid work.

<sup>6</sup> Being employed for more than five years if the age range is between 20 to 30 years old; being employed for more than ten years if the age range falls between 30 to 40 years old; being employed for more than twenty years if the age range falls between 40 to 50 years old; being employed for more than forty years if the age range lies between 50 to 60 years old.

<sup>7</sup> Being employed for two or less years if the age range is between 20 to 30 years old; being employed for less than five years if the age range falls between 30 to 40 years old; being employed for less than ten years if the age range falls between 40 to 50 years old; being employed for less than twenty years if the age range lies between 50 to 60 years old.

Figure 1.a – Market labour attachment as a function of experience and age (2010)

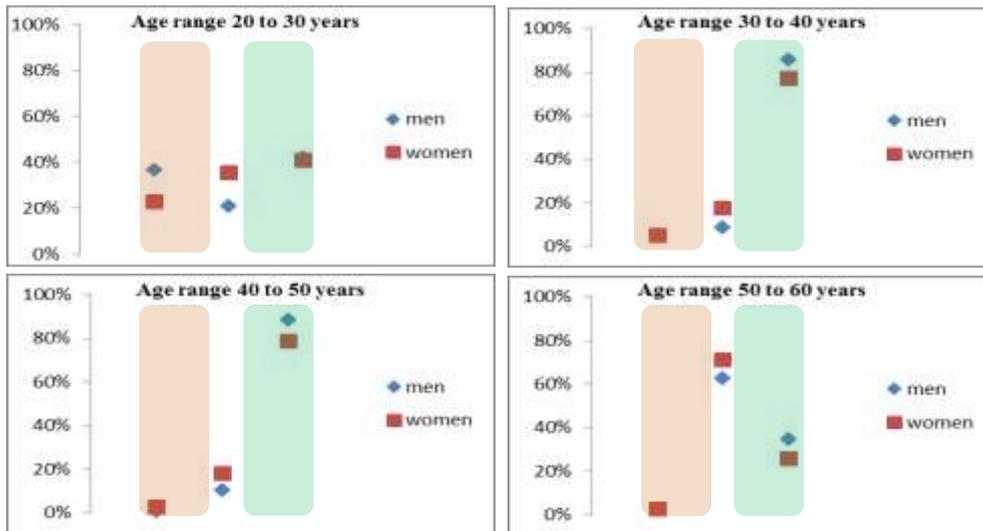
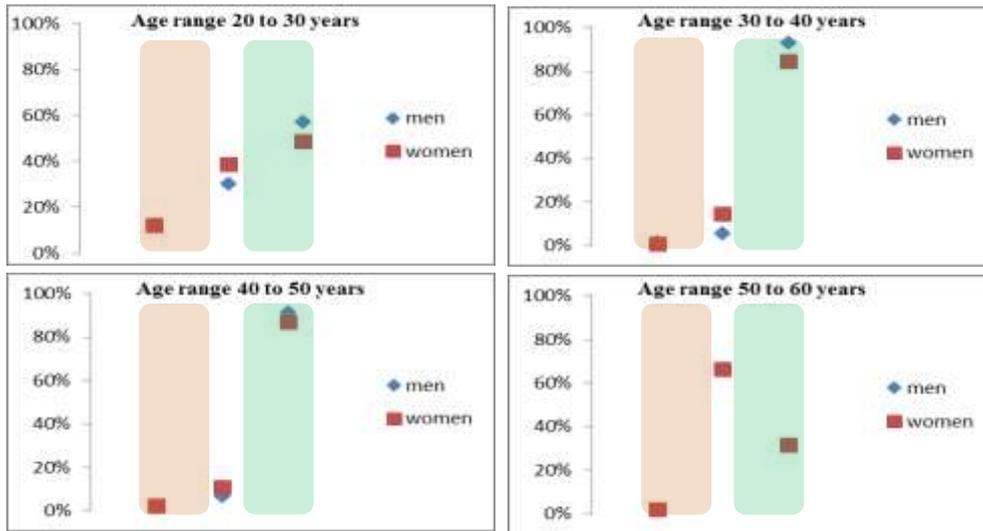


Figure 1.b– Market labour attachment as a function of experience and age (2013)



Source: INE - ICOR, author calculations

From the figures above, we can observe that, except for the early stages of a career, men in the sample appear to have higher attachment to the labour market. Nevertheless, when comparing 2013 to 2010, it appears that there has been a convergence, especially for the higher ranges of age. This is consistent with the idea that women are increasing their labour attachment, which will contribute to reduce the gap in unemployment rates between genders.

To summarize, the data replicates some of the results we expected from the literature survey, such as: a lower labour attachment for women, with convergence occurring especially during periods of economic recession; a higher presence of men in the lower levels of education; a relatively higher participation in part-time employment for women; increasing unemployment rates for men during a recession; and persistence of high unemployment rates.

## V. The results

This section presents the main results obtained using the methodology developed in Section III applied to the data described in Section IV. The average partial effects of the independent variables are presented and discussed. Finally, a special attention will be paid to the persistence in unemployment. All the estimation results were obtained with STATA.

Estimates for the panel data model (4) that considers the probability of unemployment using dynamic random effects probit (REP) are given in Table A5 of the Appendix. They

include as controls the independent variables introduced in the previous section, the variables specified by the Mundlak device in (4) to control for endogeneity due to omitted variables constant in time (unobservable individual heterogeneity) and a fixed effect of time that aims to control for macroeconomic effects. All the variables were interacted with the dummy variable *female* in order to capture significant differences in the determinants of unemployment between both genders.

The contribution for the probability of unemployment of each exogenous variable considered is obtained through the estimation of the average partial effect (APE) averaged across the distribution of unobserved heterogeneity. Table 4 gives the average partial effects for the general and restricted models, together with the respective standard error (calculated using the Delta method).

**Table 4 – Average partial effects**

	(1)	(2)
Unemp at t-1	0.055*** (0.021)	0.056*** (0.021)
Unemp at t-1×Female	-0.017 (0.012)	-0.020* (0.012)
Female	0.165 (0.113)	0.119* (0.072)
Age	0.011*** (0.003)	0.010*** (0.003)
Age×Female	-0.005** (0.002)	-0.003*** (0.001)
Unemp Spouse	0.032 (0.020)	0.043** (0.019)
Unemp Spouse×Female	0.026 (0.025)	-
Number Children	-0.018 (0.015)	-0.019 (0.015)
NumberChildren×Female	0.029** (0.014)	0.028** (0.014)
Experience	-0.004* (0.002)	-0.002 (0.001)
Experience×Female	0.003 (0.003)	-
Experience <sup>2</sup>	0.00003 (0.00003)	-
Experience <sup>2</sup> ×Female	-0.00003 (0.00005)	-
Higher Educ	-0.042** (0.017)	-0.034*** (0.011)
Higher Educ×Female	0.012 (0.021)	-

Notes:

1. Standard errors are in brackets. The standard errors were computed using the Delta Method.
2. Both models were estimated using controls as specified by Mundlak (1978)
3. Significance levels: \*10%, \*\*5%, \*\*\*1%.

Focusing on Model (2), the fixed effect of being a woman has the highest impact on the probability of unemployment, with an APE of 0.119 probability points (pr.p.) and it is statistically significant at 10%. Therefore, results show that, on average, a woman is more prone to be unemployed than a man with the same given set of characteristics (observed and unobserved) and this difference is relatively high. Considering the other variables, results show also gender discrepancies in the impact of age and number of children on the propensity to be unemployed. As expected, as age increases the probability of being unemployed is higher in average, however the effect is less severe for women (with APE equal to 0.010 pr. p. for men and 0.007 pr. p. for women). This is an interesting result, as the general perception is that, with age, it is harder to find a job for women than for men. On the other hand, having children has no relevant effect on the probability of being unemployed for men, while for women, having one more child increases that probability in average by 0.028 pr.p. holding fixed all the other factors.

As expected, having more experience lowers the propensity of being unemployed, though in a small-scale (with APE equal to -0.002). Having an high<sup>8</sup> educational level reduces the overall probability of unemployment in 0.034 pr.p., confirming the theory that relates human capital to unemployment, while having an unemployed spouse raises the same probability in 0.043 pr.p., which infers that unemployment may also be determined by the social conditions of the individual.

#### *Estimates of unemployment persistent*

The positive and significant coefficient of the lagged dependent variable suggests that there is persistence in unemployment. Therefore, our results provide favourable evidence that past unemployment raises the probability of current unemployment. This reflects the ‘scarring’ effect of unemployment, which leaves the unemployed with fewer opportunities to become employed.

For the considered time period, women seem to suffer less from the negative consequences of a previous state of unemployment, mentioned above, given that lagged unemployment increases, on average, the current probability of this state by 0.056 pr. p. for men and only by 0.036 pr p. for women. The fact that men appear to suffer more from the negative implications of previous unemployment could be explained by various factors, such as the fact that the recession affected male dominant industries the most, and

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<sup>8</sup> An individual is said to have a high educational level if they have a high school diploma, or more.

that men might be less versatile and more strict on their job search, having more reluctance, for instance, on accepting jobs that are not in the field of their previous occupation.

The effects that long-term unemployment can have on individuals (such as, loss in human capital accumulation, higher financial instability, and discouragement to actively look for work resulting from repeated failures in the search and application process) are all reasons that make studying past unemployment as a determinant of current unemployment so important. According to the literature, with regards to this topic, unemployment persistence can reflect increases in the natural rate of unemployment, i.e., it can reflect increases in the long-term equilibrium of the unemployment rate. Consequently, if the unemployment rate has been persistently high as a result of an increase in the long-term equilibrium unemployment rate, labour market policies should focus on structural labour reforms, rather than just focus on increasing short-term employment. As the period under study was marked by high unemployment rates and, simultaneously, a reduction in public spending, the lack of policies aimed to fix this crisis-aggravated problem could eventually translate into a slow adjustment of the unemployment rate, which might actually never achieve the same level as that of the period before the crisis. Therefore, labour market reforms, especially in the forms of creating stable employment and increasing human capital of long-term unemployed individuals need to take place in order to prevent the results that come from permanently higher unemployment rates.

## **VI. Conclusions and suggestions for further research**

This research provides some answers to important questions regarding gender discrimination and unemployment persistence in the Portuguese labour market. We estimate a binary panel data model for the probability of unemployment that simultaneously controls for unobserved individual heterogeneity. The latter, in this context, could represent important individual characteristics that are not observable, such as individual ability and unobserved discrimination, which are both taste-based, and statistical discrimination.

Our results suggest that there is evidence of higher probabilities of unemployment for women, relatively to men, in spite of women having a stronger presence in higher levels of education. Nevertheless, it appears that the economic crisis helped close the gender

gap in the probability of unemployment, with the unconditional unemployment rate of men surpassing women's, thus replicating some empirical evidence which found that, in periods of economic recession, men's unemployment rate rises faster than women's. This could reflect the effect of the increasing employment of female labour<sup>9</sup>, fuelled by higher financial necessities and labour instability, which was a result from the economic crisis affecting Portugal during this time. A higher level of education and experience appear to have negative effects on the probability of unemployment, contributing to its reduction. Therefore, the importance of human capital in reducing the probability of unemployment is reinforced. By controlling for ability, which is assumed to be included in the unobserved heterogeneity, these human capital effects become independent of differences in ability, which strengthens the idea that the attainment of higher levels of education and of higher labour attachment are reliable signals of high marginal productivity for employers. Both age and the number of children seem to influence the probability of unemployment differently between genders, with the increase of the number of children raising the probability of unemployment for women. This is consistent with the theory that taking care of children is still a job that is predominately carried out by women. In particular, having children might affect women's presence in the labour market in a twofold way: by signalling employers that women might need to leave work more often, or by reducing women's desire to be in full time work. Some policies regarding this particular result that take place, such as childbearing, are especially important for Portugal - a country that has suffered from the complications that arise from population ageing, hindering the foundation of social security. This could come about, for example, by reducing the non-wage cost of labour, in particular by offering day care benefits to new parents and by forcing both genders to take an equal amount of days in parental leave.

When we attempted to control for discrimination using a fixed effect for women, we obtained strong statistical evidence that discrimination increases women's probability of unemployment. This indicates that labour reforms should focus on trying to reduce both taste-based and statistical discrimination, e.g. by focusing on attaining gender parity in occupations, as this may change society's perception on gender roles. Gender parity in occupations could simultaneously spread information regarding the productivity of the

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<sup>9</sup> Albanesi & Şahin (2017) found that the rise in female labor force attachment and the decline in male attachment could mainly account for the closing of the gender unemployment gap.

other gender, which could eventually lead to a reduction in statistical discrimination by closing a specific informational gap. It can also spread the risk that each gender carries when focusing on one specific set of occupations, such as the risk of an economic crisis strongly affecting a “one-gender-dominated” industry. In the long run, if parity is attained for most occupations then, eventually, it could translate into a change in both occupational and educational gender segregation, as well as in eliminating all statistical discrimination that comes from distorted perceptions of expected productivity, based on gender.

We were also able to find strong state dependence effects with respect to the incidence of previous unemployment, during this period of high unemployment in Portugal. This finding is consistent with the theory that previous unemployment experience has a sizeable impact on future employment. Therefore, if employment instability has such high implications on future employment, then labour policies should focus on offering higher assistance in job-search and training programmes for individuals who have been unemployed for some time. Accordingly, labour policies could possibly contradict the trend of human capital depreciation and could eventually lead to higher employability.

Further research on the topic of this work could focus on capturing the impact being in a one-gender-dominant occupation has on the probability of unemployment, i.e., focusing on estimating whether women who were employed during the previous period in science, technology, engineering, and mathematics (STEM) - related occupations have higher or lower probabilities of being unemployed during the next period. This has an ambiguous expected association. The fact that being employed in these occupations is harder for women, might either reduce the probability of staying employed during the next period, or, because they were made to ensure higher expected productivity to enter the said occupations, their state of employment might be more stable than men in the same occupation and women in other occupations. Some other relevant aspects could be studied to reveal the extent that discrimination can have on the labour market, such as educational segregation, e.g.: the impact that choosing a STEM field of education has on a woman’s probability of unemployment; the impact that specific labour policies have on this gender differential, such as raising unemployment benefits or decreasing the minimum wage, and; the impact of specific policies aimed to contribute to higher gender equality and to provide better conditions for women in the labour market, such as possible equal mandatory parental leave and the provision of better child care benefits for parents.

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## VIII. APPENDIX

Table A1 – *Descriptive Statistics of the variables*

Variable	Mean	Std.	Min	Max
<i>Unemp</i>	0.150	0.357	0	1
<i>Age</i>	42.375	10.474	17	66
<i>Unemp Spouse</i>	0.101	0.302	0	1
<i>Female</i>	0.500	0.500	0	1
<i>Number Children</i>	0.461	0.713	0	5
<i>Experience</i>	23.610	12.335	0	54
<i>Higher Educ</i>	0.386	0.487	0	1

Notes:

1. Pooled data for 4 waves of the ICOR (2010-2013)
2. Sample size = 3096

Table A2 – *Descriptive Statistics of the variables for women*

Variable	Mean	Std.	Min	Max
<i>Unemp</i>	0.150	0.357	0	1
<i>Age</i>	41.753	10.015	17	66
<i>Unemp Spouse</i>	0.076	0.265	0	1
<i>Number Children</i>	0.460	0.689	0	3
<i>Experience</i>	22.318	11.842	0	54
<i>Higher Educ</i>	0.456	0.498	0	1

Notes:

1. Pooled data for 4 waves of the ICOR (2010-2013)
2. Sample size = 1,536

Table A3 – *Employed population (thousands) according to main occupation (ISCO-08)*

Occupations	2011*	2012	2013
<i>Managers</i>	287.7 (NA)	288.0 (-%0.10)	304.8 (+%5.83)
<i>Office clerks</i>	375.5 (NA)	336.2 (-%10.47)	310.2 (-%7.73)
<i>Craft, industry and construction qualified workers</i>	712.8 (NA)	618.5 (-%13.23)	540.5 (-%12.61)
<i>Plant and machine operators and assemblers</i>	380.3 (NA)	356.2 (-%6.34)	354.4 (-%0.51)
<i>Unqualified workers</i>	523.6 (NA)	503.8 (-%3.78)	495.4 (-%1.67)

Notes:

1. (% $\Delta$ )
2. Data from Statistics Portugal, Labour Force Survey
3. \*Values of ISCO-08 not available for 2010

Table A4 – Transition empirical probabilities

	2011	2012	2013
<b>Male</b>			
<i>Employed to Unemployed (1)</i>	0.0552	0.0708	0.0495
<i>Unemployed to Unemployed (2)</i>	0.6957	0.8431	0.8060
<i>Total Unemployed</i>	0.1308	0.1718	0.1795
<b>Female</b>			
<i>Employed to Unemployed (1)</i>	0.0431	0.0517	0.0547
<i>Unemployed to Unemployed (2)</i>	0.6949	0.6909	0.7818
<i>Total Unemployed</i>	0.1432	0.1432	0.1589

Notes:

1. The total is the proportion of individuals who were unemployed in the sample for the correspondent year
2. (1) refers to the proportion of the individuals who are unemployed in  $t$  given that they were employed in  $t - 1$
3. (2) refers to the proportion of the individuals who are unemployed in  $t$  given that they were unemployed in  $t - 1$

Table A5 – Random Effects probit models for the probability of unemployment

	(1)	(2)
<i>Unemp(-1)</i>	0.626*** (0.159)	0.637*** (0.159)
<i>Unemp(-1)×Female</i>	-0.281 (0.212)	-0.331 (0.210)
<i>Female</i>	1.597** (0.757)	1.283** (0.560)
<i>Age</i>	0.161*** (0.050)	0.151*** (0.049)
<i>Age×Female</i>	-0.069** (0.029)	-0.039*** (0.014)
<i>Unemp Spouse</i>	0.431* (0.237)	0.565*** (0.202)
<i>Unemp Spouse×Female</i>	0.352 (0.303)	-
<i>Number Children</i>	-0.270 (0.225)	-0.285 (0.225)
<i>Number Children×Female</i>	0.441** (0.210)	0.430** (0.209)
<i>Experience</i>	-0.057* (0.034)	-0.027 (0.022)
<i>Experience×Female</i>	0.050 (0.043)	-
<i>Experience<sup>2</sup></i>	0.0004 (0.0005)	-
<i>Experience<sup>2</sup>×Female</i>	-0.0005 (0.0008)	-
<i>Higher Educ</i>	-0.607*** (0.220)	-0.504*** (0.151)
<i>Higher Educ×Female</i>	0.172 (0.292)	-
<i>m(age)</i>	-0.062 (0.050)	-0.069 (0.049)
<i>m(unemp spouse)</i>	0.384 (0.327)	0.384 (0.327)
<i>m(number children)</i>	-0.058 (0.234)	-0.039 (0.235)
<i>m(experience)</i>	-0.054 (0.026)	-0.050* (0.026)
<i>Unemp<sub>0</sub></i>	2.730*** (0.235)	2.756*** (0.238)
Constant	-3.815 (0.565)	-3.678 (0.502)
Sigma_u ( $\rho$ )	0.948 (0.473)	0.963 (0.481)
Log likelihood	-692.917	-694.628
Wald Statistic	300.97	295.02
p-value	0.000	0.000
Sample size	3095	3095
LR test statistic - $\chi^2$ (5)	-	3.42
p-value		0.364

Notes:

- Standard errors are in brackets.
- Both models contain year dummies for 2011, 2012 and 2013 and, additionally, controls as specified by the Mundlak device identified in the table as *m(.)*.
- Significance levels: \*10%, \*\*5%, \*\*\*1%.