REM WORKING PAPER SERIES

The persistence of gender pay and employment gaps in European countries

António Afonso, M. Carmen Blanco-Arana

REM Working Paper 0338-2024

August 2024

REM – Research in Economics and Mathematics
Rua Miguel Lúpi 20,
1249-078 Lisboa,
Portugal

ISSN 2184-108X

REM – Research in Economics and Mathematics

Rua Miguel Lupi, 20
1249-078 LISBOA
Portugal

Telephone: +351 - 213 925 912
E-mail: rem@iseg.ulisboa.pt

https://rem.rc.iseg.ulisboa.pt/

https://twitter.com/ResearchRem

https://www.linkedin.com/company/researchrem/

https://www.facebook.com/researchrem/

The persistence of gender pay and employment gaps in European countries[1]

António Afonso[$], M. Carmen Blanco-Arana[#]

August 2024

Abstract

The gender pay gap and the gender gap in employment remains persistent in Europe despite the basic assertion of gender equality under EU law. We assess the factors that influence the gender pay gap and gender employment gap across European countries. Therefore, we use an unbalanced panel of 31 European countries over the period 2000-2022, and estimate a system generalized method of moment model (GMM). The main conclusions confirm that tertiary education significantly reduces gender pay gap and part-time and temporary contracts significantly increase this gap. Moreover, part-time reduces significantly gender employment gap. Gross Domestic Product (GDP) per capita does not affect these gaps and the Global Financial Crisis (GFC) saw a narrowing of the gender pay and employment gaps in European countries. The results are robust when using a fixed effects (FE) model.

JEL codes: J0, J16, C23
Keywords: Gender Pay Gap; Gender Employment Gap; Secondary Education; Tertiary Education; Part-time; Temporary Work; GMM; European countries

[1] This work was supported by the FCT (Fundação para a Ciência e a Tecnologia) [grant number UIDB/05069/2020]. The opinions expressed herein are those of the authors and do not necessarily reflect those of the authors' employers. Any remaining errors are the authors' sole responsibility.
[$] ISEG – Lisbon School of Economics and Management, Universidade de Lisboa; REM – Research in Economics and Mathematics, UECE – Research Unit on Complexity and Economics. CESifo Research Fellow (Center for Economic Studies and Ifo Institute). email: aafonso@iseg.ulisboa.pt. ORCID ID: 0000-0002-6926-2653
[#] Faculty of Economics and Business Studies, University of Malaga, Department of Applied Economics (Public Finance, Economic Policy and Political Economy), Spain. Email: c.blancoarana@uma.es. ORCID ID: 0000-0002-8241-6573

1. INTRODUCTION AND MOTIVATION

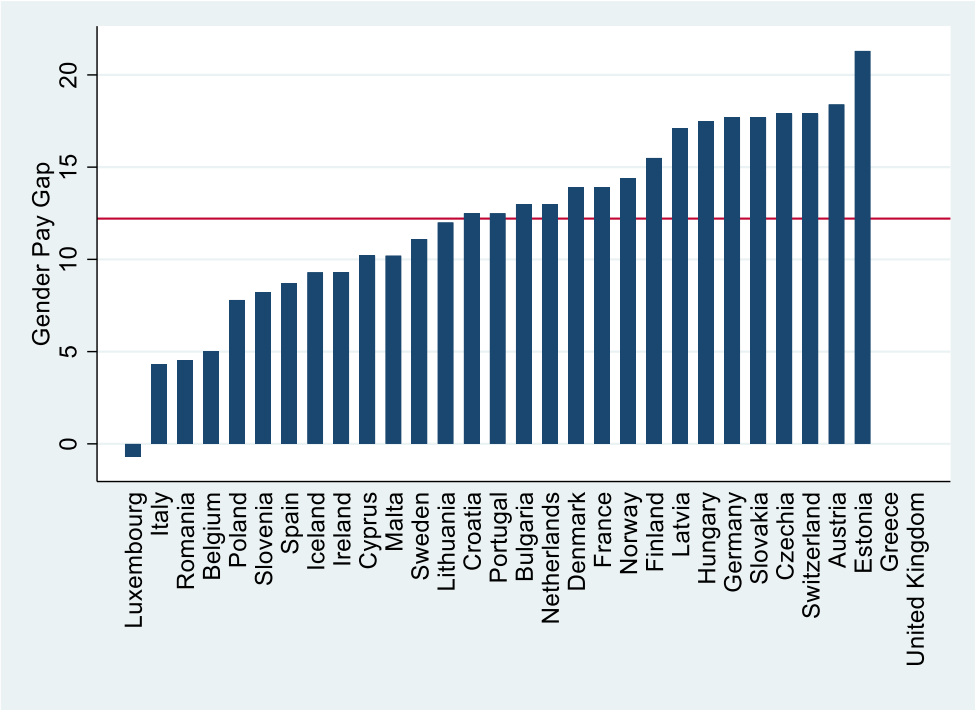
Gender equality constitutes a principle and a fundamental right in advanced societies, making the reduction of the gender pay gap and of the gender employment gap a priority challenge yet to be resolved in today's society. While significant progress has indeed been made in recent years, the gap between men and women in terms of employment remains considerable. In fact, gender inequality persists throughout the labour market, despite the codification of its termination as an essential principle of European Union (EU) law. Although the EU recognizes that participation by women in the labour market is decisive for economic growth, and while the EU has become a world leader in workplace gender-gap reduction, no member country has thus far achieved full equality, and gender gaps in terms of wages, pensions, and employment are all still relevant. The principle of equality is part of the Europe 2020 Strategy, which aims through a series of social and economic reforms to transform the EU into a sustainable, inclusive, intelligent regional economy with high productivity, steady employment, and social cohesion. Not only is the EU committed to eliminating differences, it is pursuing an economic rationale for doing so, and as regards employment it intends to implement a series of reforms to increase the employment rates for women and youths (European Commission, 2020).

The EU states that gender equality supposes the creation of jobs, higher productivity, and positive economic effects, with benefits for member countries as a collective and, therefore, for European society. Thus equality is to be developed in all areas and activities. Among the objectives of this strategy is an 'equal Europe', with equal opportunities in labour regardless of gender, and with equal pay for jobs of equal participation and value. In this context, Okun's law in economics states that adjustments in the labour market extending across major economic cycles come mainly through employment, and hence a strong association exists between changes in real GDP and changes in the employment rate. Many have also noted the failure of real wages to fall during recessions in developed economies, and this has often puzzled analysts (see Bewley, 1999; Pissarides, 2009; Kudlyak, 2010; among others). In this line, we can assert that the impact of the recent Great Recession in Europe will have been mainly felt by families through employment loss, rather than through losses in wages, and we might further anticipate that the impact of the COVID-19 crisis will be much the same (see, for example, Blanco-Arana, 2020). Indeed, a number of countries have explicitly sought to insulate employment responses by encouraging women's employment.

Despite significant progress in recent decades, gender pay gap persists in the European Countries. There are considerable differences between European countries, as seen below in

Figure 1, where the gender pay gap in European countries is shown for 2022. We observe a significant variation in gender pay gap across countries in 2022 that range from -0.7% (Luxembourg) to 21.3% (Estonia). Estonia, Austria, Czechia, Switzerland, Germany and Slovakia display the highest gender pay gaps, while the lowest ones are located in Luxembourg, Italy, Romania, Belgium, Poland and Slovenia. As a group, there was a gender pay gap of 12.21% in 2022 (it was 18.56% in 2002 as a group). Countries with data not available in 2022 are: Greece (10.4 in 2018) and United Kingdom (19.8 in 2018).

Figure 1. Gender Pay Gap (2022)

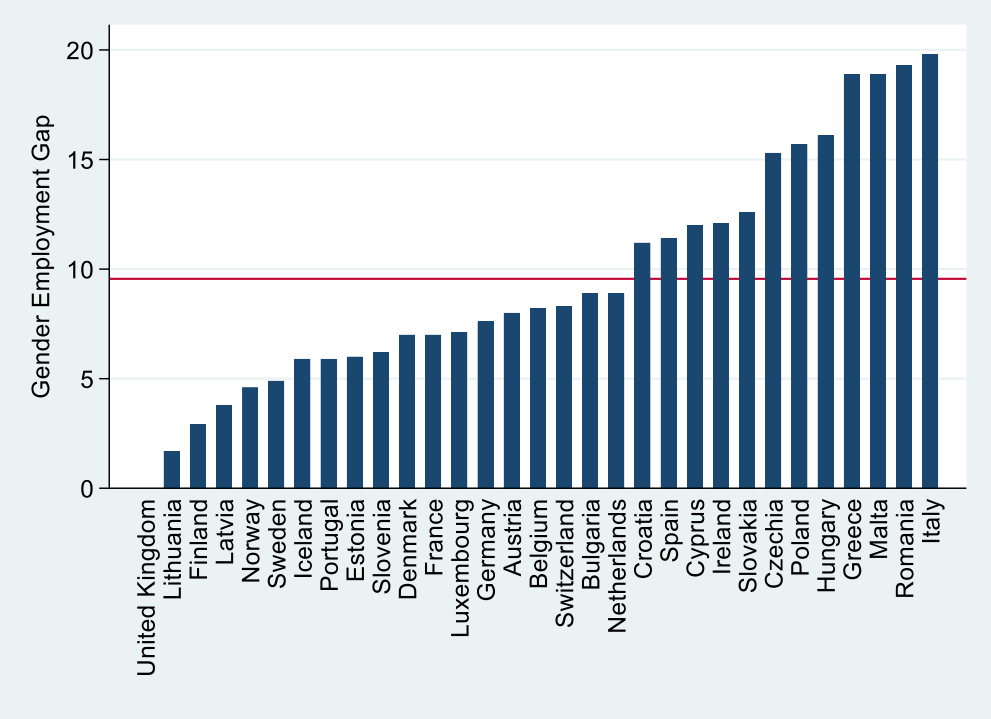


Source: Eurostat (2024).

Moreover, despite improvements in the working situation of women over recent decades, with considerable beneficial gains, one place where the gender gap especially persists is in the employment rate. Inequalities across the labour market are obvious, as seen below in Figure 2, where the gender gap in employment in European countries is shown for 2020. Significant differences between European countries range from the Southern and Eastern European nations, with above-average inequalities in the employment rate (particularly in Greece, Malta, Romania and Italy), to the Nordic countries, where inequalities are lower (notably in Lithuania, Finland, Latvia, and Sweden). For the full sample, the gender

employment gap goes from 15.63% in 2000 to 9.55% in 2020. The United Kigdom has not data available in 2022 but in 2019 the gap was 9.4%.

Figure 2. Gender gap in employment (2020)



Source: Eurostat (2024).

Thus the gender gap in the labour market is real at the European level, as well as the global level, and this has economic impacts that extend to all countries. Some studies argue that, were the employment rates of men and women equal, both production and job creation would increase, which would accrue economic benefits.

Analysis of gender inequality in the labour market has aroused great interest among academics and professionals, especially from the economic perspective and in the wake of the GFC that emerged in 2008 (see, for example, Ribas and Sajardo, 2011; Périvier, 2014; among others). Therefore, the main objective of this work is to examine inequality in the employment rates of European countries from an economic view, also considering the relationship between the gender gap and the economic growth of the countries analyzed.

Through the GFC, the European experience in economic terms varied significantly across countries, with certain (mainly Eastern) countries seeing no falls in GDP while others (mainly Southern, plus the UK and Ireland) seeing very large ones. The recession cut so deep in some European countries that governments resorted to measures of welfare and family

support, while labour markets aimed at increasing employment protections in general terms. Women's employment in particular worked to counteract declines in family incomes. Serious consequences of the GFC included drops in the employment rate as well as job destruction, impacts on GDP, and a strong increase in the unemployment rate, unevenly experienced by men and women (Weber, 2015). But if one thing is clear, it is that the GFC had a strong negative impact in terms of gender on labour markets (unevenly experienced by different countries) as well as on world economic growth. In general, labour markets improved their results once the crisis ended, but improvements were uneven among countries and, furthermore, their malfunction can harm a country's economic growth, especially during a critical economic and social shock such as that currently being sustained due to the pandemic.

This paper assesses the factors that influence the persistence of gender pay gap and the persistence of gender employment gap across European countries, with special attention paid to the Great Recession that began in 2008, by estimating a GMM model for 31 European countries. The main conclusions confirm that, on the one hand that, with regard to analysis of gender pay gap, tertiary education significantly reduces it and part-time and temporary contracts significantly increase this gap, maybe due to many women have no other choice to choose this type of contracts precarious. On the other hand, when we analyse gender employment gap, secondary and tertiary education plays a crucial role to reduce it. Moreover, in this analysis part-time reduces significantly gender employment gap, at this point, the more important thing is the fact of being working or not. Surprisingly, however, the GDP per capita does not affect to these gaps and the period of the GFC saw a narrowing of the gender gap in European countries.

The organisation of the remainder of the paper is as follows: section 2 reviews the related literature; section 3 describes the data and methodology; section 4 presents and discusses the results; and section 5 concludes.

2. LITERATURE

Gender equality is regarded as a fundamental principle and a right in all advanced societies. And yet the gender gap in employment persists and represents a disadvantage for women; solving this disparity would benefit not only companies but the economic growth of entire nations, and of society as a whole. Were female and male employment truly equitable, with women and men enjoying equal participation in the labour market, economies would be stronger and benefits would certainly be greater. Other major advantages of eliminating the

gender gap would include improved reduction of poverty in households, and improved market productivity (Demirguc-Kunt *et al*., 2013).

Progress towards gender equality in terms of employment has been widely studied in developed countries, especially within the framework of the Europe 2020 Strategy. Most studies conclude that, in recent decades, there has been a reduction in the gender gap relative to employment. Still, significant differences remain between countries (see, for example, Klasen and Lamanna, 2009; Ribas and Sajardo, 2011; Bárcena-Martín *et al*., 2013; Escribá-Agüir *et al*., 2014; Périvier, 2014; Addabbo, 2015; Casado *et al*., 2015; Baussola, 2016; Zanin and Calabrese, 2017; Brunet and Jeffers, 2019; Faďoš and Bohdalová, 2019; among others). Nevertheless, a thorough empirical investigation has not been conducted of the role of gender gaps in employment in relation to economic growth, and the few available studies must be treated with caution due to problems of endogeneity, unobserved heterogeneity, and poor data quality and availability. According to Klasen and Lamanna (2009), there are many reasons to be concerned about the gender inequalities found in important dimensions related to well-being, such as employment. From this perspective, such inequalities are problematic, as they lower well-being and represent a form of injustice under most conceptions of equity.

Among the many approaches to this issue in the literature, one argument finds that gender gaps in employment distort an economy, artificially reducing the pool of talent available for employers and thus the average ability of the workforce (see for example Esteve-Volart, 2004). A second and closely related argument suggests that gender inequality in employment can reduce economic growth via demographic effects. In this sense, a model by Cavalcanti and Tavares (2007) suggests that gender inequality in employment can be associated with higher fertility levels, which can reduce economic growth. Third, the results by Seguino (2000a, 2000b) on the impact of gender gaps in income on international competitiveness further imply that gender gaps in employment access reduce economic growth, depriving countries of the use of (relatively cheap) women's labour as a competitive advantage in an export-oriented growth strategy.

Few empirical studies focus on the impact of gender gaps in employment as related to economic growth, largely due to issues of data and econometrics, as noted above. Even so, a common perspective is that reductions in gender gaps might benefit economic growth (Esteve-Volart, 2004; Stotsky, 2006; Anxo *et al*., 2007; Cavalcanti and Tavares, 2007; Klasen and Lamanna, 2009; Brunet and Jeffers, 2019).

In this line, Stotsky (2006) examines the implications for macroeconomic policy of gender differences in economic behavior. This author finds that reducing gender inequality and improving the status of women may contribute to higher rates of economic growth and greater macroeconomic stability. Equality of opportunity in both labour and financial markets is critical to enabling women to take full advantage of improved macroeconomic conditions, and so it is possible to conclude that macroeconomic policies should take the benefits of reduced inequalities into account, especially in the lowest-income countries. Anxo *et al*. (2007) examine patterns of labour market integration over the full working lives of men and women in seven European countries and conclude that the Nordic model features the least pronounced gender inequality in terms of work-time allocation, as well as more 'active ageing' in later life. This profile is supported by a coherent and integrated set of policies for both time and income management throughout the course of life, in contrast to relatively piecemeal measures seen in other national models. Hence, the Nordic model offers worthwhile insights for EU employment policy.

Elsewhere, Klasen and Lamanna (2009) investigate the extent to which gender gaps in education and employment reduce economic growth. Using cross-country and panel regressions for the period 1960-2000, they find that gender gaps in in these areas do indeed reduce growth considerably. Moreover, the combined "costs" of education and employment gaps in the Middle East and North Africa and in South Asia, respectively, amount to 0.9–1.7 and 0.1–1.6 percentage point differences in growth, as compared to East Asia. Gender gaps in employment appear to have an increasing effect on differences in economic growth between regions, with both the Middle East and North Africa and South Asia suffering effects of slower growth in female employment. Addabbo *et al*. (2015) analyze gender differences in the decision to participate in the labour market in Spain and Italy during the Great Recession, derived from differences in women's positions in the job structure, the family, and the welfare economy. Results show a strong countercyclical 'added-worker effect' for women, in contrast with a procyclical 'discouraged-worker effect' for men. Moreover, while the added-worker effect prevails for women in Spain, the discouraged-worker effect is dominant in Italy. Baussola *et al*. (2016) analyse the gender gap in unemployment in Italy and the UK by studying the determinants of labour flows with a multinomial logit model and estimating the contribution of transitions between employment, unemployment and inactivity to the gap using data from the labour force surveys of both countries from 2004 to 2013. The analysis of the gap using a transition probability matrix shows the disadvantage of women in Italy and the advantageous

situation referring to men in the UK. According to the European Institute for Gender Equality (2017), there is evidence that gender equality produces positive effects that collaborate in the reduction of existing inequalities in the labour market, in terms of employment based on gender, meanwhile boosting economic growth both in individual countries and in general. The World Bank and the Organisation for Economic Co-operation and Development (OECD) are in charge of requiring that companies analyze their internal gender gaps and report on them. The objective is to collect data on gender inequalities in national labour markets that arise as consequences of social, political, and economic factors alike; and it is these factors that governments and societies must address. In this sense, according to Stotsky (2006), equality of opportunity in labour and financial markets is critical to enabling women to take full advantage of improved macroeconomic conditions.

Brunet and Jeffers (2019) also examine the evolution of labour market-related gender gaps during the Great Recession, examining 14 European Union member states from 2003 to 2013 through fixed effects models. Their results indicate that gender gaps decreased during that period, and particularly during the recession years. Thus, they conclude that economic growth appears to foster gender inequalities, while increased employment in the service or public sectors tends to lower gender gaps. Faďoš and Bohdalová (2019) analyze gender inequality in unemployment rates in the 27 European Union countries, finding differences across countries during the period Q1 2005 to Q2 2017. For both univariate and panel data country series, they test the hypothesis of the hysteresis to check the relation between gender inequality in unemployment and unemployment rate levels. They find that the relationship between gender inequality in unemployment and disadvantaged gender in inequality depends on the country analyzed. This result suggests that further analysis is needed to identify what causes gender inequality in unemployment and what should be done to decrease it.

We now know with certainty that the GFC of 2008 onward affected the developed economies and their labour markets in particular. Ribas and Sajardo (2011) carried out a comparative analysis of the social economy in Spain during the period 2007-2010 with the aim of highlighting the gender differences in the different periods of the crisis, as well as assessing whether the crisis affected men and women equally. Observing high unemployment figures, they concluded that the situation was not experienced equally between the sexes and that women worked more in part-time. Also in relation to this period of crisis within the Spanish economy, Cabasés *et al*. (2013) showed an unequal impact from a gender perspective, especially in the case of wages, from 2000 to 2012. The authors concluded that despite

improvements in female employment in pre-crisis years and the political actions taken during the crisis, existing inequalities (vertical, horizontal, and income) between men and women were not resolved. Likewise, Escribá-Agüir *et al*. (2014) analyzed how this period of economic tension impacted greatly on all countries of the European Union, and they noted that the Spanish labour market was especially affected, registering among the worst employment indicators of that time, especially in terms of equality. The authors further concluded that reductions in spending on active employment policies would have worsened the situation. Clearly, the period of the Great Recession remains worthy of specific analysis.

To the best of our knowledge, this paper represents the first attempt to study the factors that could affect the persistence in gender pay gap and gender employment gap over a long time span. We cover 31 European countries using a dynamic panel to assess whether the gender pay gap and gender employment gap was subject to changes during the GFC.

3. DATA, VARIABLES AND METHODOLOGY

3.1. Data and variables

In this paper, we use statistics collected by Eurostat, a primary source for information on European countries that permits comparative and cross-sectional study. Eurostat provides data and statistics on Europe and its member countries, as well as those around them. The European Central Bank relies on data produced by this body to make decisions, and information available from Eurostat allows for the monitoring of European countries in aspects such as economic growth as well as social and demographic status. Our analysis uses a dataset for 31 European countries (the EU-27 plus Iceland, Norway, Switzerland, and the United Kingdom) during the period 2000-2022, involving more than 500 observations. A time-period of 23 years was selected in order to focus on these gender gaps.

We use two dependent variables separately: the gender pay gap and the gender gap in employment. First, the *Gender Pay Gap*, where measures the difference between average gross hourly earnings of male paid employees and of female paid employees as a percentage of average gross hourly earnings of male paid employees. The indicator is unadjusted, because it gives an overall picture of gender inequalities in terms of pay and measures a concept, which is broader than the concept of equal pay for equal work. All employees working in firms with ten or more employees, without restrictions for age and hours worked, are included. Second, the *Gender Employment Gap*, which is defined as the difference in the employment rates of women and men, calculated by dividing the number of employed persons aged 20 to 64 by the

total population of the same age group. The indicator is based on the EU Labour Force Survey, which covers the population living in private households but excludes those in collective households such as boarding houses, residence halls, and hospitals. The employed population consists of persons who during the week of reference worked for at least one hour for pay or profit, or who may not have worked but held jobs from which they were temporarily absent.

As explanatory variables, we use:

- Regarding to overall economy, we use Gross Domestic Product, *GDP*, which is a measure for the economic activity (see, for example, Afonso and Blanco-Arana, 2023). It refers to the ratio of real GDP to the average population of a specific year. GDP measures the value of total final output of goods and services produced by an economy within a certain time-period. It includes goods and services that have markets (or which could have markets) and products which are produced by general government and non-profit institutions. In particular, this variable refers to the natural logarithm of GDP per capita in order to to linearize the relationship between Eurpean countries.
- We also include other factors that can relate to the reduction of these gender gaps. Women with low levels of education suffer a double disadvantage: gender gaps in employment exist across all levels of education but tend to be widest among men and women with low levels of education. According to the OECD (2017), across its member countries, the gender gap in employment among men and women with low educational levels stands at 19.5 percentage points, on average – or more than double the gap among highly-educated men and women (8.5 percentage points). Therefore, we use the variable *secondary* measured as the percentage of persons aged between 15 and 64 years with upper secondary, post-secondary non-tertiary education (levels 3-4), as well as, *tertiary* education (levels 5-8) as the percentage of persons aged between 15 and 64 years with tertiary education (levels 5-8).
- Regarding the type of contracts, in line with Sarra (2018) and Duman (2023), there are substantial gender inequalities more prevalent for temporary and informal jobs. Therefore, we use part-time employment, *part-time*, and temporary contracts, *temporary*, as percentage of total employment. The Appendix provides the statistical summary of the data series.

In addition, we sought to cover both the period of the GFC suffered by OECD countries from 2008 to 2011 and the periods before and after, in order to analyze any differences between

behaviour during a 'delicate' economic situation and otherwise. So, in the context of labour market, according to Afonso and Blanco-Arana (2023), the dichotomous variable *crisis* has been included to enable us to analyze whether the Great Recession period proved to be a significant aspect in influencing differences between men and women in employment, as well as the incidence of such differences.

3.1.Methodology

One of our interests lies in accounting for the persistence over time of gender pay gap and gender employment gap in the specification of the model. To this end, we apply dynamic panel data with one lags of the dependent variable by using the one-step system generalized method of moments' estimator (system GMM) (Arellano and Bover, 1995; Blundell and Bond, 1998). This method estimates a system of equations in both first differences and levels, in which the instruments in the level equations are the lagged first differences of the variables.

On cantest the validity of the system GMM estimator moment conditions by means of the overidentifying restrictions test proposed by Sargan (1958) and by testing the null hypothesis of no order serial correlation in the error term, given the one lags of the endogenous variable by test proposed by Arellano and Bond (1991). Thus, we have checked for the Sargan test of over-identifying restrictions suggests that the instruments are valid, while the Arellano–Bond test for second-order autocorrelation reveals that there is no significant serial correlation, and thus the estimator should be consistent.

Hence, we formulate the following panel data models to analyse Gender Pay Gap, for country *i* at time *t* and Gender Employment Gap for country *i* at time *t*:

$$Gender\ Pay\ Gap_{it} = \beta_0 + \beta_1 Gender\ Pay\ Gap_{it-1} + \beta_2 LnGDP_{it} + \beta_3 Secondary_{it} + \beta_4 Tertiary_{it} + \beta_5 Part-time_{it} + \beta_6 Temporary_{it} + \delta crisis_t + \zeta_i + \omega_{it} \quad [1]$$

$$Gender\ Employment\ Gap_{it} = \beta_0 + \beta_1 Gender\ Employment\ Gap_{it-1} + \beta_2 LnGDP_{it} + \beta_3 Secondary_{it} + \beta_4 Tertiary_{it} + \beta_5 Part-time_{it} + \beta_6 Temporary_{it} + \delta crisis_t + \zeta_i + \omega_{it} \quad [2]$$

where $Gender\ Pay\ Gap_{it}$ is the gender pay gap for country *i* and year *t*, $Gender\ Employment\ Gap_{it}$ is the gender employment gap for country *i* and year *t*, GDP_{it} refers to economic growth measured as the natural logarithm of GDP per capita for country *i* and year *t*, $Secondary$ is the percentage of people aged 15-64 years with secondary education for country *i* and year *t*, $Tertiary$ is the percentage of people aged 15-64 years with tertiary

education for country *i* and year *t*, $Part-time_{it}$ refers to the percentage of part-time contract for country *i* and year *t*, $Temporary_{it}$ refers to the percentage of temporary work for country *i* and year *t*, ζ_i captures individual-specific effects that are constant over time and not directly observed or included in the model, and ω_{it} is a normally distributed error term. Additionally, we introduce the effect of *crisis* through a dummy variable that takes a value of 1 if it covers the period of crisis (2008-2011) and 0 otherwise.

3.2. Sensitivity analysis

Moreover, given the specification of the baseline model, we have estimated a FE model.[2] The random effect model is rejected by the standard Hausman (1978) test in favour of the fixed effects model, which supports the choice of assuming a fixed effects regression method. The FE estimator allows for the correlation of individual effects with the explanatory variables of the model, assuming that the differences between countries (in this case) are constant. Thus, we estimate the panel data model conventionally with country fixed effects. We estimate the following fixed effects models:

$$Gender\ Pay\ Gap_{it} = \beta_0 + \beta_1 LnGDP_{it} + \beta_2 Secondary_{it} + \beta_3 Tertiary_{it} + \beta_4 Part-time_{it} + \beta_3 Temporary_{it} + \delta crisis_t + \zeta_i + \omega_{it} \quad [3]$$

$$Gender\ Employment\ Gap_{it} = \beta_0 + \beta_1 LnGDP_{it} + \beta_2 Secondary_{it} + \beta_3 Tertiary_{it} + \beta_4 Part-time_{it} + \beta_3 Temporary_{it} + \delta crisis_t + \zeta_i + \omega_{it} \quad [4]$$

where $Gender\ Pay\ Gap_{it}$ is the gender pay gap for country *i* and year *t*, $Gender\ Employment\ Gap_{it}$ is the gender employment gap for country *i* and year *t*, GDP_{it} refers to economic growth measured as the natural logarithm of GDP per capita for country *i* and year *t*, $Secondary$ is the percentage of people aged 15-64 years with secondary education for country *i* and year *t*, $Tertiary$ is the percentage of people aged 15-64 years with tertiary education for country *i* and year *t*, $Part-time_{it}$ refers to the percentage of part-time contract for country *i* and year *t*, $Temporary_{it}$ refers to the percentage of temporary work for country *i* and year *t*, ζ_i is the intercept for each country, and ω_{it} are the individual level residuals. Additionally, we introduce the effect of *crisis* through a dummy variable that takes a value of 1 if it covers the period of the GFC (2008-2011) and 0 otherwise.

[2] We applied the Hausman test (Hausman, 1978), and the results suggested application of a FE estimation.

4. RESULTS

4.1. Baseline

According to the methodology presented in the previous section, the results of the regression analysis of the GMM models for European countries are reported in Tables 1 and 2, respectively. Regarding the results of the dynamic model, (see Tables 1 and 2) we first observe that the GDP per capita does not affect to the evolution of gender pay gap and gender employment gap. In addition, the crisis variable suggests that during the period of the Great Recession, these gaps were reduced. Thus, we underline that, during that period of economic crisis in which the labour market was drastically affected, not all groups were affected in the same way. The economic crisis led to a drop in employment for both sexes, but male employment was apparently most affected, slowing its increase while female employment continued steady. A general trend of higher female unemployment at the beginning of the crisis was quickly reversed, leading some observers to characterize the financial crisis as a 'male recession' (Sierminska and Takhtamanova, 2011). This may have been due in part to greater effects on sectors like construction, where men tend to predominate. Furthermore, as the crisis deepened and public administration reforms were fully implemented, affecting occupations where women make up a majority (as in health and education), a greater beneficial impact might be expected on female employment than on male employment (Casaca, 2012, 2013).

Furthermore, with the inclusion of variables on education, we observe that countries with high percentage of persons aged 15-64 years with tertiary education proved fundamental to reducing the gender pay gap and gender employment gap (see Tables 1 and 2). This result is in line with findings by the OECD (2016), showing that countries where a small share of adults have advanced tertiary qualifications, their prospects for employment and wages are considerably better than those of persons with lower educational attainment. However, contrary to our expectations, the percentage of persons aged 15-64 years with secondary education does not appear to have been fundamental to reducing gender pay gap and yes to the gender employment gap.

Table 1. GMM models for Gender Pay Gap

Variables	(1)	(2)	(3)	(4)
L.GenderPayGap	0.708***	0.731***	0.743***	0.738***
	[0.050]	[0.058]	[0.059]	[0.058]
LnGDP	0.110	0.100	0.097	0.096
	[0.153]	[0.161]	[0.162]	[0.162]
Secondary	-0.031	0.011	0.016	0.013
	[0.045]	[0.058]	[0.058]	[0.058]
Tertiary	-0.141***	-0.155***	-0.136***	-0.145***
	[0.029]	[0.032]	[0.032]	[0.033]
Crisis	-0.629***	-0.688***	-0.610***	-0.613***
	[0.173]	[0.174]	[0.180]	[0.179]
Part-time		0.121*		0.064
		[0.071]		[0.078]
Temporary work			0.169**	0.144*
			[0.073]	[0.081]
Constant	8.353**	4.650	4.115	3.785
	[3.398]	[4.275]	[4.215]	[4.310]
Observations	434	375	375	375
Number of countries	31	31	31	31
Sargan test	0.0793	0.2054	0.3128	0.2633
Araellano-Bond test	0.3805	0.9083	0.8230	0.8498

Data source: Eurostat (2024). Standard deviations in brackets. *** p<0.01, ** p<0.05, * p<0.1.

By analysing the gender pay gap (see Table 1), part-time and temporary contracts significantly increase this gap, what proves that women in temporary and part-time jobs face substantial gender wage gaps. These jobs tend to offer fewer "job resources" (Bakker and Demerouti, 2007) – such as autonomy, flexibility and access to training – and women working in such jobs tend to have particularly limited access to existing job resources. They are also paid less than their male co-workers are. In other words, women working in non-standard forms of employment are at a triple disadvantage. This result is in line with Sarra (2018) who advocates that the gender wage gap tends to be higher in countries where part-time employment is more widespread and with Matteazzi *et al*. (2018) who show that the gender wage gap tends to be higher in countries where part-time employment is more widespread. On the contrary, when we analyse the gender employment gap (see Table 2), it is reduced by part-time jobs highlighting, in this analysis, the importance of being working or not.

Table 2. GMM models for Gender Employment Gap

Variables	(1)	(2)	(3)	(4)
L.EmployGap	0.839***	0.769***	0.836***	0.774***
	[0.032]	[0.034]	[0.030]	[0.034]
LnGDP	-0.134	-0.139	-0.149	-0.142
	[0.132]	[0.112]	[0.118]	[0.112]
Secondary	-0.096**	-0.117***	-0.095***	-0.120***
	[0.041]	[0.035]	[0.036]	[0.035]
Tertiary	-0.070***	-0.078***	-0.074***	-0.077***
	[0.022]	[0.019]	[0.020]	[0.019]
Crisis	-0.796***	-0.776***	-0.804***	-0.761***
	[0.140]	[0.118]	[0.125]	[0.120]
Part-time		-0.156***		-0.162***
		[0.049]		[0.049]
Temporary work			0.012	0.038
			[0.050]	[0.049]
Constant	9.387***	13.772***	9.528***	13.587***
	[2.815]	[2.679]	[2.505]	[2.685]
Observations	584	566	568	566
Number of countries	31	31	31	31
Sargan test	0.2482	0.0102	0.0807	0.0115
Arellano-Bond test	0.0116	0.0551	0.0892	0.0552

Data source: Eurostat (2024). Standard deviations in brackets. *** p<0.01, ** p<0.05, * p<0.1.

4.2. Sensitivity analysis

In our sensitivity analysis, the results for FE models are similar for the GMM models with some exceptions in terms of education. It has now been established that the effect of tertiary education is not determinant on reducing gender pay gap in European countries, while countries with secondary education increase this gap, maybe due to in order to reduce this gap it will be necessary higher rates of level of education (see Table 3). Still, it appears that education plays a crucial role in reducing the gender pay gap in Europe.

Table 3. FE models for Gender Pay Gap

Variables	(1)	(2)	(3)	(4)
LnGDP	0.148	0.188	0.180	0.180
	[0.118]	[0.126]	[0.126]	[0.125]
Secondary	0.226***	0.210***	0.206***	0.190***
	[0.038]	[0.042]	[0.042]	[0.043]
Tertiary	0.018	0.000	0.005	-0.003
	[0.056]	[0.063]	[0.063]	[0.063]
Crisis	-0.240	-0.238	-0.201	-0.201
	[0.201]	[0.204]	[0.204]	[0.204]
Part-time		0.216**		0.170*
		[0.095]		[0.098]
Temporary work			0.197**	0.160*
			[0.083]	[0.086]
Constant	0.946**	-1.464***	0.249	-1.124**
	[0.423]	[0.462]	[0.436]	[0.460]
Observations	486	425	425	425
Number of countries	31	31	31	31

Data source: Eurostat (2024). Note: We have controlled for serial correlation and performed an adjusted estimation accordingly. Standard deviations in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table 4. FE models for Gender Employment Gap

Variables	(1)	(2)	(3)	(4)
LnGDP	-0.074	-0.050	-0.072	-0.051
	[0.092]	[0.073]	[0.076]	[0.073]
Secondary	-0.078	-0.081**	-0.050	-0.082**
	[0.049]	[0.038]	[0.041]	[0.038]
Tertiary	-0.125**	-0.120***	-0.084**	-0.116***
	[0.050]	[0.038]	[0.042]	[0.038]
Crisis	-0.254	-0.269**	-0.263*	-0.244*
	[0.169]	[0.132]	[0.139]	[0.133]
Part-time		-0.496***		-0.516***
		[0.059]		[0.060]
Temporary work			-0.015	0.088
			[0.056]	[0.055]
Constant	17.723***	25.163***	14.722***	24.657***
	[0.343]	[0.319]	[0.268]	[0.322]
Observations	613	591	592	591
Number of countries	31	31	31	31

Data source: Eurostat (2024), Note: We have controlled for serial correlation and performed an adjusted estimation accordingly. Standard deviations in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Results from FE models (in Table 4) for gender employment gap are similar that estimating by GMM models which take into consideration the lag of the dependent variable. Here, we corroborate the importance of of being working regardless of contract type.

5. CONCLUSION

Most studies that focus on gender gaps in the labour market examine it in particular terms, such as in access to upper management posts. Such studies tend to neglect the influence of other contextual factors, which could influence gender inequalities. This paper assesses the factors that influence the gender pay gap and gender employment gap across European countries, considering notably the GFC that began in 2008. To this end, we use an unbalanced panel of 31 European countries over the period 2000-2022, and we estimate a system generalized GMM and fixed effects models. The main conclusions confirm, on the one hand that, with regard to analysis of gender pay gap, tertiary education significantly reduces it and part-time and temporary contracts significantly increase this gap, maybe due to many women have no other choice to choose this type of contracts precarious. On the other hand, when we analyse gender employment gap, secondary and tertiary education plays a crucial role to reduce it. Moreover, in this analysis part-time reduces significantly gender employment gap, at this point, the more important thing is the fact of being working or not. However, GDP per capita does not affect these gaps and the period of the GFC depicted a narrowing of the gender gap in European countries.

Thus, it seems essential to establish measures and policies that will eliminate gender differences via the promotion not only of female employment and participation, but of equality and work-life balance, as this remains the only path by which to attain equality in terms of employment. Guidelines for promoting and achieving equality have been set out in European legislation, but the issue remains a major challenge worldwide. Measures against inequalities in labour markets are increasingly present in national policies in all countries, often aimed at combating the factors that produce gender gaps; but progress in this area will require political commitment and the cooperation of all countries, as well as the inclusion of a strong gender perspective in all European Union policies and initiatives.

Therefore, among the measures necessary to close the gender gap in the labour market include: the achievement of equal pay and conditions among workers of both sexes for the same job (which is protected by legislation); a decrease in professional segregation, given that women have greater presence in unpaid or low-quality jobs, not only by sector but also by occupation;

professional development and support programs for women's work; the promotion of norms for practical reconciliation of family and professional life, given that women are largely responsible for households and unpaid tasks; an increase in the percentage of women with high levels of education; and the establishment of measures aimed at public organisms and private companies to attain parity in high positions.

In the European context, despite progress already made, certain aspects in the general economy and in companies continue to interfere with attainment of these goals. Progress made to date in terms of equality has been very slow to arrive, as well as insufficient. Although the situation of women in the labour market has indeed improved over recent decades, reducing the gender gap especially in terms of unemployment and labour participation, thanks to equality policies implemented by governments and companies. Our results show that the situation of women in the labour market remains unequal. Nevertheless, women remain more vulnerable than men in the labour market, having greater presence in segregated sectors that tend to pay lower wages. The participation of women remains lower than that of men; there are fewer 'active' women compared to men; and large salary differences are still the main indicator of inequalities between the two sexes. These are just a few of the essential causes of social inequality – especially discrimination between male and female work, failing to value jobs in an equitable way. Furthermore, this is a global problem, with inequalities in employment between men and women affecting all countries, all economic sectors (Bonet and Moreno, 2011), all age groups, and all types of activity. Hence, improvement of female employment would have benefits not only for women, but for society in general.

Many barriers in the labour market continue to impede gender equality; to remove these barriers, changes are needed to laws that discriminate against women before their entry into the labour market, or that prevent women from accessing certain jobs or sectors. Most important, however, is that a comprehensive set of measures be put in practice and that society and companies be made aware of the importance of achieving gender equality. In order to reduce the economic impacts of the gender gap worldwide, cooperation between countries is essential, along with changes in labour markets. In this context, the COVID-19 crisis has shone a light on parts of this workforce and essential workers in the, typically female, workforces are receiving increased recognition for their work. With this recognition, have come calls to address the pay and conditions of these workers. Collective bargaining can be mobilised to negotiate wage increases and better working conditions (OECD, 2019) and can represent a powerful tool in addressing the gender wage gap. In short, to achieve and promote equality in labour markets,

and to reduce the common occurrence of imbalances, leaders in all countries must engage in political planning that addresses both men and women equally.

REFERENCES

Afonso, A. and Blanco-Arana, M.C. (2023). Unemployment and Financial Development: Evidence for OECD Countries. *Comparative Econonomic Studies*. forthcoming.

Addabbo, T., Rodríguez-Modroño, P. and Gálvez Muñoz, L. (2015). Diferencias de género en las tasas de actividad en España e Italia durante la Gran Recesión. *Revista de Economía Mundial*, 41: 21–42.

Anxo, D., Fagan, C., Cebrían, I. and Moreno, G. (2007). Patterns of labour market integration in Europe: A life course perspective on time policies. *Socio-Economic Review*, 5(2): 233-260.

Arellano, M. and S. Bond. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies* 58: 277–297.

Arellano, M. and Bover, O. (1995). Another Look at the Instrumental Variable Estimation of Error-components Models. *Journal of Econometrics*, 68: 29–51.

Bakker, A.B. and Demerouti, E. (2007). The Job Demands-Resources model: state of the art. *Journal of Managerial Psychology*, 22(3): 309-328.

Bárcena-Martín, E., and Moro-Egido, A. (2013). Gender and poverty risk in Europe. *Feminist Economics*, 19(2): 69–99.

Baussola, M., Mussida, C., Jenkins, J. and Penfold, M. (2016). Determinantes de la brecha de género de desempleo en Italia y Reino Unido. Un estudio comparado. *Revista Internacional Del Trabajo*, 134(4): 581–608.

Bewley, T. (1999). Why Wages Don't Fall During a Recession, Harvard University Press.

Bonet, M. and Moreno, A. (2011). Desigualdad de género en tiempos de crisis: análisis comparativo de la economía social. *REVESCO: Revista De Estudios Cooperativos*, 105: 34-56.

Blanco-Arana, M. C. (2020). Socio-economic Factors on the Evolution of Mortality in Europe in the XXI Century: Policy Proposals to Face the COVID-19 Crisis. *Revista de Economía Mundial*, (56): 1-24.

Blundell, R. and Bond, S. (1998). Initial Conditions and Moment Restrictions in Dynamic Panel Data Models. *Journal of Econometrics*, 87: 115–143.

Brunet, C. and Jeffers, E. (2019). Gender Gap Evolution in Europe during the Great Recession: an Institutionalist Approach, [*L'évolution des inégalités de genre pendant la Grande Récession en Europe: une approche institutionnaliste*], Revue de la Régulation - Capitalisme, institutions, pouvoirs, Association Recherche et Régulation, 25.

Cabasés Piqué, M., and Ridao Martín, J. (2013). La incidencia de la crisis económica en la persistente desigualdad de género en el mercado de trabajo español, y en particular en la estructura salarial. Temas laborales: *Revista andaluza de trabajo y bienestar social*, 121: 143–175.

Casaca, S.F. (2012). Mercado de trabalho, flexibilidade e relações de género: Tendências recentes, in Sara Falcão Casaca (directora): Mudanças laborais e relações de género: Novos vetores de (des)igualdade. II Serie, n. 19, Colecção Económicas, Fundação Económicas. Coimbra, Almedina, 9-50.

Casaca, S.F. (2013). Exchange of good practices on gender equality: comments paper – Portugal. Equal pay days, Estonia, 18-19 June. Brussels, European Commission.

Casado, J. M. and Simón, H. (2015). La evolución de la estructura salarial (2002–2010). *Revista de Economía Aplicada*, 23(67): 5–43.

Cavalcanti, T. V. de and Tavares, J. (2007). The Output Costs of Gender Discrimination: A Model-Based Macroeconomic Estimate. Mimeograph, University of Lisbon.

Demirguc-Kunt, A., Klapper, L. and Singer, D. (2013). *Financial inclusion and legal discrimination against women: Evidence from developing countries* (Vol. 6416). World Bank, Washington, DC.

Duman, A. (2023). The Gendered Relationship Between Temporary, Informal Employment and Wages: Evidence from the Turkish Labor Market. *Feminist Economics*, 29(4): 194–222.

Escribá-Agüir, V., Fons-Martinez, J. and Escribà-Agüir, V. (2014). Economic crisis and employment conditions: gender differences and the response of social and employment policies. SESPAS report 2014. *Gaceta sanitaria*, 28(1): 37–43.

Esteve-Volart, B. (2004). "Gender Discrimination and Growth: Theory and Evidence from India''. STICERD Discussion Papers DEDPS42, London School of Economics.

European Commission, (2020). Striving for a Union of equality. The gender equality strategy 2020-2025.

European Institute for Gender Equality (2017). Economic Benefits of Gender Equality in the European Union: How closing the gender gaps in labour market activity and pay leads to economic growth, EIGE's Publications.

Eurostat (2024). European Commission Eurostat database: Available from http://ec.europa.eu/eurostat/data/database [accessed 01.05.2024].

Faďoš, M. and Bohdalová, M. (2019). Unemployment gender inequality: evidence from the 27 European Union countries. *Eurasian Economic Review*, 9(3): 349–371.

Hausman, J. A. (1978). Specification Tests in Econometrics. *Econometrica*, 46(6): 1251-1272.

Klasen, S. and Lamanna, F. (2009). The Impact of Gender Inequality in Education and Employment on Economic Growth: New Evidence for a Panel of Countries. *Feminist Economics: Inequality, Development, and Growth*, 15(3): 91–132.

Kudlyak, M. (2010). Are Wages Rigid over the Business Cycle?, *Economic Quarterly*, Federal Reserve Bank of Richmond, 2: 179-199.

Matteazzi, E., Pailhé, A. and Solaz, A. (2018). Part-time employment, the gender wage gap and the role of wage-setting institutions: Evidence from 11 European countries. *European Journal of Industrial Relations*, 24(3): 221-241.

OECD (2016). Education at Glance: 2016: OECD Indicators, OECD Publishing, Paris.

OECD (2017). The Pursuit of Gender Equality: An Uphill Battle, OECD Publishing, Paris.

OECD (2019). Negotiating Our Way Up: Collective Bargaining in a Changing World of Work, OECD Publishing, Paris.

Périvier, H. (2014). Men and women during the economic crisis: Employment trends in eight European countries. *Revue de l'OFCE*, 133(2): 41-84.

Pissarides, C. (2009). The Unemployment Volatility Puzzle: Is Wage Stickiness the Answer?, *Econometrica*, 77: 1339-69.

Ribas, M.A and Sajardo, A. (2011). Gender inequality in times of crisis: a comparative analysis of social economy. CIRIEC - España. *Revista de Economía Pública*, Social y Cooperativa, 80: 34-56.

Sargan, J.D. (1958). The estimation of economic relationships using instrumental variables, *Econometrica*, 26: 393-415.

Sarra B.Y. (2018). Formal but Less Equal. Gender Wage Gaps in Formal and Informal Jobs in Urban Brazil, *World Development*, 101: 73-87.

Seguino, S. (2000a). Accounting for Gender in Asian Economic Growth. *Feminist Economics*, 6(3): 27–58.

Seguino, S. (2000b). Gender Inequality and Economic Growth: A Cross-Country Analysis. *World Development*, 28(7): 1211–30.

Sierminska, E. and Takhtamanova, Y. F. (2011). Job flows, demographics, and the Great Recession», en Herwig Immervoll, Andreas Peichl and Konstantinos Tatsiramos (directores): Who loses in the downturn? Economic crisis, employment and income distribution. *Serie Research in Labor Economics*, 32: 115-154. Emerald Group Publishing Limited.

Stotsky, J. (2006). "Gender and its Relevance to Macroeconomic Policy: A Survey".Working Paper WP/06/233, International Monetary Fund.

Weber, C. (2015). La Euro Crisis: Causas y síntomas. *Estudios fronterizos*, 16(32): 247-282.

Zanin, L. and Calabrese, R. (2017). Interaction effects of region-level GDP per capita and age on labour market transition rates in Italy. *IZA Journal of Labor Economics*, 6(1): 1-29.

Appendix

List of countries analysed: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Table A.1. Summary statistics

Variables	Obsv.	Mean	Std. Dev.	Min.	Max.
Gender Pay Gap	651	12.28894	7.789559	-1.5	48.8
Gender Employment Gap	517	14.59458	5.984146	-0.9	30.9
GDP per capita	740	27518.92	13092.22	4900	90900
Secondary	734	46.45995	12.20812	12.3	72.2
Tertiary	734	25.21185	8.712177	4.9	46.6
Part-time	626	14.327	9.57012	1.4	47.6
Temporary work	627	8.674163	5.094168	0.6	27.1

Data source: Eurostat (2024)