

Positive effects of his and her income on first births: couple-level evidence from longitudinal tax data in Italy

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This study adopts a couple-level approach to assess whether higher-income women (men) experience lower (higher) fertility due to opportunity costs and conventional gender norms or whether income pooling within couples facilitates parenthood. We test the well-established gendered relationship between income and fertility in Italy, a country historically known for its division of family roles along traditional gender lines. Utilizing longitudinal tax data (2003–2022; $n = 8,039,372$ person-years) from Tuscany—a region representing Italian-average levels of economic development and gender equality—we apply discrete-time event-history analyses. Results show that higher income for both men and women increases the likelihood of the first birth. Married couples in which both partners are high earners (low earners) are the most (least) likely to become parents, while hypergamous/hypogamous couples lie in between. These findings challenge traditional sex-specialization models and support the view that couples' income pooling is a key factor for parenthood, which might compensate for weak public policies through private outsourcing. The positive income–fertility association grew slightly stronger in the late 2010s, suggesting rising economic prerequisites to union formation and parenthood. Overall, the findings highlight the economic stratification of parenthood in a context of high childlessness and rising costs of having a child.

Introduction

The relationship between an individual's socioeconomic status and fertility has been extensively examined (Balbo, Billari and Mills, 2013; Matysiak and Vignoli, 2024). Nonetheless, despite long-standing theoretical debate dating back to Becker's seminal work (Becker, 1960), the empirical association between personal income and fertility remains underexplored and unclear. While there is consensus that higher income is associated with higher fertility among men, findings for women are less consistent across countries (van Wijk and Billari, 2024), as college-educated and high-earning women tend to delay motherhood and remain more often childless in advanced economies (Kreyenfeld and Konietzka, 2017).

Gendered economic inequality in the transition to parenthood is a core demographic dimension of social stratification in post-industrial societies.

The reversal of the gender gap in education (Esteve *et al.*, 2016), together with rising economic instability among men (Dotti Sani, 2017), has contributed to an increase in educationally hypogamous partnerships (Steiber and Siegert, 2026), as well as in dual-earner and female-breadwinner couples (Kowalewska and Vitali, 2020). In the context of growing economic prerequisites for parenthood in affluent societies (van Wijk and Billari, 2024), shifting family values and behaviours (Aassve *et al.*, 2024), and women's rapid educational and occupational advancement (Vitali and Billari, 2017), the traditionally 20th-century negative relationship

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between women's income and fertility may be turning positive in the 21st century (Doepke *et al.*, 2023; Matysiak and Vignoli, 2026). Although earlier research has focused on macro-level trends, in a context of high costs to raise a child, an emerging micro-level literature documents an (increasingly) positive association between income and fertility for both men and women (Jalovaara and Miettinen, 2013; Hart, 2015; Kolk, 2022; van Wijk, 2024; van Wijk and Billari, 2024).

Two foundational competing theories explain the gendered links between income and fertility. According to the *New Home Economics*' (NHE) argument on the gendered division of labour, one should expect lower (higher) fertility among higher-income women (men) due to opportunity costs and traditional male-breadwinner norms (Becker, 1991). By contrast, the *Resource Pooling* narrative suggests that couples with greater shared economic resources are more likely to become parents (Oppenheimer, 1997), as income pooling might buffer individual financial shocks and allow the externalization of domestic work and childcare (Bar *et al.*, 2018), making careers compatible with childbearing.

Previous studies suffer from four limitations preventing a comprehensive test of these influential theories: (i) the indirect measurement of economic resources through educational attainment (Nitsche *et al.*, 2018, 2021), employment status (Scherer and Brini, 2023), or social class (Albertini *et al.*, 2024), rather than income; (ii) the use of cross-sectional data and completed fertility liable to reverse causality (Kleven, Landais and Leite-Mariante, 2025), (miss)identifying a women's null or negative income-fertility link (Hopcroft, 2022); (iii) a narrow focus on gender-equal Northern and Western European countries with panel register data (Hart, 2015; van Wijk, 2024); (iv) the lack of a dyadic perspective that considers both partners' joint characteristics on fertility behaviour (Nitsche, 2024), with a handful of studies combining longitudinal and couple-level income data (Jalovaara and Miettinen, 2013).

Against this theoretical and empirical backdrop, we answer the following research questions: Is there an association between men's and women's income and the timing and probability of parenthood, and if so, is it positive or negative? Has the strength and/or direction of this association changed over time? How does this association manifest when accounting for partners' income assortative mating patterns?

Our study addresses these questions by overcoming the aforementioned limitations and offering novel contributions to the long-standing but unresolved debate on couple *specialization* and *resource pooling*. Using couple-level longitudinal data from tax returns, we provide a direct test of these theories by applying discrete-time

event-history models that include both partners' incomes independently and jointly, and by examining trends in income effects on first births in Italy within the understudied Southern European context (van Wijk and Billari, 2024).

First, we examine the direct role of economic resources in the parenthood transition. Exploiting population tax data, we provide a detailed account of the income distribution for more than 8 million person-years over two decades (2003–2022). Most previous studies in Italy have instead focused on employment instability (Vignoli, Drefahl and De Santis, 2012), showing an increasingly negative association with fertility (Alderotti *et al.*, 2021), particularly for women (Scherer and Brini, 2023). Despite top-income couples reporting higher parenthood intentions, few studies in Southern Europe have examined actual fertility outcomes among younger cohorts (Santarelli, 2011).

Second, we assembled a dyadic dataset to study the link between both spouses' income and childbearing in 161,948 married couples. Studying income assortative mating and fertility is the most direct yet rarely applied approach to test theories of *couple specialization* and *resource pooling*. While partners may have differing intentions, fertility is generally the result of joint decision-making within couples, shaped by a complex interplay of socioeconomic resources (Nitsche, 2024), employment (Scherer and Brini, 2023), and gender norms.

Third, we draw on novel administrative panel tax data in Italy. Compared with cross-sectional surveys, these data portray reliable income trajectories, allow us to account for time-constant confounding, and address reverse causality by lagging income. This longitudinal approach enables examining both between-person differences in economic resources and within-person income dynamics over the life course, dimensions jointly captured in fertility event-history models. Because employment and earnings exhibit life-course volatility—especially for women due to the child penalty (Kleven *et al.*, 2025)—we focus on the first birth to minimize endogeneity, particularly severe for lifetime income and higher-order parities. First births are especially relevant in Italy, where around one-fourth of women born in the 1975s ended their reproductive period childless (ISTAT 2025). In addition, parenthood postponement, preventing higher-parity progressions, is a key driver of low fertility.

Fourth, previous studies have focused on Northern European countries with high gender equality and extensive family-friendly policies (van Wijk and Billari, 2024). We contribute new evidence from Italy, a Southern European country marked by (lowest-)low fertility rates (Kohler, Billari and Ortega, 2002), low female

employment, and comparatively limited family-oriented welfare. Due to data constraints, we focus on Tuscany, a Central Italian region exhibiting slightly above-Italian-average levels of economic development and gender equality—Gross Domestic Product (GDP) per capita, women's employment, and traditionalism (IRPET, 2021). In this Southern European setting, where traditional *couple role specialization* remains comparatively strong, *resource-pooling* mechanisms face a demanding test.

Theoretical background and hypotheses

Income inequality and growth, partnership selection, and parenthood

Income may shape the timing and probability of parenthood through between-person inequality in economic resources and within-person earnings trajectories over the life course. For men, high and stable income generally increases both the likelihood and the pace of family formation (Ludwig and Brüderl, 2018) and fatherhood (Mari, 2019). For women, higher permanent income typically correlates with stronger career attachment and greater opportunity costs of early motherhood (Bar et al., 2018), predicting later entry into motherhood even when the eventual probability remains high.

Life-cycle models emphasize that within-person earnings growth raises the opportunity costs of employment interruption, shaping the timing of parenthood (Happel, Hill and Low, 1984). For men, whose fertility is less constrained by career interruptions, rising earnings predominantly generate positive income effects on union formation and fatherhood. For women, the implications of income growth are complex. Rising returns to experience increase the opportunity costs of early childbearing, since births at younger ages entail foregone human-capital accumulation and slower wage progression. Accordingly, women tend to postpone motherhood while investing in their careers. Modern economic models, however, emphasize that when career–family compatibility is high, higher earnings and career stability may reduce the trade-offs associated with childbirth and facilitate the transition to motherhood (Bar et al., 2018; Doepke et al., 2023).

In an event-history framework, commonly applied to model fertility, these mechanisms operate jointly: the hazard rate captures both whether and when a first birth

occurs, and income effects reflect both between- and within-person variation. Although the theoretical perspectives discussed below do not generally distinguish explicitly between these dimensions, they operate through both permanent socioeconomic inequalities and dynamic life-course processes. Between-person differences in income primarily capture cross-sectional inequalities in economic resources and stable differences between individuals or couples related to family formation. However, persistent unobserved characteristics that affect both income and fertility—e.g., family-career orientations, personality, education, health, or genetics—may bias this association. By contrast, within-person income changes better identify career and life-course dynamics related to changing opportunity costs, economic stability, and partnership formation while controlling for income levels and other time-invariant confounders. Yet fixed-effects (FE) approaches are not well suited to the study of first births, as these are non-repeatable, absorbing events preventing pre-post comparisons (Kreyenfeld, 2021: 274). Both dimensions, however, may shape the likelihood and timing of first births, so event-history estimates combine cross-sectional inequalities between individuals or couples with within-individual changes over time.

Income-related mechanisms also operate indirectly through selection into stable unions, which remain key precursors to parenthood—particularly in contexts where marriage dominates family formation. Married couples typically exhibit higher childbearing intensities than cohabiting couples (Kuang et al., 2025), since individuals with stronger fertility desires are more likely to enter marriage before childbearing. Research shows that men's earnings potential is strongly associated with union entry (Kalmijn, 2011), while women's economic resources have become increasingly crucial for transitions to both cohabitation and marriage (Meggiolaro, Ongaro and Pirani, 2024).

Couple specialization

At the core of the framework linking economic resources and fertility lies the microeconomic model of NHE (Becker, 1960; 1991). This model suggests that economic resources can influence the demand for children in two opposing ways: an *income effect* or a *quality-quantity trade-off*. The *income effect* predicts that economic resources positively correlate with fertility, as increases in household income or reductions in child-rearing costs raise the demand for children, treating them as a consumption good (Bar et al., 2018). In contrast, the *quality-quantity trade-off* posits that higher economic resources may lead to greater investment in children,

thereby increasing child-related costs. As income rises, parents tend to prioritize investing in the *quality* of their children over *quantity* (Becker and Lewis, 1973).

According to Becker's *economic independence hypothesis* (1991), as women attain higher levels of education and increase their labour force participation, the opportunity costs of child-rearing rise, leading to a lower demand for children. Regarding employment, NHE argues that fertility is highest in couples in which partners specialize in distinct roles—typically, men in market work and women in unpaid domestic labour (Becker, 1991). The *substitution effect* is thus more substantial among women, especially women with high-earning potential, for whom the financial costs of stepping back from employment for child-rearing are the greatest.

The effect of female income on fertility also depends on whether women prioritize caregiving or career development. Hakim's *preference theory* (2003) suggests that 'home-centred' women are more inclined to have children and not work, or to prioritize home and family life after they form a union, regardless of social policies. 'Work-centred' women, in contrast, are more likely to prioritize work, even when married, and many remain childless regardless of family policies. Yet today, most women are 'adaptive', combining career and motherhood. For this group, *income effects* might outweigh *substitution effects*, provided a balanced division of household chores, along with welfare policies and flexible work arrangements. However, in contexts with unequal shares of family responsibilities, weak family policies, and limited work flexibility, as in Southern Europe, *adaptive* women face severe trade-offs between career progression and fertility (Santarelli, 2011).

Hypothesis 1a (H1a): The association between income and the transition to parenthood is negative for women and positive for men.

From the NHE perspective, gendered income–fertility associations should remain stable as long as the underlying mechanisms persist: men's earnings continue to signal economic readiness for family formation, while women's earnings reflect high opportunity costs of motherhood. In the Southern European context, these expectations are particularly plausible. Although women's labour market participation has increased, Italy continues to uphold traditional gender norms (Aassve et al., 2024), limited work–family reconciliation policies, and labour markets penalizing career interruptions. These conditions preserve the classic trade-offs described in *specialization* models.

Hypothesis 2a (H2a): If H1a holds, the negative (positive) association between income and the transition to parenthood for women (men) remains constant over time.

Couple specialization and assortative mating

The traditional gender-based division of labour can lead to fertility gains through *specialization* (Becker, 1991). Given that lower-earning men are more likely to remain childless and higher-earning women tend to delay or forgo motherhood, income hypogamous partnerships are expected to postpone childbirth and display lower fertility. This pattern is pronounced among couples that depend on women's earnings for financial stability, given the substantial income penalties women face when childbearing occurs before establishing their careers (Miller, 2011). In contrast, women with incomes lower than their partners' (hypergamy) are expected to have higher fertility.

Partners' relative contributions to household income may affect a couple's fertility through gender norms (Townsend, 2002). Being employed and providing income is central to a man's fatherhood identity. For women, leaving the labour force is often a deliberate choice tied to societal ideals of intensive motherhood. When a couple's employment and income situations clash with prevailing gender norms, fertility may be delayed or foregone. Southern European countries provide minimal support for balancing work and family life and uphold traditional views on women's societal roles.

Hypothesis 3a (H3a): Hypergamous couples have higher transition rates to parenthood than homogamous and hypogamous couples.

Couple resource pooling

The continuous increase in women's education and maternal employment contests NHE predictions. The macro- (Vitali and Billari, 2017) and micro-level (Matysiak and Vignoli, 2026) historically negative correlation between female employment and fertility disappeared—or even turned positive—since the 2000s, challenging longstanding assumptions about work–family trade-offs in high-income societies. Simultaneously, men have experienced declining labour market stability and reduced ability to act as sole providers, leading to delayed marriage and childbearing and to the rising women's contribution to household income (Kowalewska and Vitali, 2020).

Resource pooling theory suggests that couples with greater combined economic resources have higher fertility. Shared resources can safeguard against financial instability for either partner, allowing families to allocate

more resources to externalizing domestic and childcare services (Bar *et al.*, 2018), supporting child-rearing and career development (Oppenheimer, 1997). Research focusing on highly educated couples supports this theory, showing that dual tertiary-educated partners tend to have the highest second- and third-birth rates across various high-income countries (Nitsche *et al.*, 2018; 2021).

Hypothesis 1b (H1b): The association between income and the transition to parenthood is positive for both men and women.

Evidence suggests that parental economic investments in children have increased unequally over time (Schneider, Hastings and LaBriola, 2018), driven by well-off families' intensive parenting and mobility strategies. Together, rising economic inequality and the public/private externalization of childcare might help high-income families manage the (opportunity) costs of child-rearing, explaining why fertility has increased among the most affluent, despite overall declines (Bar *et al.*, 2018).

The financial prerequisites of parenthood are on the rise amid high inequality and inflation, stagnant real incomes, and rising housing prices (Gallo and Vignoli, 2025). Over the past two decades, income has turned into a stronger predictor of parenthood in several countries (van Wijk and Billari, 2024), especially for women. These trends point to a narrowing gender gap in how economic resources shape family formation, alongside a broader rise in the income necessary to pursue parenthood.

Hypothesis 2b (H2b): If H1b holds, the positive association between income and the transition to parenthood has increased over time for both men and women.

Couple resource pooling and assortative mating

Oppenheimer (1994) proposes that resource pooling is one of the key advantages of partnership, so that men may increasingly seek higher-income partners as the costs of childbearing rise. Contrary to Becker's (1991) theory, which predicts negative (positive) assortative mating for substitutive (complementary) traits like wages (education), income assortative mating tends to be positive. Men are competing for high-earning women just as women have traditionally competed for high-earning men (Esteve *et al.*, 2016). Likewise, higher-earning women may prefer partners who contribute to housework and childcare, a pattern more common among highly educated men (Steiber and Siegert, 2026), facilitating work-family balance (Cooke, 2008).

If the resource-pooling argument holds, the total level of economic resources matters most for fertility,

regardless of which partner contributes more. High-earning homogamous couples may exhibit the highest fertility by outsourcing housework and childcare, neutralizing substitution effects (Bar *et al.*, 2018). Conversely, homogamous low-income couples may face heightened financial insecurity and lower fertility (Oppenheimer, 1997), especially in institutional contexts offering weak family support.

Shifting gender roles and socioeconomic changes also challenge the NHE assumptions concerning *couple specialization* and the positive fertility effect of hypergamy. The *gender revolution* framework (Esping-Andersen and Billari, 2015; Goldscheider, Bernhardt and Lappegård, 2015) suggests that gender equality in the private and public spheres boosts fertility. At the couple level, this implies that fertility intentions rise in dual-earner partnerships or when partners contribute equally to household income (Marynissen, 2022).

Hypothesis 3b (H3b): High-income homogamous couples have the highest transition rates to parenthood, followed by hypergamous, hypogamous, and medium-income homogamous couples, expected to have similar rates. Low-income homogamous couples have the lowest transition rates to parenthood.

Data, variables, and methods

Data and sample selection

Income and fertility information draws from administrative population data on individual income tax returns collected by the Italian Ministry of Economy and Finance (MEF). Each year, eligible income recipients filed a tax return to pay their personal income tax (*Irpef*), including information on married couples and fiscally dependent family members linked by tax IDs. The MEF data comprises the universe of declarations submitted by Tuscan taxpayers in 2023, referring to the previous fiscal year 2022 ($N = 2.7$ million individuals), including pensioners, employees, and self-employed workers with taxable pension or labour income.¹ The retrospective tax declaration history can be traced back to 2003.

We assembled a dyadic, balanced panel of married, different-sex couples. Spousal dyads were identified from individual income tax returns filed between 2003 and 2022, conditional on the ego (one partner of a couple) having filed a 2022 tax return. A couple entered the panel in the first year when the ego reported a legal spouse, which could occur at any point between 2003 and 2022, provided that the reported spouse filed at least one tax return during the period. This procedure allows

Table 1 Population (Italy and Tuscany) characteristics in 2022

2022	Italy	Tuscany
Population	58,997,201	3,661,981
Fiscal population	42,026,960	2,778,334
Number of births	329,600	21,600
Number of marriages	146,205	8,858
Total fertility rate (TFR)	1.24	1.16
GDP per capita (×1,000 constant euro)	33.8	35.6
Gross annual income (mean)	€22,806	€23,204
Women's employment rate (age 25–34)	66 per cent	70 per cent
Women's inactivity rate (age 25–34)	34 per cent	24 per cent
% Religious marriages	44 per cent	30 per cent
% Births in marriage	59 per cent	51 per cent
Women's age at marriage (mean)	33.6	35.1
Mother's age at first birth (mean)	32.4	32.7

Source: Regione Toscana, Ufficio Regionale di Statistica (2022); ISTAT (2023).

us to reconstruct a joint retrospective fiscal observation window for both linked spouses.² We retained the first reported spouse and censored the couple upon marital dissolution. Linked tax identifiers for dependent children enabled us to recover birth years annually. To mitigate reverse causality, we excluded couples without available lagged income at t_{-2} .

We excluded women over age 50 or under 18 by calendar year, as represented in the Lexis-like table in [Supplementary Appendix Table A.1](#). We did not apply any age range for married men, since they anchor to their wives' age range, which covers the biological reproductive span. We obtained an analytical sample of 680,077 couple-years from 161,948 married couples and 323,896 spouses.

Due to data constraints, we were unable to match cohabiting partners. In traditional Italy, 74 per cent of children were born to married couples in 2014, the mean year of childbirth in our data (ISTAT, 2015). Still, focusing on married couples raises concerns about selection bias into the likelihood/timing of marriage/parenthood due to traditionalism, age, and income. Besides, we excluded those who already had a child before marriage under cohabitation due to left-censoring (most before 2005).³ Thus, to minimize selection bias, we independently analysed single/cohabiting individuals who never married

during the observation period. Otherwise, single/cohabiting individuals who subsequently marry are, by construction, included in the sample of married individuals, but are left-censored for union duration.

For single/cohabitators, we apply a sex-specific age range to cover the biological reproductive span, excluding women above 50 and men above 55, and all below 18 by calendar year. We obtain a single/cohabiting analytical sample of 3,980,921 men-years and 2,698,297 women-years from 365,180 men and 299,062 women.

[Table 1](#) compares regional and national population statistics, showing that Tuscany stands around the Italian mean in fertility, economic development, women's employment, and traditional values (religious marriages and out-of-marriage births). [Table 2](#) presents summary statistics for all variables by analytical sample, indicating that married couples are, on average, slightly older and married men earn higher incomes than single/cohabiting individuals. Still, their mean age at first birth is equivalent. For more detailed information, see [Supplementary Appendix Table A.2](#).

Variables

Transition to the first child

We operationalize the outcome through the yearly transition from childlessness at t_{-1} (0) to parenthood (1), with a newborn fiscally dependent child declared at t_0 . Individuals exit the risk set once the outcome changes from 0 to 1. Individuals with one person-year who reported a first child in year t_0 (marriage year, start of the risk set) or were childless were retained. [Table 2](#) shows that the yearly probability of having a first child during our observation window is about 14 per cent for spouses and 1.5 per cent for single/cohabiting individuals. About 60 per cent (15 per cent) of the married couples (single/cohabitators) eventually transitioned into parenthood during the study period.

Income

We use the individual gross annual incomes reported in the tax declaration, winsorized at the 99th percentile, and transformed into year-specific deciles or tertiles within each analytical sample, independently of zero income, to account for its skewed distribution, nonlinearities, and inflation. Unfortunately, our data does not include employment status. Still, we can proxy for selection into employment using year-specific zero-income (zero reported income or missing panel gaps) and (lagged to t_{-2}) tax return dummies, avoiding the exclusion of non-active or unemployment episodes. To account for income

Table 2 Summary statistics (person-years) by analytical samples and sex (2005–2022)

Variable	Women				Men			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Married Couples								
$(n_{\text{person-years}} = 1,360,154/n_{\text{individuals}} = 323,896)$								
Year of Birth	1975	8.65	1955	2002	1971	9.56	1935	2002
Age	37.76	7.39	20	50	40.96	8.49	20	86
Age (2022)	46.95	8.65	20	50	50.16	9.56	20	87
Born in Italy	0.86		0	1	0.92		0	1
College education	0.32		0	1	0.26		0	1
Real annual income (t_{-2})	€13,278	€14,454	0	€112,093	€21,040	€17,992	0	€112,093
Yearly income decile (t_{-2})	4.79	2.78	1	10	6.08	2.82	1	10
Zero/missing income	0.31		0	1	0.17		0	1
Parenthood age	33.93	4.84	20	50	36.75	5.31	20	76
Parenthood transition	0.14		0	1	0.14		0	1
Years to child	3.68	2.85	0	19	3.68	2.85	0	19
Years from marriage	3.86	3.80	0	19	3.86	3.80	0	19
Age at marriage	33.89	6.30	18	50	37.10	7.46	19	85
Couple's total income share	0.38	0.35	0	1	0.62	0.35	0	1
Single/cohabitators								
$(n_{\text{person-years}} = 6,679,218/n_{\text{individuals}} = 664,242)$								
Year of birth	1980	9.24	1955	2002	1979	9.63	1950	1997
Age	33.79	8.15	20	50	35.40	9.11	20	55
Age (2022)	41.45	9.24	20	50	42.99	9.63	25	55
Born in Italy	0.81		0	1	0.82		0	1
College education	0.32		0	1	0.17		0	1
Real annual income (t_{-2})	€12,136	€13,092	0	€107,396	€14,209	€14,061	0	€107,396
Yearly income decile (t_{-2})	5.14	2.81	1	10	5.75	2.88	1	10
Zero/missing income	0.21		0	1	0.20		0	1
Parenthood age	34.19	4.82	20	50	36.06	5.54	20	55
Parenthood transition	0.02		0	1	0.01		0	1
Years to child	9.00	4.03	0	17	9.61	3.94	0	17

assortative mating, we construct a variable for the couple's year-specific income tertile combinations, as shown in Table 3. For the sake of simplicity and stylized main findings, we aggregate all possible combinations within each hypergamous (1-2; 1-3; 2-3) or hypogamous (2-1; 3-1; 3-2) category. We run detailed robustness checks across all possible income decile combinations to support the aggregated analysis.

Methods

We estimate discrete-time event-history models with logistic regression, where the hazard represents the probability of having a first child in a given year, conditional on remaining childless up to that year. The model

primarily captures differences in the timing of entry into parenthood, rather than differences in the overall likelihood of ever becoming a parent. To disentangle timing and probability effects, we estimate interactions between income, age groups, and marriage timing. We display predicted probabilities or average marginal effects (AMEs) in all figures to improve comparability and interpretation. Models for married couples and single/cohabiting individuals are estimated independently by sex. In contrast, estimates of spouses' income assortative mating are shown only from the wife's model, since the couple-year panel is balanced.

The covariates for Model 1A (M1A) testing hypotheses 1a–1b on married couples include the wife's and husband's individual annual gross income (year-specific) deciles dummies and tax return [(0) no tax return; (1)

Table 3 Couple’s income assortative mating (year-specific tertiles)

Women	Men		
	Bottom tertile (1)	Medium tertile (2)	Top tertile (3)
Bottom tertile (1)	Low homogamy	Hypergamy	Hypergamy
Medium tertile (2)	Hypogamy	Medium homogamy	Hypergamy
Top tertile (3)	Hypogamy	Hypogamy	High homogamy

730: employees; (2) *Unico*: self-employed; (3) 770: withholder] with a 2-year lag ($t-2$) to account for reverse causality; 3-year calendar year dummies to account for period effects [(i) 2005/2007; (ii) 2008/2010; (iii) 2011/2013; (iv) 2014/2016; (v) 2017/2019; (vi) 2020/2022]; the number of years since the fiscal marriage began (time-varying) to model the baseline risk; the wife’s and husband’s ages at the start of the marriage (time-constant); and the macro-region of birth to account for migration background [(i) Italy; (ii) Europe; (iii) Asia; (iv) Africa; (v) North America; (vi) Central America; (vii) South America; (viii) Oceania]. For the main analysis of single/cohabitators testing *H1a–H1b* by sex in M1A, we control only for men’s or women’s income decile dummies, tax return type, age and age-squared (time-varying), migration background, and calendar year-group dummies.

To test our *hypotheses 2a–2b* on the changing effect of income on fertility, we run Model 2A (M2A) by sex and include interaction terms between income tertiles and four-period dummies [(i) 2005/2007; (ii) 2008/2012; (iii) 2013/2017; (iv) 2018/2022), including the spouse’s income-period interaction among married couples. We use 2008/2012 as the reference initial period to avoid severe left-censoring and selection bias in the initial panel period (2005/2007). To aggregate information, balancing age distributions, and ease interpretation, we opted for tertiles and 5-year period dummies; the results are robust to more disaggregated analyses. We plot the AMEs of the second and third tertiles relative to the bottom tertile (baseline) over time. All the remaining covariates are the same as those in M1A.

Finally, to directly test *hypotheses 3a–3b* on income assortative mating, we estimate Model 3A (M3A) (see Figure 3) using the couple’s income tertile combinations (as in Table 3) for hypergamy, hypogamy, and low, medium, or high homogamy. All the remaining covariates are as in M1A. The full output is shown in Model 3B (M3B), including each combination within hypergamy and hypogamy. To study potential heterogeneity in couples’ income assortative mating and fertility, we estimate a full moderation Model 3C (M3C) including an interaction between the wife’s and husband’s income deciles (see the full output in Supplementary Appendix Figure A.2).

Findings

Figure 1 illustrates the predicted probabilities of having a first child across income deciles by marital status and sex. If we focus on married couples on the figure’s left-hand side, income is linearly and positively associated with having a first child, particularly among women and for men from the fourth decile. The income slope is even slightly steeper for wives than for husbands. We now turn to the figure’s right-hand side on single/cohabitators men and women: while the baseline probability is substantially smaller than married couples, given their younger mean age and larger share of childless individuals (e.g., single), we can also observe a positive effect of income for men and women, particularly, as with the married, from the fourth decile and for women. Despite different baseline probabilities between married and single/cohabiting individuals, the income AMEs are relatively comparable in size and functional form, with modest inequalities ranging from 0.01 (single/cohabitators) to 0.05 (married) between the bottom and top deciles, and a slightly steeper slope for women.⁴ These findings validate *hypothesis H1b* and reject its competing *H1a*: income positively predicts fertility for both men and women.

Figure 2 tests *hypothesis 2* on the overtime evolution of the income-parenthood link. It displays the AMEs for the medium and top income tertiles relative to the bottom tertile (0) for the transition to the first child by sex and across calendar year periods. Among married couples, wives show no consistent trend in the association between income and fertility, with stable positive AMEs ranging from 0.03 (P -value < 0.000; middle tertile) to 0.05 (P -value < 0.000; top tertile) relative to the bottom tertile. Among husbands, we detect a mild rise in inequality, particularly between the top and bottom tertiles, with a slight increase in AMEs of up to 0.01 between the first (marginal effect = 0.03; P -value < 0.000) and last period (marginal effect = 0.04; P -value < 0.000). On the right-hand side of the figure, among single/cohabiting individuals, there is a similar positive pattern, but concentrated among women: income inequality in parenthood widens only slightly over time. Women (men) show a 0.01 (0.005)

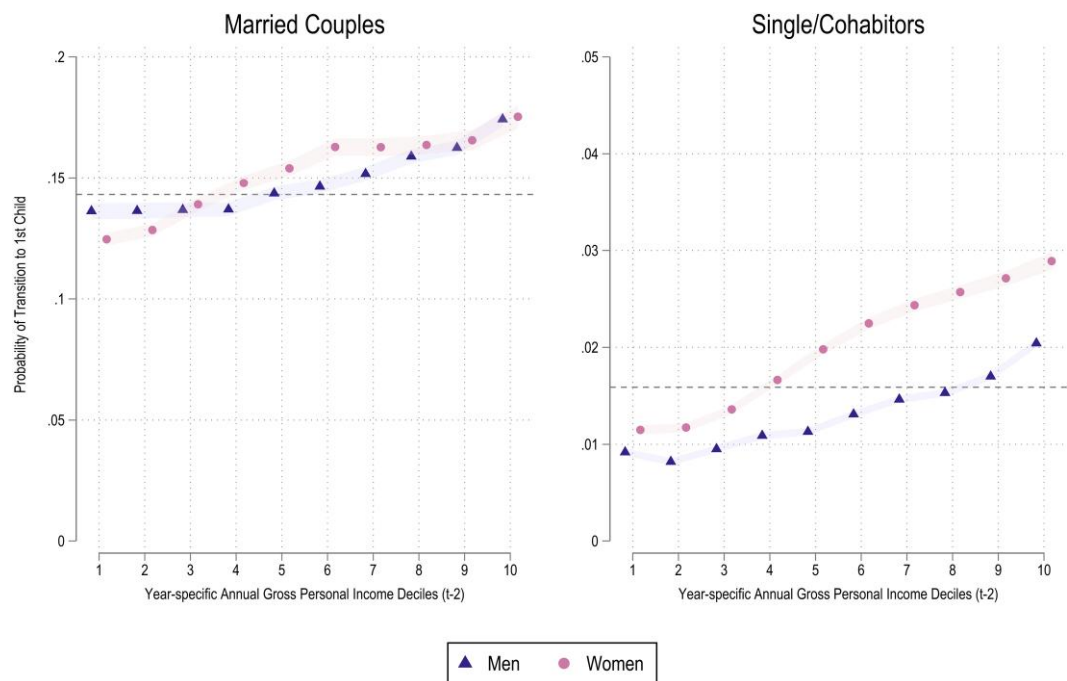


Figure 1 Model 1A: predicted probabilities of transition to first child over income deciles by married/unmarried and sex

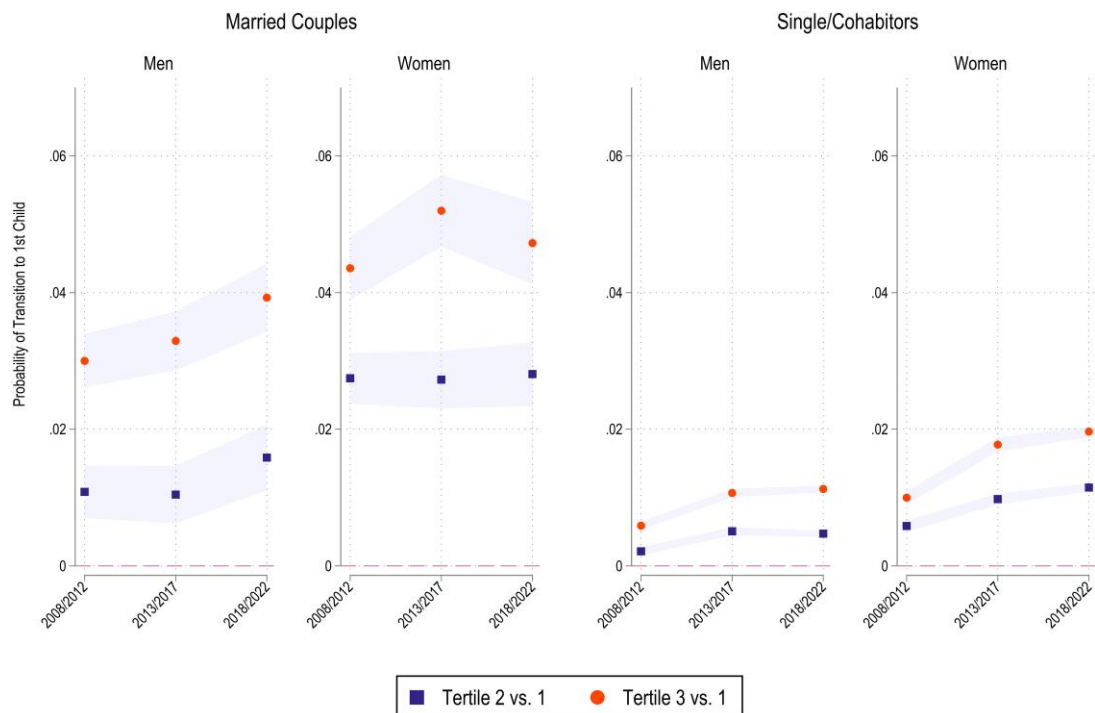


Figure 2 Model 2A: AMEs of individual medium and top income tertiles (vs 0 = bottom first tertile) on the transition to first child by sex and over year periods among married/unmarried

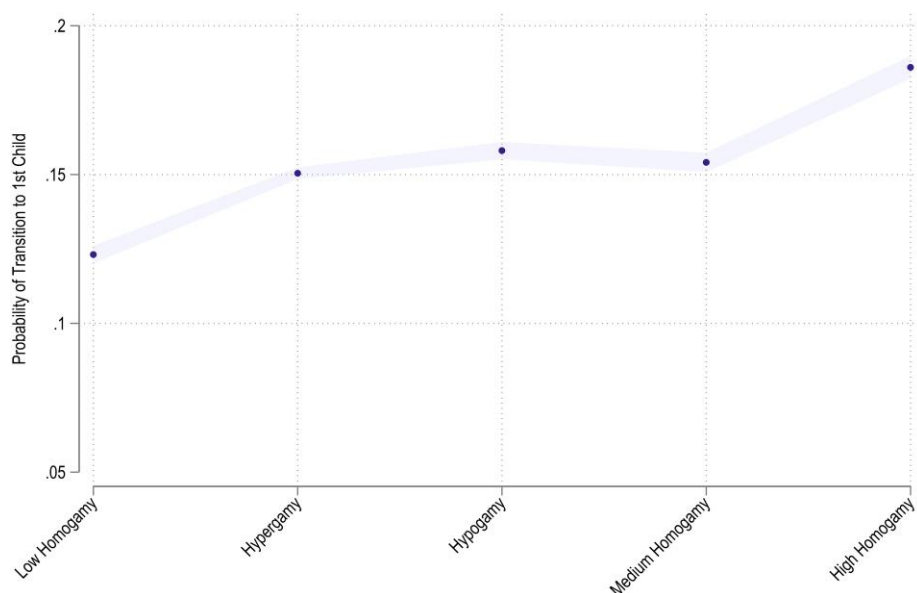


Figure 3 Model 3A: predicted probabilities of transition to first child by couple's income assortative mating.

increase in AMEs between the top and bottom tertiles across the first and last periods. These findings provide mixed evidence on *hypothesis H2b* on the increasing economic prerequisites for parenthood: higher income indeed appears to matter more for having a first child in the late 2010s and early 2020s than in the early-mid 2010s. Still, the magnitude is small when we take the effect sizes at face value.

Figure 3 illustrates the predicted probabilities of couples' income assortative mating patterns on the transition to parenthood. Three groups can be identified: low-income homogamous couples are the least likely to have a first child (predicted probability of 0.12; P -value < 0.000), followed by hypergamous/hypogamous and medium-homogamous couples, which display similar predicted probabilities (≈ 0.15 ; P -value < 0.000). Finally, married couples where both spouses earn high incomes are the most likely to have a first child (predicted probability of 0.19; P -value < 0.000). This linear positive pattern supports *hypothesis H3b* on the couple's resource pooling: the higher the couple's economic resources, the greater the probability of transitioning to parenthood, regardless of which partner contributes more. At the same time, it firmly rejects *hypothesis H3a* since the traditional hypergamous couples only show higher fertility than low-income homogamous couples, displaying slightly lower chances (Average Marginal Effects [AME] = -0.007 ; P -value < 0.000) of parenthood than the 'modern' hypogamous couples, and substantially lower chances than high-income homogamous couples (AME = -0.04 ;

P -value < 0.000). Table 4 presents the full output, disaggregating results for all possible combinations within the hypergamous and hypogamous categories. Average Marginal Effects [AME]

Robustness checks

Within-/between-individual variation and confounding

The income's intra-class correlation (ICC) of 0.6–0.75 indicates that most of the variance in event-history models is captured by between-individual inequality. Yet, to account for time-constant confounding and within-individual income change, we estimate FE linear probability models in Supplementary Appendix Figure A.1-A Model 1B (M1B), replicating the sex-specific income gradients from the event-history analysis. FE models exploiting within-individual variation in income and fertility better isolates the cohabitators, potentially at childbirth risk, from the single not in partnership. In Supplementary Appendix Figure A.1-B, we also estimate fully between-person models using deciles of average lagged annual real income across the observation period as time-constant predictors, and whether individuals ever transition to their first birth during the observation period as the outcome, with one observation per individual/couple. Substantively, the results suggest that income matters for first births both through life-course income changes and, more strongly, through durable

Table 4 Model 3B: Predicted probabilities of 1st child transition by the interaction between the wife’s and husband’s income tertiles in married couples (women’s model: $n = 680,077$)

Income tertile		Income level	Coeff.	P-value	(95 per cent confidence interval)	
Women	Men					
Hypergamy						
1	2	Low-medium	0.135	0.000	0.132	0.138
1	3	Low-high	0.152	0.000	0.149	0.155
2	3	Medium-high	0.177	0.000	0.174	0.181
Hypogamy						
2	1	Medium-low	0.151	0.000	0.146	0.155
3	1	High-low	0.162	0.000	0.157	0.168
3	2	High-medium	0.173	0.000	0.168	0.178
Homogamy						
1	1	Low	0.124	0.000	0.121	0.127
2	2	Medium	0.157	0.000	0.154	0.161
3	3	High	0.191	0.000	0.187	0.194

economic stratification in access to parenthood. Finally, in a subsample with educational attainment, we replicate the main event-history models on the gradients of income and fertility by sex, using educational attainment instead of income, and analyse income while controlling for education (Supplementary Appendix Figure A.3-A). Moreover, we (re)assess income assortative mating by controlling for educational assortative mating and estimating educational assortative mating while controlling for income assortative mating. Supplementary Appendix Figure A.3-B shows that the patterns are robust and equivalent across income and education.

Additional analyses

In the Supplementary material, we run and comment on several additional analyses that support the main findings of the article on (i) decile-level income assortative mating interactions; (ii) the effects of income assortative mating over time; (iii) relative and absolute household income (wife’s income share net of household income deciles); (iv) disentangling timing and probability in event-history models using age and marriage-duration interactions; and (v) external validation with the European Union Statistics on Income and Living Conditions (EU-SILC) data for Italy.

Discussion and conclusion

In the traditional Italian context, where low fertility coexists with low female employment, we examined income-

based fertility stratification over two decades using event-history analysis. We rejected *Home Economics* theories, expecting lower fertility among higher-income women due to opportunity costs and traditional breadwinner norms. We contributed by analysing couples’ income assortative mating and parenthood in Tuscany, a Central Italian region representing average levels of economic development and gender equality. For the first time in Italy, we exploited longitudinal data from population tax records to depict sex-specific income effects on fertility.

We report three key findings that align with couples’ *resource-pooling theories* but conflict with *specialization theories*. First, in line with *hypothesis 1b*, both men’s and women’s incomes are positively associated with higher transition rates to a first child. Our analysis reveals a fundamental shift in the relationship between women’s socioeconomic status and fertility in Italy: what was once a negative association (Santarelli, 2011; Matysiak and Vignoli, 2013) has now become a positive one. This shift is noteworthy, particularly because our study focuses on married couples, who are likely to be more selective in traditional gender roles. The positive income-parenthood association aligns with a new generation of studies suggesting that women’s employment is no longer a deterrent to family formation (Matysiak and Vignoli, 2026), even in Italy (Alderotti, 2022), a country often portrayed as a stronghold of traditionalism.

Second, the observed positive association between income and parenthood increased only slightly between 2008 and 2022. Childbearing within cohabitation has

become increasingly common among younger generations (Aassve *et al.*, 2024), with couples now prioritizing homeownership (Gallo and Vignoli, 2025) and stable employment before having children to ensure a secure living environment. This trend suggests that the economic prerequisites for parenthood might be rising among young couples. Factors such as rising housing costs (Gritti and Cutuli, 2021), inflation, and the growing instability of labour market careers (Alderotti *et al.*, 2025) are likely contributing to this shift, highlighting the growing actual and perceived economic barriers to family formation in Italy. A further complementary explanation is that the economic prerequisites for entering a co-residential partnership, a transition not observable in our data, may have risen, thereby playing a potential mediating role.

Third, couples with both partners having high incomes are the most likely to have a first child, while those with low incomes are the least likely. Couples in which both partners have middle incomes, and hypergamous or hypogamous couples fall in between. This pattern supports the idea that greater financial resources and income pooling increase the likelihood of parenthood. Shared resources might buffer against financial instability and enable families to allocate more towards childcare and domestic support (Oppenheimer, 1997). It also challenges the assumption that traditional couples, where the man earns more than the woman, exhibit higher fertility due to household role specialization. In line with Jalovaara and Miettinen's (2013) study on Finland, Italian men's and women's incomes have relatively symmetrical and independent effects. Our results further align with the existing literature on educational assortative mating and fertility (Nitsche *et al.*, 2018; 2021), finding higher-parity transitions among highly educated homogamous couples.

This study has limitations to be addressed in future research: (i) We could not fully isolate income from confounders, potentially leading to upper-bound gradients. However, we included person-years with zero or unreported income to account for employment selection, complemented event-history with FE models to net out time-constant confounders, and replicated the findings by controlling for educational attainment—a stable confounder and proxy for income potential—and educational assortative mating. (ii) Focusing on assortative mating among married couples implies positive selection on economic resources, which may attenuate income gradients. We replicate the analyses for singles/cohabitators. Still, data limitations prevented us from distinguishing between the two, depressing baseline childbearing probabilities, as unintended pregnancies are rare in Italy and most births occur within unions (74 per cent in 2014; ISTAT, 2015). Future studies should assess assortative mating in non-married

couples to fully address selection. (iii) Event-history hazards combine between- and within-individual income variation, a distinction rarely made explicit in standard income–fertility theories and models. To clarify this dimension, we complemented the main models with FE specifications, which isolate the effect of within-individual income changes on the timing of first birth, and fully between-person models, which use average lagged income to predict the probability of first-birth transitions across individuals or couples. The FE estimates show comparatively modest within-person gradients, whereas the between-person models reveal strong gradients, consistent with the income ICCs indicating substantial stable inequality. Thus, within-person income dynamics appear substantively relevant but comparatively weaker than persistent between-person inequality in shaping first-birth transitions. Theoretically, this suggests that income–fertility frameworks should distinguish more clearly between mechanisms rooted in durable economic stratification and those related to life-course income dynamics. (iv) Focusing on first births, a relevant outcome in high childlessness contexts, and lagging income addresses reverse causality by the child penalty, but limits analysis of higher-order parities. Future research should examine second- and third-births while accounting for first-birth timing (van Wijk, 2024). (v) Focusing on Tuscany questions the findings' generalizability, but the results replicated using EU-SILC data for Italy. Future studies adopting a cross-national perspective might shed new light on institutional factors.

Despite these limitations, our findings are novel in Italy for challenging traditional gender norms and the *NHE* theory. They highlight the relevance of women's employment and income to parenthood, given changing family values and the rising costs of raising a child. The economic stratification of fertility also raises concerns about the impact of assortative mating, economic inequality and meagre social policies on the chances of realizing the generalized life goal of parenthood.

By focusing on Italy—a relatively traditional and weakly facilitating institutional context for women's career–family balance—we provide a hard test of *resource-pooling* theories in a setting where *couple specialization* would otherwise be expected. Still, our findings align with the positive income gradient usually observed for women in Northern European countries, characterized by a more supportive institutional setting and an advanced *gender revolution*. In the Southern European setting, couples' income may compensate for weak public provisions by privately outsourcing childcare and domestic work, lowering opportunity costs under high economic prerequisites for parenthood.

Notes

1. Employees (self-employed/employers) earning annual incomes below €8,000 (€4,800) are not legally required to compile a tax declaration. Unemployed individuals must declare their income from unemployment benefits. Non-financial capital income is included, while financial capital income is subject to substitute taxation.
2. The couple is observed if married and at least one spouse declares taxable income in 2022. Non-active or unemployed spouses are declared in the individual tax declaration of the income-recipient spouse. We assign a zero if the spouse has a missing income and the other spouse's income is non-missing.
3. Among Italian women born 1977–1986 who have experienced both a first child and first marriage, only 14 per cent had the child before marriage (ISTAT, 2015).
4. Among Italian adults under 45, single men are more common than single women (about 11 per cent vs 6 per cent) (ISTAT, 2023). Children born to cohabiting parents may be more financially dependent on their fathers.

Supplementary data

Supplementary data are available at [ESR](#) online.

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Author contributions

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Resources, Software, Supervision, Validation, Writing—review & editing [supporting], Data curation [lead]), and Letizia Ravagli (Conceptualization, Data curation, Methodology, Supervision, Writing—review & editing [supporting]).

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Data availability

Data cannot be shared for ethical/privacy reasons. The data underlying this article include population administrative register data from tax returns collected by the Italian Ministry of Economy and Finance and cannot be shared publicly due to privacy concerns. The author(s) accessed the data within the framework of a collaboration agreement between the University of Florence and the *Istituto Regionale per la Programmazione Economica della Toscana* (IRPET) and worked on the data only at the IRPET facilities. Replication package: The code to replicate the main and additional analyses of the article is available here: <https://github.com/carjgil/income-fertility/>.

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