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to Conception and Childbirth**

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Labor Supply Responses to Conception and Childbirth

Nicholaos Giannakopoulos¹ and Athina Raftopoulou²

Abstract

This paper studies the timing of the motherhood penalty using monthly panel data from the EU-SILC for Greece (2003–2024) and an event-study design that aligns women by both conception and childbirth. Exploiting within-woman variation, we document substantial labor supply adjustments that begin at conception, well before birth. Labor force participation and employment decline by around 8 percent following conception—nearly twice the magnitude of the post-birth reduction. Dynamic estimates show that these adjustments emerge immediately after conception and persist throughout pregnancy, consistent with forward-looking behavior rather than responses driven solely by postnatal childcare demands. The effects are highly heterogeneous: the largest penalties are concentrated among younger, less educated, lower-income, unmarried, and foreign-born women. Variation by employment type and sector further reveals that self-employed women and private-sector employees disengage earlier and more sharply than their public-sector counterparts. Taken together, the results suggest that motherhood-related labor market penalties in Greece are both substantial and front-loaded, beginning during pregnancy rather than at birth.

Keywords: Childbirth; conception; female labor supply; motherhood penalty; labor force participation.

JEL codes: J13, J22, J16, C23.

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Η Επίδραση της Εγκυμοσύνης και του Τοκετού στην Προσφορά Εργασίας των Γυναικών.

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Περίληψη

Η παρούσα εργασία εξετάζει τη χρονική στιγμή κατά την οποία εκδηλώνεται η ποινή της μητρότητας (motherhood penalty), χρησιμοποιώντας μηνιαία δεδομένα πάνελ από την έρευνα EU-SILC για την Ελλάδα (2003–2024) και μια μεθοδολογία μελέτης γεγονότος (event study). Αξιοποιώντας την ενδο-ατομική διακύμανση (within-woman variation), τεκμηριώνουμε σημαντικές προσαρμογές στην προσφορά εργασίας που ξεκινούν ήδη από τη σύλληψη, πολύ πριν από τη γέννηση. Συγκεκριμένα, η συμμετοχή στο εργατικό δυναμικό και η απασχόληση μειώνονται κατά περίπου 8% μετά τη σύλληψη — μέγεθος σχεδόν διπλάσιο από τη μείωση που παρατηρείται μετά τον τοκετό. Οι δυναμικές εκτιμήσεις δείχνουν ότι αυτές οι προσαρμογές εμφανίζονται αμέσως μετά τη σύλληψη και επιμένουν καθ' όλη τη διάρκεια της εγκυμοσύνης, γεγονός που συνάδει με μια προνοητική συμπεριφορά (forward-looking behavior) και όχι με αντιδράσεις που καθοδηγούνται αποκλειστικά από τις ανάγκες φροντίδας των παιδιών μετά τη γέννηση. Τα αποτελέσματα παρουσιάζουν έντονη ετερογένεια, με τις επιδράσεις να είναι μεγαλύτερες μεταξύ των νεότερων, λιγότερο μορφωμένων, χαμηλού εισοδήματος, άγαμων και αλλοδαπών γυναικών. Η διαφοροποίηση ανά τύπο απασχόλησης και τομέα αποκαλύπτει επιπλέον ότι οι αυτοαπασχολούμενες και οι υπάλληλοι του ιδιωτικού τομέα αποδεσμεύονται από την αγορά εργασίας νωρίτερα και πιο απότομα σε σχέση με τις εργαζόμενες στον δημόσιο τομέα.

Λέξεις Κλειδιά: Τοκετός, Σύλληψη, Προσφορά εργασίας, Μητρότητα, Συμμετοχή στο εργατικό δυναμικό.

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1. Introduction

Motherhood is widely recognized as a central driver of persistent gender gaps in labor market outcomes. A large body of research documents substantial and long-lasting reductions in women's earnings, employment, and labor force participation following childbirth (Angelov et al., 2016; Kleven et al., 2019a,b; Aguilar-Gomez et al., 2025). Canonical models emphasize that labor supply decisions involve trade-offs in time allocation and opportunity costs (Becker, 1965), and that employment interruptions may generate scarring effects through lost experience and slower wage growth (Mincer and Ofek, 1980). These mechanisms are reinforced by the unequal division of unpaid work within households and by gender norms that place a disproportionate share of caregiving responsibilities on women (Bertrand et al., 2021). As a result, female labor supply is particularly responsive to changes in family structure and fertility (Goldin, 2006; Olivetti and Petrongolo, 2017).

Despite extensive evidence on post-birth labor market effects, much less is known about the timing of the motherhood penalty. Most empirical studies measure event time at childbirth and interpret subsequent declines in labor supply as the onset of maternal career disruption. This approach implicitly assumes that women's labor market behavior remains stable prior to birth. However, pregnancy is a period during which expectations, constraints, and intra-household allocations may already be adjusting, potentially inducing anticipatory labor supply responses. If such adjustments occur, analyses centered exclusively on childbirth may understate both the magnitude and the dynamics of fertility-related labor market effects. Emerging evidence suggests that women may begin adjusting labor supply during pregnancy, but systematic evidence remains limited (Simintzi et al., 2025).

This paper seeks to identify when the motherhood penalty truly begins. Specifically, we examine whether women adjust labor supply in anticipation of childbirth and how these pre-birth responses compare to post-birth effects. By shifting the empirical focus from childbirth to conception, this paper contributes to the literature on the motherhood penalty in three ways. First, we identify labor supply responses both around childbirth and conception rather than focusing solely on childbirth. Second, we exploit monthly data and an event-study design that allow us to precisely trace labor market dynamics before and after fertility events. Third, we document substantial heterogeneity in anticipatory and post-birth effects across demographic and socioeconomic groups.

Our empirical analysis uses Greek data from the European Union Statistics on Income and Living Conditions (EU-SILC) for the period 2003–2024. The data provide monthly information on labor market status, demographic characteristics, household composition, income, and detailed fertility histories. We follow women for up to four years around childbirth—two years before and two years after—allowing us to trace labor market dynamics at a monthly frequency. Building on recent methodological advances, we adapt an event-study framework that aligns individuals by estimated month of conception and by month of birth, enabling a direct comparison between pre-birth and post-birth labor supply responses. We further examine heterogeneity by age, education, marital status, income, health status, and other characteristics associated with labor market attachment.

Female labor force participation in Greece remains substantially below the European average. In 2023, the participation rate of women aged 15–64 was 61.8%, compared with 70.2% in the EU-27. This gap is closely linked to caregiving responsibilities, as reflected in particularly low employment rates among mothers with young children: 60.4% when the youngest child is aged 0–2, 57.0% for ages 3–5, and 62.9% for ages 6–14. These patterns suggest that motherhood plays a central role in shaping women’s labor market attachment in a context characterized by relatively high opportunity costs of childbearing and limited institutional support, making Greece a particularly informative setting for studying anticipatory labor supply behavior.

The results show that labor market withdrawal begins well before childbirth. Labor force participation and employment decline sharply starting at the estimated month of conception, consistent with a forward-looking labor supply response. The average decline following conception is around 8 percent and is nearly twice as large as the reduction observed after birth. These effects are highly heterogeneous: the largest declines are concentrated among younger women, as well as among those with lower education, lower income, weaker household support, and migrant backgrounds. The monthly event-study design also shows that the observed patterns cannot be explained solely by changes in labor market status at the time of birth or by classification into maternity leave, as employment begins to fall early in pregnancy and continues to decline throughout the gestation period for several groups. We should note, that while the analysis relies on survey rather than administrative data—and thus may be subject to recall error and sample attrition—it is important to highlight that administrative registers with labor market variables typically do not contain information on the timing of conception. In this respect, survey data with

retrospective monthly labor-market histories offer a unique advantage, as they allow the examination of labor supply dynamics during pregnancy that are not observable in register-based data.

The rest of the paper is organized as follows. Section 2 reviews the relevant theoretical and empirical literature. Section 3 describes long-run trends in female labor market outcomes and fertility in Greece. Section 4 presents the data and summary statistics. Section 5 outlines the empirical strategy. Section 6 reports the main results and heterogeneity analyses. Section 7 concludes.

2. Literature Review

Economic models of labor supply emphasize time allocation as a central constraint shaping individual decision-making. Becker's (1965) household production framework formalized the allocation of a finite time endowment across market work, leisure, and home production, bringing fertility and caregiving into the analysis of labor supply. Within this framework, childbearing raises the time cost of non-market activities and increases the opportunity cost of labor market participation, particularly for women, who continue to bear a disproportionate share of childcare responsibilities (Goldin, 2006). As a result, fertility choices are closely linked to women's labor supply decisions and career trajectories (Killingsworth and Heckman, 1986; Mincer and Ofek, 1982).

Subsequent work has relaxed the assumption of a unitary household and emphasized the role of intra-household bargaining in shaping labor supply and fertility outcomes (Chiappori, 1988, 1992). Differences in earnings potential, access to childcare, and institutional support affect bargaining power and the allocation of paid and unpaid work within households. Empirical evidence shows that policies altering control over household resources can influence women's labor supply and household behavior (Lundberg, Pollak, and Wales, 1996). These mechanisms interact with gender norms that assign primary caregiving responsibilities to women, reinforcing gender differences in labor market attachment (Olivetti and Petrongolo, 2017).

Human capital models further highlight the dynamic consequences of fertility-related labor supply adjustments. In Mincer and Polachek's (1974) framework, earnings growth depends on continuous accumulation of labor market experience, implying that employment interruptions associated with childbirth can generate persistent wage penalties. A large empirical literature documents that

fertility-related career breaks slow wage growth and reduce lifetime earnings, contributing to long-run gender gaps in labor market outcomes (Budig and England, 2001; Angelov et al., 2016). Together, these mechanisms underpin the concept of the motherhood penalty, defined as persistent reductions in women's labor market outcomes associated with childbearing.

To identify the causal effects of children on female labor supply, researchers have relied on quasi-experimental variation in fertility. Studies exploiting the sex composition of the first two children as an instrument for family size, find that additional children reduce maternal employment and labor force participation, particularly among women with weaker pre-birth labor market attachment (Angrist and Evans, 1998). Related evidence from Greece yields similar conclusions (Daouli et al., 2009), while results are more mixed in lower-income settings (Agüero and Marks, 2008). While these studies establish a causal link between fertility and labor supply, they primarily capture extensive-margin effects and provide limited insight into the timing of labor market adjustments.

More recent work adopts event-study designs to trace labor market dynamics around childbirth. Using administrative data, Kleven, Landais, and Søgaaard (2019a) document sharp and persistent declines in female labor supply following the first birth, with little recovery over time, while male labor market trajectories remain largely unaffected. Cross-country extensions show substantial heterogeneity in motherhood penalties across institutional and cultural settings (Kleven et al., 2019b). Event-study approaches allow for flexible dynamic responses and tests for pre-trends, but in most applications event time is anchored at childbirth, implicitly assuming stable labor supply prior to birth.

An emerging strand of the literature emphasizes that fertility decisions are forward-looking and that labor supply adjustments may occur before childbirth. Dynamic life-cycle models predict that individuals adjust labor supply in anticipation of future constraints and opportunity costs (Heckman, 1974; Hotz and Miller, 1988; Adda, Dustmann, and Stevens, 2017). Empirical evidence suggests that women adjust fertility timing to mitigate career costs, with early childbearing associated with larger and more persistent penalties (Miller, 2011). Recent work provides suggestive evidence of pre-birth labor supply responses, indicating that motherhood penalties may partly reflect anticipatory behavior rather than solely post-birth constraints (Kleven et al., 2019a; Simintzi et al., 2025).

A complementary strand of the literature emphasizes the role of institutions in shaping labor supply responses to fertility. Public policies that reduce the cost of childbirth—particularly childcare provision and parental leave arrangements—affect both mothers’ labor supply decisions and employers’ expectations regarding female labor market attachment. Access to affordable childcare facilitates mothers’ return to work and limits human capital depreciation (Anderson and Levine, 2000; Havnes and Mogstad, 2011). Parental leave policies, while securing job continuity around childbirth, may also encourage time away from work, with implications for career progression depending on duration and design (Han and Waldfogel, 2003; Kluve and Tamm, 2013). Cross-country evidence shows that differences in institutional support interact with gender norms to generate substantial heterogeneity in the magnitude and persistence of motherhood penalties (Olivetti and Petrongolo, 2017).

This paper contributes to this literature by providing direct evidence on the timing of fertility-related labor supply adjustments. By aligning women by month of conception as well as by childbirth and exploiting monthly panel data, we identify anticipatory labor supply responses that precede birth and reassess when the motherhood penalty begins.

3. Female Labor Market Trends and Fertility in Greece

Female labor market outcomes and fertility decisions in Greece have evolved substantially over the past four decades, reflecting both long-run structural change and pronounced cyclical fluctuations. At the same time, institutional constraints and prevailing family arrangements continue to shape the trade-offs faced by women when combining employment and childbearing. This section documents age-specific trends in female labor force participation, employment, and fertility (births), providing the descriptive context for the empirical analysis that follows.

Figure 1 presents the evolution of female labor force participation (LFP) and employment-to-population (EP) rates by age group over the period 1981–2024. The figure highlights substantial heterogeneity across the life cycle. Among young women aged 15–19, both participation and employment decline steadily over time, reflecting prolonged educational enrollment and delayed entry into the labor market. For women aged 20–24, participation rises modestly during the 1980s

and 1990s but declines from the early 2000s onward, while employment exhibits pronounced cyclical sensitivity, particularly during periods of adverse macroeconomic conditions.

In contrast, women in their prime childbearing and working ages (25–29 and 30–44) display strong and sustained increases in both participation and employment. Female LFP rises sharply in these age groups from the 1980s onward, reaching historically high levels by the late 2000s. Employment follows a similar long-run upward trend but is markedly more responsive to the business cycle. During the sovereign-debt crisis, employment rates in these age groups decline substantially, while participation remains comparatively stable, indicating continued labor market attachment despite limited job opportunities. This divergence underscores the importance of distinguishing labor supply decisions from labor demand constraints when analyzing female labor market behavior.

Finally, for women aged 45–64, both participation and employment increase steadily over time, particularly from the mid-1990s onward, consistent with delayed retirement, cohort effects, and rising attachment to paid work at older ages. Taken together, the age-specific patterns in Figure 1 document a pronounced reallocation of female labor market activity toward prime and older working ages.

These labor market developments closely mirror the fertility-age shifts documented in Figure 2, which shows a marked postponement of childbearing toward later ages. The decline in fertility at young ages coincides with reduced labor market participation among younger women, while the concentration of births in the early and mid-30s aligns with the period of strongest and most persistent labor market attachment. These parallel trends suggest that fertility decisions increasingly take place within a context of sustained employment, particularly among women in their late 20s and 30s. This joint evolution motivates our subsequent micro-level analysis, which focuses on the period from the early 2000s onward, when female labor force participation had stabilized at relatively high levels and fertility decisions increasingly reflected trade-offs between continuous labor market attachment and family formation.

- Insert Figure 1 about here -

Despite rising female labor market participation, fertility in Greece has remained persistently low. Rather than reflecting a uniform decline across the life cycle, this outcome has been accompanied by pronounced changes in the timing of childbearing. Figure 2 documents the evolution of the age distribution of births between 1980 and 2024. The figure shows a sharp and sustained decline in the share of births to women aged 15–19 and 20–24, alongside a marked reduction in births at ages 25–29 after the mid-1990s. In contrast, births have increasingly shifted toward older ages, with the shares accounted for by women aged 30–34 and 35–39 rising steadily over the period. Although births at ages 40–44 and 45–49 remain relatively uncommon, their share has increased consistently since the early 2000s. Since 2000s, Greece had entered the group of lowest-low fertility countries (Kohler et al., 2002) and as in other European economies, this decline was associated with delayed childbearing as women invested more heavily in education and labor market careers. In Greece, the shift toward later ages is particularly pronounced, suggesting that low period fertility partly reflects timing effects rather than a complete withdrawal from childbearing. At the same time, the concentration of births at older ages has not been sufficient to offset the decline in fertility at younger ages, contributing to persistently low aggregate fertility outcomes.

Fertility and labor market outcomes in Greece also exhibit substantial heterogeneity across demographic and socioeconomic groups. Differences in age, education, income, and household structure are associated with variation in both employment trajectories and fertility timing. Compared with other EU countries, Greece combines relatively low female employment with limited institutional support for reconciling work and family responsibilities, particularly for mothers of young children. Formal childcare availability remains uneven, and families often rely heavily on informal care arrangements, such as support from extended family members. While childcare provision and family support arrangements have evolved gradually over time, there were no abrupt institutional changes during the analysis period that coincide mechanically with conception or childbirth events. This feature allows observed labor supply dynamics around fertility to be interpreted primarily as behavioral responses rather than the mechanical effect of policy discontinuities.

Taken together, the coexistence of rising female labor force participation (Figure 1) and the pronounced postponement of childbearing toward later ages (Figure 2) suggests that women in Greece face particularly sharp trade-offs between employment and family formation. In an

environment characterized by limited external support and high coordination costs, labor supply adjustments related to fertility may plausibly begin before birth, rather than occurring only at childbirth itself. This demographic and labor market context provides a relevant setting for examining whether women adjust labor supply in anticipation of childbirth and how these adjustments compare to post-birth responses. The following sections exploit individual-level panel data to analyze labor market dynamics around conception and childbirth in this context.

- Insert Figure 2 about here -

4. Data and Descriptive Statistics

Data Source and Sample

The analysis uses microdata from the European Union Statistics on Income and Living Conditions (EU-SILC) for the period 2003–2024. EU-SILC is a nationally representative rotating panel survey that provides detailed information on individual demographic characteristics, labor market status, income, and household composition. A key feature of the survey is its retrospective monthly labor-market module, which records individuals' labor-force status for each of the twelve months preceding the interview.

The analytical sample consists of women aged 25 to 54, capturing prime working-age individuals while excluding younger and older women whose labor market participation patterns differ systematically. Both mothers and women without children are included. Observations with incomplete monthly labor-market histories within the relevant fertility window are excluded.

Fertility Timing and Event Construction

Mother–child links are identified using household registers and parental identifiers, allowing children to be matched to their biological mothers. Using reported birth months and years of biological children, we construct a unified monthly time variable that locates childbirth precisely. Event time is defined as the number of months relative to birth. Assuming a nine-month gestation period, we also estimate the corresponding month of conception and construct an analogous event-time measure relative to conception.

The month of conception is estimated by subtracting nine months from the reported month of birth. This approximation is guided by administrative evidence from the Hellenic Statistical Authority (ELSTAT), which shows (see Figure 3) that the modal gestational duration in Greece is 37–39 weeks—corresponding to approximately nine calendar months when assuming an average of 4.33 weeks per month—and accounts for roughly 61 to 71 percent of all live births over the period 2000–2024. Preterm births constitute a small share, while the incidence of gestations lasting 40 weeks or longer has declined substantially. As a result, the nine-month approximation is appropriate for the large majority of births. Any remaining variation in gestation length is modest at the monthly frequency of the data and would introduce classical measurement error in event timing, tending to attenuate estimated pre-birth effects rather than generate spurious anticipatory responses.

- Insert Figure 3 about here -

Figure 4 presents the percentage distribution of live births by year of conception, distinguishing between births occurring within the same calendar year and births occurring in the following year. For each conception cohort, the majority of births occur in the subsequent year (on average 75%), with roughly one quarter taking place within the conception year. The within-year share varies over time, reflecting shifts in the seasonal timing of conceptions. This descriptive evidence underscores the imperfect correspondence between conception year and birth year and motivates organizing the empirical analysis around conception-based timing.

- Insert Figure 4 about here -

The empirical analysis focuses on the first childbirth observed within the EU-SILC panel. Subsequent births are considered only in extended heterogeneity analyses. Twin births are treated as a single fertility event. These conventions follow standard practice in the literature and facilitate interpretation of labor supply responses around fertility transitions.

Labor Market Outcomes

EU-SILC records monthly labor-force status using standard International Labour Organization classifications. We construct two outcome variables. The first is labor-force participation, equal to one if a woman is employed or unemployed, capturing overall attachment to the labor market. The

second is employment which is equal to one if the respondent reports being employed. These outcomes allow us to distinguish between continued labor-market attachment and exits into inactivity around conception and childbirth.

EU-SILC does not separately identify maternity or parental leave. Women who are temporarily absent from work but retain an employment relationship are classified as employed, while those without a job who are not actively seeking work are classified as inactive. As a result, employment captures job attachment rather than actual time at work, whereas labor-force participation reflects broader attachment to the labor market. The analysis therefore focuses on both outcomes to distinguish between temporary job-protected absences and more substantive labor market withdrawal. Notably, the pronounced declines in labor-force participation observed during pregnancy indicate that a non-trivial share of women exit the labor market entirely rather than transitioning solely into leave⁵.

Covariates and Descriptive Statistics

The analysis controls for a rich set of individual and household characteristics. Maternal age at first observed birth is grouped into five categories (25–29, 30–34, 35–39, 40–44, and 45–54). Educational attainment is classified as primary, secondary, or tertiary and is defined as the highest level reported during the individual’s observation window. Health status is self-reported and re-coded on a three-point scale (good, fair, poor). Additional covariates include marital status, nationality, region of residence, degree of urbanization, household size, and detailed child composition measures distinguishing children by age group and gender.

Household income is measured as total disposable household income. To avoid mechanically capturing income changes associated with childbirth or employment interruptions, households are assigned to income quartiles based on income at their first appearance in the panel. Quartiles are defined separately by year to account for changes in the income distribution and are held fixed over the observation window.

⁵ This effect is consistent with forward-looking responses to anticipated motherhood costs and is supported by flat pre-trends and robustness across logit, OLS, and fixed-effects specifications.

Table 1 reports descriptive statistics for the main variables used in the analysis, including labor-force participation, employment, and demographic characteristics before and after childbirth. These statistics provide a summary of the sample composition and motivate the subsequent event-study analysis.

- Insert Table 1 about here -

5. Empirical Framework

To estimate the impact of fertility on women's labor market outcomes, we exploit the within-woman variation in labor-force participation and employment around childbirth and conception using panel data at a monthly frequency. Our empirical approach relies on linear fixed-effects models that control for time-invariant individual characteristics and common time shocks, allowing us to trace dynamic labor supply responses before and after fertility events.

We begin with a difference-in-differences specification that captures the average change in labor market outcomes following childbirth:

$$y_{it} = a + \beta P_{it}^{j \geq 0} + \gamma_i + \tau_t + \varepsilon_{it} \quad (1)$$

where y_{it} denotes the labor market outcome of woman i in month t . The indicator $P_{it}^{j \geq 0}$ equals one for all months at and after childbirth and zero otherwise. The specification includes individual fixed effects γ_i , which absorb all time-invariant differences across women, and month fixed effects τ_t , which control for aggregate labor market conditions. Identification comes from changes in outcomes within women over time, comparing periods before and after childbirth.

To allow for potentially distinct effects at the time of birth, we separate the birth month from the post-birth period:

$$y_{it} = a + \beta_1 P_{it}^{j > 0} + \beta_2 B_{it}^{j = 0} + \gamma_i + \tau_t + \varepsilon_{it} \quad (2)$$

where $P_{it}^{j>0}$ indicates all months after childbirth and $B_{it}^{j=0}$ indicates the birth month. This specification distinguishes immediate labor market responses at birth from subsequent adjustments.

Our main analysis relies on a dynamic event-study specification that traces labor market outcomes in the months surrounding fertility events:

$$y_{it} = a + \sum_{j=-24}^{24} \beta^j B_{it}^j + \gamma_i + \tau_t + \varepsilon_{it} \quad (3)$$

where B_{it}^j is a dummy variable equal to one if month t is j months relative to the event month. For childbirth-based event time, $j = 0$, corresponds to the month of birth. The omitted category is the month immediately prior to the event ($j = -1$), which serves as the reference period. This specification allows us to test pre-trends and to characterize the magnitude and persistence of post-event labor supply responses.

To examine anticipatory behavior, we estimate analogous specifications aligned by the estimated month of conception. Let $C_{it}^{j \geq 0}$ be an indicator equal to one for all months at and after the estimated month of conception, and zero otherwise. The difference-in-differences specification that captures the average change in labor market outcomes following conception, paralleling equation (1), is:

$$y_{it} = a + \beta_c C_{it}^{j \geq 0} + \gamma_i + \tau_t + \varepsilon_{it} \quad (4)$$

To allow for potentially distinct effects at the time of conception, we separate the conception month from the post-conception period. This specification, mirroring equation (2), is:

$$y_{it} = a + \beta_{c1} C_{it}^{j>0} + \beta_{c2} M_{it}^{j=0} + \gamma_i + \tau_t + \varepsilon_{it} \quad (5)$$

where $C_{it}^{j>0}$ indicates all months after conception and $M_{it}^{j=0}$ indicates the estimated month of conception. This distinguishes immediate labor market responses at conception from subsequent adjustments.

Finally, for a dynamic analysis of labor market outcomes in the months surrounding conception, we employ an event-study specification analogous to equation (3):

$$y_{it} = a + \sum_{j=-24}^{24} \beta_c^j C_{it}^j + \gamma_i + \tau_t + \varepsilon_{it} \quad (6)$$

where C_{it}^j is a dummy variable equal to one if month t is j months relative to the estimated month of conception (with $j = 0$ corresponding to the month of conception). The omitted category is the month immediately prior to conception ($j = -1$). Comparing dynamics around conception (equations 4, 5, 6) and childbirth (equations 1, 2, 3) allows us to distinguish pre-birth labor supply adjustments from post-birth responses. The estimated coefficients β_c^j capture the dynamic effects around the conception event. These conception-aligned models provide a detailed view of anticipatory behavior.

The identifying assumption underlying our empirical approach is that, conditional on individual and time fixed effects, there are no fertility-unrelated shocks that systematically coincide with conception or childbirth and independently affect women's labor market outcomes. Importantly, anticipatory labor supply responses are not viewed as a violation of identification but rather as the central object of interest. Aligning event time by the estimated month of conception allows us to distinguish forward-looking adjustments associated with pregnancy from post-birth responses driven by childcare needs or institutional constraints. While the timing of conception may reflect endogenous decisions, the event-study framework provides direct evidence on pre-event dynamics and shows that labor supply adjustments emerge sharply around conception rather than evolving gradually over longer horizons. As in the related literature, this approach cannot fully rule out time-varying selection into fertility, but it allows us to characterize the timing, magnitude, and persistence of labor supply responses with greater precision than childbirth-centered analyses.

The event-study estimates should be interpreted as describing labor market responses around fertility events rather than as causal effects of pregnancy per se. Conception is an endogenous outcome, and women may adjust fertility timing in response to anticipated changes in labor market conditions or household circumstances. Importantly, the objective of the analysis is not to rule out anticipatory behavior, but to document its timing and magnitude. By aligning women by the estimated month of conception and examining labor market trajectories at a monthly frequency, we show that labor supply adjustments occur sharply around conception rather than evolving gradually over longer horizons. The absence of systematic pre-conception trends in the months leading up to

conception provides reassurance that the estimated effects reflect fertility-related adjustments rather than differential labor market trajectories unrelated to pregnancy.

Several additional limitations should be noted. First, the analysis focuses on the first childbirth observed within the EU-SILC panel, which may not correspond to a woman’s biological first birth, potentially affecting baseline labor market attachment. Second, EU-SILC follows individuals for a limited number of years, and panel attrition may be correlated with fertility or labor market transitions, although the event-study framework mitigates this concern by exploiting within-person variation over relatively short windows. Third, the available labor market measures capture extensive-margin outcomes—labor-force participation and employment—but do not allow us to observe adjustments along the intensive margin, such as changes in hours worked or job quality. Finally, the estimates reflect individual-level responses and do not capture potential general-equilibrium or employer-side adjustments. These considerations should be kept in mind when interpreting the results. The contribution of the paper is not to estimate a causal effect of pregnancy on labor supply, but to document when labor market disengagement associated with motherhood begins.

6. Empirical Results

6.1 Fixed effects

Table 2 reports estimates of the effects of childbirth and conception on women’s labor force participation (LFP) and employment in Greece over the period 2003–2024. We focus on linear fixed-effects estimates as our main specification, which exploit within-woman variation over time; results from logit and pooled OLS models are reported for completeness and yield qualitatively similar patterns.

Childbirth Effects

Panel A presents estimates of the average effect of childbirth, distinguishing between the birth month and the post-birth period. Fixed-effects estimates indicate a statistically significant decline in both labor force participation and employment following childbirth. LFP declines by around 4 percent in the post-birth period, while employment falls by about 5 percent. The birth month itself is associated with an immediate drop of similar magnitude. These results point to a clear and

persistent reduction in women's labor market attachment following childbirth, consistent with the existing literature on the motherhood penalty (Kleven et al., 2025).

Conception Effects

Panel B shifts the event time to the estimated month of conception. Fixed-effects estimates reveal a substantially larger decline in labor market outcomes following conception than after childbirth. Labor force participation and employment fall by approximately 8 percent in the post-conception period, nearly twice the magnitude of the post-birth effect. This pattern indicates that women's labor supply begins to adjust well before childbirth, suggesting forward-looking responses during pregnancy rather than adjustments driven solely by post-birth constraints.

The coefficient on the conception month itself is positive relative to the omitted category (the month immediately prior to conception). This does not imply an increase in labor supply at conception; rather, it reflects that labor market outcomes in the conception month are slightly higher than in the preceding month. The subsequent decline emerges immediately thereafter, consistent with the onset of pregnancy-related adjustments. The positive coefficient in the conception month establishes a clean pre-treatment baseline, ruling out anticipatory declines prior to pregnancy and demonstrating a sharp behavioural break immediately thereafter, consistent with forward-looking labour supply adjustments induced by the onset of pregnancy.

Birth and Conception Effects

Panel C includes both conception and childbirth indicators to isolate their separate contributions. Once post-conception effects are accounted for, the estimated post-birth coefficients decline markedly, although they remain statistically significant. In contrast, post-conception effects remain large and precisely estimated. This pattern indicates that a substantial share of the labor market adjustment traditionally attributed to childbirth in fact occurs earlier, during pregnancy, with additional but smaller reductions following birth.

Overall, the results provide strong evidence that the motherhood penalty in Greece begins before childbirth. Average declines in labor force participation and employment are already sizable following conception and exceed post-birth effects in magnitude. These average estimates motivate

the dynamic event-study analysis that follows, which traces the precise timing and persistence of labor supply adjustments around conception and childbirth.

- Insert Table 2 about here -

6.2 Dynamic Effects around Childbirth and Conception

The event-study estimates provide a dynamic characterization of women's labor market outcomes around childbirth and conception. Figures 4 and 5 plot the monthly coefficients from the event-study specification over a window of twelve months before and after each event. All coefficients are expressed relative to the month immediately preceding the event ($j=-1$), which serves as the reference period.

Figure 5 displays labor force participation and employment dynamics around childbirth. Panel (a) shows that labor force participation declines gradually in the months leading up to birth, with a sharp drop in the birth month ($j=0$). Participation remains below its pre-birth level in the months immediately following childbirth and then recovers gradually over time, approaching—but not fully reaching—its pre-birth level within the first year. Panel (b) shows a similar pattern for employment, with a slightly larger decline around the birth month and a gradual recovery thereafter. The close correspondence between participation and employment dynamics indicates that childbirth is associated with both temporary reductions in employment and broader short-run disengagement from the labor market.

- Insert Figure 5 about here -

Figure 6 presents the corresponding event-study estimates aligned by the estimated month of conception. In contrast to the childbirth-based event time, pre-event coefficients for both participation and employment are close to zero and statistically insignificant, indicating no evidence of differential labor market trends prior to conception. Immediately after conception, however, both outcomes begin to decline. Labor force participation falls steadily throughout pregnancy, while employment exhibits a similarly persistent downward trajectory. These declines emerge well before the birth month and continue as childbirth approaches, indicating that labor supply adjustments begin during pregnancy rather than at birth itself.

- Insert Figure 6 about here -

Taken together, the event-study evidence complements the average effects reported in Table 1 and sharpens their interpretation. Whereas childbirth-based estimates capture both anticipatory and post-birth adjustments, aligning event time by conception reveals that a substantial portion of the motherhood penalty arises before childbirth. The absence of pronounced pre-conception trends supports the identifying assumption that the observed declines reflect fertility-related labor supply responses rather than unrelated differential trends. We also estimated event studies around placebo conception dates assigned 6 and 12 months prior to the observed birth. These placebo events produce no systematic labor market responses, reinforcing that observed declines are tightly linked to pregnancy timing.

6.3 Heterogeneity in Labor Market Responses to Childbirth and Conception

Heterogeneity across demographic and socioeconomic characteristics

To assess how fertility-related labor supply responses vary across women, we estimate subgroup-specific effects of childbirth and conception on labor force participation (Table 3) and employment (Table 4). Each row in the tables reports estimates from separate regressions using the baseline fixed-effects specification. The heterogeneity analysis highlights substantial variation in both the magnitude and timing of labor market adjustments. The heterogeneity analysis is descriptive and intended to characterize how fertility-related labor supply responses vary across groups with different socioeconomic characteristics and constraints. Given the large number of dimensions considered, estimates should be interpreted as indicative patterns rather than as tests of specific mechanisms. To maintain focus on economically meaningful variation, the discussion emphasizes heterogeneity by age, education, income, and family structure.

Age and Career Stage

Age at childbirth is a key dimension of heterogeneity (see Figures A1-A5 in the Appendix). The largest labor market disruptions are observed among women aged 25–29. For this group, labor force

participation declines by approximately 9 percent following childbirth and by about 15 percent following conception, with employment losses of comparable magnitude. Event-study estimates show flat pre-conception trends and steep, persistent declines beginning at conception. Effects are smaller and less persistent for women aged 30–34, who also exhibit faster post-birth recovery. Among women aged 35–39, declines in employment remain sizable and persistent, while effects for women aged 40–44 are more modest and short-lived. No statistically significant effects are detected for women aged 45–54. These patterns indicate that fertility-related labor supply penalties are largest when childbirth occurs early in the career, when labor market attachment and human capital accumulation are still evolving.

Birth Order and Cumulative Childcare Demands

Labor market responses also vary by birth order. Participation declines are largest following the second birth, while effects associated with third or higher-order births are smaller and less precisely estimated. Post-conception effects are substantially larger than post-birth effects across birth orders. Employment responses mirror these patterns, although employment losses following first conception are particularly pronounced. Overall, these results suggest that cumulative caregiving demands amplify labor supply responses, especially during pregnancy.

Socioeconomic Status and Constraints

Socioeconomic gradients are pronounced. Women with primary education experience the largest and most persistent declines in both labor force participation and employment, beginning at conception. Penalties decrease monotonically with educational attainment, consistent with higher opportunity costs and stronger labor market attachment among more educated women. Similarly, labor supply responses are largest among women in the lowest income quartile and smallest among those in the highest quartile. These gradients indicate that limited access to childcare, weaker job protection, and greater financial constraints exacerbate fertility-related labor market disruptions.

Health status further conditions responses. Women reporting good or fair health experience statistically significant declines in labor force participation and employment, while effects for women reporting poor health are smaller and imprecisely estimated, likely reflecting weaker baseline attachment to the labor market.

Family Structure and Demographic Characteristics

Family structure and demographic characteristics also matter. Foreign-born women experience substantially larger declines in employment and participation than native-born women, particularly following conception. Single mothers face markedly larger employment losses than married mothers, while estimates for widowed, divorced, or separated women are imprecise due to smaller sample sizes. These patterns are consistent with differences in access to informal support networks and labor market stability.

Child composition within the household further shapes responses. Women with older children, particularly those aged 13–15, experience larger and earlier declines in labor force participation and employment beginning at conception, suggesting that cumulative childcare responsibilities and prior career interruptions compound fertility-related penalties. Differences by child gender are smaller but systematic: mothers of female children experience slightly larger declines than mothers of male children, consistent with evidence that parental investments and caregiving norms may vary by child gender.

Household Size, Region, and Urbanization

Household size mediates both support and constraints. Women in households with two to four members experience smaller penalties than those in larger households, where caregiving demands and financial pressures are greater. Regional variation is also evident. Labor supply declines are largest in Attica and rural areas, while smaller effects are observed in the Aegean Islands and Crete, potentially reflecting differences in labor market structure and informal support. Urban–rural differences indicate smaller participation losses but larger employment declines in urban areas, consistent with greater use of job-protected leave and formal employment arrangements.

Overall, the heterogeneity results show that fertility-related labor supply responses are concentrated among younger women, those with weaker socioeconomic resources, and those facing greater cumulative caregiving demands. Across virtually all subgroups, declines in formal labor market attachment following conception exceed those observed after childbirth, reinforcing the central finding that a substantial share of the motherhood penalty reflects labor market disengagement occurring during pregnancy rather than being confined to the post-birth period.

- Insert Table 3 about here –

- Insert Table 4 about here –

Heterogeneity by Job Attachment and Employment Characteristics

To further investigate the channels through which fertility-related labor supply responses operate, we examine how conception and childbirth affect women differently depending on job attachment and employment characteristics (Table 5). We specifically analyze effects for women whose initial (at $t=1$) primary labor market status was either full-time paid employment or full-time self-employment, allowing us to identify the specific forms of labor market detachment. We also assess the role of the employment sector, differentiating between women who have ever been employed in the public sector (at least once) and those who have solely been in the private sector.

For women who were initially in full-time paid employment, we observe a substantial reduction of approximately 9.0 percentage points ($p < 0.01$) in this status after conception. When examining the birth period, we find a statistically significant 5.5 percentage point reduction in full-time paid employment after childbirth ($p < 0.01$). The picture is even more pronounced for women initially engaged in full-time self-employment. For this group, we find a remarkably larger and highly significant reduction in the probability of continuing full-time self-employment post-conception, declining by an average of 18.3 percentage points ($p < 0.01$). The impact after childbirth for self-employed women is also significant, showing an additional 6.9 percentage point decrease in full-time self-employment ($p < 0.01$).

A direct comparison of these effects reveals critical insights into the timing of labor market adjustments. The post conception coefficients are substantially larger than the post birth coefficients. This clearly indicates that a significant portion, indeed the majority, of the labor market adjustment, particularly for self-employed women, occurs during the pregnancy period (i.e., between conception and birth), rather than being concentrated solely at the moment of childbirth. For self-employed women, the initial post-conception drop is nearly three times larger than the additional impact observed post-birth. This strongly suggests that self-employed women begin to adjust their work arrangements or disengage from full-time self-employment much earlier in the pregnancy, likely due to a lack of formal leave options or the demanding nature of managing their own business. For paid employees, while a decline is still evident at birth, its smaller magnitude

relative to the total post-conception effect might reflect the utilization of statutory maternity leave or employer accommodations that allow for a more structured, but still impactful, withdrawal.

Further strengthening these findings, our analysis of the employment sector yields striking differences in labor force attachment (LFP) between public and private sector employees. For women who have ever been in the public sector, we find no statistically significant decline in LFP during the entire post-conception period. Crucially, the average effect after birth is not significant (coefficient = 0.014, $p=0.456$), suggesting strong job protection and a rapid return to the labor force for public sector employees. In stark contrast, women who have never been in the public sector experience a substantial and statistically significant decline in LFP. We observe an 11.1 percentage point reduction in LFP post-conception ($p < 0.01$), signifying an earlier and more pronounced withdrawal from the labor force during pregnancy. This detachment continues post-birth, with 9.5 percentage point reduction ($p < 0.01$) in LFP, indicating a more sustained disengagement.

This pronounced heterogeneity points to critical underlying mechanisms. Self-employment, while often lauded for its flexibility, frequently lacks the formal maternity leave provisions, job protection, and employer-subsidized benefits typically associated with paid employment. The financial and operational demands of maintaining a self-owned business may be less compatible with the physical and time demands of pregnancy and early childcare, leading to a greater need for full disengagement or a shift away from full-time self-employment. Similarly, the robust attachment observed in the public sector strongly implies that public sector jobs typically offer more comprehensive and secure maternity leave policies and greater job security compared to the private sector. These findings highlight that the impact of fertility is not uniform across all employment types or sectors, with self-employed women and those in the private sector facing particularly acute challenges in reconciling work with new motherhood.

- Insert Table 5 about here –

6.4 Robustness

Complementary Evidence from Matching and Weighting

As a robustness check, we complement the main fixed-effects event-study analysis with propensity score matching (PSM) and inverse-probability-weighted regression adjustment (IPWRA) to account for observable differences between women who conceive and those who do not. In both approaches, conception is defined as the treatment, and women who conceive are compared to observationally similar women who do not conceive based on pre-conception characteristics such as age, education, having any children, and marital status. For computational feasibility, these robustness checks are implemented on a 10% random subsample of the full dataset. Propensity score matching estimates indicate that, among women who conceive, labor force participation after conception is approximately 6.4 percentage points lower than for observationally similar women who do not conceive (ATET = -0.064 , $p < 0.01$; Appendix Table A1). IPWRA yields a somewhat smaller but still statistically significant effect indicating that, among women who conceive, labor force participation after conception is approximately 4.4 percentage points lower than the counterfactual of not conceiving (ATET = -0.044 , $p < 0.01$). This estimate is smaller than the corresponding PSM estimate (-6.4 pp), suggesting that part of the post-conception decline reflects observable differences between women, while a substantial negative effect remains. Covariate balance was assessed using inverse-probability weights for the ATE specification. Standardized differences before weighting were large for several covariates (e.g., marital status, number of children), but after weighting, all differences were very close to zero, and variance ratios were near one, indicating that the IPW procedure successfully balanced the covariates between treated and control women (Table A2). Overall, the PSM/IPWRA estimates complement the event-study findings by demonstrating that selection on observables cannot fully explain the decline, while the event-study design continues to provide the most credible within-woman evidence on the timing and magnitude of fertility-related labor supply adjustments.

Alternative conception timing

To assess the sensitivity of our baseline fixed-effects estimates, we re-estimated the main specification using alternative definitions of the conception window: e.g. 6 months, and 3 months

prior to birth vs 9 months (baseline). Table A3 reports the estimated coefficients for labor force participation (LFP) and employment (EP).

The results indicate that the negative effect of conception on labor supply is robust across timing windows. For LFP, the estimated decline is largest using the 9-month window (−8.0 pp) and slightly smaller for 6 months (−7.4 pp) and 3 months (−6.5 pp). A similar pattern is observed for employment, with coefficients ranging from −8.1 pp (9 months) to −7.4 pp (3 months). The slightly smaller coefficients in the shorter windows indicate that these narrower definitions capture only the immediate period around conception. This pattern confirms that the baseline 9-month window correctly captures the timing of labor supply adjustments, including both the early and immediate post-conception changes. All coefficients remain statistically significant at the 1% level, demonstrating a robust and sharp reduction in both labor force participation and employment associated with conception.

7. Conclusion

This paper examines how fertility affects women’s labor market outcomes in Greece, with particular emphasis on the timing of labor supply adjustments around conception and childbirth. Using high-frequency monthly panel data from EU-SILC, we show that labor market disengagement associated with motherhood begins well before birth. Women’s labor force participation and employment decline sharply following conception, and these pre-birth adjustments account for a substantial share of the reductions traditionally attributed to childbirth.

The results indicate that labor force participation falls by approximately 4–5 percent after childbirth, while the decline following conception exceeds 8 percent. Event-study estimates reveal that these effects emerge immediately after conception and persist throughout pregnancy, with additional but smaller declines following birth. This pattern is consistent with forward-looking labor supply adjustments in anticipation of future constraints rather than responses confined to postnatal childcare demands. Although participation and employment recover gradually after childbirth, the initial losses are sizable and persistent over the medium run. We also note that the similarity of estimates across logit, OLS, and fixed-effects specifications, and across participation and employment outcomes, suggests that results are not driven by survey misclassification.

Labor market responses to fertility are highly heterogeneous. The largest penalties are borne by younger women, those with lower education and household income, single women, and foreign-born women. These groups experience earlier, larger, and more persistent declines in both participation and employment, suggesting that limited resources and weaker labor market attachment amplify the costs of motherhood. Variation across regions and household structures further highlights the role of local labor market conditions and informal support networks in shaping women's responses to fertility.

By documenting that labor supply adjustments begin at conception, this study contributes to the literature on the motherhood penalty by shifting attention from childbirth to pregnancy as a critical period of adjustment. While prior work has established substantial post-birth penalties in high-income countries, evidence on anticipatory behavior remains limited, particularly in Southern European contexts. Adapting an event-study framework to monthly survey data allows us to capture these early dynamics and to reassess the timing of motherhood-related labor market penalties.

Several limitations should be noted. The analysis relies on survey data rather than administrative records, which may introduce measurement error in labor market status and event timing. The absence of longitudinal earnings information on a monthly basis prevents an assessment of wage trajectories around fertility. In addition, the analysis focuses exclusively on women and does not examine paternal labor supply responses, which may be of particular interest in settings with strong gender norms. These limitations point to avenues for future research.

While the analysis focuses on Greece, the findings are most directly informative for countries characterized by low fertility, limited childcare provision, and relatively traditional gender norms. The timing of labor supply adjustments documented here is likely to be particularly relevant in institutional environments where combining employment and family responsibilities requires substantial coordination and forward planning. Caution is therefore warranted in extrapolating magnitudes to high-support settings, although the broader insight that motherhood penalties may begin prior to childbirth is likely to generalize more widely. However, similar institutional features characterize several Southern and Eastern European labor markets, suggesting that the timing patterns documented here could be relevant beyond the Greek case.

Overall, the findings underscore that the labor market consequences of motherhood in Greece are both substantial and front-loaded, arising during pregnancy rather than only after childbirth. Recognizing the anticipatory nature of these adjustments is essential for understanding the persistence of female labor market penalties and for interpreting fertility–employment trade-offs in low-fertility, low-employment settings.

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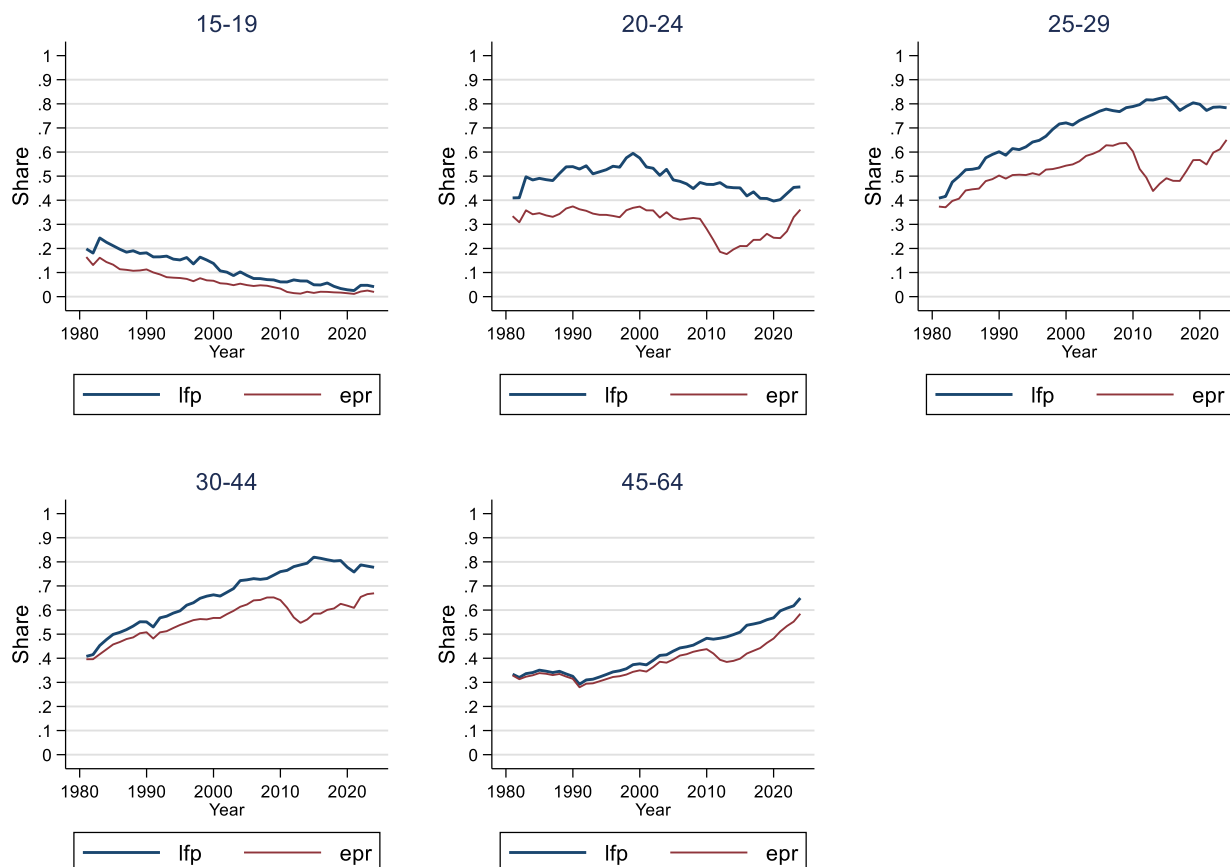
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Figures

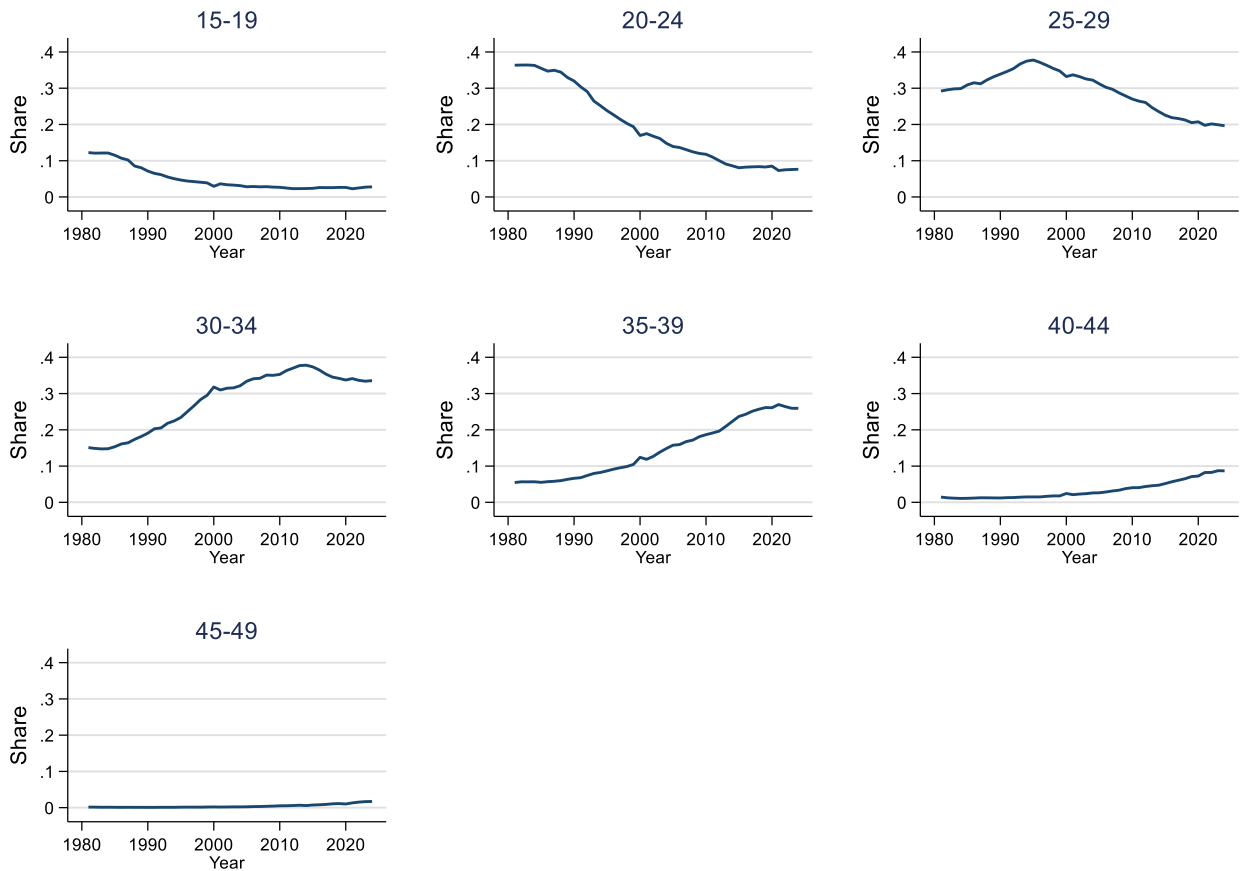
Figure 1. Female Labour Force Participation and Employment by Age Group, 1981–2024



Source: Authors' calculations based on ELSTAT, Labour Force Survey (LFS).

Notes: Each panel reports the female labour force participation rate (LFPR) and the employment-to-population ratio (EPR) for the indicated age group. LFPR is defined as the share of women who are either employed or unemployed in the working-age female population of the corresponding age group, while EPR is defined as the share of employed women in the population of that age group. All series are annual and refer to the entire country. The vertical scale is common across panels to facilitate comparison across age groups.

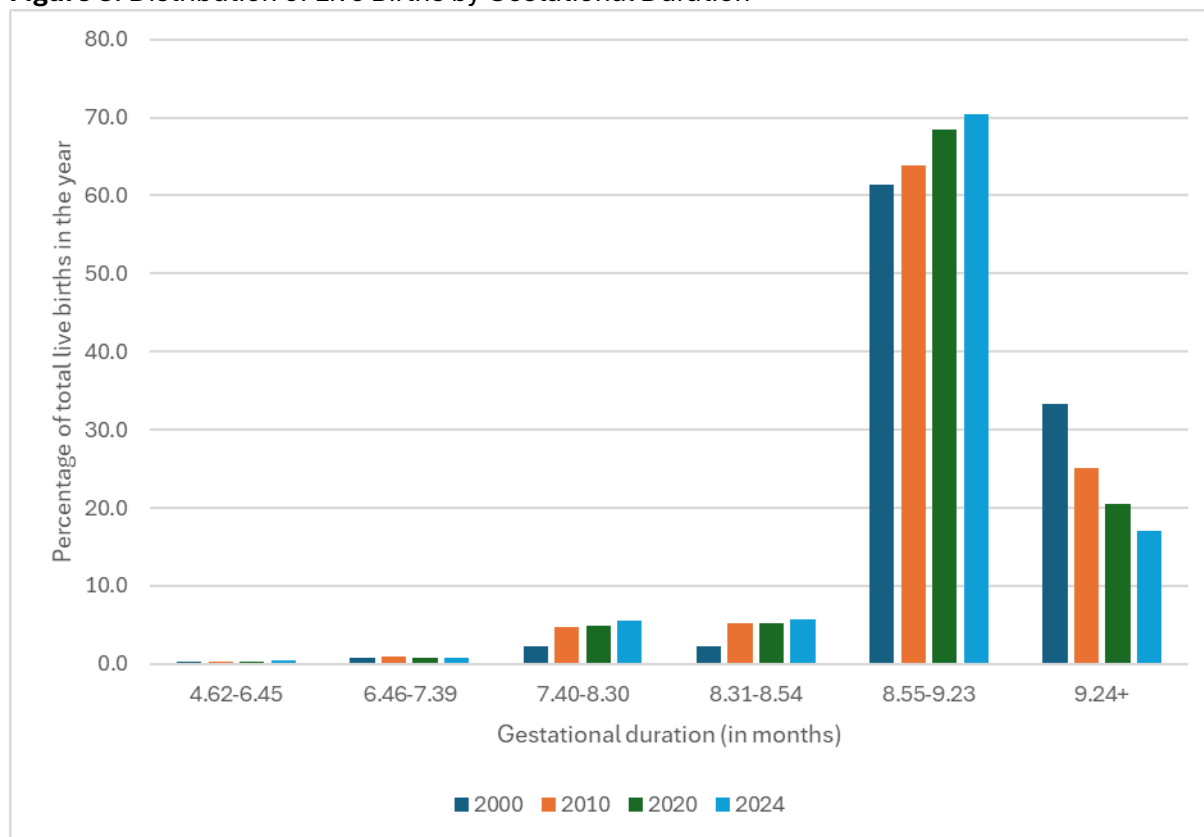
Figure 2. Evolution of the Age Distribution of Births, 1980–2024



Source: Authors' calculations based on ELSTAT, Vital Statistics.

Notes: Each panel reports the share of total annual live births accounted for by the indicated maternal age group. Shares are computed as the number of births in a given age group divided by total births in the corresponding year. The vertical scale is common across panels to facilitate comparison across age groups. Data refer to births by year of occurrence and cover the entire country.

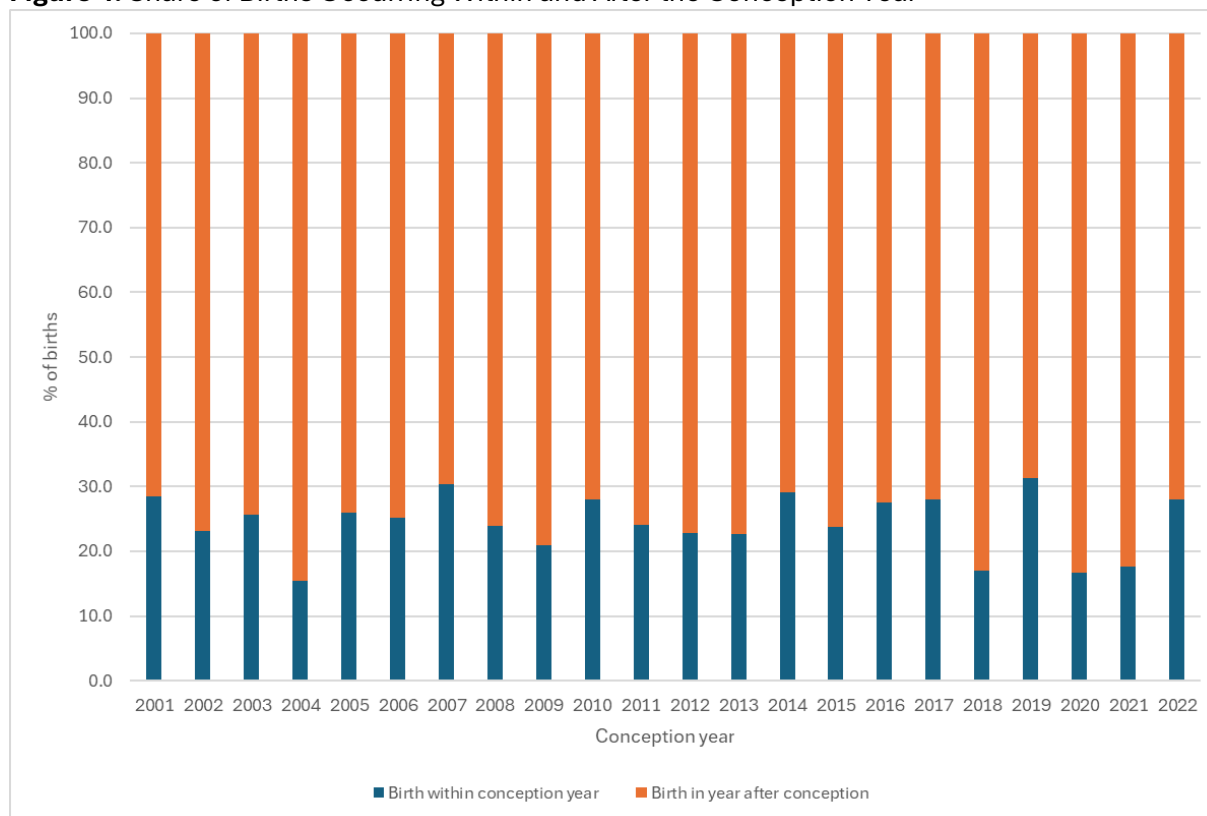
Figure 3. Distribution of Live Births by Gestational Duration



Source: Hellenic Statistical Authority (ELSTAT). <https://www.statistics.gr/el/statistics/-/publication/SPO03/->

Notes: The figure shows the distribution of live births by gestational duration, expressed in months. Gestational duration is grouped based on completed weeks of pregnancy and converted to months assuming an average of 4.33 weeks per month. Percentages are computed relative to the total number of live births in each year.

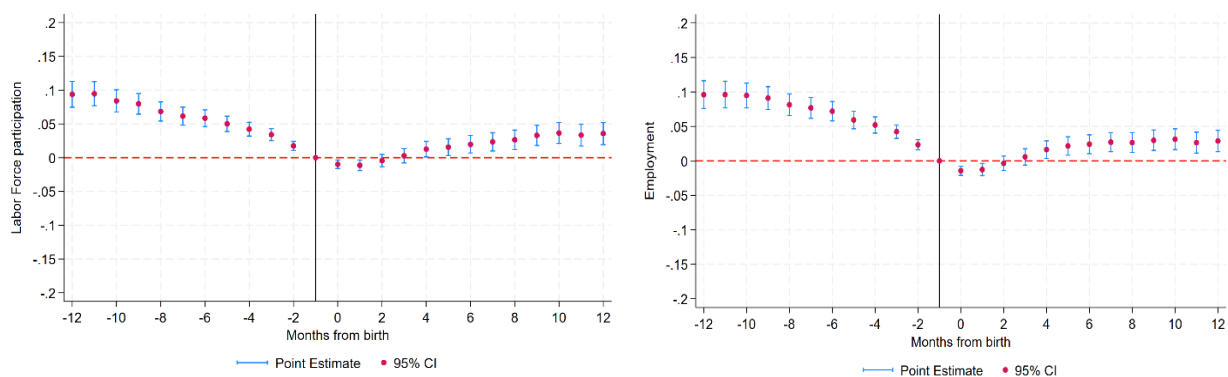
Figure 4. Share of Births Occurring Within and After the Conception Year



Source: EU-SILC, Hellenic Statistical Authority (ELSTAT).

Notes: The figure reports the percentage distribution of live births by year of conception, distinguishing between births occurring within the same calendar year as conception and births occurring in the following year. Conception year is defined as the calendar year corresponding to the estimated month of conception, obtained by subtracting nine months from the reported month of birth. Percentages are computed within conception cohorts and therefore sum to 100 percent for each year.

Figure 5. Effects of Birth on Female LFP and ER.

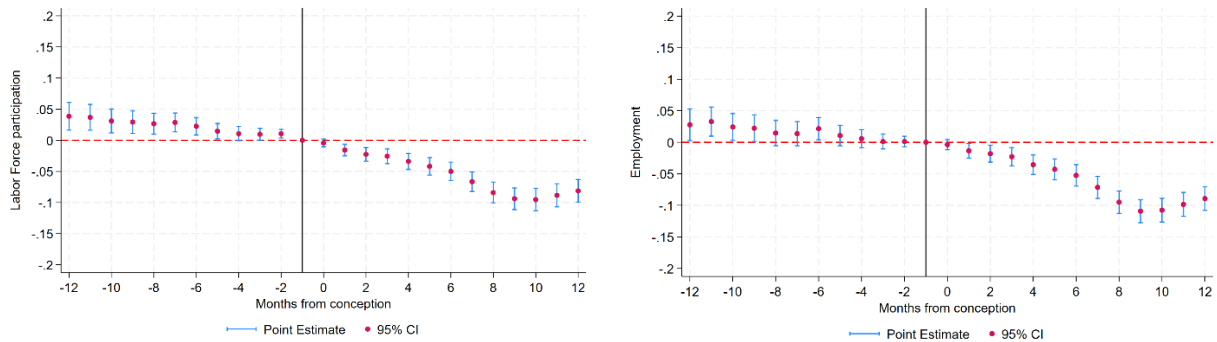


a) Labor force participation rate

b) Employment rate

Source: EU-SILC, Hellenic Statistical Authority (ELSTAT). Notes: This figure displays event study estimates of the impact of childbirth on women's labour force participation (panel a) and employment (panel b). The horizontal axis shows months relative to birth (month 0). The vertical axis reports the estimated coefficients from the regression model, with 95% confidence intervals. Standard errors are clustered at the individual level.

Figure 6. Effects of the Conception on Female LFP and ER.



a) Labor force participation rate

b) Employment rate

Source: EU-SILC, Hellenic Statistical Authority (ELSTAT). Notes: This figure displays event study estimates the impact of conception on women's labour force participation (panel a) and employment (panel b). The horizontal axis shows months relative to birth (month 0). The vertical axis reports the estimated coefficients from the regression model, with 95% confidence intervals. Standard errors are clustered at the individual level.

Tables

Table 1. Summary Statistics

	Pre-child period	Post-child period	Difference
Labor force participation			
Average	0.729	0.692	-0.047***
12 months before or more	0.809	-	
11 months before	0.773	-	
10 months before	0.757	-	
9 months before	0.751	-	
8 months before	0.743	-	
7 months before	0.730	-	
6 months before	0.726	-	
5 months before	0.715	-	
4 months before	0.707	-	
3 months before	0.698	-	
2 months before	0.680	-	
1 month before	0.660	-	
0 (birth)	-	0.649	
1 month after	-	0.646	
2 months after	-	0.654	
3 months after	-	0.661	
4 months after	-	0.669	
5 months after	-	0.676	
6 months after	-	0.680	
7 months after	-	0.682	
8 months after	-	0.686	
9 months after	-	0.694	
10 months after	-	0.700	
11 months after	-	0.697	
12 months after or more	-	0.741	
Pre-child period characteristics			
Age 25-29	0.137	-	-
Age 30-34	0.148	-	-
Age 35-39	0.170	-	-
Age 40-44	0.183	-	-
Age 45-54	0.360	-	-
Education (Primary)	0.128	-	-
Education (Secondary)	0.533	-	-
Education (Tertiary)	0.338	-	-
Born in Greece	0.892	-	-
Married	0.707	-	-
Not Married	0.206	-	-
Widowed, separated, divorced	0.085	-	-
Good health	0.638	-	-
Fair health	0.269	-	-
Poor health	0.091	-	-
Children aged 1-2	0.069	-	-
Children aged 3-5	0.111	-	-
Children aged 6-12	0.245	-	-
Children aged 13-15	0.131	-	-
Male children	0.272	-	-
Female children	0.262	-	-
Household size	3.326	-	-
Low income	0.250	-	-

Lower-middle income	0.250	-	-
Upper-middle income	0.249	-	-
High income	0.249	-	-
Resident of Northern Greece	0.320	-	-
Resident of Central Greece	0.145	-	-
Resident of Attica	0.303	-	-
Resident of Aegean islands/Crete	0.231	-	-
Urban area	0.378	-	-
Semi-urban area	0.250	-	-
Rural area	0.372	-	-

Source: EU-SILC, Hellenic Statistical Authority (2003–2024). Note: Descriptive statistics of women's labour force participation and demographic characteristics before and after childbirth. Labour force participation rates are reported monthly over a [-2, +2] year window surrounding the observed childbirth. Individual and household-level characteristics are based on the pre-childbirth period.

Table 2. Childbirth and Conception Effects on Female LFP and Employment

	Logit		OLS		Fixed Effects	
	Labor Force Participation	Employment	Labor Force Participation	Employment	Labor Force Participation	Employment
Panel A: Birth; All women (NxT=1,209,643, N=33,838)						
Post birth	-.046*** (.009)	-.046*** (.010)	-.046*** (.009)	-.045*** (.010)	-.043*** (.007)	-.054*** (.006)
Post birth	-.045*** (.009)	-.044*** (.010)	-.045*** (.009)	-.043*** (.010)	-.041*** (.007)	-.051*** (.007)
Birth month	-.035*** (.007)	-.045*** (.007)	-.039*** (.007)	-.045*** (.007)	-.043*** (.006)	-.042*** (.006)
Panel B: Conception; All women (NxT=1,209,643, N=33,838)						
Post conception	-.043*** (.008)	-.040*** (.010)	-.043*** (.008)	-.040*** (.009)	-.080*** (.009)	-.081*** (.009)
Post conception	-.044*** (.008)	-.041*** (.010)	-.044*** (.008)	-.041*** (.009)	-.082*** (.009)	-.084*** (.009)
Conception month	.054*** (.008)	.067*** (.010)	.060*** (.009)	.069*** (.010)	.049*** (.007)	.060*** (.007)
Panel C: Birth & Conception; All women (NxT=1,209,643, N=33,838)						
Post birth	-.014* (.008)	-.019** (.009)	-.015* (.009)	-.019*** (.009)	-.010* (.006)	-.023*** (.006)
Birth month	-.035*** (.007)	-.045*** (.007)	-.039*** (.007)	-.045*** (.007)	-.040*** (.006)	-.040*** (.006)
Post conception	-.031*** (.009)	-.025** (.010)	-.031*** (.009)	-.024** (.010)	-.075*** (.009)	-.068*** (.009)
Conception month	.043*** (.007)	.051*** (.007)	.047*** (.006)	.051*** (.007)	.041*** (.005)	.043*** (.006)

Source: EU-SILC, Hellenic Statistical Authority (ELSTAT). Notes: Sample restricted to women with the relevant information both before and after birth. Standard errors are clustered at the individual level. Statistical significance: *** at 1%, ** at 5% and * at 10%.

Table 3. Heterogeneity in the Impact of Birth and Conception on Women's Labor Force Participation.

Sub-group	Birth		Conception		Observations	Women
	Post birth	Birth month	Post conception	Conception month		
Women aged 25 to 29	-.087*** (.015)	-.030** (.012)	-.145*** (.020)	.093*** (.015)	148,177	4,643
Women aged 30 to 34	-.038*** (.011)	-.056*** (.009)	-.100*** (.014)	.052*** (.011)	173,309	5,011
Women aged 35 to 39	-.046** (.013)	-.020* (.010)	-.053*** (.017)	.043*** (.016)	207,766	5,776
Women aged 40 to 44	-.054** (.026)	-.017 (.023)	-.068** (.028)	.044* (.025)	228,128	6,214
Women aged 45 to 54	-.043 (.039)	.030 (.032)	.037 (.023)	-.014 (.032)	452,263	12,194
Birth order #1	-.044*** (.011)	-.043*** (.009)	-.097*** (.014)	.059*** (.010)	41,659	1,146
Birth order #2	-.051*** (.012)	-.030*** (.009)	-.101*** (.017)	.063*** (.011)	42,219	1,177
Birth order #3 or higher	-.031 (.023)	-.048*** (.016)	-.089*** (.027)	.056*** (.021)	16,593	432
Born in Greece	-.042*** (.007)	-0.04*** (.006)	-.080*** (.009)	.048*** (.007)	1,086,398	30,195
Born abroad	-.028 (.026)	-.058** (.020)	-.102*** (.030)	.059** (.025)	123,221	3,642
Not Married	-.098** (.034)	-.030 (.027)	-.109*** (.030)	.043 (.029)	229,197	7,001
Married	-.037*** (.007)	-.045*** (.006)	-.079*** (.010)	.048*** (.007)	877,688	23,948
Widowed, separated, divorced	-.038 (.062)	.042 (.050)	-.022 (.067)	.027 (.068)	102,758	2,889
Primary Education	-.065* (.035)	-.025 (.024)	-.112** (.049)	.108*** (.038)	157,186	4,343
Secondary Education	-.048*** (.010)	-.042*** (.009)	-.105*** (.014)	.062*** (.011)	641,009	18,054
Tertiary Education	-.032*** (.009)	-.044*** (.008)	-.058*** (.012)	.031*** (.009)	411,448	11,441
Good health	-.046*** (.008)	-.039*** (.006)	-.088*** (.010)	.051*** (.008)	763,869	21,612
Fair health	-.031* (.018)	-.047*** (.014)	-.071*** (.023)	.037** (.017)	330,853	9,125
Poor health	-.020 (.044)	-.091** (.041)	-.077 (.064)	.114** (.050)	114,921	3,101
Children aged 1 to 2	-.041*** (.010)	-.018*** (.006)	-.068*** (.016)	.057*** (.010)	84,035	2,361
Children aged 3 to 5	-.043*** (.013)	-.035*** (.011)	-.081*** (.016)	.048*** (.012)	138,252	3,786
Children aged 6 to 12	-.057*** (.015)	-.030*** (.013)	-.101*** (.021)	.063*** (.017)	307,051	8,299
Children aged 13 to 15	-.058 (.038)	-.060** (.030)	-.131*** (.045)	.107** (.044)	165,042	4,452
Male children	-.029*** (.010)	-.035*** (.008)	-.068*** (.015)	.043*** (.011)	338,048	9,191
Female children	-.042*** (.010)	-.032*** (.008)	-.086*** (.015)	.062*** (.011)	325,360	8,850
Household with 1 person	-.159* (.085)	-.014 (.074)	-.138* (.065)	-.055 (.070)	67,624	2,016
Household with 2 persons	-.056*** (.016)	-.063*** (.017)	-.084*** (.015)	.049*** (.013)	237,207	6,729
Household with 3 persons	-.039*** (.011)	-.035*** (.009)	-.075*** (.015)	.056*** (.011)	344,701	9,555
Household with 4 persons	-.022* (.013)	-.051*** (.011)	-.071*** (.021)	.029** (.014)	400,471	11,079
Household with >5 persons	-.045* (.020)	-.017 (.015)	-.093*** (.028)	.066*** (.022)	159,640	4,459
Lower income	-.032 (.019)	-.023 (.015)	-.090*** (.026)	.033 (.019)	303,615	8,471
Lower-middle income	-.044*** (.015)	-.056*** (.012)	-.105*** (.019)	.058*** (.015)	304,584	8,460
Upper-middle income	-.046*** (.012)	-.053*** (.011)	-.079*** (.015)	.056*** (.012)	302,353	8,457
High income	-.035*** (.010)	-.035*** (.009)	-.053*** (.014)	.041*** (.011)	299,091	8,450
Resident of Northern Greece	-.028*** (.012)	-.028** (.010)	-.054*** (.015)	.028*** (.012)	350,755	10,820
Resident of Central Greece	-.031* (.016)	-.060*** (.014)	-.090*** (.023)	.060*** (.018)	183,588	4,914

Resident of Attica	-.051*** (.013)	-.060*** (.011)	-.103*** (.016)	.063*** (.013)	379,812	10,278
Resident of Aegean islands/Crete	-.048*** (.015)	-.023 (.013)	-.075*** (.020)	.045*** (.015)	295,488	7,826
Urban area	-.028** (.011)	-.049*** (.009)	-.058*** (.013)	.038*** (.011)	436,173	12,796
Semi-urban area	-.044*** (.013)	-.030** (.012)	-.081*** (.017)	.038*** (.013)	304,359	8,458
Rural area	-.051*** (.012)	-.046*** (.010)	-.107*** (.016)	.066*** (.012)	469,111	12,584

Source: EU-SILC, Hellenic Statistical Authority (ELSTAT). Notes: The table reports subgroup-specific regression estimates of the impact of childbirth and conception on women's labour force participation. Each row corresponds to a separate regression for the indicated subgroup. The dependent variable is a dummy indicator that takes the value 1 if the individual was either employed or unemployed during the current month and 0 otherwise. "Post birth" and "Post conception" capture the average treatment effect in the months following the birth or conception event, respectively. "Birth month" and "Conception month" measure the immediate effect at the time of the event. Standard errors are clustered at the individual level. Statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 4. Heterogeneity in the Impact of Birth and Conception on Women's Employment.

	Birth		Conception			
Sub-group	Post birth	Birth month	Post conception	Conception month	Observations	Women
Women aged 25 to 29	-.105*** (.015)	-.042** (.011)	-.157*** (.021)	.112*** (.018)	148,177	4,643
Women aged 30 to 34	-.055*** (.011)	-.035*** (.010)	-.086*** (.014)	.060*** (.011)	173,309	5,011
Women aged 35 to 39	-.063** (.012)	-.028* (.011)	-.089*** (.017)	.056*** (.018)	207,766	5,776
Women aged 40 to 44	-.029 (.021)	-.029 (.021)	-.050** (.024)	.043** (.021)	228,128	6,214
Women aged 45 to 54	-.070** (.039)	.020 (.034)	.044* (.025)	.049 (.041)	452,263	12,194
First birth	-.046*** (.012)	-.058*** (.010)	-.103*** (.016)	.067*** (.012)	41,659	1,146
Second birth	-.048*** (.011)	-.029*** (.009)	-.070*** (.015)	.047*** (.011)	42,219	1,177
Third birth or higher	-.029 (.020)	-.055*** (.015)	-.080*** (.023)	.066*** (.020)	16,593	432
Born in Greece	-.050*** (.007)	-.042*** (.006)	-.080*** (.010)	.059*** (.008)	1,086,398	30,195
Born abroad	-.064*** (.020)	.041** (.016)	-.118*** (.025)	.071*** (.024)	123,221	3,642
No-Married	-.140*** (.037)	-.001 (.030)	-.163*** (.038)	.095** (.035)	229,197	7,001
Married	-.044*** (.007)	-.046*** (.006)	-.076*** (.009)	.056*** (.008)	877,688	23,948
Widowed, separated, divorced	-.039 (.047)	-.030 (.040)	-.008 (.048)	.019 (.066)	102,758	2,889
Primary Education	-.079*** (.029)	.002 (.023)	-.107*** (.039)	.098*** (.033)	157,186	4,343
Secondary Education	-.052*** (.010)	-.047*** (.008)	-.106*** (.013)	.060*** (.011)	641,009	18,054
Tertiary Education	-.051*** (.009)	-.041*** (.009)	-.063*** (.013)	.056*** (.010)	411,448	11,441
Good health	-.058*** (.007)	-.038*** (.006)	-.088*** (.010)	.066*** (.008)	763,869	21,612
Fair health	-.030** (.016)	-.056*** (.013)	-.079*** (.019)	.029** (.016)	330,853	9,125
Poor health	-.029 (.049)	-.072* (.042)	-.053 (.070)	-.090* (.051)	114,921	3,101
Children aged 1 to 2	-.054*** (.009)	-.023*** (.007)	-.069*** (.016)	.064*** (.011)	84,035	2,361
Children aged 3 to 5	-.046*** (.012)	-.025** (.011)	-.064*** (.015)	.047*** (.012)	138,252	3,786
Children aged 6 to 12	-.066*** (.013)	-.040*** (.012)	-.092*** (.018)	.074*** (.016)	307,051	8,299
Children aged 13 to 15	-.048 (.035)	-.068** (.027)	-.092* (.053)	.098** (.050)	165,042	4,452
Male children	-.044*** (.009)	-.029*** (.008)	-.071*** (.013)	.054*** (.011)	338,048	9,191
Female children	-.056*** (.009)	-.030*** (.008)	-.075*** (.013)	.074*** (.011)	325,360	8,850
Household with 1 person	-.0185** (.095)	.027 (.051)	-.145* (.083)	.132* (.067)	67,624	2,016
Household with 2 persons	-.058*** (.016)	-.077*** (.016)	-.099*** (.018)	.063*** (.016)	237,207	6,729
Household with 3 persons	-.050*** (.010)	-.036*** (.009)	-.064*** (.014)	.062*** (.011)	344,701	9,555
Household with 4 persons	-.034*** (.012)	-.043*** (.011)	-.072*** (.018)	.031** (.015)	400,471	11,079
Household with >5 persons	-.068*** (.017)	-.016 (.013)	-.103*** (.028)	.099*** (.023)	159,640	4,459
Low income	-.035** (.017)	-.040*** (.013)	-.081*** (.022)	.049*** (.018)	303,615	8,471
Lower-middle income	-.044*** (.013)	-.044*** (.011)	-.071*** (.019)	.070*** (.015)	304,584	8,460
Upper-middle income	-.057*** (.012)	-.068*** (.012)	-.109*** (.016)	.061*** (.014)	302,353	8,457
High income	-.052*** (.011)	-.023** (.010)	-.062*** (.015)	.046*** (.013)	299,091	8,450
Resident of Northern Greece	-.053*** (.012)	-.011 (.010)	-.069*** (.017)	.043*** (.012)	350,755	10,820
Resident of Central Greece	-.025 (.015)	-.062*** (.015)	-.058*** (.020)	.057*** (.019)	183,588	4,914
Resident of Attica	-.067*** (.012)	-.063*** (.010)	-.114*** (.016)	.082*** (.013)	379,812	10,278

Resident of Aegean islands/Crete	-.042*** (.014)	-.038*** (.013)	-.071*** (.018)	.047*** (.016)	295,488	7,826
Urban area	-.063*** (.010)	-.026*** (.009)	-.082*** (.013)	.067*** (.011)	436,173	12,796
Semi-urban area	-.039*** (.014)	-.042*** (.012)	-.067*** (.020)	.049*** (.015)	304,359	8,458
Rural area	-.048*** (.011)	-.059*** (.010)	-.097*** (.015)	.060*** (.012)	469,111	12,584

Source: EU-SILC, Hellenic Statistical Authority (ELSTAT). Notes: The table reports subgroup-specific regression estimates of the impact of childbirth and conception on women's employment. Each row corresponds to a separate regression for the indicated subgroup. The dependent variable is a dummy indicator that takes the value 1 if the individual was employed during the current month and 0 otherwise. "Post birth" and "Post conception" capture the average treatment effect in the months following the birth or conception event, respectively. "Birth month" and "Conception month" measure the immediate effect at the time of the event. Standard errors are clustered at the individual level. Statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

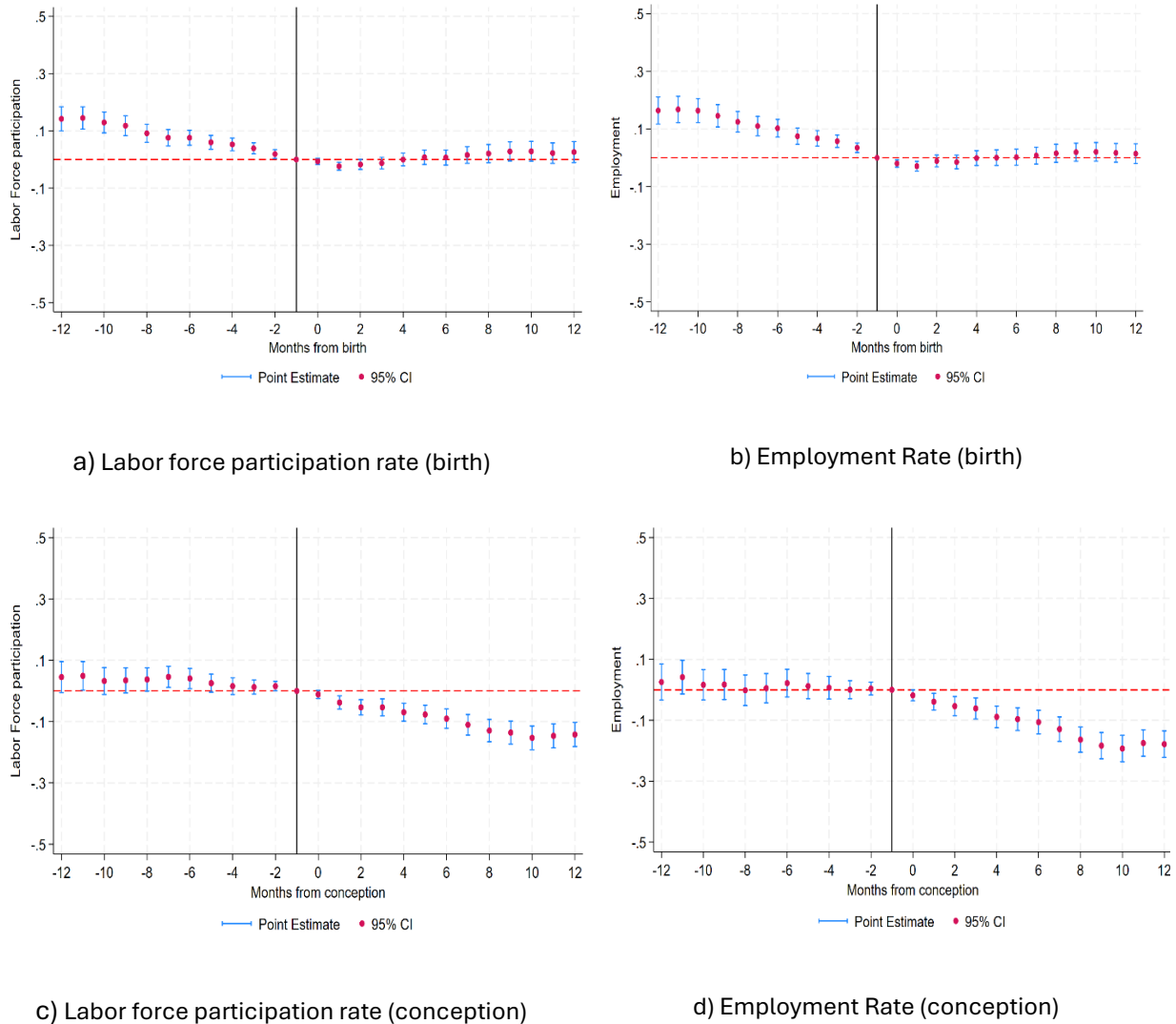
Table 5. Employment impact: Heterogeneity by Job Attachment and Employment Characteristics

	Birth	Conception
Sub-group	Birth month	Conception month
Full time wage earner	-.055***(.010)	-.087***(.013)
Full time self employed	-.069***(.024)	-.183***(.032)
Panel B		
Public sector wage earner	.003(.021)	-.005 (.020)
Private sector wage earner	-.124***(.023)	-.130***(.031)

Source: EU-SILC, Hellenic Statistical Authority (ELSTAT). Notes: The table reports subgroup-specific regression estimates of the impact of childbirth and conception on women's employment. Each row corresponds to a separate regression for the indicated subgroup. The dependent variable is a dummy indicator that takes the value 1 if the individual was employed during the current month and 0 otherwise. "Post birth" and "Post conception" capture the average treatment effect in the months following the birth or conception event, respectively. "Birth month" and "Conception month" measure the immediate effect at the time of the event. Standard errors are clustered at the individual level. Statistical significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

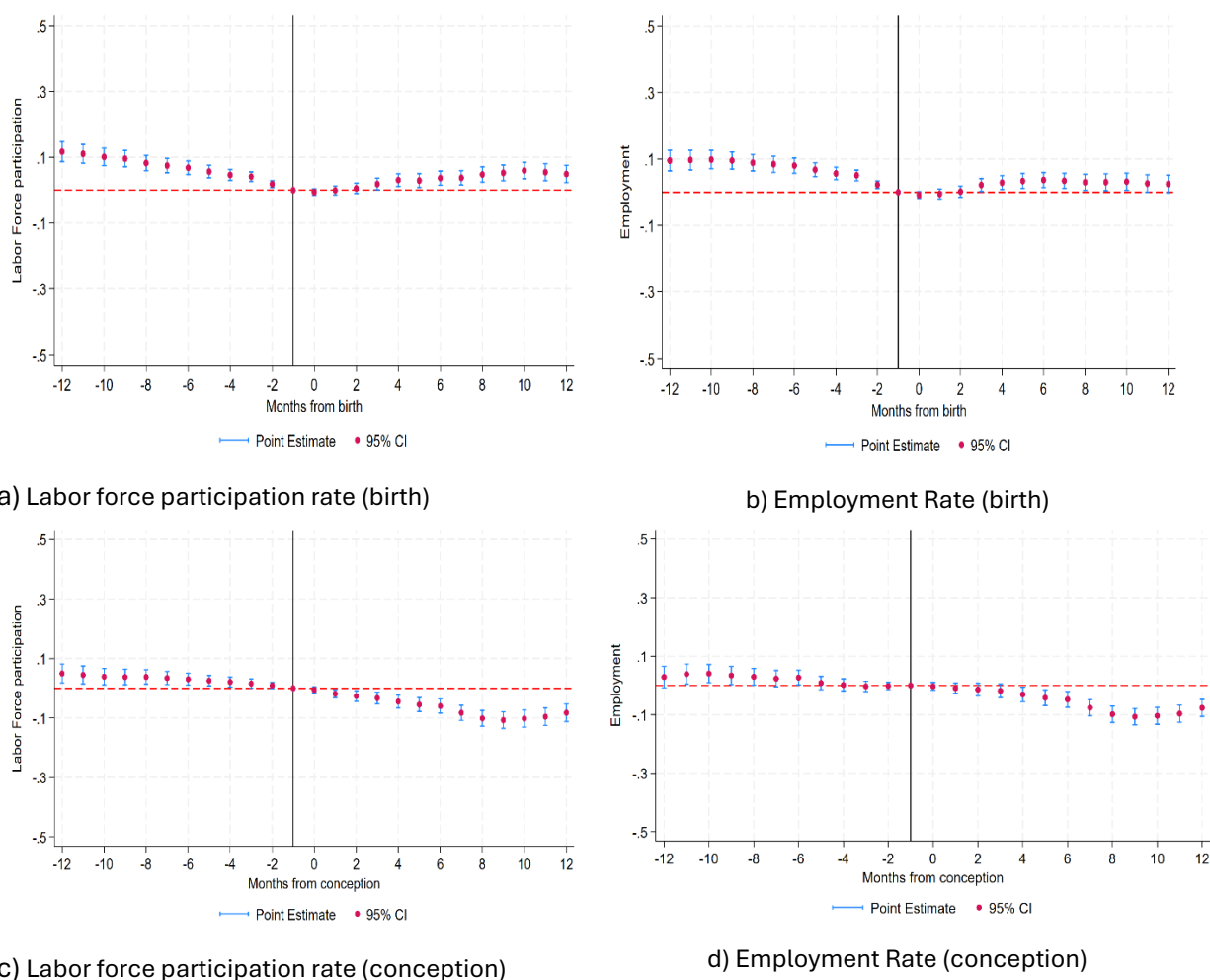
Appendix

Figure A1. Labor Market Effects of Conception and Birth for Mothers Aged 25–29



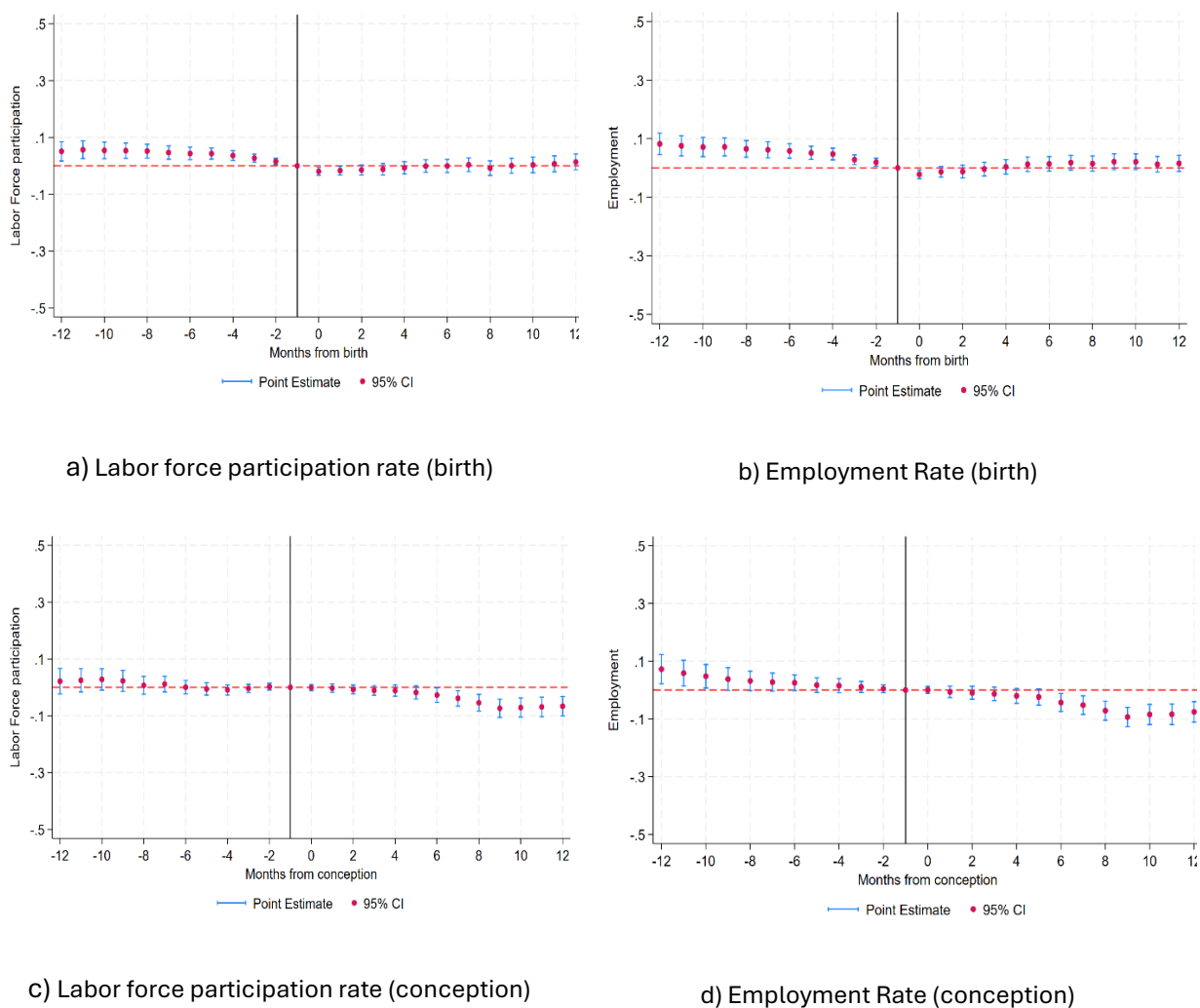
Source: EU-SILC, Hellenic Statistical Authority (ELSTAT). Notes: This figure presents event study estimates of the effect of childbirth (panels a–b) and conception (panels c–d) on labour force participation and employment rates for women aged 25–29. The horizontal axis measures months relative to the event (birth or conception), and the vertical axis shows changes in labour market outcomes. Each red point represents the estimated impact at a given month, with vertical bars indicating 95% confidence intervals. Standard errors are clustered at the individual level.

Figure A2. Labor Market Effects of Conception and Birth for Mothers Aged 30–34



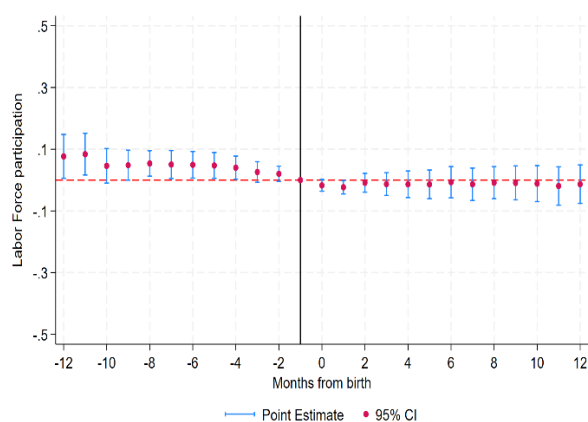
Source: EU-SILC, Hellenic Statistical Authority (ELSTAT). Notes: This figure presents event study estimates of the effect of childbirth (panels a–b) and conception (panels c–d) on labour force participation and employment rates for women aged 30–34. The horizontal axis measures months relative to the event (birth or conception), and the vertical axis shows changes in labour market outcomes. Each red point represents the estimated impact at a given month, with vertical bars indicating 95% confidence intervals.

Figure A3. Labor Market Effects of Conception and Birth for Mothers Aged 35–39

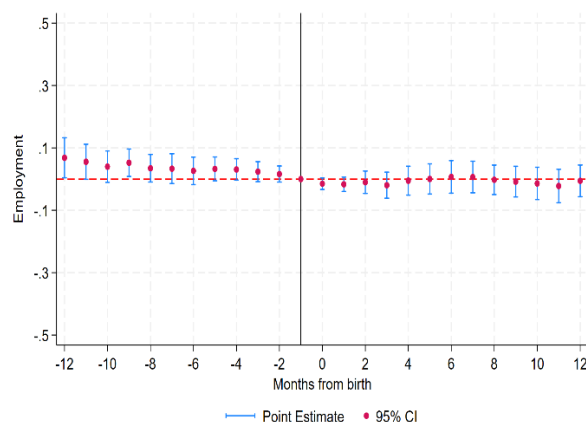


Source: EU-SILC, Hellenic Statistical Authority (ELSTAT). Notes: This figure presents event study estimates of the effect of childbirth (panels a–b) and conception (panels c–d) on labour force participation and employment rates for women aged 35–39. The horizontal axis measures months relative to the event (birth or conception), and the vertical axis shows changes in labour market outcomes. Each red point represents the estimated impact at a given month, with vertical bars indicating 95% confidence intervals.

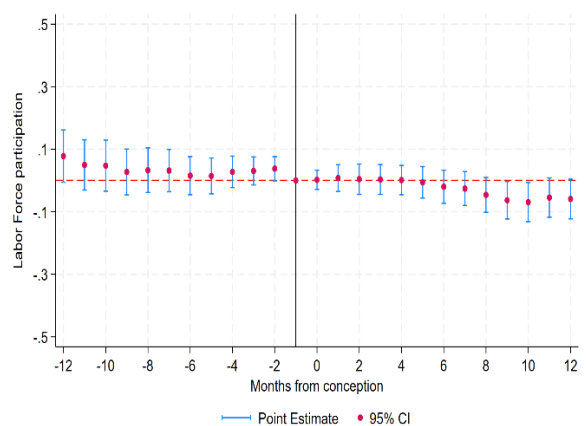
Figure A4. Labor Market Effects of Conception and Birth for Mothers Aged 40–44



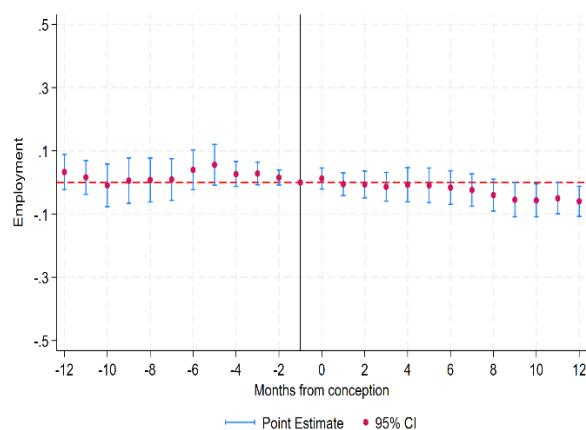
a) Labor force participation rate (birth)



b) Employment Rate (birth)



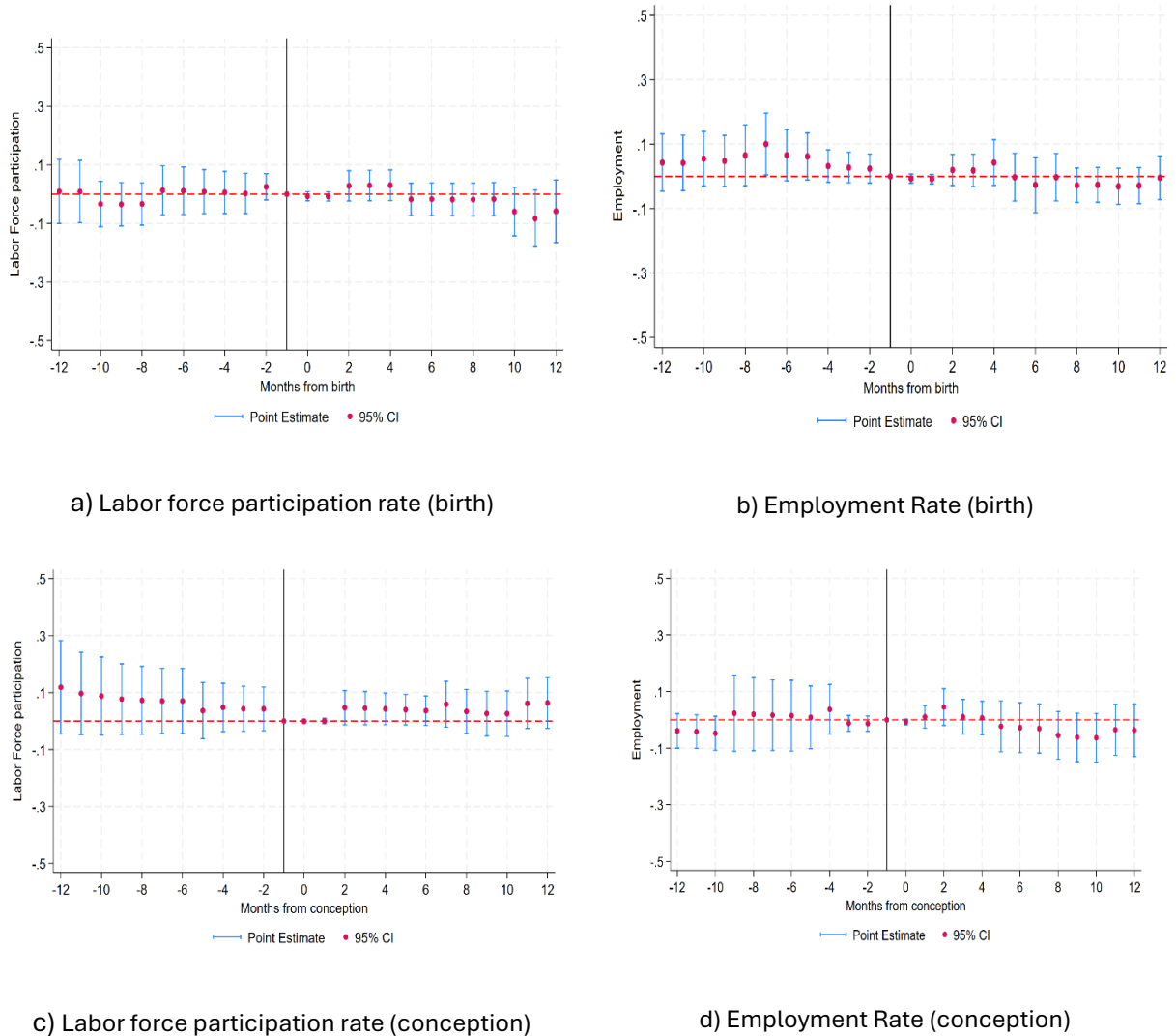
c) Labor force participation rate (conception)



d) Employment Rate (conception)

Source: EU-SILC, Hellenic Statistical Authority (ELSTAT). Notes: This figure presents event study estimates of the effect of childbirth (panels a–b) and conception (panels c–d) on labour force participation and employment rates for women aged 40–44. The horizontal axis measures months relative to the event (birth or conception), and the vertical axis shows changes in labour market outcomes. Each red point represents the estimated impact at a given month, with vertical bars indicating 95% confidence intervals.

Figure A5. Labor Market Effects of Conception and Birth for Mothers Aged 45–54



Source: EU-SILC, Hellenic Statistical Authority (ELSTAT). Notes: This figure presents event study estimates of the effect of childbirth (panels a–b) and conception (panels c–d) on labour force participation and employment rates for women aged 45–54. The horizontal axis measures months relative to the event (birth or conception), and the vertical axis shows changes in labour market outcomes. Each red point represents the estimated impact at a given month, with vertical bars indicating 95% confidence intervals.

Table A1. PSM / IPWRA robustness (10% subsample).

Treatment effects (ATET)				
Method	Sample size	ATET (pp)	Std. Err	95% CI
PSM	70,210	-0.0642	0.0060	-0.0758, -0.0527
IPWRA	70,210	-0.0436	0.0057	-0.0547, -0.0325

Note: Reports the estimated ATET for labor force participation using PSM and IPWRA.

Table A2. Covariate balance (standardized differences).

Covariate	Difference before	Difference after (IPW ATE)
Age	-0.3628	0.0218
Primary Education	-0.1595	0.0009
Secondary Education	-0.0838	-0.0026
Has kids	0.7871	0.0197
Unmarried	-0.8814	0.000
Married	-0.5143	0.0014

Note: Shows standardized differences before and after IPW weighting.

Table A3. Alternative conception timing windows

	Fixed Effects	
	Labor Force Participation	Employment
9 months (baseline)	-.080*** (.009)	-.081*** (.009)
6 months	-0.074** (0.008)	-0.0802*** (0.008)
3 months	-0.064*** (0.007)	-.074*** (.007)

Notes: Coefficients are from high-dimensional fixed-effects regressions including individual, year, and month fixed effects, with standard errors clustered at the individual level. All coefficients represent the effect of being in the post-conception period defined relative to the indicated window.

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