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Educational Assortative Mating and Motherhood Penalty in China

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Abstract

Prior studies have examined how the motherhood penalty varies by individual characteristics, but few considered how spousal characteristics might moderate the income effect of parenthood. To address this gap, we examine how the motherhood penalty varies by educational assortative mating in China, where the gender gap in education has declined and the gender wage gap has widened. Using data from the China Family Panel Studies 2010–2018, we test how the effect of motherhood on women’s absolute and relative income vary by educational pairings. Our results show that women in homogamy at low education levels and in heterogamy with large spousal education gaps experience the largest motherhood penalties in absolute and relative income. When spousal education gaps are moderate, hypergamy lessens the motherhood penalty on women’s absolute income, whereas hypogamy mitigates the penalty on women’s relative income. These findings underscore the significance of considering couple dynamics in understanding motherhood penalties.

Keywords: Motherhood Penalty; Educational Assortative Mating; Gender; Income; China.

Introduction

Prior research has found evidence of the “motherhood penalty,” i.e., mothers earning less than comparable childless women, in many societies, including China (Linde Leonard & Stanley, 2020; Yu & Xie, 2018; Zhao, 2018). Most studies examine the sources of the penalty or its variations by women’s socioeconomic and demographic characteristics (Gough & Noonan, 2013). However, few have considered how spousal characteristics may moderate the motherhood penalty. As work-family arrangements tend to differ depending on spousal differences in education (van Bavel et al., 2018), the degree of the motherhood penalty may vary by educational pairings. The few existing studies on this topic examine how the effect of motherhood on women’s share of couple income varies by educational pairings in Europe (Dotti Sani, 2015; Klesment & van Bavel, 2016; Nylín et al., 2021; van Bavel & Klesment, 2017). Using longitudinal data from the China Family Panel Studies (CFPS), we examine how motherhood penalties on women’s absolute income and relative income differ by educational assortative mating in China. In the context of the country’s narrowing gender gap in education and declining fertility, our study provides important insight into the implications of educational assortative mating for mothers’ earnings and couples’ income dynamics.

Our study contributes to the literature on the motherhood penalty by considering the impact of couple dynamics in two ways. First, examining variations in motherhood penalties by educational assortative mating takes into account the fact that parenthood and divisions of labor involve both partners (Killewald & García-Manglano, 2016). Educational pairing is a key determinant of couple-level negotiations over household divisions of market labor, domestic work, and decision-making power (van Bavel et al., 2018). Second, we conceptualize the economic consequences of motherhood in two dimensions, women’s absolute income and their share of couple income. Absolute income is an indicator of labor market performance, which may involve changes in employment status, occupations, job positions, wages, and work hours around parenthood (Dribe & Nystedt, 2013). Relative income is an indicator of within-couple inequality, which reflects relative status and power differentials between spouses and has important implications for household decision-making (Musick et al., 2020). Therefore, understanding how motherhood affects women’s relative income, in addition to absolute income, and how these effects vary by educational assortative mating introduces a couple-level perspective in studying motherhood penalties.

China offers a particularly interesting context for this study. Marriage and childbearing are nearly universal in China, with a short gap between the time of marriage and the time of first birth. Non-marital childbearing is extremely rare (Yu & Xie, 2021). The birth policy has gradually loosened. The gender gap in education has been closing in recent decades. In urban China, women have higher average education than men among recent birth cohorts (Wu & Zhang, 2010). The decline or even reversal of the gender gap in education reshapes the educational difference between spouses. Although homogamy remains the most prevalent type of educational assortative mating, hypogamy has gradually increased among recent marriage cohorts (Han, 2010). Despite the narrowing gender gap in education, the gender wage gap and gender-based occupational segregation have increased (Iwasaki & Ma, 2020). The division of household labor remains unequal, which is perceived as normative by many Chinese couples (Ji et al., 2017). Partly due to the unequal division of household labor, married women and mothers face disadvantages in labor market outcomes (Zhang et al., 2008). Prior research has found evidence of the motherhood penalty on women's earnings in China (Yu & Xie, 2018), especially for mothers of young children (Zhao, 2018). However, how the effect of motherhood on women's share of couple income and how the motherhood penalty varies by educational assortative mating remains unknown.

Theoretical Framework

Relative resource theory, gender theory, and social capital theory provide useful theoretical frameworks for understanding how educational assortative mating moderates the effect of motherhood on income.

The relative resources theory posits that the spouse with more resources relative to the other has more bargaining power to negotiate for desired outcomes (Blood & Wolfe, 1960). As educational pairing reflects spousal differences in bargaining resources, women who are more educated than their husbands may have more resources to bargain for a more egalitarian division of labor (van Bavel et al., 2018; Yu & Xie, 2012). This perspective is closely related to opportunity costs in microeconomics. Women with higher levels of education than their husbands and thus higher relative earnings potential may have greater opportunity costs of reductions in work hours or detachment from the labor force (van Bavel & Klesment, 2017). The relative resources theory would thus predict that women in hypogamy may experience a smaller penalty on their income, especially their relative income, as they often contribute a substantial

proportion of family income (Hannum et al., 2013; van Bavel et al., 2018). In contrast, women in hypergamy may experience a larger penalty, given a more gendered division of labor where she focused more on domestic work (Klesment & van Bavel, 2016). Existing research in Europe suggests that women in hypogamy experience a smaller penalty on relative earnings (Klesment & van Bavel, 2016; Nylén et al., 2021; van Bavel & Klesment, 2017).

The gender theory contends that the division of labor between spouses is guided by gendered expectations of parenthood and employment, known as “doing gender” (West & Zimmerman, 1987). Women more educated than their husbands may perform more housework to compensate for the deviation from gender norms (Bittman et al., 2003) and refrain from outearning their husbands (Bertrand et al., 2015). Thus, in contrast to the relative resources theory, the gender theory would argue that women in hypogamy may experience a larger penalty on their income by doing gender through the gender display of housework performance and labor market behaviors (Dribe & Nystedt, 2013). Given that the gender display is more apparent with vast spousal differences in socioeconomic status, we would expect women in hypogamy of large spousal education gaps to experience a larger motherhood penalty.

The social capital theory underscores the significance of social networks for career trajectories (Lin et al., 1981). Spouses are part of one’s social capital (Komter et al., 2012). The better-educated partner provides the less-educated partner access to information and social networks that may facilitate career developments (Dribe & Nystedt, 2013). Furthermore, as education is positively associated with gender-egalitarian attitudes (Shu, 2004), a woman marrying a highly educated man may benefit from his more egalitarian and thus more supportive attitudes toward her career (Dribe & Nystedt, 2013; Musick et al., 2020). Thus, from the perspective of social capital theory, women in hypogamy may experience a larger penalty, given limited spousal resources, whereas women in hypergamy may experience a smaller penalty, given better access to career-facilitating spousal resources. Access to spousal resources conducive to women’s career development may have more bearings on their absolute income (Dribe & Nystedt, 2013), an indicator of labor market performance.

In summary, based on the theories of relative resources, gender, and social capital, we derive the following theoretical expectations. Women in hypogamy may experience a smaller penalty, given more relative resources (H1a), or a larger penalty by doing gender (H1b). Women

in hypergamy may experience a larger penalty, given lower relative resources (H2a), or a smaller penalty through more access to spousal resources (H2b).

Data and Methods

Data

Data are from the China Family Panel Studies (CFPS), a nationally representative longitudinal biennial survey of Chinese households and their individual members since 2010. We limited our analysis to the 2010, 2012, 2014, and 2018 surveys where personal income was consistently measured. The analytic sample consisted of women interviewed in at least two waves. Data were organized into person-waves. We imposed the following restrictions to construct our analytic sample. First, we restricted to waves where women were aged 20–49 because most women would have finished their education by the age of 20 and completed childbearing by the age of 49. Second, we restricted to waves where women were married and living with their husbands and where both women and their husbands were interviewed, which were necessary conditions for couple income to be observed. The few women who changed partners were excluded so that educational assortative mating was predetermined during the observation window and not subject to change due to remarriages. Third, we restricted to waves where the combined income of a woman and her husband was not zero to study within-couple income inequality. Waves, where a woman earned zero income, were included as long as her husband earned some income because an income drop to zero following parenthood may be considered as a form of the motherhood penalty. Finally, we excluded women who remained childless during the period and waves where a woman's first-born child was over 15 years old to examine changes in women's income over motherhood stages where work-family conflicts were more intense. The final analytic sample consisted of 6,767 person-year observations from 2,713 women.

Measurement

We examined two income outcomes. Absolute income was measured by a woman's annual individual income after tax¹. All values were logged and CPI-adjusted in constant 2009 *yuan*. Income captures possible motherhood effects on wages, work hour adjustments, job changes, and employment status transitions. To examine within-couple income inequality, we

¹ For women with zero income, their logged income was the log of 0.1 cent.

further examined relative income, measured by a woman's share of couple income, i.e., her income divided by the sum of her and his income and multiplied by a hundred.

We tested two forms of motherhood effect. The number of children (no child, one child, two or more children) measured the effect of additional births. Time from first birth allowed us to examine how the motherhood effect unfolded over time. We measured time from first birth as years since the birth of the first child: <0 (before the birth of the first-born), 0–3, 4–6, 7–9, 10–12, and 13–15.

Educational assortative mating was measured as educational pairings of the couple. Each spouse's education included three levels, elementary school or less (Low), middle school (Med), and high school or more (High). Thus, there were nine possible educational pairings: (1) Wife Low – Husband Low, (2) (Wife Low – Husband Med), (3) (Wife Low – Husband High), (4) Wife Med – Husband Low, (5) Wife Med – Husband Med, (6) Wife Med – Husband High, (7) Wife High – Husband Low, (8) Wife High – Husband Med, and (9) Wife High – Husband High.

We adjusted for several time-varying control variables that may be associated with motherhood status and income outcomes based on a review of the motherhood penalty literature in China (Yu & Xie, 2018; Zhang et al., 2008; Zhao, 2018) and Western societies (Cukrowska-Torzewska & Matysiak, 2020). First, we controlled for women's potential work experience and its squared term. Potential work experience, commonly used to approximate exact experience, was a function of a woman's age and years of education. Second, we accounted for women's and their husbands' respective employment status, including whether one was employed, whether one was employed in the public sector, whether one was non-farm employed, and whether one was self-employed. Third, we adjusted for several household characteristics, including whether women lived with their own parents, whether women lived with their parents-in-law, urbanicity of residence, and the province of residence.

Analytic Strategy

We employed fixed effects models to examine how the number of children and time from first birth affect women's absolute and relative income. Fixed effects models accounted for all time-invariant characteristics associated with motherhood status, educational pairings, and income outcomes. For each income measure (Y) of woman *i* at wave *t*, we tested two models: (1) the effect of number of children (N) by educational pairings (E) and (2) the effect of time from first

birth (T) by educational pairings. All models adjusted for the time-varying covariates (X). The model testing the effect of time from first birth also controlled for the number of children.

$$Y_{it} = \beta_0 + \beta_1 N_{it} + \beta_2 N_{it} \times E_i + \beta_3 X_{it} + \alpha_i + \mu_{it} \quad (1)$$

$$Y_{it} = \gamma_0 + \gamma_1 T_{it} + \gamma_2 T_{it} \times E_i + \gamma_3 X_{it} + \gamma_4 N_{it} + \delta_i + \varepsilon_{it} \quad (2)$$

Preliminary Results

Descriptive Statistics

Table 1 shows the descriptive statistics of women's income, motherhood status, and educational assortative mating patterns. On average, women contributed 30.82% of couple income. Across all person-waves, 5.6% of the sample had no child, and 36% had two or more children. At the baseline interview in 2010, about 10% of the sample was childless; by the time of the last interview in 2018, about 54% had at least two children (results not shown). Homogamy was the predominant form of educational pairing, especially among high-school graduates. Hypergamy was more prevalent than hypogamy. Heterogamy with large educational gaps between spouses was the least common.

Regression Results

Tables 2 and 3 present the fixed effects model results on the effect of the number of children and time from first birth, respectively. To visualize and facilitate the interpretation of how the motherhood effects vary by educational assortative mating, we plotted predicted changes in women's logged income and income share by motherhood and educational pairing in Figures 1 and 2 based on the results in Tables 2 and 3, respectively.

Compared to homogamy at low levels of education, women in homogamy of middle- or high-school educated couples experienced smaller penalties on both absolute and relative income at additional births and over time. Women in heterogamy where their husbands' education was two levels higher or lower experienced the largest motherhood penalties on absolute and relative income at additional births and over time. Women in hypergamy where their husbands' education was one level higher experienced smaller penalties on absolute income at second births and over time than women in homogamy. Women in hypogamy where their husbands' education was one level lower experienced smaller penalties on relative income over time. Women with middle school education married to men with elementary school education or less also experienced smaller penalties on relative income at first birth.

Discussion

Consistent with prior research in China (Yu & Xie, 2018; Zhao, 2018), we find evidence of the motherhood penalty on women's income persisting over the life course. To consider the motherhood penalty from a couple-level perspective, we further show the effect of motherhood on women's relative income and how motherhood penalties vary by educational assortative mating. Consistent with prior studies in Western societies (Looze, 2014; Musick et al., 2020; Nylin et al., 2021), women's own education mitigates motherhood penalties on both absolute and relative income, as education reflects a woman's human capital, opportunity costs, and resources to outsource domestic labor. Our results show that women homogamy at low levels of education experience larger penalties than women in homogamy of middle- or high-school educated couples. We further consider the impact of couple dynamics and demonstrate how motherhood penalties depend on not only her own education but also who she marries.

Heterogamy with large spousal education gaps tends to exacerbate motherhood penalties in both absolute and relative income. Women in hypergamy where their husbands' education was two levels higher experience large motherhood penalties given lower relative resources and more gendered division of labor, in line with the relative resources theory. Meanwhile, women in hypogamy where their husbands' education was two levels lower experience large motherhood penalties given limited spousal resources and gender display, in line with the gender theory.

When spousal education gaps are moderate, hypergamy lessens the motherhood penalty on women's absolute income, whereas hypogamy mitigates the penalty on women's relative income. Access to spousal resources may be more relevant to one's career development, from the perspective of social capital theory, and has more bearings on absolute income, an indicator of labor market performance. Relative earnings potential and opportunity costs may be more consequential for within-couple division of labor, considering the relative resources theory, and has larger impacts on relative income, an indicator of within-couple income inequality.

Together, our study underscores the significance of considering couple dynamics in understanding motherhood penalties. Decisions around parenthood, including the quantum and timing of fertility, division of market and household labor, and resource exchange, are negotiated at the couple level (Musick et al., 2020; van Bavel & Klesment, 2017). Educational assortative mating has important implications for mothers' earnings and within-couple income inequality.

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Table 1 Descriptive Statistics of Women’s Income, Motherhood Status, and Educational Assortative Mating Patterns.

	Mean/%	SD
Income Outcomes		
Logged Income	3.85	7.72
Income Share (%)	30.82	31.68
Motherhood Status		
Number of Children		
0	5.59	
1	58.39	
2+	36.03	
Time from First Birth		
<0	3.66	
0-3	20.88	
4-6	19.52	
7-9	19.65	
10-12	19.88	
13-15	16.40	
Educational Assortative Mating		
Wife Low – Husband Low	16.85	
Wife Low – Husband Med	11.26	
Wife Low – Husband High	3.04	
Wife Med – Husband Low	8.20	
Wife Med – Husband Med	18.80	
Wife Med – Husband High	8.98	
Wife High – Husband Low	2.20	
Wife High – Husband Med	6.61	
Wife High – Husband High	24.06	
N (person)	2,713	
N (person-year)	6,767	

Table 2. Fixed Effects Models of Women’s Income by Number of Children and Educational Assortative Mating.

	Model 1		Model 2	
	Logged Income		Income Share	
	B	(SE)	B	(SE)
Number of Children (ref. = 0)				
1	-5.19***	(1.47)	-16.02**	(6.06)
2+	-8.97***	(1.60)	-24.85***	(6.63)
Number of Children × Educational Assortative Mating (ref. = Wife Low – Husband Low)				
One Child × Wife Low – Husband Med	2.57	(2.17)	1.72	(9.00)
One Child × Wife Low – Husband High	-0.39	(3.78)	-3.07	(15.63)
One Child × Wife Med – Husband Low	1.31	(2.09)	18.44*	(8.66)
One Child × Wife Med – Husband Med	1.54	(1.83)	11.07	(7.57)
One Child × Wife Med – Husband High	1.42	(2.01)	9.06	(8.32)
One Child × Wife High – Husband Low	-0.39	(2.71)	-5.84	(11.22)
One Child × Wife High – Husband Med	1.49	(2.15)	2.53	(8.92)
One Child × Wife High – Husband High	3.68*	(1.62)	11.18†	(6.72)
Two+ Children × Wife Low – Husband Med	4.87*	(2.38)	11.67	(9.84)
Two+ Children × Wife Low – Husband High	1.41	(3.66)	1.38	(15.17)
Two+ Children × Wife Med – Husband Low	3.36	(2.33)	17.82†	(9.63)
Two+ Children × Wife Med – Husband Med	2.83	(1.98)	15.61†	(8.21)
Two+ Children × Wife Med – Husband High	6.71**	(2.25)	15.45†	(9.30)
Two+ Children × Wife High – Husband Low	0.16	(3.26)	-2.33	(13.48)
Two+ Children × Wife High – Husband Med	5.64*	(2.41)	8.18	(9.96)
Two+ Children × Wife High – Husband High	6.84***	(1.85)	13.74†	(7.64)
N (person)	2,713		2,713	
N (person-year)	6,767		6,767	

Notes: All models controlled for women’s potential work experience and its squared term, women’s and their husbands’ respective employment status (whether one was employed, whether one was employed in the public sector, whether one was non-farm employed, and whether one was self-employed), whether women lived with their own parents, whether women lived with their parents-in-law, urbanicity of residence, and the province of residence.

† p <.1; * p<.05; **p<.01; ***p<.001.

Table 3. Fixed Effects Models of Women’s Income by Time from First Birth and Educational Assortative Mating.

	Model 3		Model 4	
	Logged Income		Income Share	
	B	(SE)	B	(SE)
Time from Birth (ref. = <0)				
0–3	–6.80***	(1.99)	–23.86**	(8.28)
4–6	–8.23***	(2.19)	–25.80**	(9.13)
7–9	–7.68***	(2.30)	–24.06*	(9.55)
10–12	–8.95***	(2.45)	–30.54**	(10.21)
13–15	–11.78***	(2.61)	–33.87**	(10.85)
Time from First Birth × Educational Assortative Mating (ref. = Wife Low – Husband Low)				
0–3 × Wife Low – Husband Med	6.14*	(2.83)	9.20	(11.77)
0–3 × Wife Low – Husband High	–5.22	(6.56)	–12.97	(27.27)
0–3 × Wife Med – Husband Low	3.41	(2.78)	28.96*	(11.58)
0–3 × Wife Med – Husband Med	3.92†	(2.35)	15.18	(9.79)
0–3 × Wife Med – Husband High	5.79*	(2.52)	21.40*	(10.50)
0–3 × Wife High – Husband Low	2.22	(3.28)	–0.60	(13.64)
0–3 × Wife High – Husband Med	6.70*	(3.00)	24.01†	(12.47)
0–3 × Wife High – Husband High	6.69**	(2.11)	21.25*	(8.79)
4–6 × Wife Low – Husband Med	7.17*	(3.01)	11.03	(12.54)
4–6 × Wife Low – Husband High	–2.64	(6.34)	–12.12	(26.36)
4–6 × Wife Med – Husband Low	3.21	(2.99)	20.04	(12.42)
4–6 × Wife Med – Husband Med	5.79*	(2.51)	18.45†	(10.44)
4–6 × Wife Med – Husband High	9.93***	(2.72)	24.13*	(11.31)
4–6 × Wife High – Husband Low	1.52	(3.64)	–9.05	(15.13)
4–6 × Wife High – Husband Med	8.18**	(3.15)	21.88†	(13.11)
4–6 × Wife High – Husband High	9.45***	(2.29)	21.73*	(9.52)
7–9 × Wife Low – Husband Med	5.60†	(3.05)	5.24	(12.68)
7–9 × Wife Low – Husband High	–1.32	(6.57)	–7.87	(27.33)
7–9 × Wife Med – Husband Low	4.74	(3.06)	24.03†	(12.71)
7–9 × Wife Med – Husband Med	5.52*	(2.54)	19.99†	(10.58)
7–9 × Wife Med – Husband High	9.09**	(2.77)	26.35*	(11.51)
7–9 × Wife High – Husband Low	4.52	(3.81)	–1.35	(15.83)
7–9 × Wife High – Husband Med	9.50**	(3.24)	22.92†	(13.47)
7–9 × Wife High – Husband High	9.28***	(2.33)	18.84†	(9.71)

10–12 × Wife Low – Husband Med	7.52*	(3.14)	12.87	(13.06)
10–12 × Wife Low – Husband High	0.80	(6.67)	0.27	(27.73)
10–12 × Wife Med – Husband Low	5.77†	(3.15)	28.80*	(13.10)
10–12 × Wife Med – Husband Med	6.29*	(2.64)	20.77†	(10.97)
10–12 × Wife Med – Husband High	12.42***	(2.92)	26.48*	(12.14)
10–12 × Wife High – Husband Low	4.46	(4.07)	2.56	(16.93)
10–12 × Wife High – Husband Med	11.32***	(3.39)	30.04*	(14.10)
10–12 × Wife High – Husband High	10.94***	(2.44)	22.07*	(10.15)
13–15 × Wife Low – Husband Med	8.22*	(3.23)	13.32	(13.44)
13–15 × Wife Low – Husband High	4.49	(6.74)	5.12	(28.06)
13–15 × Wife Med – Husband Low	8.77**	(3.28)	33.74*	(13.63)
13–15 × Wife Med – Husband Med	8.53**	(2.70)	25.87*	(11.22)
13–15 × Wife Med – Husband High	15.26***	(3.01)	31.61*	(12.51)
13–15 × Wife High – Husband Low	5.47	(4.56)	–4.91	(18.97)
13–15 × Wife High – Husband Med	12.86***	(3.48)	30.17*	(14.49)
13–15 × Wife High – Husband High	14.39***	(2.52)	25.30*	(10.47)
N (person)	2,713		2,713	
N (person–year)	6,767		6,767	

Note: † p <.1; * p<.05; **p<.01; ***p<.001.

Notes: All models controlled for the number of children, women’s potential work experience and its squared term, women’s and their husbands’ respective employment status (whether one was employed, whether one was employed in the public sector, whether one was non-farm employed, and whether one was self-employed), whether women lived with their own parents, whether women lived with their parents-in-law, urbanicity of residence, and the province of residence.

† p <.1; * p<.05; **p<.01; ***p<.001.

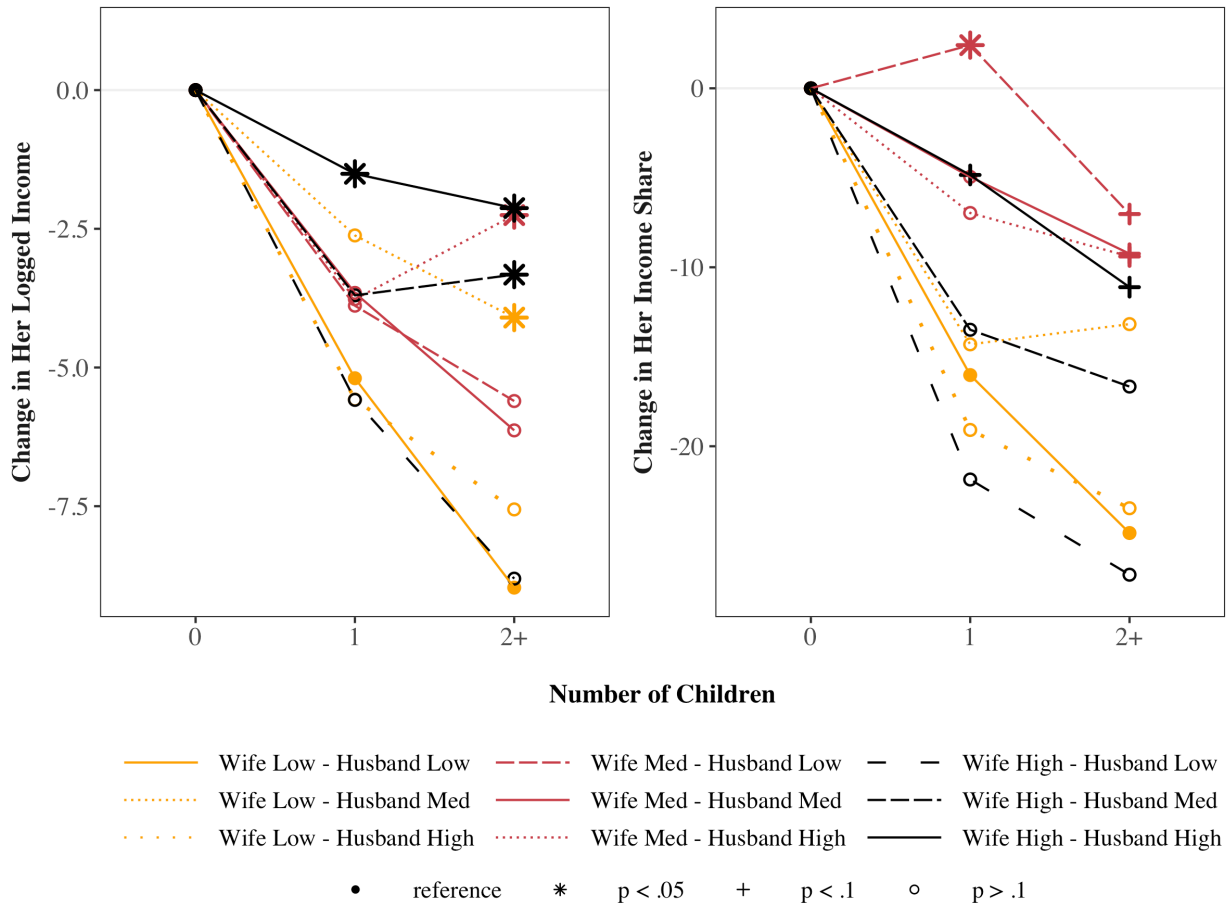


Fig. 1 Predicted Change in Logged Income and Income Share by Number of Children and Educational Pairing. Predictions are derived from fixed effects models shown in Table 2.

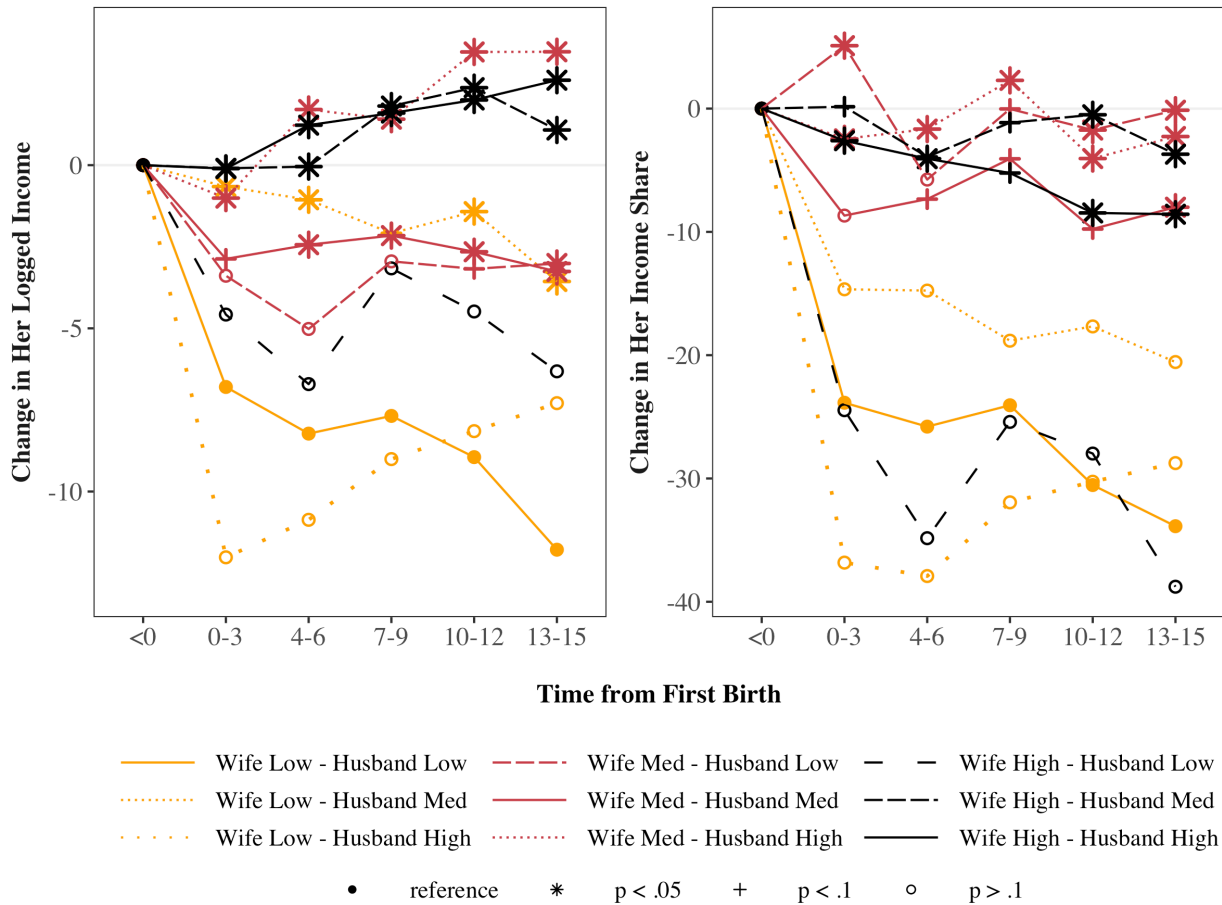


Fig. 2 Predicted Change in Logged Income and Income Share by Time from First Birth and Educational Pairing. Predictions are derived from fixed effects models shown in Table 3.