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Cultural-Policy Framework and Mothers' Earnings Penalty: A European Comparison

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ABSTRACT

This article explores the diversity of cultural and policy contexts in Western European countries and examines their role in explaining the persistent and heterogeneous motherhood penalty. Using harmonized European Union Statistics on Income and Living Conditions (EU-SILC) data from 13 countries, the analysis spans 2006 to 2022 and provides average and distributional results. The findings reveal a motherhood penalty in 10 countries, with the highest levels observed in Sweden, Norway, Germany, and Austria. For these countries, quantile regressions show a decreasing motherhood penalty along the earnings distribution. The empirical analysis further sheds light on how work–family policies, culture, minimum wages, and wage-setting institutions mediate the role of motherhood on women's earnings. The results indicate that while work–family policies promote female employment, they do not significantly mitigate the motherhood penalty. In contrast, higher minimum wages and more coordinated and centralized wage bargaining are more effective in reducing the motherhood penalty, particularly in the lower segment of the earnings distribution. More traditional gender roles and cultural values emphasizing masculinity, individualism, and power distance are associated with a lower motherhood penalty.

JEL Classification: C21, J31, N34

1 | Introduction

The convergence of men's and women's economic roles is a major advance in many developed countries (Goldin 2014; Kleven and Landais 2017). However, true gender equality in the labor market remains elusive as women continue to bear the primary responsibility for parenthood. Goldin (2024) argues that women's earnings decline significantly following childbirth and never fully recover. To effectively address the motherhood penalty as a critical gender equity issue, a global perspective is crucial to understanding how countries compare in terms of the earnings effect of motherhood and identify the key factors driving these effects. The diversity of cultural backgrounds and policy frameworks in Western European countries, coupled with a persistent yet variable motherhood penalty, deserves closer attention. A thorough understanding of motherhood-related earning inequalities is currently lacking in these countries, preventing the assessment of the role of European and national policies in addressing the issue.

Most research on the impact of motherhood on earnings in Europe has focused on individual countries, yielding mixed results due to variations in empirical approaches, sample selection, and time periods. Comparative studies remain scarce and often rely on outdated or nonharmonized data. Furthermore, existing comparative analyses that explore the role of country-level factors in mediating the effect of motherhood on earnings tend to examine these contextual factors in isolation or neglect some of them. This article addresses these gaps in the literature through a two-step empirical analysis of both individual and country-level socioeconomic, institutional, and cultural determinants of motherhood wage penalties, using a cross-country comparative

framework over a relatively long and recent period. Penalties are assessed both on average and across the wage distribution.

Our contribution is twofold. First, it considers several Western European countries from 2006 to 2022, for which we draw on the same harmonized data, sample selection criteria, and empirical methodologies. This enables more reliable cross-country comparisons regarding the motherhood wage penalty or premium (MEP) at the mean and across the wage distribution. Second, it seeks to explain cross-country variations in the MEP by jointly considering country differences in several dimensions of the socioeconomic and institutional context, such as work–family policies, prevailing gender norms and cultural values, minimum wage regulations, wage-setting institutions, and economic conditions. The study is pioneering in exploring how these contextual factors are related to the motherhood earnings gap (MEG) at different points of the earnings distribution. This evidence is valuable for informing policymakers about the relative role of various policies in mediating the effect of motherhood on women's earnings.[1]

Our empirical strategy follows a two-stage approach. In the first stage, we conduct an individual-level analysis to estimate the MEP, employing the European Union Statistics on Income and Living Conditions (EU-SILC) cross-sectional harmonized data from 13 countries. From a methodological point of view, the individual-level analysis makes noteworthy contributions to the literature on the motherhood penalty. First, to deal with endogeneity issues related to motherhood and labor outcomes, we estimate bounding values for the Ordinary Least Squares (OLS) estimates of the MEP (Oster 2019), which have not been previously applied in this literature. Second, the study incorporates recent econometric advances in quantile regression analysis to study the effect of motherhood across the earnings distribution (Borgen et al. 2023; Rios-Avila and Maroto 2022), also accounting for selection into motherhood. To our knowledge, this is the first comparative study at the European level investigating the MEP along the earnings distribution.

The second stage involves a country-level analysis. The dependent variables are the first-stage country-year estimates of the MEP at the mean and at the 10th and 90th percentiles. Data on contextual factors come from the Eurostat database, the OECD Family database, the European and World Values Surveys, and the ICTWSS Database (Visser 2019). There are several studies investigating the importance of family policies and cultural values, as well as their interaction, for the motherhood penalty (Budig et al. 2012, 2016; Cukrowska-Torzewska 2017; Kleven et al. 2019; Misra et al. 2011). Cultural attitudes are generally measured through societal perceptions of gender roles and beliefs about the impact of maternal employment on children and family well-being. In addition to these indicators, our analysis covers other cultural dimensions based on Hofstede's (2011) framework. To the best of our knowledge, the relationship between Hofstede's cultural dimensions and the MEP has not yet been explored in the literature. Further, in the literature, the linkage between labor market institutions and the motherhood penalty was solely explored by Dupuy and Fernández-Kranz (2009), though neglecting family policies and culture. Considering that labor market institutions are also likely to be influenced by cultural values (Algan and Cahuc 2006) and are likely to impact wage inequality, this study fills the gap in the existing comparative literature on the motherhood penalty by taking into account the joint role of the aforementioned contextual factors in the MEP, at the mean and across the distribution, using a large number of country-year observations. This approach contrasts with prior studies, which have largely concentrated on average effects, allowing for a more nuanced understanding of the role of institutional factors in the MEP at various earnings levels.

The results reveal a motherhood wage penalty in nearly all countries, with particularly pronounced effects in Northern Europe. While family-friendly policies aim to support mothers' employment, they appear ineffective in mitigating the penalty, as they do not necessarily guarantee good-paying jobs for mothers. In contrast, higher minimum wages and more coordinated and centralized wage bargaining systems are associated with a reduction in the motherhood penalty, especially in the lower end of the earnings distribution. Interestingly, more traditional gender norms and cultural values are also linked to a lower motherhood penalty, suggesting a complex relationship between cultural context and labor market outcomes for mothers.

The remainder of this article is organized as follows. The subsequent section reviews the related literature and discusses how contextual factors mediate the relationship between motherhood and earnings across the wage distribution. The data and the empirical strategy are described in Sections 3 and 4, respectively. Section 5 discusses the results of the individual-level analysis, and Section 6 discusses those of the country-level analysis. The final section concludes.

2 | Literature Review

This article is related to an extensive body of research on the earnings penalty associated with motherhood. The literature identifies several mechanisms driving this penalty. First, having children entails childcare commitments incompatible with job requirements, thereby modifying women's attitudes and incentives toward work (Bryan and Sevilla-Sanz 2011). Due to the burden of family responsibilities, mothers often reduce their labor supply by trading off higher wages for child-friendly jobs, such as part-time jobs, that are easier to combine with parenting. For the same reason, mothers are less likely to hold greedy jobs that require working during weekends, holidays, or evenings but that tend to offer disproportionate rewards (Goldin 2014, 2021, 2024). Goldin (2014) highlights the role of compensating differentials in explaining both the gender and the MEGs. Her analysis demonstrates that jobs where bargaining and competition matter the most are those with a highly convex pay structure relative to hours worked. These nonlinearities arise in the absence of perfect substitutes for workers, enhancing their bargaining power and increasing their ability to extract surplus from employers (Carbonnier 2020).

Second, child-related career interruptions hinder the accumulation of work experience, reduce job seniority, and erode previously acquired human capital and skills, adversely affecting earnings (Adda et al. 2017). Third, the motherhood penalty is possibly explained by a selection effect of women into motherhood, besides

employment and occupational choices (Amuedo-Dorantes and Kimmel 2005), as well as the sorting of women, and especially mothers, in specific types of firms. Fourth, the dip in mothers' earnings may result from employer discrimination against them (Gangl and Ziefle 2009; Ishizuka 2021). Lastly, psychological factors, such as differences in risk preferences, aspirations, and negotiation behavior, may also explain disparities in earnings profiles between mothers and childless women through their effect on career choices and salary outcomes (Badaoui et al. 2024; Blau and Kahn 2017; Goldin 2024).[2]

The effects of the mechanisms mentioned above may be impeded or exacerbated by family policies, prevailing cultural values, or labor market institutions. This is likely the reason for the heterogeneous effects of motherhood on women's earnings across countries—some being negative and others positive or nil. Empirical literature highlights the crucial role of work–family policies, such as the provision and quality of early childhood education and care services, flexible working arrangements, and parental leave schemes, in promoting maternal employment by helping women balance work and family responsibilities (Berloffa et al. 2023; Olivetti and Petrongolo 2017). The diversity of work-life policies across European countries, particularly regarding maternity leave provisions, reflects underlying cultural norms about motherhood and societal expectations concerning the appropriate timing for a mother's return to work after childbirth. These policies also embody assumptions about the role of the extended family and community in supporting the transition to motherhood. In turn, they are likely to shape women's identities as both workers and mothers (Garcia-Lorenzo et al. 2024; Vair 2013).

However, these policies might also affect earnings. Part-time employment, for instance, is associated with lower monthly earnings and, possibly, with an hourly wage penalty or premium (Kleven et al. 2019; Matteazzi et al. 2014, 2018). Maternal leave policies can affect earnings by allowing mothers to remain employed after childbirth, likely with the same employer, thus building up tenure and seniority. However, longer leaves can be associated with skill deterioration. Existing comparative research at the European level shows mixed evidence about the nexus between work–family policies and the MEP. Budig et al. (2016) and Misra et al. (2011) find that moderate-length leaves, public childcare services, lower marginal tax rates on second earners, and paternity leaves are associated with smaller motherhood wage penalties. Differently, Cukrowska-Torzewska (2017) finds no significant correlation between work–family policies and the motherhood wage penalty. Olivetti and Petrongolo (2017) find that prolonging leave significantly reduces employment and earnings in the short run, with only minor effects in the long run.

Besides the lack of clear evidence on the average relationship between work–family policies and the MEP, research has yet to examine this relationship across the wage distribution. One might expect more family-friendly policy contexts to be associated with a larger maternity penalty at the lower end of the wage spectrum, as part-time employment is more prevalent in low-wage jobs (Fernández-Kranz and Rodríguez-Planas 2011; Matteazzi et al. 2014, 2018). In addition, differences in the duration of leave may exist between high- and low-wage workers, with higher earners more likely to return to work shortly after childbirth (Kuhlenkasper and Kauermann 2010). In contrast, low-wage earners may take longer leaves due to the high cost of alternative childcare options, such as early education services and babysitting.

Cultural values also play a role in shaping women's work behavior, the work-life balance, and the MEG. Davis (2024) explores how patriarchal values influence women's labor supply across economic development stages. His findings confirm a U-shaped pattern between female labor force participation and income. He also finds a divergence in women's empowerment between more and less patriarchal societies, as women's participation is lower and increases more slowly with development in more patriarchal contexts. Conservative norms toward gender roles constrain mothers to be exclusively present for children to avoid their suffering and contribute to the relatively lower earnings of mothers by lowering their labor supply (Kleven et al. 2019). Building on Hofstede (2011) classification of cultural values, research on the relationship between women's labor force participation and cultural norms highlights that societies characterized by high masculinity, traditionalism, individualism, strong uncertainty avoidance, pronounced power distance, and low indulgence are more likely to constrain women's participation in the labor market (Best and Williams 1994; Cuddy et al. 2015; Schein 1984). These cultural configurations often correlate with limited support for caregiving and family-oriented policies, thereby discouraging employment, particularly among mothers, and reinforcing traditional gender roles. Budig et al. (2012) find that family policies may be more effective at reducing the motherhood penalty when cultural values support maternal employment. However, it is important to recognize that even in cultures that support female and maternal employment, this does not necessarily translate into women and mothers holding high-status jobs or occupations. This distinction is crucial because while modern values may encourage female participation in the workforce, they do not guarantee equitable access to quality employment and higher earnings opportunities.

No studies have investigated the role of culture in the motherhood penalty across the wage distribution. One can expect more conservative gender norms to be associated with a lower motherhood penalty at the top of the wage distribution and a larger penalty at the bottom due to a selection effect. Women who decide to deviate from the prevailing gender norms and enter paid work under unfavorable cultural contexts are those who are likely to earn higher wages, given their observable and unobservable characteristics. In addition, in low-wage sectors, conservative gender norms may push mothers to either leave the workforce or work fewer hours, as these norms reinforce the idea that caregiving is their primary role. In contrast, in higher wage sectors, the economic benefit of maintaining a career may outweigh the pressure to conform to traditional gender roles, resulting in a lower motherhood penalty.

Likewise, labor market institutions are likely to affect the MEP. Previous empirical evidence shows that strong labor market institutions reduce wage and income inequality (Autor et al. 2016; Checchi and García-Peñalosa 2008; Dreger et al. 2015). Comparative research indicates smaller gender wage differentials in countries with more coordinated

bargaining systems, higher collective bargaining coverage, and minimum wages (Blau and Kahn 1992; Schäfer and Gottschall 2015). Matteazzi et al. (2018) find that strong institutions significantly narrow the female full-time/part-time pay gap by raising the wages of part-timers, who are located at the bottom of the wage distribution. The literature almost lacks evidence about the association between labor market institutions and the motherhood wage gap. Dupuy and Fernández-Kranz (2009) find that the family pay gap is higher in the presence of more powerful unions and more generous unemployment benefits. However, the latter analysis is conducted with only 17 country-year observations. Our study contributes to the existing research by analyzing the role of minimum wages and wage-setting institutions on the MEP with 221 country-year observations and, crucially, across the earnings distribution. We expect strong labor market institutions to be associated with reducing the motherhood earnings penalty, especially at the lower end of the wage distribution.

3 | Data and Descriptive Statistics

3.1 | Individual-Level Analysis

The individual-level analysis estimates the MEP in 13 European countries using EU-SILC harmonized cross-sectional data for the period 2006–2022.[3]

We focus on a sample of women aged 25–40. The age selection is partly driven by data availability, though this age bracket corresponds to the prime years of childrearing (Badaoui et al. 2024; Cukrowska-Torzewska and Matysiak 2020). EU-SILC data provide information on the total number of children residing with the mother at the time of the interview rather than the total number of children a woman has given birth to. Including women older than 40 poses the risk of misclassifying some as childless, particularly those who had children at younger ages and whose children have already left the parental home.[4] In our study, we define the motherhood status with a dummy variable taking value one if at least one child under 18 resides in the household where the woman lives. We exclude from the analysis individuals who are students, retirees, self-employed, permanently disabled, or/and unfit to work, women in the armed forces, and family workers. The final sample consists of 229,070 observations, ranging from 10,069 (for Austria) to 26,602 (for Spain).

At the time of the interview, respondents reported their employment status corresponding to each month of the income reference period (IRP), i.e., the calendar year preceding the interview. Based on this information, we define a woman as employed if she worked at least 1 month, either full-time or part-time, during the IRP.

Our dependent variable is the logarithm of the real full-time equivalent gross monthly income earned during the IRP.[5] At the interview, respondents reported the annual gross income earned during the IRP. To account for different purchasing powers across countries and their variations within countries over time, we divided this amount by the Current Price Index (2015 = 100) to obtain the real annual gross income. Lastly, to obtain an income measure adjusted for hours worked, we divided the real annual gross income by the number of months worked during the IRP expressed in full-time equivalent.[6] For brevity, we use the term *monthly earnings* when referring to the real full-time equivalent gross monthly income.

Supporting Information Table A.1 in Appendix A shows the mean log *monthly earnings* for women with and without children, as well as the raw earnings gap over the entire observation period (2006–2022). On average, childless women have 10% lower *monthly earnings* than mothers in Austria, Germany, Norway, and Sweden. The gap is smaller in the other countries, while it is positive in Greece, with mothers earning 8% more than childless women. Figure A.1 in Appendix A shows the trend of our dependent variable by motherhood status and country. In Austria, Germany, Norway, Portugal, and Sweden, childless women outearn mothers, while the opposite is observed in Greece. In the other countries, the earnings lines for both groups nearly overlap, indicating a smaller or negligible gap.

3.2 | Country-Level Analysis

The second-stage analysis explores the role of contextual factors in explaining cross-country heterogeneity in the MEP as estimated by the individual-level analysis for each country and year. The data sources of the contextual variables are the Eurostat database, the OECD Family database, the European Values Survey (EVS) Trend File 1981–2017, the World Values Survey (WVS) Trend file 1981–2020, and the ICTWSS Database (Visser 2019). The contextual variables are lagged by 1 year prior to the IRP. Thus, they refer to the period 2005–2021.

To assess the degree of family-friendly policies, we run a Principal Component Analysis (PCA) on the following variables: (i) share of female part-time employees among employed women, (ii) childcare enrollment rate for children aged 0–2, (iii) paid paternity and parental leaves reserved for the exclusive use of the father, and (iv) the maximum length of leave for mothers. The first three variables positively correlate with female employment. In contrast, the last one negatively correlates because the longer the leave, the higher the share of inactive mothers (EU-SILC data consider as not working the individuals on full-time parental leave). We retain the first component that we label *Work–Family Policy index*. A higher value of this index indicates a more family-friendly policy environment.

We opt to control for a composite index rather than single policy variables. Indeed, countries can achieve a successful work–family policy through either a single policy or a combination of policies, which may reinforce or offset each other's impact on women's employment and earnings (Mandel and Semyonov 2005). For example, France and Portugal exhibit similarly family-friendly policy environments, with comparable early childcare enrollment rates and extended maternity leave. However, while France relies more on flexible working schedules, Portugal offers longer paid paternity leave.

To assess gender-role attitudes and opinions, we use two distinct indices. The first gauges cultural values regarding women's roles in both family and society. We carry out a PCA analysis

on variables drawn from the EVS Trend File.[7] These variables represent the proportions of individuals aged 15–64 who agreed with the following statements: "Jobs scarce: Men should have more right to a job than women," "Women want a home and children," and "Pre-school child suffers with working mother". The first principal component is our indicator of societal norms on gender roles, which we label the *Gender Roles index*. Higher values of this index indicate more traditional views about women's roles at home and in the labor market. The second index is the female–male unemployment gap for individuals aged 20–29, referred to as *Discrimination index*. This measure aims to capture labor market discrimination against young women and broader societal attitudes toward female employment (Berloffa et al. 2023).

To deepen our understanding of the influence of cultural values, we draw on Hofstede's (2011) framework, which captures multidimensional societal values: masculinity/femininity (competitiveness vs. care), individualism/collectivism (personal autonomy vs. group orientation), long-term/short-term orientation (future planning vs. tradition), indulgence/restraint (freedom of gratification vs. control), high/low power distance (acceptance of hierarchy vs. preference for equality), and high/low uncertainty avoidance (preference for stability vs. tolerance of ambiguity). For each dimension, we carry out a PCA analysis on variables drawn from the EVS and WVS Trend Files. We use a sample of individuals aged 15–64, and we retain the first principal component as the index for that dimension.[8]

To construct the *Masculinity index*, we rely on four measures: the unjustifiability of abortion, the unjustifiability of homosexuality, the importance attributed to good pay in a job, and the share of individuals who agree with the statement that men should have a greater right to employment than women when jobs are scarce. All the variables are positively correlated with each other, and higher values of the index indicate more masculine societal values. To construct the *Individualism index*, we use two variables: unconcern for elderly people and the level of disagreement with the statement that work is a duty toward society. The two variables are positively correlated, and high index scores reflect societies where personal goals trump group goals. The *Long-Term Orientation index* is based on two variables: the importance placed on thrift, saving money, and things as a child quality, and the belief that pride in one's nationality is not particularly important. The two variables are positively correlated, and higher values of the index reflect a greater emphasis on future-oriented values. The *Uncertainty Avoidance index* is constructed using two variables: lack of confidence in the justice system and the belief that most people cannot be trusted. The two variables are positively correlated. Higher values indicate greater uncertainty avoidance. The *Power Distance index* relies on two variables: the importance placed on obedience as a child quality and the extent to which societies are materialistic. The two items are positively correlated, with higher index values associated with greater respect for authority. Finally, the *Indulgence index* is constructed using the following variables: the importance placed on leisure time, feelings of happiness, and the sense of freedom of choice and control. The second variable is negatively correlated with the other two items. Higher values of the index indicate more indulgent societies prioritizing the fulfillment of human needs and desires.

We rely on three indices to characterize labor market institutions. The first is the Kaitz index, i.e., the ratio between the nominal legal minimum wage and the median wage adjusted for industry-level coverage. The second is the *Centralization index* (Visser 2019), which accounts for the dominant level of wage bargaining, the incidence of additional enterprise bargaining, and the incidence of general and temporary opening clauses. Higher values of the index are associated with more centralized wage bargaining. Lastly, given that the presence and the degree of coordination in wage bargaining also play a role in shaping earnings inequality, we construct a *Coordination index* running a PCA on the following variables: (i) degree of coordination of wage setting, (ii) type of coordination of wage setting, and (iii) government intervention in wage bargaining (Visser 2019). We retain the first component as our measure of wage coordination, where higher values indicate a more coordinated bargaining process.

The natural logarithm of per capita GDP is used to take into consideration economic conditions. Supporting Information Table A.2 in Appendix A shows the mean value of contextual variables for the entire period 2005–2021, Supporting Information Figure A.2 shows average values for the indices by country, and Supporting Information Table A.3 shows their correlation matrix. More details about the definition and sources of contextual variables are provided in Appendix B.

4 | Empirical Methodology

4.1 | Individual-Level Analysis

The first stage of our empirical analysis aims to estimate the magnitude of the MEP in each country over the period 2006–2022. The baseline analysis consists of an OLS estimate of the effect of being a mother, ceteris paribus, on the logarithm of *monthly earnings* using a pooled sample of women with and without children. As a sensitivity analysis, we run an Oaxaca-Blinder (OB) (Blinder 1973; Oaxaca 1973) decomposition analysis to allow the returns to observable characteristics to differ between mothers and nonmothers. We acknowledge that our results cannot be causally interpreted due to potential endogeneity concerns, particularly due to omitted variable bias. To address these limitations, we adopt two different methodological strategies. First, we apply the approach proposed by Oster (2019) to assess the robustness of our OLS estimates to unobserved confounding. Second, we implement Coarsened Exact Matching (CEM) (Iacus et al. 2012) to estimate the MEP on a matched subsample of mothers and childless women with highly comparable observable characteristics. Lastly, to evaluate the effect of motherhood across the earnings distribution, we apply recent econometric advances in quantile analysis and estimate a Quantile Treatment Effect (QTE) model (Borgen et al. 2023; Rios-Avila and Maroto 2022), which also addresses the endogeneity of the motherhood status through propensity score matching. Appendix C provides more details about methodologies.

4.1.1 | Baseline Analysis

We first estimate by OLS the following model:

$$Y_{ijt} = \beta_0 + \beta_1 X_{ijt} + \mathbf{Z}'_{ijt}\beta_2 + \mathbf{R}'\beta_3 + \mathbf{T}'\beta_4 + u_{ijt} \quad (1)$$

where i, j, and t are the subscripts for the person, the region, and the year-IRP, respectively. The dependent variable Y stands for the logarithm of *monthly earnings*, X is the motherhood status (dummy variable), and Z includes a set of individual and job-related characteristics. R and T are vectors of region and year dummies, and u is the residual error term. Estimations of Equation (1) are conducted separately for each country. We are mainly interested in the estimated coefficient β_1, which measures the MEP, ceteris paribus.

Individual attributes include a polynomial of order two, real labor market experience (in years),[9] nationality (dummy equal to one if the country of birth is the same as the country of residence), tertiary education (dummy variable), and partnership status (dummy equal to one for living in a couple). Job-related characteristics include the public economic sector (dummy equal to one, if public administration and defense, compulsory social security, education, health, and social networks),[10] occupation (five categories), firm size (dummy equal to one if the firm has more than 50 employees), permanent job contract (dummy variable), and managerial position with supervising responsibility (dummy variable).[11] Supporting Information Table A.4 in Appendix A provides descriptive statistics of our sample.

4.1.2 | Decomposition Analysis

It serves as a sensitivity analysis of the OLS results after accounting for possible heterogeneous returns to observed characteristics between mothers and nonmothers. The twofold OB decomposition estimates Equation (1) separately for mothers and childless women and splits the MEG into a composition and a wage-structure effect. The former represents the portion of the MEG explained by differences in observables between the two groups of women. It measures the gap that would exist if the returns to observed characteristics were the same for all women and corresponded to those of childless women. On the other hand, the wage-structure effect is the portion of the MEG due to differences in the returns to (observed) characteristics between the two groups of women, often interpreted as a measure of discrimination. We selected childless women as the reference group to ensure that the OLS estimate of the MEP (i.e., β_1) and the wage-structure effect are comparable in terms of meaning.

4.1.3 | Robustness Analysis

We acknowledge the presence of potential endogeneity issues in estimating Equation (1), which are mainly related to omitted variables. We do not observe individuals' traits, such as career ambitions, commitment to family values, gender, and identity norms, ability, effort, which can concurrently explain the decision to have children together with the decision to participate in the labor market and the level of earnings for those in paid work. To overcome this limitation, we apply, in turn, Oster's approach to computing bounding values for the OLS-based estimates of the MEP and the CEM method to estimate the MEP on a matched sample of mothers and childless women in which observed differences between the two groups of women have been minimized.

Oster's approach involves estimating bounding values for the MEP by considering movements in β_1 estimates and R-squared between a parsimonious specification, which controls only for motherhood status, and the controlled specification as in Equation (1). Additionally, it allows us to evaluate the role that unobservable factors should have compared to observable factors, as measured by the coefficient of proportionality δ, to make the MEP negligible. The larger the δ value, the lower the role of unobservables and the lower the omitted variable bias in OLS estimates.

We also implement the CEM method that allows for a more straightforward assessment of the effect of motherhood in that it enhances the comparability of two groups (mothers and nonmothers) by balancing key characteristics. The method involves coarsening relevant control variables into subgroups and then identifying strata so that mothers (i.e., treated group) and childless women (i.e., control group) within the same stratum have identical values for all the coarsened variables. The central challenge lies in achieving a balance that refines the definition of the control group as much as possible—with a greater number of variables used to define the strata and a greater number of subcategories within each variable—while securing a sufficient sample within the same stratum. We define the strata using the following variables: experience, tertiary education, partnership status, public economic sector, and firm size. On the matched samples, we estimate Equation (1) weighting observations according to the size of their strata.[12]

4.1.4 | Quantile Analysis

Thus far, the empirical investigation has been interested in the average effect of the relationship between earnings and motherhood. However, evaluating the MEP for women located in different parts of the earnings distribution is undoubtedly relevant. In the literature on the motherhood wage penalty, there is an ongoing debate about the more suitable quantile regression model to evaluate the MEP along the earnings distribution. The debate began with an exchange between Budig and Hodges (2010, 2014) and Killewald and Bearak (2014) concerning the choice between the conditional quantile regression (CQR) model (Koenker and Bassett 1978) and the unconditional quantile regression (UQR) model (Firpo et al. 2009). Since 2014, UQR models have become the standard tool in investigating the motherhood wage penalty across the wage distribution. More recently, Rios-Avila and Maroto (2022) and Borgen et al. (2023) have introduced QTE models via the recentered influence function (RIF). When the motherhood status is defined as a dichotomous variable, UQR models estimate population-level effects, i.e., how the women's earnings distribution would change if a larger share of the female population had children. Differently, QTE models estimate individual-level effects, i.e., the difference in earnings between mothers and childless women at some points of the earnings distribution, everything else being constant. The choice between the quantile regression models depends on the research question. In our study, we opt for the QTE approach because it is the most suited to answer our research question: Is there and how large is the difference in earnings when comparing mothers to childless women along the earnings distribution, all else being equal?

4.1.5 | Country-Level Analysis

The second-stage analysis explores the role of work–family policies, social norms on gender roles and other cultural values, minimum wages, wage-setting institutions, and economic conditions in explaining the differences in the MEP among countries. In doing so, we estimate several estimated dependent variables (EDV) regression models. We first obtain country-year-specific estimates of the MEP at the mean (OLS estimates by country and year) and some quantiles of interest (e.g., 10th and 90th, QTE estimates by country and year), which serve as the dependent variables of a weighted least squares (WLS) regression where the unit of observation is the country-year. We have a total of 221 country-year observations. The weights in the WLS regressions are properly constructed using the standard errors of the dependent variables and an estimate of the variance of the component of the OLS and QTE regression residuals that is not due to sampling of the dependent variable. According to Lewis and Linzer (2005), this feasible generalized least squares approach yields superior results compared to OLS.

The explanatory variables include the set of indices described in section 3.2. The correlation between the *Gender Roles* and the *Discrimination* indices is 0.74, while the correlation between the *Gender Roles* and the *Masculinity* indices is 0.95. For this reason, we include them separately in the WLS regression, as well as the other cultural dimensions. The same rationale applies to the *Centralization* and *Coordination* indices. Supporting Information Table A.3 in the Appendix A reports the correlation matrix for these contextual variables.

5 | Results of the Individual-Level Analysis

5.1 | Baseline OLS Analysis, Sensitivity, and Robustness Checks

Figure 1 shows the OLS estimates of the MEP by country.[13] In 10 out of 13 countries, we find evidence of a significant motherhood earnings penalty, underscoring that motherhood continues to represent a substantial challenge to women's economic outcomes. Based on the magnitude of the penalty, we can classify the countries into three groups. The first group includes Sweden and Norway, which have the largest penalties of 19% and 15%, respectively. The second group comprises Germany and Austria with a moderate penalty, ranging between 5% and 10%. Finally, the third group includes Portugal, Denmark, Spain, Italy, Belgium, and Finland, where the penalty is smaller and below 5%. In the remaining three countries, we find no significant earnings difference between mothers and nonmothers in the Netherlands and France, and a small motherhood premium, below 5%.[14] Notice that these country groupings do not align with the traditional clusters of European welfare states, such as the Nordic, Mediterranean, and Continental models.

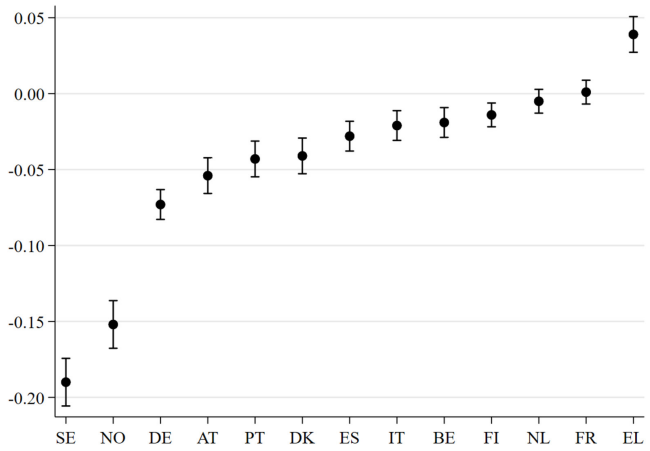

FIGURE 1 | MEP estimates and 95% confidence intervals by country. *Source:* EU-SILC 2007–2023 (IRP: 2006–2022). [Colour figure can be viewed at wileyonlinelibrary.com]

The empirical evidence for Norway and Sweden, where the penalty is higher than in the other countries, can be somewhat surprising and unexpected, given the reputation of these countries for being family- and women-friendly. However, a long-term penalty of roughly 20% for mothers (compared to fathers) is also found by Angelov et al. (2016) and Kleven et al. (2019) in Sweden. In line with our results, Kleven et al. (2019) found a lower penalty in Denmark than in Sweden. However, our evidence is completely different for Austria and Germany. Kleven et al. (2019) found a penalty in these two countries, ranging from 41% to 61%, while our results indicate a penalty lower than 10%. The difference between our and their results relies on the definition of the outcome variable. They use the gross labor income in levels and fill in missing income for nonparticipants with 0s (while also refraining from controlling for job-related variables in their estimates of event study models). Differently, we do not include nonparticipants, who are mainly mothers. Given that the share of nonparticipants is much higher in German-speaking than in Nordic countries, the inclusion of 0 values for income results in a larger motherhood penalty in the former than in the latter countries.

Supporting Information Table A.5 in Appendix A shows a series of robustness and sensitivity analyses. We estimate a Heckman model to account for self-selection into employment in Austria, Belgium, Germany, Greece, Spain, Italy, and Portugal, where the share of employed women is below 0.80. We deal with missing values in self-reported labor market experience and job-related variables by estimating the model on the subsample of women with complete information (Sensitivity 1 and 2). We estimate the model on the subsamples of individuals who worked either full-time or part-time during the IRP (Sensitivity 3) and those who were full-year employed during the IRP (Sensitivity 4). The sensitivity analyses produce results that are qualitatively comparable to the OLS model. Sensitivity 5 focuses on the pre-COVID period. Specification (a) reproduces the estimations for the years 2006–2019. The results are broadly consistent with the baseline model, except for the Netherlands, where a small motherhood premium is observed in the pre-COVID period. Specification (b) estimates the model on a broader sample, including women who changed jobs or contract types between the IRP and the time of the interview. This sensitivity check is motivated by data availability (see Footnote 5 for further details). The two specifications yield similar results. Lastly, we provide a distinctive

analysis of the MEP by replacing the motherhood binary measure with three indicators of the number of children (Sensitivity 6). The penalty decreases across all countries and becomes statistically insignificant in Belgium. By contrast, the Netherlands still shows a significant penalty, though its magnitude is very small. In Greece, the premium declines, and in France, a small premium is also observed.

5.2 | OB Decomposition Analysis

Table 1 shows the results of the OB decomposition analysis. The findings for the wage-structure effect are consistent with the OLS estimates of the MEP, except for the Netherlands, where the OB analysis reveal the existence of a small motherhood penalty. Three key insights emerge from the analysis. First, there is a group of countries, including Austria, Germany, and Portugal, where the raw MEG is negative, and only a small portion of this gap is explained by differences in characteristics between mothers and childless women (i.e., a negative composition effect). This results in a penalty for mothers (i.e., a negative wage-structure effect). Second, another group of countries, including Denmark, Spain, Norway, and Sweden, shows a negative raw MEG, while the composition effect is positive. This suggests that in these countries, if mothers received the same returns to their characteristics as childless women, they would, on average, earn higher wages. This partly accounts for the large wage penalties observed in Sweden and Norway. Finally, a third group of countries, including Belgium, Finland, France, Italy, and the Netherlands, displays both a positive raw MEG and a positive composition effect, implying a motherhood penalty when the composition effect exceeds the raw MEG (all listed countries, except for France). In other words, in these countries, the motherhood gap would be even larger, in favor of mothers, if the returns to their observed characteristics were the same as those of nonmothers.

Supporting Information Figure A.3 in Appendix A shows the contribution of the different control variables to the MEG. In all countries, labor market experience positively contributes to explaining the gap. On average, mothers are older than childless women. Thus, they have been in paid work for longer, which is generally associated with higher earnings. By contrast, job-related characteristics and education tend to reduce the composition effect. Job-related characteristics play a relevant role in Austria, Germany, and Portugal, where mothers seem more likely to be employed in the less rewarding segments of the labor market. In these countries, mothers are also less likely than childless women to have a university degree, which is associated with higher earnings prospects.

5.3 | Oster (2019) and CEM

OLS estimates of the MEP can be biased due to endogeneity issues. So, we apply Oster's (2019) approach to compute bounding values for the MEP (Table 1) and obtain an estimate of the extent to which unobservables should play compared to observables to make the MEP negligible, as provided by the value of the coefficient of proportionality δ.

The results suggest that omitted variable bias is a minor concern in Austria, Germany, Denmark, Spain, Finland, Italy, Norway, and Sweden, where the absolute value of δ is almost equal to or exceeds two, indicating that unobservable factors must play at least twice the role of observables to eliminate the penalty. The results are somewhat less robust in Belgium, Greece, and Portugal, where the value of δ is between 1 and 2. However, the bounding set does not include 0, suggesting the existence of a significant MEP in these countries.

In the bottom part of Table 1, we show the MEP estimates based on the CEM method. The coarsening of variables allows matching rates ranging from 72% to 91% of women, depending on the country. In addition, the CEM substantially improved covariate balance, as proved by the reduction in the multivariate L1 statistic following the matching procedure. Using our matched samples of mothers and childless women, the MEP estimates based on the CEM procedure closely align with the OLS estimates, except for Belgium, where the small penalty is no longer significant, and the Netherlands, where we find evidence of a small penalty as in the OB decomposition analysis.

5.4 | QTE Regression Results

Figure 2 provides a graphical representation of the results from the QTE regressions by country. In almost all countries, the motherhood penalty decreases along the wage distribution, with the decline being more pronounced in countries where the average penalty is moderate or high, such as Austria, Germany, Norway, and Sweden. Notably, in Belgium, Germany, France, and the Netherlands, we even observe a motherhood premium in the upper tail of the distribution. This evidence is in line with studies investigating the evolution of the MEP over time and pointing out that the motherhood penalty has narrowed in the more recent years and, in some cases, even turned into a premium, mainly due to maternal wages that sharply increase at the upper wage quantiles (Glauber 2018; Kwak 2022). A possible explanation relies on women's decision to delay childbearing, which allows them to accumulate more work experience and establish careers before becoming mothers.[15] Another factor contributing to this trend is mothers choosing to work longer hours.[16] In Greece, the OLS analysis revealed a small motherhood premium that is generally significant and tends to increase across the wage distribution.

6 | Results of the Country-Level Analysis

Previous analysis has highlighted the heterogeneous effects of motherhood across European countries, both on average and along the earnings distribution. From a comparative standpoint, we now explore how national variations in socioeconomic, cultural, and institutional contexts contribute to this cross-country heterogeneity. The dependent variable in the country-level analysis is the MEP at the mean (Supporting Information Figure A.4), and at the 10th and 90th percentiles of the earnings distribution (Supporting Information Figure A.5). Notably, several countries experienced an increase in the motherhood penalty following the Great Recession (e.g., Norway and Sweden) and the COVID-19 pandemic (e.g.,

TABLE 1 | Results of OB decomposition analysis, Oster's (2019) approach, and CEM by country.

	AT	BE	DE	DK	EL	ES	FI	FR	IT	NL	NO	PT	SE
Oaxaca-Blinder decomposition													
Mean log monthly	7.839***	7.989***	7.874***	8.283***	7.137***	7.307***	7.959***	7.680***	7.493***	8.088***	8.198***	6.823***	7.787***
Earnings of mothers	(0.005)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
Mean log monthly	7.940***	7.973***	7.959***	8.316***	7.058***	7.321***	7.958***	7.666***	7.484***	8.068***	8.294***	6.898***	7.874***
Earnings of childless women	(0.004)	(0.004)	(0.003)	(0.005)	(0.003)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.005)	(0.005)
MEG	−0.101***	0.016***	−0.086***	−0.033***	0.080***	−0.014***	0.001	0.014***	0.009**	0.020***	−0.096***	−0.075***	−0.086***
	(0.007)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)	(0.006)	(0.007)
Composition effect	−0.049***	0.033***	−0.012***	0.012**	0.042***	0.011**	0.020***	0.014***	0.034***	0.034***	0.017***	−0.019***	0.051***
	(0.005)	(0.004)	(0.004)	(0.006)	(0.005)	(0.005)	(0.003)	(0.004)	(0.004)	(0.004)	(0.006)	(0.006)	(0.007)
Wage-structure effect	−0.052***	−0.017***	−0.074***	−0.044***	0.038***	−0.025***	−0.019***	0.000	−0.024***	−0.014***	−0.113***	−0.056***	−0.137***
	(0.007)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.004)	(0.004)	(0.005)	(0.005)	(0.008)	(0.006)	(0.009)
Oster													
Bounding values	[−0.072;-0.033]	[−0.036;-0.006]	[−0.078;-0.067]	[−0.045;-0.038]	[0.002; 0.059]	[−0.036;-0.023]	[−0.020;-0.009]	[−0.001; 0.008]	[−0.037;-0.009]	[−0.018; 0.004]	[−0.183;-0.129]	[−0.056;-0.023]	[−0.230;-0.154]
Coefficient of proportionality	2.21	−1.52	5.96	25.45	1.04	−13.16	−2.98	0.08	−1.95	−0.52	−48.01	1.77	−5.05
$\delta \mid \beta = 0$													
CEM regression model													
MEP estimate	−0.049***	−0.006	−0.072***	−0.039***	0.040***	−0.027***	−0.018***	−0.001	−0.020***	−0.023***	−0.109***	−0.054***	−0.137***
	(0.007)	(0.006)	(0.005)	(0.007)	(0.006)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.010)	(0.007)	(0.011)
Matched strata	87	88	91	83	72	88	83	89	88	90	76	86	77
Multivariate L1													
Before matching	0.4712305	0.4821456	0.4406295	0.4816354	0.7001563	0.5489928	0.3728796	0.4799263	0.6087663	0.4957009	0.5257536	0.5655001	0.5135257
After matching	1.590e-16	1.324e-15	3.234e-15	2.560e-15	8.692e-16	2.572e-15	4.844e-15	1.075e-15	6.739e-15	8.705e-15	4.336e-15	3.681e-15	1.743e-15

Note: Standard errors are in brackets. $^{**}p < 0.05$, $^{***}p < 0.01$. The bounding set is computed assuming $R^{max} = 1.3\widetilde{R}$ and $\delta = 1$ and $\delta = -1$.
Source: EU-SILC, 2007–2023 (IRP: 2006–2022).

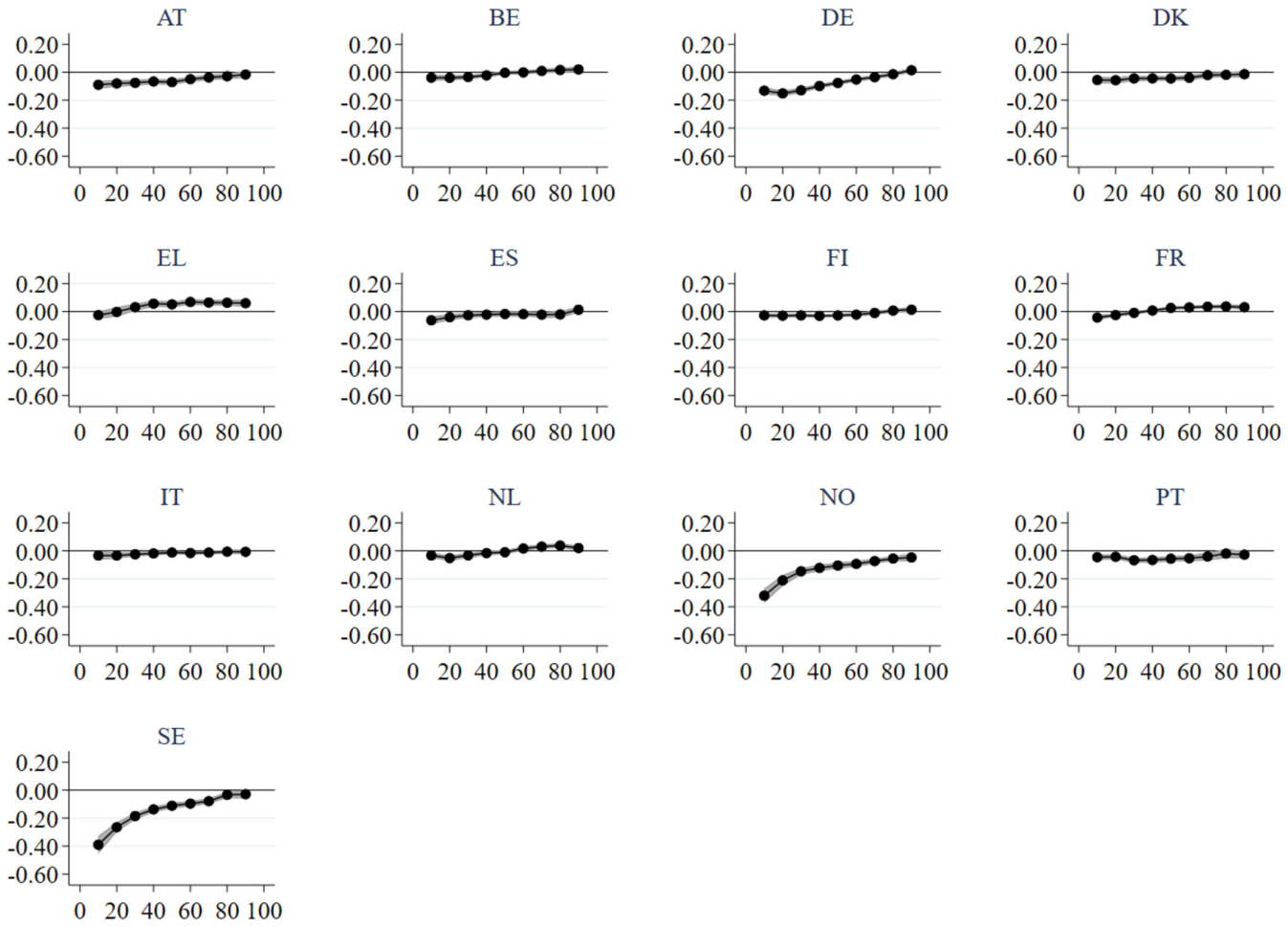

FIGURE 2 | Motherhood earnings penalty/premium along the unconditional earnings distribution (10th to 90th percentile) by country. *Source:* EU-SILC 2007–2023 (IRP: 2006–2022). [Colour figure can be viewed at wileyonlinelibrary.com]

Germany, Denmark, Greece, and the Netherlands). Table 2 shows the results of the country-level analysis, based on nine different specifications.

6.1 | Main Results

6.1.1 | Work–Family Policies

The results suggest that, at the mean (see Column 1 of each specification), the degree of family-friendliness of the policy context does not account for cross-country variation in the MEP. Results are in line with Cukrowska-Torzewska (2017). However, they differ from Olivetti and Petrongolo (2017), who find that larger motherhood penalties are, on average, associated with more family-friendly policy contexts, and Budig et al. (2016) and Misra et al. (2011), who report smaller motherhood penalties in more family-friendly environments. It is important to note that these results are not directly comparable, as they may reflect variations in the countries, methodologies, dependent variables, and time periods analyzed. When examining the earnings distribution, in line with our expectations, the results indicate that more family-friendly contexts are associated with larger motherhood penalties at the lower end of the distribution compared to other segments (see Column 2 of each specification).

This evidence suggests that while family-friendly policies aim to support mothers' employment,[17] they do not necessarily address the nature of the jobs mothers hold. For instance, maternal employment rates are high in countries where part-time work is prevalent, but such jobs are often concentrated in lower skilled, lower status, or temporary positions. As a result, mothers may experience an earnings penalty, especially for those in low-wage employment.

6.1.2 | Gender Norms

The results suggest that women experience a lower earnings penalty upon becoming mothers in countries where there are (i) more conservative gender norms on women's roles in both private and public spheres, as reflected in higher *Gender Roles index* values; or (ii) barriers to young women's entry into paid work, as indicated by higher *Discrimination index* values. See Column 1 of Specifications 1 to 3 in Table 2.[18] Our findings diverge from those of Kleven et al. (2019), likely reflecting significant differences in both the country samples and the methodology used to measure the motherhood earnings penalty. When examining the earnings distribution, no significant effects are found at both ends of the earnings distribution (Columns 2 and 3).

Several mechanisms may be at play in explaining our findings. Positive selection into employment is one possible mechanism.

TABLE 2 | Results of the country-level analysis.

	Specification 1			Specification 2			Specification 3		
	Mean	**10 pct**	**90 pct**	**Mean**	**10 pct**	**90 pct**	**Mean**	**10 pct**	**90 pct**
	(1)	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**	**(1)**	**(2)**	**(3)**
Work–family policy									
Work–family Policy index	−0.002	−0.010	−0.003	−0.002	−0.011**	−0.003	−0.003	−0.010**	−0.003
	(0.003)	(0.005)	(0.002)	(0.003)	(0.005)	(0.002)	(0.003)	(0.005)	(0.002)
Gender role attitudes									
Gender roles index	0.008***	0.009	−0.000	0.008***	0.007	−0.000			
	(0.003)	(0.006)	(0.003)	(0.003)	(0.006)	(0.003)			
Discrimination index							0.003***	0.003	0.002
							(0.001)	(0.002)	(0.001)
Labor market institutions									
Kaitz index	0.084***	0.122***	0.064***	0.082***	0.115***	0.067***	0.089***	0.127***	0.064***
	(0.015)	(0.029)	(0.012)	(0.015)	(0.028)	(0.013)	(0.016)	(0.031)	(0.013)
Centralization index	0.009**	0.023***	0,009				0.009**	0.023***	0.009**
	(0.004)	(0.008)	(0.005)				(0.004)	(0.008)	(0.005)
Coordination index				0.006**	0.019***	−0.000			
				(0.002)	(0.005)	(0.002)			
GDP									
Log per capita GDP	−0.068***	−0.120**	−0.016	−0.077***	−0.152***	−0.014	−0.073***	−0.134***	0.001
	(0.022)	(0.048)	(0.019)	(0.022)	(0.046)	(0.020)	(0.021)	(0.041)	(0.018)
Constant	0.607***	1.054**	0.128	0.732***	1.444***	0.132	0.661***	1.202***	−0.049
	(0.232)	(0.501)	(0.193)	(0.230)	(0.480)	(0.205)	(0.221)	(0.427)	(0.187)
Observations	221	221	221	221	221	221	221	221	221
R-squared	0.366	0.239	0.152	0.372	0.260	0.139	0.361	0.235	0.160

TABLE 2 | (Continued)

	Specification 4			Specification 5			Specification 6			Specification 7			Specification 8			Specification 9		
	Mean	10 pct	90 pct	Mean	10 pct	90 pct	Mean	10 pct	90 pct	Mean	10 pct	90 pct	Mean	10 pct	90 pct	Mean	10 pct	90 pct
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Work–family policy																		
Work–family policy index	−0.002	−0,009	−0.003	−0.002	−0,009	−0.003	−0.004	−0.011**	−0.003	−0.002	−0.008	−0,004	−0.003	−0,01	−0.004	−0.002	−0.008	−0.003
	(0.003)	(0.005)	(0.002)	(0.003)	(0.005)	(0.002)	(0.003)	(0.005)	(0.002)	(0.003)	(0.005)	(0.002)	(0.003)	(0.005)	(0.002)	(0.003)	(0.005)	(0.002)
Hofstede's cultural values																		
Masculinity index	0.007**	0.013	−0.001															
	(0.004)	(0.008)	(0.003)															
Individualism index				0.019***	0.028***	0,005												
				(0.003)	(0.006)	(0.003)												
Long-term orientation index							−0.003	−0.004	−0.001									
							(0.003)	(0.008)	(0.003)									
Power-distance index										0.012**	0.025**	−0.010**						
										(0.005)	(0.012)	(0.004)						
Uncertainty avoidance index													0.003	0.007	−0.005			
													(0.004)	(0.009)	(0.004)			
Indulgence index																−0,006	−0,013	0.001
																(0.003)	(0.007)	(0.003)
Labor market institutions																		
Kaitz index	0.083***	0.116***	0.065***	0.072***	0.101***	0.059***	0.095***	0.134***	0.065***	0.065***	0.078***	0.082***	0.084***	0.113***	0.073***	0.081***	0.109***	0.065***
	(0.015)	(0.027)	(0.012)	(0.015)	(0.031)	(0.013)	(0.018)	(0.037)	(0.013)	(0.016)	(0.030)	(0.015)	(0.016)	(0.029)	(0.013)	(0.016)	(0.029)	(0.012)
Centralization index	0.010**	0.025***	0,009	0.005	0.018**	0,008	0.009**	0.023***	0,009	0.006	0.017**	0.011**	0.008*	0.022***	0.010**	0.007	0.019**	0,009
	(0.004)	(0.009)	(0.005)	(0.004)	(0.008)	(0.005)	(0.005)	(0.008)	(0.005)	(0.005)	(0.009)	(0.005)	(0.004)	(0.008)	(0.005)	(0.004)	(0.008)	(0.005)
GDP																		
Log per capita GDP	−0.064**	−0.088	−0.022	−0.107***	−0.169***	−0.015	−0.101***	−0.156***	−0.015	−0.073***	−0.097	−0.039**	−0.094***	−0.137***	−0.032	−0.096***	−0.143***	−0.017
		(0.065)	(0.022)	(0.015)	(0.030)	(0.014)	(0.018)	(0.036)	(0.014)	(0.023)	(0.051)	(0.017)	(0.021)	(0.043)	(0.019)	(0.017)	(0.033)	(0.015)
Constant	0.571	0.726	0.187	1.021***	1.578***	0.120	0.949***	1.427***	0.119	0.678***	0.844	0.357**	0.880***	1.236***	0.286	0.902***	1.308***	0.142
	(0.296)	(0.686)	(0.227)	(0.155)	(0.311)	(0.147)	(0.184)	(0.381)	(0.148)	(0.232)	(0.524)	(0.175)	(0.220)	(0.443)	(0.200)	(0.177)	(0.336)	(0.154)
Observations	221	221	221	221	221	221	221	221	221	221	221	221	221	221	221	221	221	221
R-squared	0.359	0.244	0.152	0.434	0.286	0.164	0.348	0.233	0.152	0.361	0.250	0.170	0.347	0.234	0.158	0.354	0.243	0.153

Note: Standard errors are in brackets. $^{**}p < 0.05$, $^{***}p < 0.01$.

Women, and especially mothers, who decide to deviate from the prevailing gender norms and enter paid work under unfavorable cultural contexts are those who are likely to earn, on average, higher wages due to their observable and unobservable characteristics.[19] In the lower and upper tails, the lack of significance may reflect distinct labor market dynamics, such as wage compression at the bottom of the distribution, due, for instance, to statutory minimum wages or union-negotiated minimum pay rates, and selection in high-wage jobs at the top, where cultural norms may exert less influence and other individual characteristics, such as networks and bargaining skills, matter more.

6.1.3 | Cultural Values

On average, our results suggest a lower motherhood penalty in countries where cultural values emphasize masculinity (Specification 4), individualism (Specification 5), and power distance (Specification 8). Cultural values and societal norms strongly shape women's labor force participation through a selection effect, which is expected to play a more relevant role in masculine and high power-distance cultures, where traditional gender roles and limited support for caregiving discourage women, especially mothers, from working. These norms reinforce hierarchical and male-dominated labor markets. Additionally, individualistic cultures often associate men with agentic traits and women with communal roles, reinforcing stereotypes that lead women to assume more unpaid care work and limit their career involvement after childbirth.

The analysis across the earnings distribution shows that the correlations between the MEP and cultural dimensions such as masculinity, uncertainty avoidance, long-term orientation, and indulgence are not statistically significant at both ends of the distribution. In contrast, individualism is associated with a reduction in the motherhood penalty only at the bottom of the distribution. Several mechanisms can explain this evidence. In lower wage segments of the labor market, workers tend to be more substitutable, which weakens their individual bargaining power. Moreover, these sectors often rely on flat or regulated pay scales, with limited salary negotiation possibilities. As a result, wage differentials between mothers and nonmothers are compressed, contributing to a smaller observed penalty. Furthermore, higher power distance is associated with a smaller motherhood penalty at the lower end, but with a larger penalty among high earners. In the upper tiers of the occupational hierarchy, where roles typically demand leadership and long working hours, high power-distance cultures might reinforce traditional and male-dominated norms. Within this context, mothers may be perceived as less committed than childless women, leading to a steeper earnings penalty at the top. Thus, cultural norms embedded in organizational hierarchies can outweigh the advantages conferred by personal characteristics and positive selection in high-status jobs, thus reinforcing the pay difference between mothers and nonmothers.

6.1.4 | Minimum Wages and Wage-Setting Institutions

Minimum wages play a significant role in mediating the impact of motherhood on earnings. Higher minimum wages are linked to a reduction in the motherhood penalty, both at the average level (Column 1 of each specification) and at both ends of the earnings distribution (Columns 2 and 3 of each specification), with a particularly strong effect at the lower end. This effect is likely due to the effectiveness of minimum wage regulations to boost earnings in the least remunerative segments of the labor market, where mothers are generally more likely to be located.

A more centralized (all specifications, except for the second one) and a more coordinated (Specification 2) wage bargaining is associated with a significant reduction in the motherhood penalty at the mean and in the lower tail of the earnings distribution.

These findings align with existing literature showing that coordinated and centralized wage bargaining helps reduce earnings inequality, particularly at the lower end of the distribution (Matteazzi et al. 2018). In such systems, individual wage negotiation is limited, which can mitigate disparities like the motherhood penalty. For example, in Italy, no motherhood wage penalty is observed when considering base wages alone, but a significant gap emerges when bonuses and additional payments are included, suggesting mothers are less likely to receive these extra payments, compared to childless women, or may receive lower amounts (Badaoui et al. 2024). Our result is consistent with the literature that underscores the role of worker substitutability in shaping earnings outcomes (Goldin 2021). However, more coordinated and centralized wage bargaining tends to standardize wages and conditions across firms and roles, thus decoupling compensation from long hours or being always-on, which is a feature of nonsubstitutable work, and reducing the motherhood penalty.

6.1.5 | Log Per Capita GDP

As economic conditions improve, the motherhood penalty tends to increase, particularly among women at the lower end of the income distribution. Higher income countries often exhibit greater labor market participation among mothers. In these countries, lower skilled mothers are more likely to enter the workforce, resulting in negative selection into employment (Albrecht et al. 2003; Korpi et al. 2013), which contributes to a larger motherhood wage penalty.

6.2 | Heterogeneity Analysis

As a heterogeneity analysis, we estimated three specifications including pairwise interactions among the *Work–Family Policy*, *Gender Roles*, and *Centralization* indices. Supporting Information Figure A.7 plots the results. On average, interaction terms are never statistically significant. However, it is interesting to discuss the evidence related to the interaction between the *Work–Family Policy* and *Gender Roles* indices. The first panel of Supporting Information Figure A.7 shows the linear prediction of the MEP as the degree of family-friendliness of the policy context increases for a modern country in terms of gender norms (*Gender Roles index* = −3, corresponding to Denmark in 2006) and a traditional country (*Gender Roles index* = 4, corresponding

to Greece in 2016). In the country with a cultural context that is supportive of women's and mothers' participation in the labor market (gray line), an improvement in work–family policies leads to a reduction in the motherhood penalty. This evidence aligns with findings of Budig et al. (2012), who argue that family policies may be most effective at reducing the motherhood penalty when cultural support for maternal employment is strong. However, in our case, the effect is not statistically significant. Our analysis also shows that, as the *Work–Family Policy index* increases, the motherhood penalty increases in countries with an unsupportive cultural context (black line). We argue that when policy support for mothers' labor market participation increases within a culturally unsupportive environment, the more likely it is that low-skilled mothers will also enter the labor market. This reduces the positive selection effect, thereby leading to a larger motherhood wage penalty (Korpi et al. 2013).

7 | Conclusion

This article investigates cross-country differences in the effect of motherhood on women's earnings. The variable of interest is the real full-time equivalent gross monthly income of women aged 25–40. Using a repeated cross-sectional EU-SILC survey for the years 2006 to 2022, we implement several empirical strategies—at the individual level and at the country level—to assess the role of work–family policies, gender norms, cultural values, minimum wages, and wage-setting institutions in mediating the effect of motherhood on earnings, both at the mean and at different points of the earnings distribution.

The individual-level analysis goes beyond previous research by providing more recent evidence, addressing endogeneity issues related to motherhood and labor outcomes, applying advanced econometric methods, and exploring the motherhood penalty along the earnings distribution in a comparative framework based on harmonized data. A motherhood penalty is observed in Austria, Belgium, Germany, Denmark, Spain, Finland, Italy, Norway, Portugal, and Sweden. Neither a premium nor a penalty is observed in France and the Netherlands. Greece is the only country where mothers enjoy a premium. However, the quantile analysis shows that the motherhood penalty tends to decrease along the earnings distribution, particularly in countries where the penalty is moderate or high.

The country-level analysis, exploring the role of socioeconomic, cultural, and institutional variables in explaining cross-country MEP heterogeneity, reveals important results. First, lower motherhood penalties are observed in countries with more traditional gender roles and cultural values that emphasize masculinity, individualism, and power distance. Second, although work–family policies support women's and mothers' employment, they do not effectively mitigate the motherhood penalty. In contrast, minimum wage regulations and wage-setting institutions prove to be more successful in achieving this goal.

Future research should explore additional factors contributing to the observed MEG, particularly the role of negotiation strategies. Mothers and nonmothers may differ in their approach to negotiating promotions, career advancement, or salary increases. For instance, mothers may prioritize negotiating reduced hours or other job amenities (e.g., ease of entering or leaving work, or shorter lunch breaks) that support work-family balance rather than asking for wage increases. At the same time, it would be important to control for workplace practices regarding work-life balance, flexibility, and attitudes toward shared parenting. One might expect that a firm with a positive attitude toward shared parenting, where fathers also take parental leave, would be more attentive to ensuring substitutability among workers across different roles, with consequent positive effects on wage differentials (Goldin 2014). While there is limited clear evidence in the literature on these factors, they could be significant in understanding the wage penalty faced by mothers.

From a policy perspective, governments should implement targeted incentives to encourage firms to obtain family-friendly workplace certifications, which are already in place in Finland, Germany, and Slovenia. Greater workplace pay transparency is also important, particularly in relation to the criteria used to allocate nonbase remunerations, such as productivity bonuses or performance-based incentives. To tackle mothers' discrimination at work, one policy response could be the introduction of nontransferable parental leave schemes that require both mothers and fathers to take the same duration of leave. Such policies can promote a deeper cultural shift toward gender equality by normalizing paternal caregiving. However, they may also have unintended consequences. These policies might have a negative impact on fertility rates, as shown by Farré and González (2019) for Spain. They would also reduce the fatherhood wage premium by aligning fathers' employment patterns more closely with those of mothers and by increasing the substitutability of male workers. Finally, it is crucial to ensure the participation of both male and female stakeholders in roundtable discussions on economic policy design, as emphasized by May et al. (2018). A greater inclusion of women serves to enrich the debate and expand the diversity of perspectives.

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Data Availability Statement

The data that support the findings of this study are available from European Commission. Restrictions apply to the availability of these data, which were used under license for this study. Data are available from the author(s) with the permission of European Commission.

Endnotes

[1] Dupuy and Fernández-Kranz (2009) use data for 35 countries from 1988, 1994, and 2002 of the International Social Survey Program (nonharmonized data). Budig et al. (2012) use Luxembourg Income Study (LIS) data from 22 countries for 1995 and 2000 (harmonized data). Budig et al. (2016) and Misra et al. (2011) use LIS data for 2000/2001 for 22 and 21 countries, respectively. Cukrowska-Torzewska (2017) and Cukrowska-Torzewska and Matysiak (2020) use EU-SILC data for 28 European countries for the period 2003–2012 and 26 European countries for the period 2003–2014, respectively (harmonized data). Kleven et al. (2019) use different data sources for Austria (Austrian Central Social Security Register, 1980–2017), Denmark (administrative data for the full Danish population, 1980–2013), Germany (German Socio-Economic Panel, 1984–2016), Sweden (fiscal statistics and registry data, 1997–2011) and UK (British Household Panel Survey, 1991–2009).

[2] Psychological factors, such as feelings of guilt, regret, and inadequacy, can also influence mothers' economic decisions. For instance, based on focus group research, Schmidt et al. (2025) identifies different types of mothers according to their expectations about what a mother ought to do, is expected to do, and desires to do. These expectations, in turn, can shape mothers' labor market choices, including decisions around career interruptions, work schedules, and job types.

[3] While EU-SILC longitudinal data would enable controlling for time-invariant unobserved characteristics, the 4-year rotating panel structure limits the investigation to assessing only the short-term impact of motherhood on earnings. See, for instance, Cukrowska-Torzewska (2017). Selected countries include Austria (AT), Belgium (BE), Germany (DE), Denmark (DK), Greece (EL), Spain (ES), Finland (FI), France (FR), Italy (IT), The Netherlands (NL), Norway (NO), Portugal (PT), and Sweden (SE). The choice of countries is driven by data availability. The UK and Ireland are not included in the analysis because of their different definition of the income reference period, which is crucial for our measure of earnings. Other countries, especially Central and Eastern European countries, were excluded because of missing information on country-level variables that we use in our empirical specifications.

[4] This age-based sample selection is supported by the data, which reveal a substantial decline in the share of mothers among women aged 42 and older.

[5] A growing number of studies investigating the penalty associated with motherhood use earnings instead of hourly wages, as they provide a better measure of the extent to which motherhood affects women's economic conditions (Angelov et al. 2016; Budig et al. 2012; Kleven et al. 2019).

[6] The total number of full-time equivalent months worked during the IRP is computed as the sum of months worked full-time and the number of months worked part-time. The latter is multiplied by the ratio between the number of part-time working hours of the respondent and the country-year average number of (in-sample) hours worked by full-timers. The number of working hours is declared at the time of the interview. Hence, there is a time lag between the end of the IRP and the time of the interview. However, we do not include women who have declared that they have changed their jobs or types of contracts with the same employer since the last interview. We run a sensitivity analysis that deals with this data issue (see Supporting Information Table A.5 in Appendix A—Sensitivity 3 and 4). The information on job or contract changes is available up to 2020 (interview year). As a robustness check, for the 2006–2019 IRPs, we estimate the baseline specification both on the restricted sample (excluding job changers, as in the baseline analysis up to 2019 IRP) and on the full sample (including all respondents). The results of this check are shown in Supporting Information Table A.5—Sensitivity 5.

[7] We focus on survey data collected in 1999–2000, 2008–2009, and 2017–2018, using interpolation to estimate values for the entire period 2005–2021.

[8] EVS data are collected in 1996–2000, 2008–2009, and 2017–2018. WVS data are collected in 1996–2000, 2005–2007, 2011–2013, and 2017–2018. We use interpolation to estimate values for the entire period 2005–2021.

[9] We fill in missing values in self-reported years of real labor market experience by using the predictive mean matching imputation method with a number of regressors (the employment status during the IRP, age, education years, the number of children, nationality, and partnership status). To do this, we examined different numbers of imputations and different numbers of nearest neighbors. The results are consistent among different choices and are available from the authors upon request. We run a sensitivity analysis that excludes individuals with missing information on experience (see Supporting Information Table A.5 in Appendix A, Sensitivity 1).

[10] This categorization is driven by the prevalence of female employees in these sectors, where public employment is widespread. Unfortunately, EU-SILC data do not provide information on whether the employee works in the public or private sector.

[11] To deal with missing values for the variables referring to economic sector, firm size, permanent job contract, and managerial position, we define four dummies equal to one when the associated variable has a missing value. This allows us to keep the individuals in-sample. We provide results for a sensitivity analysis that excludes individuals with missing information on job-related variables (see Supporting Information Table A.5 in Appendix A, Sensitivity 2).

[12] The CEM procedure does not improve the balance between mothers and childless women across unobserved characteristics. There is evidence showing that CEM may outperform other matching techniques, such as propensity score matching, with respect to covariate balance and effect bias (King and Nielsen 2019).

[13] Supporting Information Table A.5 in Appendix A shows the full set of results.

[14] The heterogeneity of the estimated MEP across our sampled European countries is likely to be rooted in contextual factors. This heterogeneity motivated our country-level analysis. Qualitative evidence in the literature underscores that motherhood is a social, relational, and historically situated process (Garcia-Lorenzo et al. 2024).

[15] The timing of motherhood is influenced by cultural definitions of both the *right* conditions and the qualities of a *good* mother. Using semistructured interviews that explored the transition to motherhood, Budds et al. (2016) rely on discursive psychology and concludes on the presence of two main narratives about older motherhood. The first, older motherhood as circumstance portrays delayed motherhood as the outcome of life events beyond women's control, such as the absence of the *right* conditions. The second, older motherhood as readiness reflects a framing in which women view themselves as emotionally and practically prepared for motherhood, with readiness tied to notions of personal fulfillment and perceived ability to meet the standards of *good* motherhood.

[16] Descriptive statistics based on our data show that women who became mothers before the age of 25 have lower earnings compared to those who delayed motherhood until after 30, or even more, until after 35 years old. This highlights the correlation between the timing of motherhood and earnings levels, with earlier motherhood associated with lower earnings. Descriptive statistics also show that, on average, mothers worked 2 more hours per week, rising from 32 to 34 h, during the 2006–2019 period (with similar figures across countries), followed by a decrease to 33.5 h in 2022. Differently, the number of weekly hours of childless women has remained constant at 37 h per week over the same period.

[17] To investigate the relationship between work-family policies and women's employment, we estimate a multilevel logit model for the probability of being employed with the same set of individual and country-level controls considered in our analysis. We introduce a random intercept, a random slope for the motherhood status dummy, and an interaction term between the motherhood dummy and the *Work-Family Policy index* to check if the latter mediates the effect of motherhood on employment probability. The left-hand side panel of Supporting Information Figure A.6 in Appendix A plots the results of the interaction term between the motherhood dummy and the *Work-Family Policy index*. As the policy context becomes more family-friendly, the employment probability of women with and without children increases, but to a larger extent for mothers.

[18] The right-hand side panel in Supporting Information Figure A.6 in Appendix A provides a graphical representation of the result associated with an interaction term between the motherhood status dummy and the *Gender Roles index* in a multilevel logit model for employment probability. As the context becomes more traditional, the employment probability of both women with and without children declines.

[19] The results of the Heckman two-stage model, presented in Supporting Information Table A.5 in Appendix A, point in this

direction. Indeed, women are positively selected in the labor market in Greece, Italy, and Portugal, which have the most conservative contexts among our sampled countries.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Supplementary Information S1:** Appendices. [Correction added on 16 October 2025, after first online publication: All in-text citations to the supporting information elements have been corrected in this version.]