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**GENDER SEGREGATION IN THE EUROPEAN
LABOUR MARKET:
TRENDS AND DETERMINANTS**

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Abstract

The paper analyses the gender gaps in participation, employment and type of occupation (part-time and temporary contracts) identified in 15 European labour markets. The analysis, based on ECHP, EUSILC and OCSE data, demonstrates the significance of gender as a determinant for the differences observed across genders in labour market outcomes. The gaps are found to vary over time: participation and employment gaps show a closing trend while part-time and temporary gaps are widening. Among the individual and household characteristics, presence of children in the household, level of education and age cohort appear to exert different effects across genders. Welfare regimes appear to play a significant role as well: the social democratic model appears to be more efficient in achieving high female employment and smaller part-time gaps. On the contrary, southern models are characterised by larger employment and temporary gaps. Among the macro policy and institutional determinants, childcare subsidies, parental-leaving schemes, active and passive labour market policies and employment protection legislation are found to have considerable impacts on the identified gender gaps.

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GENDER SEGREGATION IN THE EUROPEAN LABOUR MARKET: TRENDS AND DETERMINANTS

Introduction

Over the last two decades, many European countries experienced great progresses for what concerns women's integration in the labour market. Driven by the major cultural and demographic changes occurred in our society and supported by the appointment of coherent national and international targets (i.e. Lisbon 2000), female workforce participation and employment have both increased. Evidence shows that participation rate has gone from around 55% in 1990s to more than 66% in 2008. This trend was almost duplicated by the employment rate, which increased from 49% to 61%. Such a steady improvement in women's position in the labour market has ultimately had a significant impact on the gender employment gap that nearly halved from 25% in 1990 to 14% in 2008 (Cipollone *et al.*, 2012).

In the same decades, most of the European countries experienced a trend of substantial deregulation of the labour market. This led to an exponential increase of "atypical" jobs, a definition including heterogeneous job arrangements such as part-time jobs, temporary and seasonal/casual jobs (Booth *et al.*, 2002, A). Evidence has shown that women are overrepresented in atypical jobs in at least 15 EU countries¹ (Petrongolo, 2004). As the incidence of atypical jobs may systematically differ across genders, systematic features of these non-standard contractual arrangements may be a factor of gender segregation in the labour market (*ibidem*).

Part-time work may represent, especially for women, an interesting opportunity to combine paid work and family commitments. Sometimes, however, part-time might represent a form of underemployment, to the extent that it coincides with lower wage than comparable permanent jobs. Similarly, even temporary contracts have a potential double-sided nature. On the one hand, firms may use them as a useful tool to screen incoming workers and as *stepping-stones* towards permanent contracts. On the other hand, they may be also used to hold a buffer stock of employees with low level wages and lower human capital accumulation to be discharged at low cost in case of adverse economic circumstances (Booth *et al.* 2002, B).

¹ Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, the Netherlands, Portugal, Spain, Sweden, United Kingdom.

The objective of this paper is to identify and test the main micro and macro determinants of labour market performances in order to shed light on the factors that affect the observed gender gaps.

The paper is organised as follows. Section 1 briefly reviews the evolution over time of the four gender gaps considered and introduces the theoretical framework for the analysis of the across-gender heterogeneity in the labour market outcomes. Discussing different models and empirical evidence from previous literature, the section identifies the main determinants of female labour market participation and employment. For what concerns the micro-level determinants, family ties, education and age cohorts are considered. The macro-level determinants analysed are social policies and labour market institutions. The policies considered are subsidies to households with children, parental leave and subsidies to elderly population. Among the institutions, we consider active and passive labour market policies and the degree of employment protection legislation (EPL).

Section 2 describes the data used for the empirical analysis. Section 3 describes the econometric model used (probit regression model) and presents the specifications modelled to test the significance of micro and macro determinants of the four gender gaps over time and across welfare regimes. There follow the results of the probit analysis. Section 4 concludes.

1. Literature Review

The aim of the following chapter is to provide the reader with a review of the ample literature produced over past decades on the subject of female labour market performance. The issue is a vast one and presents plenty of research subareas. In addition, since the topic was already of the utmost relevance more than forty years ago and as it has gained more and more importance since then, research in this field has experienced an evolutionary pattern, focusing attention on ever new research questions and methods. The review that follows aims to be complete and comprehensive but also wants to present the previous literature in a manner consistent with the specific thesis examined. The chapter is divided in three sections. Section 1.1 reviews the main demographic determinants of female preferences towards work and goes through their evolution in the last decades, focusing on their effects on female labour market outcomes. The section presents evidence that the outcome of past labour market developments in Europe is consistent with a certain degree of gender segregation. Section 1.2 reviews the academic literature produced on segregation and discrimination. More specifically, it presents the

classical definition of discrimination as “unexplained residual”, introduces two theories of discrimination and points out the main limitations of the definition used. Finally, section 1.3 introduces the macro level determinants of women’s employment choices.

1.1 Historical framework and preferences

Traditional economic literature on women’s employment has been mainly concerned with the quantitative side of women’s labour market performance compared to men. This stream of literature mainly focused on the microeconomics-based cost-benefit analysis of the choice between paid labour and unpaid housework. Neoclassical models design the individual choice of labour market participation as a utility maximisation problem. The individual maximises his utility choosing a particular consumption-leisure combination. According to this family of models, the individual supplies hours of labour up to the allocation of time that makes him indifferent between an extra hour of paid work and an extra hour of leisure.

A related line of reasoning introduces the so called “home production model”, developed by Becker (1965) as an extension of the neoclassical utility model. In the home production model, family utility depends on the consumption of “basic commodities”, obtained combining market goods with home production of goods and services. The latter includes taking care of children. Thus, together with time spent in the market and leisure time, an additional use for time is introduced: home production time. Productivity in home production can vary across family members. According to the home production model, housekeeping and family-care may negatively influence labour market participation of the spouse who has a relative advantage in home production and a relative low wage (Cigno, 1991). The concept of home production is crucial to explain the historical weaker attachment of women to the labour market as, traditionally, it is considered a better alternative to labour work for women than for men. This is consistent with the ample evidence showing that the elasticity of female labour supply to the market wage is higher, especially for married women.

Children further increase the elasticity of female labour to market wage. The reason for this stems from the fact that housekeeping and family-care duties increase female reservation wage. Reservation wage is defined as the lowest wage rate at which a worker would be willing to accept a particular type of job. Supplying additional labour to the market is worthwhile only

as long as the wage earned is high enough to make up for the lost home production that the household with a working woman had to outsource.

This framework is consistent with the empirical evidence showing the existence of a negative relationship between family ties and female participation to the labour market. Cipollone *et al.* (2012), show evidence of this relation in their micro-based multivariate probit regression analysis for 15 European countries. As female labour supply is very sensitive to policies and institutions, countries were clustered by welfare regime after Ferrera's (1996) classification². When compared to the labour market performance of single women, Cipollone *et al.* (2012) find that being in couple has a statistically significant negative effect on both female activity and employment rates. From the interaction of the variable *married* with each welfare regime, it emerges that marital status has a stronger negative effect on female activity and employment rates in those countries characterised by a more traditional family structure, as that rooted in continental and southern countries. The presence of children in the household has a negative effect on female labour market involvement regardless of the welfare regime. Indeed, women with young children have a statistically significant lower probability of been active and employed than their equivalents with no children. The effect is significant for children of all ages, from 0 to 14. However, the magnitude of this impact differs considerably among welfare regimes. The age of the youngest child has its most critical effect in the UK, while it has a substantially lower impact in southern countries. This may be explained by the differences in demographic and labour force composition and by the welfare-specific policies and institutions. Female participation in southern countries is traditionally low. This means that the women who participate are, on average, highly educated and thus more strongly attached to the labour market than their equivalents with lower education levels. Moreover, southern countries still enjoy extended structures of families, in which relatives can take care of children, allowing mothers to continue to work. Thus, family networks replace the public childcare services that are generally not sufficient to meet the large demand. Finally, the higher degree of labour market rigidities in the southern countries makes harder for women who temporarily exited the labour market to be reintegrated to the position they previously held. This further

² The four groups are: liberal countries (the UK), continental countries (Austria, Belgium, Luxembourg, the Netherlands, Germany, Ireland and France), democratic (or Nordic) countries (Denmark, Sweden and Finland) and southern countries (Greece, Spain, Portugal and Italy).

strengthens their labour market attachment, thus reducing the children's negative effect on women's labour market involvement (Cipollone *et al.*, 2012).

1.1.2 1960s – 1990s: the decrease in participation and employment gaps

Recent research has emphasized the major role that cultural developments towards female employment have played in changing women's labour market performance. In particular, cultural norms about gender roles and welfare are considered partly responsible for the notable increase of female employment occurred in the OECD countries between 1960s and 1990s.

In this context, the steadily increasing level of education achieved by women since those years has played a major role in these progresses. As Klesment and Van Bavel (2015) point out in their EUSILC based analysis, while men have historically reached higher education levels than women, the education gender gap has closed and even reversed in many countries. Until the second half of the twentieth century, most part of university college students were males and their enrolment and completion rates were higher than female rates almost everywhere. According to Schofer and Meyer (2005), however, male domination of higher education has ceased and since the 1990s women enrolled in higher education worldwide are more than men. Moreover, in many OECD countries, women are now not only outnumbering men in college level education, but they are also performing better and graduating more successfully (Vincent-Lancrin, 2008).

As a matter of fact, in many OECD countries, the wife now typically has as much as or more education than her husband, while it has always been the other way around in the past. With the expansion of female participation to college level education over the course of the 20th century, educational hypergamy (women marrying someone with a higher level of education) has been widely replaced by educational homogamy (marriages between people with equivalent academic achievements). This has deeply mined the traditional male breadwinner model, which had in the male predominance in education a fundamental pillar (Klesment and Van Bavel, 2015).

Higher education significantly increases the potential salary for working women, strengthening their attachment to labour work. Although the actual direction of causality is hard to identify, higher education level has likely redesigned women's choices about fertility and labour supply. Highly educated women with a sizeable potential salary in the labour market

have a higher opportunity cost of staying at home to take care of house and children than less educated women with a worse earning perspective have. Thus, as shown in Cipollone *et al.* (2012), highly educated women have a statistically higher probability of being active and employed than low skilled ones. Once again, welfare regimes – and the policies and institutions associated - play an important role in shaping female labour supply decisions. Medium and high skilled women have a probability of being active and employed that is statistically higher in liberal countries (UK) than in democratic, continental or southern ones. Overall, however, the relation between female higher education and activity and employment outcomes exhibits a significant positive trend (Cipollone *et al.*, 2012).

Dolado *et al.* (2002) analyse the role of female educational attainments in relation to female participation and employment figures making a comparison between the trend in Europe and US. The datasets used are the 1999 European Labour Force Survey (Eurostat) for Europe and the 1999 Current Population Survey (March Supplement) for the US. From the analysis it emerges that the relation between education and employment status heavily depends upon age cohorts. A more detailed decomposition of employment rates in Europe, controlling both for education level and age cohort, shows evidence that the gender gap relative to the youngest cohort (16-24) with tertiary level education is close to zero. The gap, however, widens for the same age cohort having less than tertiary level education. Overall, the gap is increasing in the age cohort and decreasing in the level of education. Therefore, according to the evidence presented by Dolado *et al.* (2002), the gender gap reaches its maximum amplitude for the 55-64 age cohort with less than tertiary education.

Overall, the combination of behavioural and demographic changes points towards evidence of a shrinking activity and employment gap among genders. Cipollone *et al.* (2012), borrowing from Vigdor (2008), build up an indicator to measure the difference between men and females in Europe, controlling for a set of individual characteristics. The activity rate, employment rate and the type of contract (temporary vs. permanent and part-time vs. full time) are used as indicators of labour market performance. Such indices can be interpreted as dissimilarity indices ranging from 0 to 1, with dissimilarity reaching its maximum at 0. The indices allow to distinguish between demographic changes and behavioural changes that reflect the demographic trends. More specifically, the activity index, capturing the differences between men and women outside the labour market, reflects the behavioural trends coming from the supply side of the labour market. The employment index, instead, measures the gender

difference in the labour market performance and is more likely to capture those behavioural trends coming from the demand side. Indices for the type of contractual agreement (temporary and part-time) are also included to shed further light on employment differences (Cipollone *et al.*, 2012). For the analysis, Cipollone *et al.* (2012) use a joint micro dataset obtained merging ECHP data (1994 – 2001) and EU-SILC data (2003 – 2009). The trend followed by the micro-based gender gap indicators is examined individually for each of the 15 European countries³ involved. Interestingly, results show a trend common to most part of the countries. The picture is that of a shrinking gender gap for both participation and employment rates. Interestingly, however, Cipollone *et al.* (2012) find evidence of a marked increase in the female labour market participation, which does not correspond to a similarly significant increase in employment rates.

1.1.3 1990s – today: the increase in temporary and part-time gaps

In the same paper, Cipollone *et al.* (2012) make a second interesting finding, showing that the part-time and temporary gender gaps have both considerably increased between 1994 and 2009. Further investigation concerns the analysis of the correlation between female activity rates and type of employment. Institutional frameworks are clustered into the four Ferrera's (1996) welfare regimes. Three specifications are used in the study: the first relates activity rates to indicators of temporary contracts, the second relates activity rate to the part-time indicators and the third one includes both indicators simultaneously. The analysis shows that, in southern countries - historically characterised by lower female employment levels - an increase in female labour market participation is related to an increase in temporary contracts. For what concerns the part-time indicator, there emerges a negative and significant association in all welfare regimes except than in the liberal UK. This indicates the existence of a clear labour market heterogeneity across countries. In those countries characterized by high women's participation levels (e.g. UK), a positive trend in female activity rates is associated with an increase in permanent employment. In the other European countries instead, the trend brings women to hold lower quality jobs. Decomposing the trend by age cohorts and education levels, it finally emerges that the effects seem to be driven by prime age (25-54) and less educated women.

³ The 15 countries analysed are: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.

In synthesis, empirical evidence shows that, alongside a substantial reduction of activity and employment gender gap, temporary and part-time gaps are widening. The fact is very significant and is the subject of numerous studies.

1.1.4 Systematic features of atypical jobs

Preliminary to any analysis concerning “atypical jobs”, it is necessary to clarify the distinction, inside the category of temporary jobs, between fixed-term contracts and seasonal/casual jobs. Following Booth *et al.* (2002, A) definition, fixed-term contracts are contracts concerning a job that could, in principle, be held on a permanent basis. This feature distinguishes them from seasonal and casual contracts, for which the nature of the job itself is temporary. For the remaining part of this thesis, we will refer to temporary contracts meaning their fixed-term component, as it is the *locus* where systematic gender segregation from the demand side is more likely to have a systematic effect.

Temporary contracts are a tool commonly used to enhance the labour market flexibility. When a firm discharges temporary workers, it generally incurs in a lower amount of liquidation and restrictions than when it discharges permanent workers. The reason is that permanent employment is covered by a higher degree of employment protection. This explains why, over the last decades, the share of temporary employment has dramatically increased in countries characterised by rigid employment protection legislations (e.g. France, Italy, Spain) while it has remained fairly low and constant in those (e.g. UK) with relatively lower degree of employment protection regulations. In their UK based analysis, Booth *et al.* (2002, A) find evidence that temporary works are generally less desirable than equivalent permanent contracts. In fact, temporary contracts are generally associated with lower job satisfaction, lower wages and lower investment in specific human capital. Booth *et al.* (2002, A) formulate two hypotheses to explain why firms may provide temporary contracts to their workforce and what are the consequences in terms of female employment. First, there may be arrangements in which it is unlikely that the temporary contract will be then transformed into a permanent contract. This happens when the firm wants to hold a buffer stock of employees to be discharged at low cost in case of adverse economic conditions. These jobs are associated with almost no investment in specific human capital accumulation, since this investment would be inefficient for both employers and employees. Therefore, such contractual arrangements may be attractive for those

categories of workers who have a lower probability to be willing to continue their career in the firm. This includes young, single individuals who are still uncertain about their career choices. For women, as Booth *et al.* (2002, A) point out, this affinity may be even higher since they traditionally have higher probability of non-market employment. Second, fixed-term jobs may serve as an effective tool for firms to screen incoming workers at relatively low cost. In this framework, firms offer permanent contracts to workers that are already known to have high ability, while they offer fixed-term contracts, which may be later renewed as permanent contracts, to those workers about whom the firm is unsure. Again, women may be more willing to defer investment in specific human capital – even for high ability individuals – because they have better non-market opportunities. Hence, Booth *et al.* (2002, A) suggest that, in the UK, women are more likely than men to voluntarily sort into fixed-term contracts, especially prime-age cohorts.

In the second part of their research, Booth *et al.* (2002, A) provide empirical results about job satisfaction of workers employed in fixed-term contracts in comparison to those employed in permanent contracts. Despite its measurement difficulties, job satisfaction has been proven to be a useful tool to give insights on many labour market aspects, through its correlation with effort, productivity and separations. The analysis of Booth *et al.* (2002, A) controls for several individual and workplace characteristics⁴. As regressions use data from the British Household Panel Survey, their results are UK specific. As we have already shown, the British labour market has some specific features that distinguish it from the majority of the other European countries. However, as the UK is often used as a benchmark for other EU labour markets, it is interesting to shed further light on its labour market related figures. For what concerns fixed-term jobs, results show that they are associated with statistically significant wage penalty and with low satisfaction with job security and promotion prospects. These evidence about job dissatisfaction of temporary workers is consistent with the existence, alongside with voluntary sorting, of a share of involuntary sorting in temporary jobs.

⁴ The control variables included in the regressions are: cohort of entry into the labour market (5 dummies), disabled, region of residence (6), industry (6), firm size (7), number of full time and part-time jobs ever held at the start of the panel, marital status (2 dummies), age-marital status interactions (2), number of (marital or cohabiting) partnerships, and cohort of partnership (3).

1.1.5 Evidence of gender segregation and hypothesis of gender discrimination

The incidence of involuntary sorting in fixed-term contracts (but even more in part-time contracts) among European women is an interesting topic with important policy and institutional implications. Hence, it has been the subject of several studies. An analysis that stands out among the others for its direct approach to the issue is that carried out by Petrongolo (2004), who expands the research field to comprise both types of atypical contracts.

Using micro data from the ECHPS and aggregate data from Eurostat, Petrongolo (2004) presents evidence of gender employment segregation in 15 EU countries. Recalling how, in the last decades Europe has witnessed a dramatic growth in the use of “atypical” or “non-standard” contracts, Petrongolo (2004) remarks the importance of understanding the incidence and characteristics of such contractual arrangements to interpret the recent labour market developments. Embracing the Booth *et al.* (2002, B) framework, temporary contracts are recognised to have a potential double-sided nature. On the one hand, firms may use them as a useful and effective tool to screen incoming workers. In this guise, temporary contracts represent *stepping-stones* towards permanent contracts. On the other hand, they may be also used to hold a buffer stock of employees with low level wages and lower human capital accumulation to be discharged at low cost in case of adverse economic conditions (Petrongolo, 2004).

More interesting, however, is the relation between female employment and part-time work. Part-time jobs may represent a valid opportunity to combine wage work with out of the market activities. This type of contract entails potential benefits especially for women, allowing them to conciliate paid work and family commitments. Sometimes, however, part-time might represent a form of underemployment, to the extent that it coincides with lower wage than comparable permanent jobs (*ibidem*).

Petrongolo (2004) examines whether, *ceteris paribus*, European women are more likely than men to be segregated in atypical jobs. Following Altonji and Blank (1999), discrimination is defined as the residual difference in labour market outcomes that cannot be explained by differences in preferences and productivity across genders (*ibidem*).

Petrongolo (2004) distinguishes between part-time and temporary work incidence. Defining part-time as jobs in which the employee works less than 30 hours a week, the author finds that part-time incidence is significantly higher for women in every country considered. On average, women are more likely to work as part-timers in central and northern Europe,

whereas no geographical pattern can be distinguished for men. Interestingly, there is evidence of a negative cross-country correlation between part-time incidence and involuntary part-time. In other words, for part-timers of northern and central Europe, part-time is less likely to be perceived as involuntary than it is in the south. The result is strong especially among women.

The statistics on temporary work incidence show that women are generally over-represented also in these positions. The incidence of temporary work, however, depends more on cross-country differences than on gender. The same result holds for figures concerning the share of involuntary workers.

The next step of Petrongolo (2004) research consists in the estimation, through multivariate probit analysis, of the probability of women relative to men to work part-time, to be an involuntary part-timer and to hold a temporary job. These estimations are made controlling for a number of individual and job characteristics. The control variables used encompass: age, education, occupation, sector and year dummies, family composition of workers and previous unemployment spells. The effect of family characteristics is allowed to differ across genders, to capture the component of employment status that may be explained by the different family commitments of the two genders. The estimations also include controls for the existence of an unemployment spell just prior to the current job. This follows from the fact that women may experience more frequent non-employment spells than men, and atypical contracts may be used as stepping stones from non-employment into permanent employment (Petrongolo, 2004). This reasoning is consistent with evidence presented by Booth *et al.* (2002, A), among the others. The method estimates the equations of interest for women and men belonging to three different demographic groups: single individuals with no kids, married individuals with no kids and married individuals with small kids (meaning at least one aged 0-2 and at least one aged 3-5). Even though these groups do not represent an exhaustive sample of the whole population, nevertheless they are suitable for estimating the average across gender differences and what part of it is explained by family ties and what part instead depends on gender alone.

The results show that, though women are overrepresented in part-time positions everywhere, in northern and central Europe this fact is largely explained by family ties (especially the presence of small kids) and it is generally not perceived by women as an involuntary segregation. The situation changes rather radically in southern Europe, where family ties lose much of their explanatory power (especially in France, Italy and Portugal) and

women are significantly more likely to be involuntary part-timers. This evidence is allegedly consistent with some degree of gender discrimination against women in southern European countries (Petrongolo, 2004). More generally, Petrongolo (2004) argues that, as there is no evidence that women are systematically happier than men on atypical jobs, the disproportionate representation of women in atypical jobs is not explained by differences in preferences across genders and may be an important factor of gender discrimination.

1.2 Segregation and theories of discrimination

As Petrongolo (2004) shows, European women are overrepresented both in part-time and temporary employment. Hence, despite the positive trends detected for the activity and employment indicators, is not appropriate to talk about an overall improvement in women labour market outcome. There is, indeed, objective evidence supporting the theory of gender segregation in the European labour markets. We may note here, however, that there is substantial difference between gender segregation and gender discrimination.

Though many scholars (see Biblarz *et al.*, 1996 among others) have argued that gender labour market segregation is caused by gender discrimination, occupational segregation is defined as the *distribution* of people based upon demographic characteristics, most often gender, both across and within occupations and jobs (Bergmann, 1981). Therefore, gender segregation in the labour market can even arise from factors different than discrimination. First, men and women may differ in their market and non-market human capital and productivity. This may lead them to have different competitive advantages across occupations. Second, genders may also have different preferences about job characteristics. The residual difference in labour market outcomes that cannot be explained by differences in preferences or productivity across categories of workers (in this case genders) would be allegedly consistent with employers' discrimination (Altonji and Blank, 1999).

1.2.1 Discrimination as unexplained residual

The aforementioned theory is also known as the “preferences/human capital” hypothesis. In this framework, discrimination is the residual difference that cannot be explained by these factors. This theory has been widely spread in the economic labour field and it is at the basis of

several studies on the female labour market performance, among the others Petrongolo (2004). Hereafter we are going to spend further attention to characterise the factors that may determine gender occupational segregation.

1.2.1.a Preferences

The distribution of preferences concerning job characteristics across demographic groups leads to different labour force participation, occupational and wage distribution across them (Altonji and Blank, 1999). When we consider female supply of market labour, there are several individual characteristics affecting this choice. Presence of children in the household, marital status, age and age cohort are just some of the elements that may influence the decision between market and non-market labour. A major issue concerns the identification of the source of different preferences across demographic groups. In other words, there is the concrete risk of simultaneous causality between female preferences and pre-labour market discrimination, which may shape preferences of young females so that they will be comfortable with traditional roles once they are grown up (Altonji and Blank, 1999).

1.2.1.b Comparative advantage

In a competitive economy, differences in comparative advantage among individuals will influence their allocation of time across occupations and between market and non-market work (Altonji and Blank, 1999). Some scholars, as Becker (1965) and Mincer *et al.* (1974), pointed at the biological predisposition of women to reproduction as the source of women comparative advantage in domestic production. This theory had a core importance in the past, as men had a comparative advantage in labour market, as physical force played a predominant role in labour market activities.

It is widely recognised that investment in specific labour market human capital has a lower value for those individuals who expect to spend more time outside the labour market (e.g. women). According to Altonji and Blank (1999), in the last decades we have witnessed a steady decline of fertility rate, marriage rate and marriage duration, together with an exponential increase of the service sector, in which physical strength is not required.

Therefore, according to this school of thought, this trend would reduce the impact of the biological comparative advantage and lead to a change in women approach to the labour market. This would result into a gradual convergence in educational and career choices, with women undertaking historically male patterns (Altonji and Blank, 1999). This prediction is consistent with the evidence presented in the previous sections.

1.2.1.c Human capital investment

Differences in human capital investment is an issue closely related to the comparative advantage across genders. The return on market-specific human capital investment is higher for those workers who plan to stay longer in the labour market and are not expected to exit. According to the theory of demand for human capital, the decrease in fertility rate and in the average family size would predict an increase of demand for human capital by women, as well as a shift of women education towards areas of interest typically dominated by men (Altonji and Blank, 1999).

1.2.2 Theories of discrimination

Discrimination is defined as the unequal treatment among equally productive workers based on an observable characteristic that can be race, ethnicity but also gender.

Following Altonji and Blank (1999), economic models of discrimination can be divided into two major categories: competitive models and collective models. Collective models emphasize the discriminatory action of a majority group against a minority one, often using the legal system or institutional constraints as enforcement mechanism. These models are discussed especially by peripheral streams of labour economic literature. Most part of labour economic literature, instead, has focused its research on competitive models of discrimination, in which agents act individually. Competitive models outline two major types of discrimination. The first one is taste-based discrimination, where the discriminating agent has some prejudice against members of minority groups and against interacting with them. The second is statistical discrimination and is characterised by the concept that the discriminating agent has imperfect information about the skills and behaviour of the minority group members. We will now discuss these two theories with more details.

1.2.2.a Taste-based discrimination

The model of taste-based discrimination has been codified as early as 1971. Becker (1971) develops a comprehensive model of taste-based discrimination according to which discrimination may come from employers, employees or even consumers. For the purpose of our analysis, however, we shall consider the first case only. In fact, we are considering involuntary gender segregation and consumers are not a core part of the analysed framework.

Becker (1971) codifies prejudice as a taste for discrimination. The framework is that of employers belonging to group A, who are prejudiced against members of the minority, group B. Employers maximise a utility function given by the difference between revenues earned on the market selling the value produced by workers, minus the cost of employing them. The general case is captured by the following formula:

$$U = pF(N_A + N_B) - w_A N_A - w_B N_B - d N_B,$$

where p is the price level, F is the production function, N_x is the number of workers belonging to group $x=(A,B)$ and w_x is the wage paid to members of group x . For prejudiced employers is like if the cost of hiring a worker belonging to group B is augmented by a factor d , called coefficient of discrimination (Altonji and Blank, 1999).

Booth *et al.* (2002, B) adapt this framework of employers' discrimination to the specific case of gender discrimination. In this model, firms that have a taste for discrimination perceive women as less productive than men by a factor d . Prejudice against women is one of the reasons that Booth *et al.* (2002, B) propose to explain the disproportional representation of women in temporary jobs. The firm invests in human capital accumulation of its permanent workers and this training has a high firm-specific component, which raises workers' productivity. The model assumes that the prejudice is firm specific, so that prevailing market wages are the same for males and females. Given these assumptions, the firm would hire men in permanent positions and women in temporary ones to maximise the productivity of its bunch of workers, given that the firm perceives men as more productive than women by the factor d (Booth *et al.*, 2002, B).

Altonji and Blank (1999) extend the framework of taste based discrimination as to include the case in which the disutility the employer derives from hiring a worker of group B

depends on the position held by the worker. This particular prejudice configuration, they argue, may lead to a theory of occupational segregation.

This nexus has been emphasized by Booth *et al.* (2002, B), in a model in which trained permanent workers earn rents, temporary do not. In this case, even if women are considered as productive as men, managers having prejudice against women can arbitrarily decide to assign rents to men, thus hiring men as permanent workers and women in temporary jobs. Thus, according to Booth *et al.* (2002, B), a second reason to explain women over-representation in temporary jobs lies in the deliberate discrimination of employers with perfect information about workers' productivity.

1.2.2.b Statistical discrimination

After the impact of pioneering papers as Phelps (1972) and Arrow (1973), labour economic literature has shifted its attention to the analysis of the effects of statistical discrimination by employers based on workers' observable characteristics, such as gender. The most innovative feature of statistical theory of discrimination is the assumption that employers have imperfect information about the skills and turnover rate of employees. This information bound acquires even greater importance in case of prime-age workers, who have no or limited working history from which employers may draw useful information to assess their profile as workers.

Under these circumstances, firms need to rely on observable characteristics, such as race and gender, to screen workers, basing decisions on a statistical correlation between belonging to a demographic group and labour market behaviour, after controlling for all the other information the firm has (Altonji and Blank, 1999). The framework of firms facing great uncertainty about future behaviour of their workers has been proven by several studies, Altonji and Pierret (1997) among the others. However, it is important to bear in mind that discrimination based on predictions about the worker's behaviour inferred from characteristics such as gender and race is still a form of discrimination, even if such predictions are statistically rational given the information available to the firm.

The "theories of statistical discrimination" is a label that gathers several literature sub-strands. These strands share a common interest for the long-term consequences of discrimination on the incentives for members of the minority (discriminated) group to invest in the acquisition of labour-market skills that may not be recognised and adequately remunerated

in the labour market due to a certain demographic membership. In other words, given a framework of diffused prior beliefs about the productivity of group members, stereotypes may become self-confirming.

This case was modelled, among the others, by Coate and Loury (1993). They assume two groups of workers, A and B, (majority and minority respectively) with members of the two groups having identical innate abilities. The model shows that, if firms have the prior belief that workers belonging to group B are less skilled than workers belonging to group A, in the long run there may be equilibria in which members of group B will effectively end up with lower ability than members of group A. This follows from the fact that, future generations of group B will likely internalize the effects of discrimination, thus modifying their decision to invest in human capital in a way that will confirm the *a-priori* stereotype. Therefore, we can talk about a feedback effect of employer's behaviour on the behavioural incentives of the minority group.

More recently Booth *et al.* (2002, B) related the issue of statistical discrimination with the evidence of women being disproportionately represented in temporary jobs. The framework is one in which firms can employ workers in either temporary or permanent positions. Permanent workers receive a firm-specific training, which increases their productivity, whereas temporary workers remain untrained. Booth *et al.* (2002, B) assume that there is an exogenous probability (δ) that a worker will leave for a non-market job after the firm has hired her and has eventually invested in her training (in case of permanent workers). Traditionally, women have better non-market opportunities than men. This is equivalent to say that the expected probability that the worker would leave the labour market is higher for female workers than for male ones. Given these premises, the firm minimises the expected loss from the eventuality that its workers leave the labour market (and the firm) if it hires men in permanent positions and women in temporary positions (Booth *et al.* 2002, B). Even if women may have a higher statistical incidence of labour market separations, it is nonetheless unethical to discriminate workers on the mere basis of their gender.

1.2.3 Caveat on interpreting the unexplained gap as evidence of discrimination.

The standard definition of gender discrimination as the residual difference that is not explained by personal and job characteristics is widely used in labour economic literature. In their milestone paper, Altonji and Blank (1999), though focusing on gender wage gap, draw attention

to the limitations of this model in identifying discrimination. In other words, though a large unexplained residual is consistent with discrimination, it does not represent a direct test for it. Discrimination, defined as the unexplained gap, is susceptible to both underestimation and overestimation (Altonji and Blank, 1999).

1.2.3.a Underestimation

If discrimination affects preferences and human capital investment decisions of the minority group, then the unexplained gap definition will underestimate discrimination because some of the control variables are themselves affected by discrimination. Therefore, simultaneous causality threatens the internal validity of the estimation. Under these circumstances, the resulting estimation may represent a lower bound for the actual extent of gender discrimination in the labour market.

For what concerns the endogeneity of controls, we have already explained how expected labour-market discrimination may affect decisions to invest in human capital. It is only in more recent times that economists started to look at gender differences in terms of preferences and psychological traits as a potential explanation of gender differences in labour-market outcomes (Azmat and Petrongolo, 2014).

Measuring preferences through observational data is extremely difficult. Experiments, instead, offer methodologies for the study of behavioural and strategic interactions in controlled environments. Since then, researches in the field proliferated. The hypothesis is that, if differences in preferences are systematically correlated to gender and if they pertain areas that are potentially correlated with market success, then preferences may explain a significant proportion of the gender gap in labour market outcome (ibidem).

Azmat and Petrongolo (2014) report experimental evidence concerning preference towards risk, competition, salary bargain and other-regarding attitudes. All these areas are correlated with market-success, which they measure in terms of wage. According to the findings of numerous experimental studies, these preferences are also significantly correlated with gender. Results show that, on average, women are more risk-averse than men⁵, more prone than

⁵ Eckel and Grossman, 2008; Croson and Gneezy, 2009

men to avoid competition, less likely than men to start competitive negotiation for their compensation and, finally, also more sensitive than men to equity considerations and altruism⁶.

While experimental evidence suggests that men and women differ significantly in preferences that are potentially related to their performance in the labour market, the causes of these differences are not entirely understood. On this purpose, there are two main explanatory hypotheses considered: nature and nurture.

On the nature side, the influence of physical differences across genders has considerably decreased, following the progresses in contraception and child rearing, and due to the shift of market-required skills towards brain skills. A more subtle issue concerns the impact that brain structure and sex hormones may have on preferences affecting labour market results. Several researches have produced evidence of a significant correlation between sex hormones and gender behaviour (Azmat and Petrongolo, 2014). Nevertheless, they are mostly non-experimental researches, hence subject to the potential bias of non-observable determinants of behaviour.

On the nurture side, the hypothesis is that preferences are shaped by education, household and society (Azmat and Petrongolo, 2014). Within a lab experiment setting, Gneezy *et al.* (2008) analyse the gender attitude towards competition in a patriarchal and a matrilinear society. The resulting evidence of symmetric gender gaps is consistent with the conclusion that different attitude of men and women towards competition may not derive from biological differences but rather from nurture. Similar results holds for gender attitude towards risk. Though these results are significant blocks towards the recognition of nurture as a shaping factor of preferences, they are not definitive and the question as to the source of preferences across genders remains still open (Azmat and Petrongolo, 2014).

1.2.3.b Overestimation

Parallel to these arguments supporting underestimation of discrimination, the “unexplained gap” definition entails another *caveat*, as it leaves room for overestimation of discrimination as well.

⁶ Croson and Gneezy, 2009

Altonji and Blank (1999) elaborate the concept in relation to gender wage gap. Since the controls used in the regressions specifications are *only very crude proxies* to measure skills, ability and experience, there may be omitted variables related to human capital and preferences that are correlated with wages. In this case, the unexplained gap measured would be an overestimation of the discrimination effect on market outcomes. The gap, indeed, would capture both the effect of discrimination and of the omitted variables. The omitted variables may be unmeasurable or unmeasured productivity variables that are observed by employers but are not included in the regression specification.

The two caveat exposed in this section – impact of pre-market discrimination on individual characteristics and non-measurability of some workers' characteristics that are observed by the employer – are two important weaknesses of the regression approach to analysis of gender discrimination in the labour market. In the first case the regression would control for too little whereas in the second case it would control for too much (Azmat and Petrongolo, 2014).

The natural response to these limits of regression analysis was the use of experimental frameworks. The most widely used typologies of experiment are audit studies and control studies. Though experiments may be of different typologies and each typology presents peculiar strengths and weaknesses, they all allow researchers to perform regressions with a generally higher degree of control on individual characteristics. Studies performed with experimental approach find far more limited evidence of discrimination against women in the marketplace than it emerges from regression analyses. Different results from the two approaches may be driven by systematic gaps in unobservables in favour of men, which may bias the unexplained gap (Azmat and Petrongolo, 2014).

1.3 The macro policy and institutional determinants

An extensive branch of literature on the topic has analysed the role of policies and institutions in shaping the female labour market performance. There is a large consensus on the fact that policy and institutional determinants play a key role in shaping women's working decisions. This section presents those determinants that are more significant for our analysis.

1.3.1 Institutions

Following Cipollone *et al.* (2012) classification, we presents three major institutional labour market determinants that affect female labour market performance, i.e. active and passive labour market policies and employment protection legislation.

1.3.1.a Active labour market policies

Active labour market policies aim to foster labour market mobility, offering incentives to workers to allocate themselves in productive activities and to unemployed to find a new job (Armingeon, 2007). In the Boeri and Van Ours (2013) definition, active labour market policies are measures enabling labour markets to overcome market failures (e.g. generous welfare states) that lower incentives to join the active population.

The effects of these policies are measured using the Beveridge curve, also named UV-curve, as it represents the relationship between unemployment and job vacancy rates in an economy. The curve has a hyperbolic shape and captures the negative relationship between unemployment and vacancies, as higher unemployment rates are generally associated with lower job vacancies. The position of the curve in the graph depends on the overall degree of efficiency of the labour market. The unemployment-vacancies ratio can be improved through the adoption of efficient active labour market policies that decrease unemployment rates for any level of vacancies.

Hence, active policies improve the labour market conditions through two channels: first, they increase the number of people looking for an occupation and, second, through education programs, they increase the average quality of the works found by unemployed (Boone and Van Ours, 2004).

Pissarides *et al.* (2005), Blau and Kahn (2007) and Cipollone *et al.* (2012) find a strong relation between low educated women and poor quality jobs. This effect is particularly pronounced in Southern and, to a less extent, in Continental countries. This relation may be explained with the higher incidence among women of part-time jobs, as they offer lower training opportunities, and, consequently, lower career prospects.

1.3.1.b Passive labour market policies

Passive labour market policies consist of two main typologies: unemployment subsidies and retirement schemes.

Unemployment subsidies are a form of income replacement supplied by the welfare state in case of job loss (Boeri and Van Ours, 2013). The criteria to access the subsidies, their amount (proportional to the wage earned by the worker when he was employed) and their duration are decided by the State. The net replacement rate captures the ratio between the amount of the subsidy net of taxes and of the net salary earned while working.

OCSE statistics presented in Boeri and Van Ours (2013) show evidence that unemployment subsidies schemes entail a general flattening in wage distribution: recipients whose salary exceeded the national average earn a smaller percentage than those who earned below the national average. Thus, unemployment subsidies increase reservation wage: this effect is stronger for those categories of workers with worse earning perspectives and significantly reduces their incentives to search for a new job (Boeri and Van Ours, 2013).

Another critical aspect of unemployment benefits concerns their duration. The interaction between time and devaluation of human capital due to long periods of inactivity makes it harder to re-enter the labour market and entails the risk of a non-reversible exit.

Layard, Nickell and Jackman (1991), using cross-sectional data for 20 OCSE countries, show evidence of a positive correlation both between unemployment rates and amount of subsidies and between unemployment rates and duration of subsidies. Hence, the amount of the subsidies should decrease over time to reduce the risk of moral hazard from subsidies recipients of not actively look for a new job.

Passive labour market policies favour the exit from employment of those categories of workers whose labour supply is more elastic to wage, e.g. women, young and elder workers (Bertola *et al.*, 2002). In fact, they all have relatively good alternatives to paid work: women may prefer home production, young may prefer education and elder worker may prefer early-retirement.

Coming to retirement schemes, the last decades have been characterised by a dramatic decline in elderly people's labour supply. Most part of EU pension systems used to offer great incentives to retire early and these incentives appear to be strongly and negatively correlated with labour market participation of elderly workers (Börsch-Supan, A., 2000). Early retirement schemes had been originally intended as an instrument to favour the entrance of young workers

in the labour market and the generational turnover. However, with the progressive ageing of population and advancements in medicine, many EU countries must urgently review their pension policies to prevent the collapse of pension institutions.

Bertola *et al.* (2002) found that pension schemes do not significantly affect the labour market performance of women, while they are significant for men as they expect higher pensions and remain longer in the market, widening the gender gap.

1.3.1.c Employment Protection Legislation

Employment protection legislation (EPL) includes all types of employment protection measures, whether grounded primarily in legislation, court rulings, collectively bargained conditions of employment or customary practice. Employment protection refers both to regulations concerning hiring (e.g. rules favouring disadvantaged groups, conditions for using temporary or fixed-term contracts, training requirements) and firing (e.g. redundancy procedures, mandated pre-notification periods and severance payments, special requirements for collective dismissals and short-time work schemes), legal constraints to layoffs and compensations (OECD, 1999).

In case of layoffs, the EPL entails a series of judicial proceedings that raise the cost of dismissal, thus making sometimes more convenient to leave workers in place. Boeri and Van Ours (2008) consider EPL as another form of protection against unemployment, in parallel with passive labour market policies.

According to OECD (2004), EPL produces two opposite effects on labour market: on the one hand, it protects existing jobs making more difficult and costly for firms to fire their employees; on the other hand, EPL reduces the probability of re-employment of unemployed workers. In fact, when deciding whether to hire workers, the employer foresees that future firing costs might be incurred, as in case of an economic downturn.

Over the past 15 years, OECD countries have followed a pattern of convergence in the strictness of EPL. Despite this convergence, the relative position of countries concerning EPL rigidity has not changed much and there exist still a large cross-country heterogeneity.

According to OECD (2004), this heterogeneity plays an important role in explaining cross-country difference in the labour markets. Indeed, convergence mainly consisted of a relaxation of EPL in countries where protective measures were particularly strict at the end of

1980s and, in most cases, these reforms were partial measures, affecting either temporary or permanent employment but rarely both. In particular, these reforms consisted in easing the use of temporary contracts while keeping the existing arrangement for permanent contracts unaltered.

The different degree of protection covering permanent rather than temporary contracts likely explains the increasing incidence of fixed-term contracts, especially for young and low-skilled workers, and the increase of a duality in the labour market (OECD, 2004). Indeed, a dual EPL may radicalise a two-tier labour market structure, strengthening the position of protected workers (*insiders*) while relegating temporary contracts to the dimension of low quality jobs used by firms as a form of employment adjustment (*ibidem*).

Literature has stressed the different effects that EPL may produce on employment outlooks of different demographic groups. According to OECD (2004), evidence suggests the existence of a negative relation between EPL and the employment rates of young workers and prime-age women, while little or no effects have been identified between EPL and employment rates of prime-age men.

Indeed, young workers and prime-age women are more likely to be affected by the downward pressure of EPL on hiring decisions as, in the case of prime-age women, they are more likely than men to frequently experience unemployment spells, particularly when trying to conciliate paid work with family responsibilities (OECD, 2002). Hence, there is evidence supporting the theory of a dual labour market, where employment opportunities of *outsiders* (mainly youth and women) are negatively affected by the reduced hiring by firms, while these categories are also less benefited by the reduced firings that EPL entails.

1.3.2 Policies

After the analysis of the main institutional determinants of female labour market outcomes, we now examine some of the social policies implemented by the State to encourage women's participation to the labour market. The selected policies are: financial help to households with children (childcare subsidies), parental leave and provision of financial help to elderly population.

1.3.2.a Childcare subsidies

Childcare is a term indicating all the services to take care and to supervise children, usually from age six weeks to age thirteen. The State may affect occupational choices of mothers providing subsidies and benefits that incentivise the use of childcare services.

Indeed, childcare subsidies reduce the cost to use the childcare services. Jaumotte (2003) discusses three cases in which the supply of childcare subsidies is particularly justified to raise female participation and employment. First, when the tax and benefit systems lower the incentives for women to supply work, childcare subsidies reduce the tax burden faced by working mothers. Second, when the wage structure is particularly flat, childcare services may not be affordable for mothers with relatively low wages. This follows from the fact that a downward compression of wage structure would lower the wage of mothers with respect to the wage of carers, thus making childcare services not affordable unless the subsidies are provided. Third, childcare subsidies play an important role when credit markets are not efficient. In fact, credit market imperfections (most commonly adverse selection and moral hazard) prevent women belonging to low-income households from borrowing against future earnings to afford childcare services and earn a market income (Jaumotte, 2003).

While childcare subsidies are generally recognised to boost female labour supply, two types of substitution effect may reduce their effectiveness. First, publicly provided childcare may substitute for privately afforded childcare services. Second, publicly provided childcare may substitute for informal childcare services by grandparents or other household members. Still, in the Jaumotte (2003) model, using panel data for OCSE countries between 1985 – 1999, childcare subsidies have a positive and significant correlation with the aggregate participation rate and the full-time participation rate of women.

A different reasoning applies to childcare benefits, defined as lump-sum transfers to households with young children to support their maintenance. The major effect produced by these benefits is an income effect that decreases the labour supply. Hence, from the point of view of female participation, childcare benefits appear to have a negative impact and, as such, are less preferable than subsidies (Jaumotte, 2003).

Results obtained by Bassanini and Duval (2006) confirm these relations: subsidies result to have a positive impact on employment rate of women from 25 to 54 years old while benefits have a negative impact.

European government overall expenditure on childcare subsidies and benefits differs considerably across welfare states. Nordic welfare regimes are more generous with families with children while Southern governments spend considerably less (Jaumotte, 2003).

1.3.2.b Parental leave

Another form of support the government gives to families with children consists of parental leave, which includes maternity, paternal and childcare leave. The effects on female employment are relevant as parental leave allows women to leave the job for a certain period while remaining employed and, for a sub-period of the leave, to earn the wage or a portion of it.

Jaumotte (2003) affirms that these leaves give a significant contribution to female participation as they facilitate conciliation of work and family care. However, while leave strengthens women's attachment to the labour market, there may be negative consequences on hiring, as parental leave is a cost for the employer.

In addition, extended parental leave may have long run negative consequences on salary and career prospects (Edin and Gustavsson, 2001) and may even make it difficult for women to reintegrate the labour market, especially at the position they previously held, as competences devaluate during prolonged states of inactivity (Ondrich *et al.*, 1998).

1.3.2.c Elderly subsidies

While literature has mainly devoted attention to the effect of maternity and childcare on working perspectives of women, another determinant of female employment may be identified with the presence of elderly relatives in the household (Gauten and Hagen, 2010).

With their cluster analysis and multilevel analysis across 21 European countries, Naldini *et al.* (2014) find that the welfare state provisions concerning elderly care influence the employment decision of women, especially mid-life ones. However, the effects of elderly-care responsibilities on female employment are less radical than those coming from childcare duties: only the 11% of women caring for an elderly parent change their employment decisions, mainly moving to part-time employment rather than completely withdrawing from the labour market (Naldini *et al.*, 2014).

Effects vary widely across countries, family cultures and welfare regimes. In Scandinavian countries, where elderly care services have higher coverage than the EU average, the effects are less pronounced than in Southern and Eastern European countries, where mid-life women face greater difficulties in remaining attached to the labour market (ibidem). Ultimately, together with family culture, the coverage of elderly care services is found to play an important role in influencing women's employment decisions (ibidem).

According to Cipollone *et al.* (2014), women's choice between paid work and unpaid care strictly depends on the relative comparison between wage perspectives and family care opportunities. Monetary support to elderly care - as cash benefits in general - increase the income of the household and raise female reservation wage, thus discouraging market participation of women with lower earning perspectives. As such, elderly care benefits may be negatively correlated with participation and employment rates of low-educated women.

2. The Data

2.1 Dataset

The dataset used results from the combination of both micro-data and macro-data from three different sources.

The micro-data component of the dataset combines the ECHP (European Community Household Panel) and the EUSILC (European Union Statistics on Income and Living Conditions) into a unique dataset that allows the observation of individual and household characteristics both across countries and over time.

The ECHP micro-data is a household survey conducted across the EU-15⁷ states under the supervision of Eurostat. The ECHP data range from 1994 to 2001. The first wave was collected across 12 states while Austria, Finland and Sweden joined in 1995, 1996 and 1997 respectively. The dataset includes information concerning both the individual and the household characteristics.

The EUSILC is the heir of ECHP. The dataset comprises information about the characteristics, living standards and social exclusion of both individuals and households.

⁷ Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.

Differently from ECHP, EUSILC includes the 25 EU member states. Of course, for consistency reasons, the data used here are those relative to the 15 EU states included in the ECHP and mentioned in the Ferrera's (1996) analysis. The waves used for the research in this thesis range from 2003 to 2009.

The macro-data component is a set of macro-policy and institutional indicators reported at the aggregate level for each of the 15 countries examined. The dataset is the one used in Cipollone *et al.* (2012) and includes six dimensions of cross-country heterogeneity, that, as described in the literature review, are expected to affect female participation and performance in the labour market. These variables are: the degree of employment protection legislation (EPL), passive and active labour market policies, subsidies devoted to elderly people, childcare subsidies and the extent of parental leave. Here it follows a brief description of these variables, as reported in Cipollone *et al.* (2012).

Table 1. Description of macro-policy and institutional variables

Category	Variable	Description	Source
Institutions	Active labour market policies	Sum of national expenditure (expressed as a percentage of GDP) in active labour market policies. It includes Training, Job Rotation and Job Sharing, Employment incentives, Supported employment and rehabilitation, Direct job creation and Start-up incentives.	Cipollone <i>et al.</i> (2012); OECD various years
	Passive labour market policies	Sum of public expenditure on measures of income support (expressed as a percentage of GDP) including: out-of-work income maintenance and support, Early retirement.	Cipollone <i>et al.</i> (2012); OECD various years
	Employment protection legislation	Synthetic index of employment protection which refers both to regulations concerning hiring (e.g. rules favouring disadvantaged groups, conditions for using temporary or fixed-term contracts, training requirements) and firing (e.g. redundancy procedures, mandated pre-notification periods and severance payments, special requirements for collective dismissal and short-time work schemes).	Cipollone <i>et al.</i> (2012); OECD various years
Policies	Family subsidies	Sum of national expenditures on allowances and other types of monthly transfers to the households (per family at constant prices (2000) and constant PPPs(2000), in US dollars). We consider a weighted sum of monthly family allowances for the first, second, and third child in national currency, with weights equal to the average number of children a woman would have if she lived to the end of her childbearing years (conventionally considered to be 15-44 but sometimes 15-49) and bore children at the prevailing rate for each age during that period. Value of tax and benefit transfers of one-earner-two-parent two-child families are considered. The value was calculated by subtracting the disposable income (after taxes and transfers) of a one-earner-two parent-two-child family from that of a comparable childless single earner.	Cipollone <i>et al.</i> (2012); Gauthier (2011a and 2011b)
	Parental leave	Synthetic indicator of national expenditures on maternity, parental, and childcare leave schemes. It is a weighted sum of the total number of weeks of maternity, parental and child-care leave, with weights equal to the cash benefits paid during the leave as a percent of female wages in manufacturing.	Cipollone <i>et al.</i> (2012); Gauthier (2011a and 2011b)
	Elderly subsidies	Sum of national transfers to the elderly population (per head at constant prices (2000) and constant PPPs (2000), in US dollars), weighted by the percentage of old-age population (over 70 years old) within the country. This set of policies includes: Old age cash and in kind benefits, Residential care or Home-help services.	Cipollone <i>et al.</i> (2012); Gauthier (2011a and 2011b)

2.2 Descriptive statistics

For the purpose of the analysis of female participation to the labour market, I reduced the dataset to the working age population (16-64). The final sample consists of 1,979,365 observations covering a timeframe of 16 years.

2.2.1 Microdata

Female individuals compose the overall sample for 51%. Both female and male sample have a similar age distribution, with a mean close to 40 years and are organised into four age cohorts (16-34, 35-44, 45-54, 55-64). The activity and employment rates amount to 62% and 55%, respectively, for the female sample while they raise to 79% and 73% respectively for the male sample. Interestingly, temporary and part-time jobs involve the 16% and 32%, respectively, of the female sample, while the figures decrease to 13% and 6%, respectively, for the male sample.

The micro level individual characteristics include information about marital status (single, in couple, separated, widowed) and education level. In the female sample, 38% of individuals report to have achieved low levels of education (ISCED_0_3), 35% report middle education and 24% report upper-secondary education degrees (ISCED_5_7). In the male sample, the equivalent percentages are 37%, 36% and 23% respectively, thus showing a similar distribution.

The household characteristics concern the presence and number of children in the household, age of dependent children, presence of an elderly person in the household and education level of the partner. The 36% of the female individuals reported presence of children in the house, against the 19% of male individuals.

The variable ‘cycle’ measures the business cycles of national GDP over the years considered, 1994-2009. The variable ‘trend’ is a linear trend that allows us to study the evolution of female patterns of occupation over time. Finally, four dummy variables (liberal, democratic, continental and southern) identify the welfare state of each observation.

Table 2. Summary statistics: Female sample

	Variable	Obs.	Mean	Std. Dev.	Min	Max
Individual characteristics	active	1009640	0.617	0.486	0	1
	employed	1009640	0.551	0.497	0	1
	part-time	560403	0.315	0.465	0	1
	temporary	476743	0.158	0.364	0	1
	age	1009640	40.5	13.4	16	64
	ISCED03	981151	0.381	0.438	0	1
	ISCED35	981151	0.349	0.486	0	1
	ISCED57	981151	0.243	0.479	0	1
	incouple	1002912	0.571	0.495	0	1
	separated	1002912	0.02	0.139	0	1
	divorced	1002912	0.077	0.267	0	1
	widowed	1002912	0.025	0.155	0	1
Household characteristics	children	1009640	0.61	0.962	0	15
	child	1009640	0.361	0.48	0	1
	child03	1009640	0.092	0.288	0	1
	child36	1009640	0.102	0.303	0	1
	child614	1009640	0.247	0.431	0	1
	old70	1009640	0.058	0.233	0	1
	pISCED03	1009640	0.24	0.427	0	1
	pISCED35	1009640	0.227	0.419	0	1
	pISCED57	1009640	0.17	0.376	0	1
Trend	year	1009640	2003	5	1994	2009
	cycle	999525	-0.005	1.94	-8.64	4.17
Welfare state	liberal	1002912	0.062	0.241	0	1
	democratic	1002912	0.162	0.368	0	1
	continental	1002912	0.395	0.489	0	1
	southern	1002912	0.381	0.486	0	1

Table 3. Summary statistics: Male sample

	Variable	Obs.	Mean	Std. Dev.	Min	Max
Individual characteristics	active	969722	0.793	0.405	0	1
	employed	969722	0.729	0.445	0	1
	part-time	710079	0.055	0.228	0	1
	temporary	516104	0.128	0.334	0	1
	age	969722	40.2	13.6	16	64
	ISCED02	940738	0.374	0.468	0	1
	ISCED35	940738	0.362	0.487	0	1
	ISCED57	940738	0.229	0.453	0	1
	incouple	962726	0.618	0.486	0	1
	separated	962726	0.011	0.105	0	1
	divorced	962726	0.04	0.197	0	1
	widowed	962726	0.006	0.0797	0	1
Household characteristics	children	969722	0.36	0.86	0	14
	child	969722	0.189	0.391	0	1
	child03	969722	0.089	0.284	0	1
	child36	969722	0.098	0.297	0	1
	child614	969722	0.236	0.425	0	1
	old70	969722	0.059	0.235	0	1
	pISCED03	969722	0.235	0.424	0	1
	pISCED35	969722	0.221	0.415	0	1
	pISCED57	969722	0.166	0.372	0	1
Trend	year	969722	2003	5	1994	2009
	cycle	895663	0.031	1.84	-8.64	4.2
Welfare state	liberal	969722	0.058	0.234	0	1
	democratic	969722	0.169	0.375	0	1
	continental	969722	0.39	0.488	0	1
	southern	969722	0.383	0.486	0	1

2.2.2 Macrodata

Analysing four dimensions of social security systems - the rules of access, the conditions under which benefits are granted, the regulations to finance social protection and the organization and management of social security administration - Ferrera (1996) classifies European countries into four institutional welfare regimes. The macro-level component of the dataset consists in the observation of each of the six policy and institutional variables⁸ for each state (15) in each year (16), for a total of 240 observations per variable. As we cluster the data relative to each state in a classification based on the welfare regime, we can have the empirical evidence of how the policy and institutional variable differ across welfare states.

Liberal welfare regime, also known as “residual”, is characterised by a level of social expenditure lower than the other regimes and by a minimal inference of social assistance, which is only addressed to the weakest categories of citizens. Indeed, we can observe that the Liberal regime has the lowest levels of spending both on family policies and on active and passive policies. Liberal UK also has the lowest degree of labour market rigidity, as captured by the fact its EPL is the lowest among the four. Access to subsidies is tightly conditioned to employability.

The Social Democratic model provides the highest level and coverage of social insurance. The Democratic welfare state is based on the principle of “universal provision”, according to which the access to social provisions is more generalised and less subject to restrictive eligibility requirements. Indeed, we can notice that it has the highest levels of spending in almost all social policies, from family to elderly-oriented policies. As we can see, Social Democratic countries are also characterised by significant expenditures on active and passive labour market policies and by the second lowest level of EPL. Hence, Social Democratic welfare state, typical of Scandinavian countries, is characterised by flexible and inclusive institutions, in a combination that balances both the flexibility and the security dimensions of “flexicurity”.

The Continental model is characterised by an important role of passive policies while active policies are less important than in the Social Democratic models. The labour market is a rather rigid one, as we can see from the EPL indicator, which is the second highest among the

⁸ Policies: childcare subsidies, parental leave and elderly subsidies. Institutions: active and passive labour market policies and EPL.

four regimes. Finally, Continental countries account for above average expenditures in family policies, with the highest degree of generosity in parental leaving schemes.

The Southern model, typical of Mediterranean countries, is the one with the lowest shares of expenditures. Having the lowest degree of elderly population support and the second lowest level of expenditure on family policies, it overall it guarantees a low level of social assistance. The model is characterised by a high segmentation of rights and status of people eligible to receive subsidies and, as a consequence, the access to social provisions is very conditioned. For what concerns the degree of labour market rigidity, labour market in Southern countries appears to be the most rigid one, accounting for the highest level of EPL.

Table 4. Summary statistics: Policies and Institutions per Welfare Regime

	Variable	Obs.	Mean	Std. Dev.	Min	Max
Liberal	leave	16	610.82	100.11	557.89	810.00
	family_subsidies	16	3.99	1.00	2.17	5.89
	elderly	16	45.97	8.61	33.32	58.27
	epl_all	16	0.69	0.08	0.59	0.78
	passive_imp	16	0.37	0.24	0.16	0.94
	active_imp	16	0.08	0.03	0.04	0.16
Democratic	leave	48	3407.72	1126.58	810.00	5515.50
	family_subsidies	48	5.85	2.16	2.64	10.21
	elderly	48	58.98	26.86	19.96	101.29
	epl_all	48	1.93	0.35	1.32	2.49
	passive_imp	48	2.16	1.02	0.45	4.99
	active_imp	48	1.25	0.47	0.64	2.66
Continental	leave	112	3866.42	2622.538	800.00	10024.00
	family_subsidies	112	5.66	3.25	1.14	14.48
	elderly	112	14.70	10.38	0.97	39.39
	epl_all	112	2.16	0.66	0.93	3.22
	passive_imp	112	1.63	0.69	0.43	3.29
	active_imp	112	0.71	0.30	0.00	1.19
Southern	leave	64	2789.71	2250.76	750.00	7700.97
	family_subsidies	64	4.14	1.81	0.58	9.50
	elderly	64	11.49	6.69	0.58	24.08
	epl_all	64	3.02	0.62	1.60	3.82
	passive_imp	64	1.00	0.61	0.00	3.14
	active_imp	64	0.31	0.26	0.00	0.75

3. Probit regression analysis

3.1 The econometric model

This section is dedicated to the introduction and description of the econometric model used: the probit model. The probit regression is a nonlinear regression model specifically designed to deal with binary dependent variables. Since a regression with a binary dependent variable (Y) models the probability that $Y=1$, it is reasonable to use a nonlinear formulation that forces the predicted value to range between 0 and 1. For this reason, the probit model uses the standard normal cumulative distribution function, that produces probabilities included between 0 and 1. The model, therefore, presents some peculiarities in the interpretation of the coefficients. As the regression estimates the probability that $Y=1$, the coefficient of a regressor X expresses the effect of a variation of X (or the effect of $X=1$ in case of a binary regressor) on the probability that $Y=1$. Therefore, unless one does not perform “marginal effects”, the coefficient on the X only identifies the sign and statistical significance of the effect, not its magnitude. The econometric software estimates the probit coefficients on the basis of the standard maximum likelihood procedure (Stock & Watson, 2012).

This method produces efficient and consistent estimators with confidence intervals and standard errors that can be interpreted in an analogous way as those of regression functions whose dependent variable is not a binary one, subject to the above peculiarities (ibidem).

3.2. Specifications

The specifications modelled use as dependent variables the dummies relative to labour force participation (*active*), employment (*employed*) and the dummies relative to the type of contract held, depending on whether the contract is a part-time one (*parttime*) or a fixed-term one (*temporary*).

Using the entire sample of men and women, the basic model defines the employment status as:

$$y_{ijt} = \beta female_{ijt} + \delta X_{ijt} + \lambda trend_t + \sigma cycle_{jt} + \tau welfare_j + \varepsilon_{ijt} \quad (1)$$

where y is the occupational status (active, employed, temporary contract or part-time job) at time t for individual i living in welfare state j . ***Female*** is the variable of interest: it is a dummy variable for gender and takes value 1 when the individual is female. The coefficient β captures the existence, direction and significant of a baseline gap between men and women in the employment status imposed as dependent variable. X is a set of individual and household characteristics observed at time t that are introduced as control variables to capture the heterogeneity in labour market outcomes which is due to micro-level characteristics other than gender. *Cycle* indicates the business cycles of national GDP, *trend* is a linear trend and *welfare* is a set of four dummies selecting the welfare state according to Ferrera's (1996) classification.

In order to investigate the effect over time of gender on labour market gaps, a second specification is introduced.

$$y_{ijt} = \beta \text{female}_{ijt} + \theta(\text{female}_i \cdot \text{trend}_t) + \delta X_{ijt} + \lambda \text{trend}_t + \sigma \text{cycle}_{jt} + \tau \text{welfare}_j + \varepsilon_{ijt} \quad (2)$$

The coefficient on the interaction between ***female*** and *trend* captures the evolution over time of the influence of gender (and specifically of being a woman) on labour market performance. From the sign and significance of the coefficient θ we can detect the evolution of the gender gap over time for each occupational status that is imposed as dependent variable.

We now may want to test separately the significance of relevant individual and household characteristics as determinants of the four labour market status and of the associated gender gaps. For this reason, we introduce the regression set 3. This set of regressions includes three separate models through which we test the significance of family ties (regression 3.1), education level (r. 3.2) and age cohort (r. 3.3). To reach this objective the variable ***female*** is interacted with each of the relevant characteristics, in turn.

Specification 3.1 allows the effect of the variable ***female*** to change depending on the presence of children in the household (*child_d*) and on three dummies identifying the age cohort to which the smallest child in the household belongs: *child_age* = (*child_0_3*, *child_3_6*, *child_6_14*), alternatively.

$$y_{ijt} = \beta \text{female}_{ijt} + \delta X_{ijt} + \gamma_1(\text{female}_{ijt} \cdot \text{child}_{dijt}) + \gamma_2(\text{female}_{ijt} \cdot \text{child}_{ageijt}) + \lambda \text{trend}_t + \sigma \text{cycle}_{jt} + \tau \text{welfare}_j + \varepsilon_{ijt} \quad (3.1)$$

Specification 3.2 allows the effect of the variable *female* to change depending on the highest level of education attained by each woman. *Education* is a factor for three dummies that identify women with lower secondary education (*ISCED_0_3*), upper secondary education (*ISCED_3_5*) and tertiary education (*ISCED_5_7*).

$$y_{ijt} = \beta \text{female}_{ijt} + \delta X_{ijt} + \gamma_1(\text{female}_{ijt} \cdot \text{education}_{ijt}) + \lambda \text{trend}_t + \sigma \text{cycle}_{jt} + \tau \text{welfare}_j + \varepsilon_{ijt} \quad (3.2)$$

Finally, regression 3.3 allows the effect of the variable *female* to change depending on the age cohort the woman belongs to. The age range of working age population (16-64) is organised into four age cohorts: 16-34, 35-44, 45-54 and 55-64, each represented by a dummy:

$$y_{ijt} = \beta \text{female}_{ijt} + \delta X_{ijt} + \gamma_1(\text{female}_{ijt} \cdot \text{age}_{ijt}) + \lambda \text{trend}_t + \sigma \text{cycle}_{jt} + \tau \text{welfare}_j + \varepsilon_{ijt} \quad (3.3)$$

After having tested for the significance of relevant individual and household characteristics, we model regression 4 to test for the significance of welfare regimes as determinants of labour market gender gaps. Following Petrongolo (2004), we acknowledge the existence of substantial differences across welfare regimes for what concerns the set of macro characteristics influencing the labour market environment (in terms of culture, social policies and labour market institutions). To show how different welfare regimes affect labour market gaps between genders, regression 4 interacts the variable *female* with the four identified welfare regimes (Liberal, Social Democratic, Continental and Southern) to capture the effects of welfare states on the identified gender gaps.

$$y_{ijt} = \beta \text{female}_{ijt} + \delta X_{ijt} + \lambda \text{trend}_t + \sigma \text{cycle}_{jt} + \tau \text{welfare}_j + \nu(\text{female}_{ijt} \cdot \text{welfare}_j) + \varepsilon_{ijt} \quad (4)$$

We may want to note here that, for the analyses concerning macro-level determinants of gender gaps, we will consider as dependent variables only the probability to be employed, to hold a part-time job or to have a temporary contract.

We now want to test in a more accurate way what are the characteristics of a welfare regime that exert the greater impacts on the labour market gaps. Two models are developed to perform separate tests for significance and estimated effect of social policies and labour market institutions. The two models are described by regressions 5 and 6, respectively.

Policy, as included in specification (5) stands for the set of relevant policies that, according to previous academic studies on the subject, are deemed to affect labour market gender gaps: *family subsidies*, *parental leave* and *elderly subsidies*.

$$y_{ijt} = \beta \mathbf{female}_{ijt} + \delta \mathbf{X}_{ijt} + \lambda \mathbf{trend}_t + \sigma \mathbf{cycle}_{jt} + \tau \mathbf{welfare}_j + \omega \mathbf{policy}_{jt} + \theta(\mathbf{female}_{ijt} \cdot \mathbf{policy}_{jt}) + \varepsilon_{ijt} \quad (5)$$

An analogous reasoning applies to specification (6), through which we want to test the effect and significance of institutional framework on labour market gender gaps. The institutional variables considered are *active labour market policies*, *passive labour market policies* and *employment protection legislation*.

$$y_{ijt} = \beta \mathbf{female}_{ijt} + \delta \mathbf{X}_{ijt} + \lambda \mathbf{trend}_t + \sigma \mathbf{cycle}_{jt} + \tau \mathbf{welfare}_j + \rho \mathbf{institution}_{jt} + \chi(\mathbf{female}_{ijt} \cdot \mathbf{institution}_{jt}) + \varepsilon_{ijt} \quad (6)$$

3.3 Results

3.3.1 Baseline model

Table 5 presents the results of specification 1, showing the effects of the individual variables discussed in the literature review on the probability for both male and female individuals of being active (column 1), employed (column 2), working part-time (column 3) and holding a fixed-term contract (column 4).

Table 5. Participation, employment and occupational gender gaps: Baseline model⁹

	active			employed			part-time			temporary		
	Coef.		Std. Error	Coef.		Std. Error	Coef.		Std. Error	Coef.		Std. Error
<i>Gender</i>												
Male												
female	-0.653	***	0.002	-0.606	***	0.002	1.071	***	0.003	0.236	***	0.003
<i>Marital status</i>												
Single												
incouple	0.071	***	0.004	0.127	***	0.004	0.038	***	0.005	-0.222	***	0.006
separated	0.534	***	0.010	0.422	***	0.010	-0.084	***	0.012	-0.172	***	0.013
divorced	0.568	***	0.006	0.421	***	0.006	-0.201	***	0.007	-0.207	***	0.008
widowed	0.221	***	0.008	0.276	***	0.008	-0.064	***	0.012	-0.247	***	0.013
<i>Children</i>												
No children												
children	-0.116	***	0.002	-0.107	***	0.002	0.026	***	0.003	0.056	***	0.004
child_d	0.147	***	0.005	0.170	***	0.005	-0.008		0.006	-0.049	***	0.008
child_0_3d	-0.067	***	0.004	-0.085	***	0.004	0.096	***	0.005	-0.071	***	0.006
child_3_6d	0.000		0.004	-0.027	***	0.004	0.147	***	0.005	-0.027	***	0.006
child_6_14d	-0.110	***	0.003	-0.101	***	0.003	0.181	***	0.004	0.061	***	0.004
<i>Cohabiting with elderly</i>												
No elderly												
old_70d	0.041	***	0.004	0.017	***	0.004	-0.081	***	0.007	-0.011		0.007
<i>Education</i>												
Low educated												
ISCED_3_5	0.304	***	0.003	0.314	***	0.002	-0.076	***	0.004	-0.270	***	0.004
ISCED_5_7	0.712	***	0.003	0.709	***	0.003	-0.183	***	0.004	-0.268	***	0.005
<i>Partner education</i>												
pISCED_0_3	0.346	***	0.004	0.358	***	0.004	-0.178	***	0.005	-0.082	***	0.006
pISCED_3_5	0.449	***	0.004	0.472	***	0.004	-0.143	***	0.005	-0.247	***	0.006
pISCED_5_7	0.415	***	0.004	0.462	***	0.004	-0.053	***	0.005	-0.224	***	0.006
<i>Age</i>												
age_16_34												
age_35_44	0.496	***	0.003	0.446	***	0.003	-0.016	***	0.004	-0.424	***	0.005
age_45_54	0.284	***	0.004	0.282	***	0.003	0.051	***	0.005	-0.572	***	0.005
age_55_64	-0.686	***	0.004	-0.608	***	0.004	0.348	***	0.006	-0.690	***	0.006
<i>Macro</i>												
trend	-0.012	***	0.000	-0.006	***	0.000	0.027	***	0.000	0.019	***	0.000
cycle	-0.006	***	0.001	0.002	***	0.001	0.013	***	0.001	0.002	***	0.001
<i>Welfare state</i>												
Liberal												
democratic	0.039	***	0.005	-0.042	***	0.005	-0.432	***	0.006	0.505	***	0.010
continental	-0.079	***	0.005	-0.157	***	0.005	-0.002		0.006	0.368	***	0.010

⁹ * significant at 10%, ** significant at 5%, *** significant at 1%

southern	-0.107 ***	0.005	-0.238 ***	0.005	-0.456 ***	0.006	0.842 ***	0.010
Observations	1890229		1890229		1226209		971302	

As the dataset used includes both male and female individuals, the main variable of interest is *female*. In order to isolate (as much as possible) the relation between gender alone and labour market participation and type of occupation, the model includes as control variables those individual and household characteristics that, as discussed in the literature review, have been shown to have a significant relation with women's labour market outcomes. Controlling for marital status, presence of children in the household, age and number of children, education and education of the partner, age cohort, trend, cycle and welfare state, gender appears to have a significant effect. In particular, the estimated coefficients in columns (1) and (2) show that, given individual, household and macro characteristics, women have significantly lower probabilities of being active and employed than men. Columns (3) and (4) report the estimated effect of gender on the probability of holding a part-time job or a fixed term-contract. In line with the literature review, results show that women are statistically more likely than men to hold both a part-time and a fixed-term contract, *ceteris paribus*.

To sum up, the results of specification 1 confirm that gender is a statistically significant determinant of the labour market outcomes of individuals. For the 15 European countries considered, there is evidence of the existence of significant labour market gaps between genders, in terms of both quantity of participation and employment and in terms of the quality of jobs. In fact, being a woman means having lower probabilities than men to be active or employed, while it entails having higher probabilities to hold a part-time or temporary contract, *ceteris paribus*.

3.3.2 Trend over time

After we have ascertained the existence of four significant gender gaps in European labour markets, both in terms of quantity (active, employed) and quality (part-time, temporary) of jobs, we devote the next step of the analysis to test whether these gaps have followed a significant evolution over time during the years considered (1994 – 2009). Table 6 reports the estimated coefficients of specification 2, where the effect of gender is allowed to vary over time.

Table 6. Participation, employment and occupational gender gaps: Trend

	active			employed			part-time			temporary		
	Coef.		Std. Error	Coef.		Std. Error	Coef.		Std. Error	Coef		Std. Error
<i>Gender</i>												
female	-0.833	***	0.004	-0.763	***	0.004	0.946	***	0.006	0.156	***	0.008
I(female * trend)	0.020	***	0.000	0.018	***	0.000	0.014	***	0.001	0.008	***	0.001
<i>Marital status</i>												
incouple	0.075	***	0.004	0.131	***	0.004	0.041	***	0.005	-0.221	***	0.006
separated	0.538	***	0.010	0.425	***	0.010	-0.081	***	0.012	-0.171	***	0.013
divorced	0.570	***	0.006	0.423	***	0.006	-0.199	***	0.007	-0.207	***	0.008
widowed	0.228	***	0.008	0.283	***	0.008	-0.059	***	0.012	-0.247	***	0.013
<i>Children</i>												
children	-0.112	***	0.002	-0.103	***	0.002	0.025	***	0.003	0.056	***	0.004
child_d	0.132	***	0.005	0.156	***	0.005	-0.018	***	0.006	-0.055	***	0.008
child_0_3d	-0.068	***	0.004	-0.085	***	0.004	0.097	***	0.005	-0.071	***	0.006
child_3_6d	-0.001		0.004	-0.028	***	0.004	0.147	***	0.005	-0.028	***	0.006
child_6_14d	-0.110	***	0.003	-0.102	***	0.003	0.181	***	0.004	0.061	***	0.004
<i>Cohabiting with elderly</i>												
old_70d	0.041	***	0.005	0.017	***	0.004	-0.081	***	0.007	-0.011		0.007
<i>Education</i>												
ISCED_3_5	0.302	***	0.003	0.312	***	0.002	-0.077	***	0.004	-0.270	***	0.004
ISCED_5_7	0.707	***	0.003	0.705	***	0.003	-0.186	***	0.004	-0.269	***	0.005
<i>Partner education</i>												
pISCED_0_3	0.344	***	0.004	0.357	***	0.004	-0.180	***	0.005	-0.082	***	0.006
pISCED_3_5	0.450	***	0.004	0.473	***	0.004	-0.143	***	0.005	-0.247	***	0.006
pISCED_5_7	0.416	***	0.004	0.463	***	0.004	-0.051	***	0.005	-0.224	***	0.006
<i>Age</i>												
age_35_44	0.495	***	0.003	0.446	***	0.003	-0.015	***	0.004	-0.423	***	0.005
age_45_54	0.284	***	0.004	0.282	***	0.003	0.052	***	0.005	-0.571	***	0.005
age_55_64	-0.689	***	0.004	-0.610	***	0.004	0.347	***	0.006	-0.691	***	0.006
<i>Macro</i>												
trend	-0.024	***	0.000	-0.016	***	0.000	0.018	***	0.001	0.015	***	0.001
cycle	-0.006	***	0.001	0.002	***	0.001	0.013	***	0.001	0.003	***	0.001
<i>Welfare state</i>												
democratic	0.039	***	0.005	-0.041	***	0.005	-0.433	***	0.006	0.504	***	0.010
continental	-0.080	***	0.005	-0.157	***	0.005	-0.003		0.006	0.366	***	0.010
southern	-0.109	***	0.005	-0.239	***	0.005	-0.458	***	0.006	0.840	***	0.010
Observations	1890229			1890229			1226209			971302		

Columns (1) and (2) report the estimated effects of individual and household characteristics and an interaction term between *female* and *trend* on the probability of individuals of being active

or employed, respectively. The coefficient on the variable *female* captures the sign of the existing gender gaps while the coefficient on the interaction term captures the evolution of the gap over time. We can notice that, controlling for individual and household characteristics, both activity and employment gender gaps have decreased over time, with women converging to typically-male standards in terms of participation and employment.

Columns (3) and (4) report the estimated effects of specification 2 on the probabilities of individuals to hold a part-time or a temporary contract, respectively. In line with the results obtained from specification 1, women have a statistically higher probability to hold an atypical contract. Interestingly, both part-time and temporary gender gaps exhibits a positive trend over time. These results suggest that, while participation and employment gender gaps are gradually closing, the gender gap concerning the type of contract held is instead widening over time, *ceteris paribus*.

This evidence is consistent with the hypotheses - analysed in the literature review - of a twofold labour market evolution. The decrease in participation and employment gaps may suggest progresses in women labour market integration. Some researchers, however, consider hours worked as a more accurate measure for women integration in the labour market than activity rates (Jonung and Persson, 1993). Previous literature has also shown that –with some exceptions, e.g. the Democratic countries – atypical contracts are generally perceived as lower quality jobs than permanent ones (Petrongolo, 2004; Booth *et al.*, 2002, A). Evidence presented in table 6 shows that the increase in women labour market participation and employment is significantly absorbed into part-time and temporary contracts, as part-time and temporary gender gaps are increasing over time. These results seem to confirm the hypothesis, advanced in previous literature and recalled here, of gender segregation in the European labour markets, as women are increasingly over-represented in atypical jobs, which are generally perceived as lower-quality forms of employment.

3.3.3 Individual and household characteristics

After we presented evidence of the existence of gender gaps in the European labour markets and after we have focused on the evolution of these gaps over time, we are now turning to a deeper analysis of the possible determinants of these gaps. In this section we turn our attention to the impact of personal and household characteristics. For the purpose of the analysis,

consistently with what emerged from the literature review, three categories of micro-level characteristics have been selected. They are presence and age of children, highest level of education attained and age. The effects of each of them are tested with a separate specification.

3.3.3.a Children

Probit regression 3.1 aims to capture the effect of family ties on women's probabilities to be active in the labour market or employed, and on the type of job they hold. Consistently with previous empirical literature, we identify the major component of women's family responsibilities with the presence of children in the household. Therefore, together with the already known micro-level controls, regression 3.1 includes interaction terms between the variable *female* and the dummy for the presence of children in the household (*child_d*) and between *female* and age of the youngest child. The age of the youngest child is captured by three dummies selecting the age cohort of the child, depending on whether the child is a toddler (*child_0_3d*), in pre-primary (*child_3_6d*) or primary (*child_6_14d*) education.

Table 7. Participation, employment and occupational gender gaps: Children

	active			employed			part-time			temporary		
	Coef.		Std. Error	Coef.		Std. Error	Coef.		Std. Error	Coef.		Std. Error
<i>Gender</i>												
female	-0.427	***	0.003	-0.400	***	0.003	0.834	***	0.004	0.197	***	0.004
<i>Marital status</i>												
incouple	0.084	***	0.004	0.140	***	0.004	0.029	***	0.005	-0.223	***	0.006
separated	0.568	***	0.010	0.451	***	0.010	-0.112	***	0.012	-0.179	***	0.013
divorced	0.579	***	0.006	0.430	***	0.006	-0.210	***	0.007	-0.211	***	0.008
widowed	0.213	***	0.008	0.267	***	0.008	-0.048	***	0.012	-0.244	***	0.013
<i>Children</i>												
children	-0.126	***	0.002	-0.117	***	0.002	0.039	***	0.003	0.062	***	0.004
child_d	0.575	***	0.007	0.505	***	0.007	-0.189	***	0.010	-0.090	***	0.011
I(female * child_d)	-0.541	***	0.006	-0.440	***	0.006	0.218	***	0.008	0.049	***	0.009
child_0_3d	0.358	***	0.008	0.217	***	0.007	-0.065	***	0.009	-0.053	***	0.008
I(female * child_0_3d)	-0.641	***	0.010	-0.511	***	0.008	0.295	***	0.011	-0.025	**	0.011
child_3_6d	0.292	***	0.008	0.168	***	0.006	-0.086	***	0.009	-0.065	***	0.008
I(female * child_3_6d)	-0.431	***	0.009	-0.326	***	0.008	0.394	***	0.010	0.075	***	0.011
child_6_14d	0.021	***	0.004	0.011	***	0.004	-0.110	***	0.006	0.007		0.006

I(female * child_6_14d) <i>Cohabiting with elderly</i>	-0.235	***	0.005	-0.212	***	0.005	0.457	***	0.007	0.102	***	0.008
old_70d <i>Education</i>	0.045	***	0.004	0.020	***	0.004	-0.085	***	0.007	-0.011		0.007
ISCED_3_5	0.307	***	0.003	0.315	***	0.002	-0.078	***	0.004	-0.270	***	0.004
ISCED_5_7 <i>Partner education</i>	0.716	***	0.003	0.711	***	0.003	-0.187	***	0.004	-0.267	***	0.005
pISCED_0_3	0.318	***	0.004	0.332	***	0.004	-0.165	***	0.006	-0.077	***	0.006
pISCED_3_5	0.431	***	0.004	0.455	***	0.004	-0.129	***	0.005	-0.243	***	0.006
pISCED_5_7 <i>Age</i>	0.398	***	0.004	0.446	***	0.004	-0.038	***	0.005	-0.223	***	0.006
age_35_44	0.495	***	0.003	0.441	***	0.003	-0.004		0.004	-0.424	***	0.005
age_45_54	0.265	***	0.004	0.266	***	0.004	0.079	***	0.005	-0.569	***	0.005
age_55_64 <i>Macro</i>	-0.704	***	0.004	-0.622	***	0.004	0.355	***	0.006	-0.688	***	0.006
trend	-0.009	***	0.000	-0.003	***	0.000	0.026	***	0.000	0.019	***	0.000
cycle <i>Welfare state</i>	-0.005	***	0.001	0.003	***	0.001	0.012	***	0.001	0.002	**	0.001
democratic	0.039	***	0.006	-0.041	***	0.005	-0.441	***	0.006	0.504	***	0.010
continental	-0.083	***	0.005	-0.160	***	0.005	0.000		0.006	0.369	***	0.010
southern	-0.111	***	0.005	-0.242	***	0.005	-0.457	***	0.006	0.843	***	0.010
Observations	1890229			1890229			1226209			971302		

Not surprisingly, the estimated effects in columns (1) and (2) are qualitatively the same. Considering the coefficients on the interaction terms, indeed, it clearly emerges that both activity and employment gender gaps are significantly greater for women with children than for those without children. In addition, both gaps are greater when children are very small (*child_0_3*) while they decrease as children grow up.

From the estimated effects in column (3), it emerges that the part-time gender gap is larger for women with children. Interestingly, the size of the estimated gap increases as children grow up. These findings are consistent with what is commonly observed in reality. In fact, educational institutions in most European countries share a general tendency to reduce the duration of school hours, and more generally of childcare, as children grow up. This, coupled with the progressive ageing of grandparents as children grow up, force mothers to find substitutes for both formal and informal childcare. Under these circumstances, as children grow up, women with a lower opportunity cost of reducing their working hours tend to progressively shift to part-time jobs that allow them to conciliate paid-work and family responsibilities.

Column (4) presents evidence of the effect of family duties on the gender gap in temporary contracts. Overall, we find that the gap is statistically greater for women with children than for those without children. Interestingly, we find that the gap is smaller for those with small children (*child_0_3d*) than for those without children. When children are above 3 years of age, instead, the gap is greater for women with children than for their analogous without children. This partially puzzling result may instead have a plane explanation. Indeed, it is reasonable to expect that those women who remain in the labour market during the first years of maternity are those who have a permanent job, as their opportunity cost of leaving that job is relatively higher. Women employed in temporary contracts, instead, generally have both a lower degree of protection in case of maternity and a lower opportunity cost of leaving their job during the first years of maternity. As a result, it is reasonable to hypothesise that women with temporary jobs exit the labour market during the first years of maternity. As children grow up, women return to the labour market. The recent unemployment/inactivity spell, however, compromises their labour market opportunities and increases the likelihood that they will hold temporary jobs.

To sum up, child presence in the household and age of the youngest child are both significant determinants of women participation, employment and occupational choice. Indeed, it emerges that mothers have statistically significant lower probabilities of been active and employed than women without children. This effect is stronger when children are smaller (aged 0-3). Women with children are also more likely to hold a part-time job, though this effect is stronger for women with children in pre-primary and primary education. Finally, women with children are also more likely than women without children to hold temporary contracts and this effect is driven by women whose children are in pre-primary and primary education age.

3.3.3.b Education

Consistently with previously discussed empirical literature, we identify another major determinant of women's labour market participation and outcomes with education. Probit regression 3.2 (table 8) describes the effect of education on women's probabilities to be active in the labour market or employed, and on the type of contract they hold. Three dummies capture the highest level of education attained: *ISCED_0_3* in case of lower secondary education, *ISCED_3_5* in case of upper secondary education and *ISCED_5_7* for tertiary education.

Table 8. Participation, employment and occupational gender gaps: Education

	active			employed			part-time			temporary		
	Coef.		Std. Error	Coef.		Std. Error	Coef.		Std. Error	Coef.		Std. Error
<i>Gender</i>												
female	-0.812	***	0.003	-0.756	***	0.003	1.112	***	0.005	0.249	***	0.005
<i>Marital status</i>												
incouple	0.074	***	0.004	0.131	***	0.004	0.036	***	0.005	-0.222	***	0.006
separated	0.542	***	0.011	0.428	***	0.010	-0.088	***	0.012	-0.172	***	0.013
divorced	0.569	***	0.006	0.421	***	0.006	-0.204	***	0.007	-0.207	***	0.008
widowed	0.239	***	0.008	0.294	***	0.008	-0.070	***	0.012	-0.249	***	0.013
<i>Children</i>												
children	-0.115	***	0.002	-0.106	***	0.002	0.027	***	0.003	0.056	***	0.004
child_d	0.151	***	0.005	0.175	***	0.005	-0.010		0.006	-0.050	***	0.008
child_0_3d	-0.073	***	0.004	-0.090	***	0.004	0.097	***	0.005	-0.070	***	0.006
child_3_6d	-0.004		0.004	-0.031	***	0.004	0.148	***	0.005	-0.027	***	0.006
child_6_14d	-0.113	***	0.003	-0.105	***	0.003	0.182	***	0.004	0.061	***	0.004
<i>Cohabiting with elderly</i>												
old_70d	0.042	***	0.005	0.017	***	0.004	-0.080	***	0.007	-0.011		0.007
<i>Education</i>												
ISCED_3_5	0.167	***	0.003	0.200	***	0.003	-0.106	***	0.006	-0.260	***	0.006
I(female * ISCED_3_5)	0.249	***	0.005	0.217	***	0.004	0.045	***	0.007	-0.020	***	0.008
ISCED_5_7	0.507	***	0.005	0.518	***	0.004	-0.062	***	0.006	-0.256	***	0.006
I(female * ISCED_5_7)	0.353	***	0.006	0.342	***	0.005	-0.187	***	0.008	-0.023	***	0.008
<i>Partner education</i>												
pISCED_0_3	0.350	***	0.004	0.362	***	0.004	-0.179	***	0.005	-0.082	***	0.006
pISCED_3_5	0.452	***	0.004	0.475	***	0.004	-0.145	***	0.005	-0.247	***	0.006
pISCED_5_7	0.412	***	0.004	0.459	***	0.004	-0.057	***	0.005	-0.224	***	0.006
<i>Age</i>												
age_35_44	0.495	***	0.003	0.446	***	0.003	-0.017	***	0.004	-0.424	***	0.005
age_45_54	0.286	***	0.004	0.284	***	0.003	0.048	***	0.005	-0.572	***	0.005
age_55_64	-0.684	***	0.004	-0.605	***	0.004	0.343	***	0.006	-0.690	***	0.006
<i>Macro</i>												
trend	-0.012	***	0.000	-0.006	***	0.000	0.027	***	0.000	0.019	***	0.000
cycle	-0.006	***	0.001	0.002	***	0.001	0.013	***	0.001	0.002	***	0.001
<i>Welfare state</i>												
democratic	0.033	***	0.005	-0.047	***	0.005	-0.427	***	0.006	0.505	***	0.010
continental	-0.080	***	0.005	-0.158	***	0.005	-0.001		0.006	0.368	***	0.010
southern	-0.111	***	0.005	-0.243	***	0.005	-0.454	***	0.006	0.842	***	0.010
Observations	1890229			1890229			1226209			971302		

Not surprisingly, estimated effects in columns (1) and (2) are qualitatively the same. As predicted based on the previously discussed empirical literature, both the participation and employment gaps decrease for more educated women. Indeed we can notice that both gaps are greater for low skilled women (*ISCED_0_3* are the control group), while they decrease as the education level increases. This is explained by the fact that women with higher education have better career and earning opportunities in the labour market than low-educated women, and, consequently, a higher opportunity cost of staying out of the labour market.

Column (3) presents evidence of the effect of education on the gender gap in part-time contracts. Results show that the gap is greater for middle-educated women than for low-educated women while it is significantly smaller for high-educated women. This is a rather interesting result as one might have expected a linear negative trend between part-time gap and education. This empirical evidence may be explained by the fact that part-time is a useful tool for those women who want or have to conciliate paid work with household responsibilities.

We find a strictly negative relation as we consider the effect of education level on temporary gender-gap (column 4). Indeed, evidence shows that the gap decreases as the education level increases. In fact, the gap is greater for low-skilled women, while it decreases for middle-skilled and high-skilled ones. This result is consistent with what emerged from the previously discussed empirical literature (Petrongolo, 2004) that showed that, in all the 15 EU countries considered, temporary contracts are perceived as low-quality jobs, as they entail worse training, career and earning perspectives than their permanent equivalents. It is therefore easily understood why women with higher education show a smaller temporary gender gap than low-skilled women.

To sum up, the level of education is negatively related with both activity and employment gender gaps as high-skilled women have a higher opportunity cost of staying out of the labour market than low-skilled women. When it comes to part-time gender gap, the relation is less linear as the gap increases for middle-skilled women even though it decreases for highly skilled women. Finally, the temporary gender gap steadily declines with education level, as temporary jobs are generally consistent with lower workers' satisfaction than their permanent equivalents.

3.3.3.c Age

The third and last individual characteristic for which we are interested to test the significance as a determinant of labour market gender gaps is age. We do so by running regression 3.3, where the variable female is interacted with the three dummy variables that identify the age cohort the individual belongs to (*age_16_25* is the control group of prime age individuals). Table 9 reports the estimated results.

Table 9. Participation, employment and occupational gender gaps: Age

	active			employed			part-time			temporary		
	Coef.		Std. Error	Coef.		Std. Error	Coef.		Std. Error	Coef.		Std. Error
<i>Gender</i>												
female	-0.434	***	0.003	-0.439	***	0.003	0.792	***	0.005	0.183	***	0.005
<i>Marital status</i>												
incouple	0.075	***	0.004	0.131	***	0.004	0.040	***	0.005	-0.222	***	0.006
separated	0.538	***	0.011	0.422	***	0.010	-0.080	***	0.012	-0.172	***	0.013
divorced	0.574	***	0.006	0.424	***	0.006	-0.203	***	0.007	-0.209	***	0.008
widowed	0.213	***	0.008	0.267	***	0.008	-0.054	***	0.012	-0.246	***	0.013
<i>Children</i>												
children	-0.120	***	0.002	-0.109	***	0.002	0.032	***	0.003	0.059	***	0.004
child_d	0.197	***	0.005	0.206	***	0.005	-0.053	***	0.006	-0.064	***	0.008
child_0_3d	-0.101	***	0.004	-0.109	***	0.004	0.116	***	0.005	-0.066	***	0.006
child_3_6d	-0.025	***	0.004	-0.046	***	0.004	0.168	***	0.005	-0.023	***	0.006
child_6_14d	-0.115	***	0.003	-0.104	***	0.003	0.190	***	0.004	0.062	***	0.004
<i>Cohabiting with elderly</i>												
old_70d	0.022	***	0.005	0.002		0.004	-0.072	***	0.007	-0.009		0.007
<i>Education</i>												
ISCED_3_5	0.305	***	0.003	0.314	***	0.002	-0.072	***	0.004	-0.269	***	0.004
ISCED_5_7	0.715	***	0.003	0.710	***	0.003	-0.176	***	0.004	-0.266	***	0.005
<i>Partner education</i>												
pISCED_0_3	0.331	***	0.004	0.347	***	0.004	-0.161	***	0.006	-0.077	***	0.006
pISCED_3_5	0.437	***	0.004	0.463	***	0.004	-0.128	***	0.005	-0.243	***	0.006
pISCED_5_7	0.408	***	0.004	0.455	***	0.004	-0.040	***	0.005	-0.222	***	0.006
<i>Age</i>												
age_35_44	0.987	***	0.006	0.744	***	0.005	-0.394	***	0.007	-0.490	***	0.006
I(female * age_35_44)	-0.750	***	0.007	-0.501	***	0.006	0.584	***	0.008	0.127	***	0.008
age_45_54	0.587	***	0.005	0.477	***	0.005	-0.222	***	0.007	-0.617	***	0.007
I(female * age_45_54)	-0.529	***	0.006	-0.367	***	0.006	0.451	***	0.008	0.094	***	0.009
age_55_64	-0.651	***	0.005	-0.592	***	0.005	0.258	***	0.007	-0.702	***	0.008

I(female * age_55_64)	-0.079	***	0.006	-0.040	***	0.005	0.142	***	0.009	0.031	***	0.011
<i>Macro</i>												
trend	-0.011	***	0.000	-0.005	***	0.000	0.026	***	0.000	0.019	***	0.000
cycle	-0.006	***	0.001	0.002	***	0.001	0.013	***	0.001	0.002	***	0.001
<i>Welfare state</i>												
democratic	0.043	***	0.006	-0.039	***	0.005	-0.438	***	0.006	0.504	***	0.010
continental	-0.075	***	0.005	-0.155	***	0.005	0.000		0.006	0.368	***	0.010
southern	-0.106	***	0.005	-0.238	***	0.005	-0.455	***	0.006	0.842	***	0.010
Observations	1890229			1890229			1226209			971302		

Not surprisingly, results in column (1) and (2) are qualitatively the same. The estimated effects bring evidence that both participation and employment gaps are greater for women aged 35 and above than for prime-age women. These findings are consistent with the issues discussed in the literature review, according to which, the last decades have witnessed a cultural evolution in the conception of female work. These developments were also sustained by the appointment of formal European targets for female participation and employment, as those - although not fully reached - set within the Lisbon Strategy in 2000. The ultimate result of this decennial evolution is the one observed in columns (1) and (2): controlling for the most important determinants of labour market performance, the gender participation and employment gaps are smaller for prime-age individuals than for women aged 35 and above, as women in the younger generations tend to converge to typically male participation and employment patterns.

Column (3) presents the estimated effects of regression 3.3 on the probability to be employed in a part-time job. The estimated effects suggest that the part-time gap is greater for women aged 35 and above than for those aged 16-34. Interestingly, we can see that the gap seem to be smaller for the eldest age cohort (55-64). This, however, may be explained by the effect of retirement and pre-retirement schemes that offer greater incentives to women in part-time occupations than in full-time ones to use pre-retirement opportunities.

Estimated effects concerning temporary gap between genders are reported in column (4). Evidence shows that the gap is again larger for women aged 35 and above, especially for those aged 35-44. This result is an interesting one as the previous empirical literature (Booth *et al.*, 2002, B) produced a number of reasons for which women, and especially prime-age women, might be overrepresented in temporary jobs. One of these reasons consists in the fact that temporary jobs may be relatively attractive for those categories of workers who have a lower probability to be willing to remain with the current employer. These categories include young

and single individuals, who may be still unsure about their career preferences, and women, for which the effect is even larger as they are generally considered to have better non-market opportunities than men (Booth *et al.*, 2002, B).

In synthesis, this section brought evidence that individual and household characteristics are significant determinants of the quantitative (participation and employment) and qualitative (part-time and temporary) labour market gender gaps identified in the 15 European countries considered. In particular, presence and age of children appear to worsen both the quantitative and qualitative gaps, as women's labour supply is generally more sensitive to family ties. On the contrary, women's education attainments strengthen their attachment to the labour market and to higher quality of occupations, thus significantly reducing both the quantitative and qualitative gaps. Finally, the evidence concerning the estimated effect of age on women's labour market patterns confirm the trend emerged for the quantity gap, with women of younger generations who are converging to typically male standards of labour supply and employment rates, thus closing the quantitative gender gap. For what concerns the effects of age on part-time and temporary gaps, evidence suggests that younger women are converging to typically male standards also in terms of quality of the employment.

The overall result emerged from this section confirms the hypothesis that the four labour market gender gaps are significantly influenced, each in a different way, by individual and household characteristics, such as presence and age of children, education level and age of the individuals.

After we tested for the significance of micro-level characteristics as determinants of occupational gender gaps, we are now ready to turn our attention to the second hypothesis advanced at the beginning of the section: are there macro variables influencing the employment and occupational gaps? In the remaining part of this section, we will test this hypothesis at different levels.

3.3.4 Welfare regimes

Regression 4 (table 10) captures the differences in employment, part-time and temporary gender gaps across the four welfare regimes. This approach gives us an overview of the way in which different institutional regimes affect the employment and occupational differences between

genders. The regression controls for individual and household characteristics, as well as for trend and cycle.

Table 10. Employment and occupational gender gaps: Welfare regimes

	employed			part-time			temporary		
	Coef.		Std. Error	Coef.		Std. Error	Coef.		Std. Error
<i>Gender</i>									
female	-0.383	***	0.009	1.135	***	0.011	0.096	***	0.018
<i>Marital status</i>									
incouple	0.130	***	0.004	0.038	***	0.005	-0.222	***	0.006
separated	0.430	***	0.010	-0.080	***	0.012	-0.174	***	0.013
divorced	0.419	***	0.006	-0.210	***	0.007	-0.205	***	0.008
widowed	0.290	***	0.008	-0.059	***	0.012	-0.250	***	0.013
<i>Children</i>									
children	-0.106	***	0.002	0.027	***	0.003	0.056	***	0.004
child_d	0.176	***	0.005	-0.002		0.006	-0.052	***	0.008
child_0_3d	-0.089	***	0.004	0.095	***	0.005	-0.071	***	0.006
child_3_6d	-0.031	***	0.004	0.150	***	0.005	-0.027	***	0.006
child_6_14d	-0.104	***	0.003	0.182	***	0.004	0.062	***	0.004
<i>Cohabiting with elderly</i>									
old_70d	0.016	***	0.004	-0.078	***	0.007	-0.011		0.007
<i>Education</i>									
ISCED_3_5	0.315	***	0.002	-0.069	***	0.004	-0.272	***	0.004
ISCED_5_7	0.707	***	0.003	-0.169	***	0.004	-0.271	***	0.005
<i>Partner education</i>									
pISCED_0_3	0.361	***	0.004	-0.171	***	0.006	-0.084	***	0.006
pISCED_3_5	0.472	***	0.004	-0.141	***	0.005	-0.247	***	0.006
pISCED_5_7	0.464	***	0.004	-0.059	***	0.005	-0.224	***	0.006
<i>Age</i>									
age_35_44	0.446	***	0.003	-0.015	***	0.004	-0.424	***	0.005
age_45_54	0.278	***	0.003	0.051	***	0.005	-0.571	***	0.005
age_55_64	-0.614	***	0.004	0.349	***	0.006	-0.689	***	0.006
<i>Macro</i>									
trend	-0.006	***	0.000	0.028	***	0.000	0.019	***	0.000
cycle	0.002	***	0.001	0.013	***	0.001	0.002	***	0.001
<i>Welfare state</i>									
democratic	-0.075	***	0.008	-0.190	***	0.011	0.426	***	0.015
I(female * democratic)	0.088	***	0.010	-0.370	***	0.013	0.142	***	0.021
continental	-0.038	***	0.007	-0.084	***	0.010	0.314	***	0.014
I(female * continental)	-0.200	***	0.010	0.136	***	0.012	0.094	***	0.019
southern	-0.012	*	0.007	-0.321	***	0.010	0.743	***	0.014
I(female * southern)	-0.400	***	0.010	-0.217	***	0.012	0.181	***	0.019
Observations	1890229			1226209			971302		

Estimated results in table 10 bring evidence that the institutional regime plays a significant role in shaping the labour market gender gaps. In particular, column (1) shows that, among the four regimes, the employment gender gap is smaller in Social Democratic countries, increases in Liberal (the control group) and Continental countries and reaches its maximum in Southern countries.

Column (2) presents evidence of the effect of different welfare regimes on the part-time gender gap. The estimate effect brings evidence that the part-time gap is smaller for women in Democratic countries than for those in Liberal countries. A similar result is obtained for Southern countries, where the gap is smaller than in Liberal countries as well. However, it is interesting to note that, although the two results are similar, they are due to very different reasons. Indeed, previous empirical literature (Petrongolo, 2004) has shown that part-time has very different meanings in the two welfare regimes. For what concerns Democratic countries, part-time contractual arrangements have been “institutionalised” and part-time workers enjoy relatively high protection. As such, part-time incidence among men is significantly higher in Democratic countries than in the rest of Europe and, consequently, this significantly reduces the part-time gender gap. When it comes to the perception of part-time in Southern European countries, the situation changes dramatically. Contrarily to what happens in Nordic countries, part-time is associated to significantly worse earning and career perspectives, as well as to a lower degree of protection. Hence, in Southern countries, part-time significantly reduces job satisfaction, and this effect is stronger for men than for women (Petrongolo, 2004). The result is that, in Mediterranean countries, part-time is generally less diffused and mainly held by women, as an alternative to inactivity.

To sum up, welfare regimes appear to be significant determinants of individuals’ employment decisions and of their preferences concerning time allocation among responsibilities. This effect is even more significant for women as their choices are generally more sensitive to external incentives and circumstances.

3.3.5 Policies

Regression 5 estimates the effect of selected social policies on the employment, part-time and temporary gender gaps in the 15 European countries considered. The three policies, selected

among those that the literature review (Cipollone *et al.*, 2012; Jaumotte, 2003) considers to be the most effective to influence women's labour market performance, are subsidies to households with dependent children, parental leave and subsidies to individuals cohabiting with an elderly person. The extents of the policies are captured by three indicators, *family_subsidies*, *leave* and *elderly*, respectively, that grow as the coverage and magnitude of each policy increase. Table 11 reports the estimated results that control for individual and household characteristics, trend, cycle and welfare regime.

Table 11. *Employment and occupational gender gaps: Policies*

	employed			part-time			temporary		
	Coef.		Std. Error	Coef.		Std. Error	Coef.		Std. Error
<i>Gender</i>									
female	-0.758	***	0.005	0.810	***	0.007	0.234	***	0.008
<i>Marital status</i>									
incouple	0.127	***	0.004	0.045	***	0.005	-0.221	***	0.006
separated	0.435	***	0.010	-0.057	***	0.012	-0.180	***	0.013
divorced	0.414	***	0.006	-0.216	***	0.007	-0.208	***	0.008
widowed	0.282	***	0.008	-0.056	***	0.012	-0.248	***	0.013
<i>Children</i>									
children	-0.103	***	0.002	0.030	***	0.003	0.055	***	0.004
child_d	0.167	***	0.005	-0.001		0.006	-0.060	***	0.008
child_0_3d	-0.082	***	0.004	0.089	***	0.005	-0.063	***	0.006
child_3_6d	-0.027	***	0.004	0.147	***	0.005	-0.026	***	0.006
child_6_14d	-0.098	***	0.003	0.190	***	0.004	0.054	***	0.004
<i>Cohabiting with elderly</i>									
old_70d	0.021	***	0.004	-0.061	***	0.007	-0.021	***	0.007
<i>Education</i>									
ISCED_3_5	0.314	***	0.002	-0.075	***	0.004	-0.267	***	0.004
ISCED_5_7	0.710	***	0.003	-0.167	***	0.004	-0.286	***	0.005
<i>Partner education</i>									
pISCED_0_3	0.355	***	0.004	-0.200	***	0.006	-0.081	***	0.006
pISCED_3_5	0.465	***	0.004	-0.169	***	0.005	-0.246	***	0.006
pISCED_5_7	0.460	***	0.004	-0.074	***	0.005	-0.239	***	0.006
<i>Age</i>									
age_35_44	0.445	***	0.003	-0.027	***	0.004	-0.415	***	0.005
age_45_54	0.282	***	0.003	0.048	***	0.005	-0.569	***	0.005
age_55_64	-0.610	***	0.004	0.354	***	0.006	-0.680	***	0.006
<i>Macro</i>									
trend	-0.008	***	0.000	0.019	***	0.000	0.026	***	0.000
cycle	-0.001	***	0.001	0.001	*	0.001	0.021	***	0.001
<i>Welfare state</i>									

democratic	-0.086	***	0.006	-0.616	***	0.007	0.577	***	0.011
continental	-0.219	***	0.006	-0.047	***	0.007	0.249	***	0.011
southern	-0.268	***	0.006	-0.404	***	0.007	0.728	***	0.011
<i>Policies</i>									
family_subsidies	0.014	***	0.001	0.021	***	0.001	-0.058	***	0.001
I(female * family_subsidies)	-0.004	***	0.001	0.032	***	0.001	0.009	***	0.001
leave	0.000	***	0.000	0.000		0.000	0.000	***	0.000
I(female * leave)	0.000	***	0.000	0.000	***	0.000	-0.000	***	0.000
elderly	-0.003	***	0.000	0.005	***	0.000	-0.003	***	0.000
I(female * elderly)	0.006	***	0.000	-0.001	***	0.000	0.000		0.000
Observations	1880224			1219243			969490		

Subsidies provided to family with dependent children increase gender employment gap. This result may be explained by the double nature of the components of family-oriented policies (captured by the variable *family_subsidies*), as they include both childcare subsidies and childcare benefits. Childcare subsidies, consisting of all those measures that aim to decrease the cost of childcare services, increase women's labour supply as they lower the cost of formal care, making it more affordable for a larger number of mothers. The other component are childcare benefits that consist, essentially, in lump-sum transfers to help families in the maintenance of children. As such, childcare benefits exert an income effect for women receiving the benefits as they raise mothers' reservation wage. As such, their impact on women's employment is negative. The evidence reported in table 11 may be reasonably explained by the prevalence of the latter effect on the former. The combination of these two effects may also explain why family subsidies increase the part-time gap, as we see in column (2). In fact, the subsidies allow women to participate and be employed in the labour market, while the income effect allows them to work-part-time, so that they conciliate wage-work with childcare.

The second family-oriented policy for which we test the significance as a determinant of the gender gaps in labour market is parental leave, which, together with family subsidies, is another measure for the welfare state support to families with children. The indicator *leave* increases as the generosity of parental leaving schemes increases, i.e. when the overall number of days available increases or when the amount of paid days of leave increases. Way may want to note that, although the index includes the leave available to both parents, it is extremely rare that fathers take up their leaving opportunities (Fagan *et al.*, 2003). The effect of leave on women's

labour market supply is a complex one: it may strengthen women's attachment to work in contexts where the alternative would be to leave their job but it may weaken their attachment if it becomes a substitute for formal childcare (ibidem). These considerations may help us understand the reasons for which the estimated effect of parental leave on the employment and part-time gaps between genders is far from being linear. Some more insights may be done about the tiny negative coefficient reported in column (3), relative to the gender gap in temporary works. Indeed, it is reasonable to hypothesise that more generous parental leaving schemes allow women to remain attached to the job they held before maternity, thus reducing the number of women that re-enter in the labour market with temporary jobs after maternity due to the fact that the inactivity spell made it more difficult for them to find immediately a permanent job, *ceteris paribus*.

Finally, the third policy considered is the sum of the transfers made to elderly population. The reason for which we included this policy in the analysis is that the current circumstances of progressive population ageing may increase the burden of caring responsibility that rests on women. Under these conditions, transfers to elderly population may have a positive impact on women's activity and employment performance, as they increase the affordability of formal elderly-care services. At the same time, however, elderly subsidies may also exert a negative effect on women's employment. Indeed, especially for women cohabiting with an elderly relative, elderly subsidies increase women's reservation wage, that is, the minimum wage at which women would be willing to accept a job. The estimated effects in table 11 seem to suggest that the former effect prevails in the countries considered, as more generous elderly subsidies reduce the gender employment gap (column 1). Overall, however, we may note that the effects of the subsidies on part-time and temporary gender gaps are rather small.

To sum up, different social policies appear to have a significant impact on women's labour market outcomes and occupational choices. Family oriented policies (i.e. childcare and leave policies) turn out to be the most relevant ones although their effects are often complex and may either reduce or increase gender gaps in the labour market.

3.3.6 Institutions

After having analysed the effects of social policies on the gender gaps in the European labour market, we now turn our attention to the impact of the other typology of macro-level determinants: labour market institutions. Following the previous empirical literature, we have selected those three labour market institutions that are deemed to have the most important effects on labour market at large and specifically on women labour market decisions. Hence, specification 6 allows the effect of the variable *female* to vary depending on the level of active and passive labour market policies and of employment protection legislation (EPL). The power of each institution is captured by three indicators: *active_lmp*, *passive_lmp* and *epl_all*, respectively. Indicators of active and passive labour market policies increase as the amount of resources allocated and the coverage of the policies increase. The EPL indicator increases as hiring and firing regulations become stricter and the labour market rigidity increases. The results of specification 6 are presented in table 12.

Table 12. Employment and occupational gender gaps: Institutions

	employed			part-time			temporary		
	Coef.		Std. Error	Coef.		Std. Error	Coef.		Std. Error
<i>Gender</i>									
female	-0.526	***	0.008	1.252	***	0.010	0.230	***	0.013
<i>Marital status</i>									
incouple	0.142	***	0.004	0.025	***	0.005	-0.226	***	0.006
separated	0.426	***	0.010	-0.107	***	0.013	-0.152	***	0.013
divorced	0.409	***	0.006	-0.194	***	0.007	-0.232	***	0.009
widowed	0.293	***	0.008	-0.069	***	0.012	-0.241	***	0.014
<i>Children</i>									
children	-0.102	***	0.002	0.017	***	0.003	0.057	***	0.004
child_d	0.170	***	0.005	0.002		0.006	-0.057	***	0.008
child_0_3d	-0.093	***	0.004	0.098	***	0.005	-0.061	***	0.006
child_3_6d	-0.027	***	0.004	0.148	***	0.005	-0.027	***	0.006
child_6_14d	-0.099	***	0.003	0.182	***	0.004	0.056	***	0.004
<i>Cohabiting with elderly</i>									
old_70d	0.023	***	0.004	-0.080	***	0.007	-0.010		0.007
<i>Education</i>									
ISCED_3_5	0.322	***	0.002	-0.091	***	0.004	-0.260	***	0.004
ISCED_5_7	0.708	***	0.003	-0.198	***	0.004	-0.283	***	0.005
<i>Partner education</i>									
pISCED_0_3	0.346	***	0.004	-0.162	***	0.006	-0.076	***	0.006
pISCED_3_5	0.477	***	0.004	-0.140	***	0.005	-0.245	***	0.006

pISCED_5_7	0.466	***	0.004	-0.048	***	0.006	-0.241	***	0.007
<i>Age</i>									
age_35_44	0.454	***	0.003	-0.026	***	0.004	-0.429	***	0.005
age_45_54	0.295	***	0.004	0.036	***	0.005	-0.578	***	0.006
age_55_64	-0.590	***	0.004	0.339	***	0.006	-0.683	***	0.007
<i>Macro</i>									
trend	-0.005	***	0.000	0.022	***	0.000	0.032	***	0.000
cycle	-0.002	***	0.001	0.013	***	0.001	0.025	***	0.001
<i>Welfare state</i>									
democratic	-0.279	***	0.007	-0.212	***	0.010	0.165	***	0.013
continental	-0.344	***	0.007	0.258	***	0.008	-0.008		0.012
southern	-0.398	***	0.006	-0.177	***	0.008	0.430	***	0.011
<i>Institutions</i>									
active_1mp	0.112	***	0.006	-0.091	***	0.011	-0.180	***	0.011
I(female * active_1mp)	0.307	***	0.008	-0.026	**	0.012	0.064	***	0.014
passive_1mp	-0.053	***	0.003	0.019	***	0.005	0.212	***	0.005
I(female * passive_1mp)	-0.041	***	0.004	0.039	***	0.006	-0.040	***	0.007
epl_all	0.115	***	0.002	-0.074	***	0.004	0.134	***	0.004
I(female * epl_all)	-0.087	***	0.003	-0.103	***	0.004	0.014	***	0.005
Observations	1823511			1184018			927508		

From the estimated results, it emerges that active labour market policies significantly reduce the employment gender gap (column 1). The explanation we suggest for this evidence refers to the fact that incisive active labour market policies improve the matching between searching workers and vacancies. This increases overall employment levels with a greater effect on female employment, as a better matching strengthens women's attachment to the labour market, as it emerges in column (1). The increase in the quality of the match exerts a different effect depending on the typology of contract considered. As we can see from column (2), extensive active labour market policies reduce the part-time gender gap (column 2) while they increase the temporary gap (column 3). The rationale behind this evidence is closely related to the increase in the overall labour market efficiency. Indeed, it is reasonable to hypothesise that a better matching between workers and vacancies strengthens workers' attachment to full-time employment, as the job matches the workers' expectations. It is therefore reasonable to infer that, under these circumstances, workers are less willing to work part-time than full time. This effect is stronger for female workers as they have better non-market opportunities that, in case of dissatisfaction with their job, may be better conciliated with part-time. On the contrary, a satisfactory matching between workers and vacancies may induce more workers to accept

temporary jobs, as the lower job satisfaction associated with this type of contracts is counterbalanced by the satisfaction with the job held.

Passive labour market policies appear to increase the employment (column 1) and part-time gender gap (column 2), while they reduce temporary gender gap (column 3). These dynamics can be traced back to a unifying rationale, which is that for which generous passive labour market policies encourage workers to remain in unemployment longer than they would do if these policies were less generous. The specific effects differ for different categories of workers, as it emerges from the estimated coefficients. As noted several times, women generally have better non-market opportunities and their labour supply is more sensitive to labour market conditions. Hence, in case of generous passive labour market policies, the incentives to lag in unemployment have greater impacts on women's employment and the gender employment gap widens (column 1). These incentives also affect the willingness of workers to accept temporary jobs, that, as already noted, are generally associated with a lower degree of job satisfaction. For the same reasons mentioned about employment, women have even lower incentives than men to accept temporary jobs, as they may find more convenient to shift to housework. Hence, we observe that, as the generosity of passive labour market policies increases, temporary gender gap decreases.

For what concerns the effect of passive labour market policies on the estimated part-time gap we can see that it is a positive one: as generosity of policies increases the part-time gap increases too. This effect may be explained by the fact that, on average, male part-timers are less satisfied with shorter working-hours than their female counterparts (Petrongolo, 2004). Hence, it is reasonable to hypothesise that generous unemployment benefits give men greater incentives to remain unemployed until they do not find a full-time job than they give to women. This explains the result observed in column (2).

Finally, let us consider the effect of employment protection legislation (EPL) on the analysed gender gaps. Not surprisingly, a higher EPL coincides with a greater employment gender gap. Indeed, in countries characterised by more rigid labour market institutions, the employment opportunities of those categories of workers with higher statistical probabilities to have a discontinuous labour history are more penalised. This is the case of women: as a higher EPL makes it more costly for employers to fire women in case of maternity, the ultimate result is

that women have significantly lower employment rates, *ceteris paribus*. This is precisely the estimated effect captured in column (1).

The diffused labour market rigidity makes it also more difficult for these categories of workers (mainly young and women) to access to part-time jobs. In fact, employers in countries characterised by rigid labour markets use part-time contracts to enhance the flexibility of their labour force and, consequently, tend to increase the incidence of part-time among men. This tendency significantly reduces women's possibilities to access to part-time contracts, thus explaining the evidence reported in column (2), according to which EPL reduces part-time gender gap.

The combination of the just described incentives that high EPL gives to employers determines the estimated effect in column (3). Here we clearly observe that a high EPL significantly increases the incidence of temporary jobs in the economy, with an effect that is even larger for women. In fact, in case of stricter firing conditions and of higher firing costs, employers have great incentives to hire people with temporary contracts. Indeed, temporary contracts allow a greater labour force flexibility, both due their temporary nature and due to the fact that the level of protection guaranteed to temporary workers is generally lower than the one guaranteed to permanent ones (Booth *et al.*, 2002, B). The incentive to hire women in temporary jobs is even higher as this allows employers to discharge them at lower cost in case, for example, of maternity.

In synthesis, labour market institutions are found to have significant effects on the employment, part-time and temporary gender gaps existing in Europe. Active labour market policies are found to improve the quantitative conditions of female employment (reducing the employment gap) whereas their effect on the quality of female employment is less linear. Passive labour market policies, especially if excessively generous, reduce the overall labour market efficiency with negative consequences for women's labour market performance, as women find even greater incentives to shift to non-market activities. Finally, rigid labour market institutions reduce the overall efficiency of the labour market and exert a clear negative impact on both the quantity and the quality of female employment.

4. Conclusion

Over the last two decades, women's integration in the labour market experienced radical transformations in many European countries. The increase in female participation and employment rates led to the gradual decline in both participation and employment gender gaps. In many European countries, this pattern has occurred together with a trend of labour market deregulation that increased the incidence of atypical jobs, especially in countries characterised by high labour market rigidities. The incidence of atypical contracts has increased unevenly between genders, leading to an increase in both part-time and temporary gender gaps.

This analysis provides evidence of the determinants of different labour market decisions and outcomes between genders, and of the resulting quantitative and qualitative gender gaps.

A preliminary analysis of the literature concerning female labour market has allowed us to outline a theoretical and empirical framework from which to start the development of the empirical investigation. Through the discussion of different models, it was highlighted the importance of both microeconomic and macroeconomic factors, together with that of different welfare regimes as determinants of gender labour market outcomes.

The empirical analysis, performed through probit regressions, tested for the effects and significance of selected factors as determinants of quantitative and qualitative gender gaps. Four main results have emerged from this analysis.

First, controlling for individual characteristics, the gender is found to significantly increase the activity, employment, part-time and temporary gaps. Though acknowledging the accuracy limits of the regression approach to labour market segregation, the amplitude of the dataset used provides us with a significant number of degrees of freedom. The evidence found is allegedly consistent with the existence of gender occupational segregation in the European labour market. Indeed, while it emerges a closing tendency in quantitative gender gaps, the qualitative gaps show an increasing trend over time.

Second, micro-level characteristics, such as family ties, educational attainments and age appear to have different effects on occupational decisions across genders. In particular, family ties and presence of children in the household increase both the quantitative and qualitative gender gaps, leading to lower participation rates and higher incidence of atypical jobs among women. Education is found to be a significant determinant for the integration of women in the labour market as it increases the labour market attachment and the quality of jobs held.

Third, participation and occupational gaps are found to differ widely across welfare regimes. Liberal and Social democratic regimes result, overall, to perform better in terms of female labour market integration. Scandinavian countries have traditionally high female participation rates and generous welfare expenditures on childcare and family-oriented policies. The liberal UK, has reached high female participation levels as well, leveraging on the flexibility of its labour market and on the efficiency of its expenditure on active labour market policies. The Continental model, though characterised by generous family policies, exhibits a higher labour market rigidity that undermines women's labour market performance. Indeed, Continental models feature a large employment gap as well as large part-time and temporary gaps. Finally, the Southern model is found to be inefficient as its rigidity seriously hampers female integration.

Finally, a more accurate analysis of the effects exerted by specific policies and institutions has revealed the importance of a correct balancing between flexibility and security. Indeed, excessively generous welfare regimes (lavish family subsidies and passive policies) trigger an income effect that exerts a more harmful impact on women labour market performance, as women generally have a lower opportunity cost to leave the market or reduce their working time. Rigid labour markets favour the occupational radicalisation in a two-tier labour market, where incumbent workers benefit of high degrees of protection while entrants have limited opportunities for career and professional development and find themselves stuck in a limbo of uncertainty and low quality jobs. There exist several reasons for which women have higher statistical probabilities to belong to the latter group. Hence, it is reasonable to hypothesise that enhancements in labour market flexibility of permanent works may improve the employment outlook for European women. At the same time, however, as women have statistically higher probabilities to hold atypical jobs, it is of the utmost importance to combine market deregulation with policies that guarantee access to employment security and income support during transition periods even for atypical contracts. In synthesis, we can argue that, a combination of flexible labour market institutions and occupational security, as the model implemented by Scandinavian countries, may successfully equate the possibilities of women to be fully integrated in the labour market at different stages of their lives to the possibilities of men, contributing to the reduction of gender employment and occupational gaps.

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