Should I Stay or Should I Go? Single Motherhood Revisited*

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Abstract

We propose a model of single motherhood where a child is a public good to its parents and parental care is in the form of voluntary contributions. We argue that the two-parent family can be sustained in either an indigent or a high-resource environment, but is vulnerable if a single mother "can just make it." The proposed reason is that in a repeated prisoners' dilemma game, defection of the mother as a response to defection of the father can maintain cooperation. However, a tit-for-tat strategy is only credible if the mother cannot support a child and is therefore better off abandoning it; or child quality can be reduced without major harm to the child, allowing the mother to counter defect with defect. By contrast, mothers who can support a child, but barely, cannot reduce their effort without jeopardizing the child, a bind that can make them vulnerable to desertation. We present supporting evidence from the United States natality data 1969-2008 and time use surveys 1965-2012. *JEL Classification: TBA*

1 Introduction

The fraction of children born to unmarried mothers quadrupled over the last 40 years from 10% in 1970. Unmarried childbearing is more likely among low skilled and poor mothers. In 2011, almost 60% of birth to women without a high school degree were out of wedlock, a statistic that fell below 10% for college educated mothers. Unmarried mothers are also more likely to shoulder the parenting burden alone, amplifying household income inequality and the share of children raised at or near poverty level (e.g., Lundberg and Pollak [2007]). The fraction of the population under age 18 living in poverty is at 22 percent (almost twice that of the rest of the population), up from 15 percent in the early 1970s, and the over-representation of children increases with

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the severity of the poverty measure. Whereas children made up 24 percent of the population in 2012, they made up 27 percent of those in living at between 100-200% of the poverty level, 34 percent of those between 55-99% percent of the poverty level and 35 percent of those living below 50% [DeNavas-Walt et al., 2013].

Single motherhood among the less educated poses a puzzle, in particular when juxtaposed with the two-parent norm among the better educated. Given the low-skilled and time-intensive nature of parenting, and the hardship that single parenting imposes on the child and its caregiver, the low skilled may have plenty both to give and to gain in the parenting department. While it is possible that the men facing unmarried mothers have little to contribute to their children, the sheer rate of single motherhood would require a level and a rate of increase in male disfunction that seems implausible to us.

Whereas the early literature on single motherhood and out-of-wedlock fertility emphasized the lack of marriageable men, notably Wilson [1987], a view bolstered by stagnating or declining wages at the lower end of the skill distribution, this explanation is hard to reconcile with the across-the-board real wage growth between 1980 and 2005 [Autor and Dorn, 2013] – a period that saw out-of-wedlock fertility rise from 18 to 37 percent.

From a biological perspective, children are public goods to their parents, a feature that invites free-riding. Parenting may be conceived as a repeated game of voluntary contributions – in each period the parent decides whether to contribute, knowing the history of contributions by the other parent. We use the terms contribute and cooperate interchangeably as umbrella terms for actions that benefit the child at some cost to the parent. For instance, to cooperate may be to staying with the child and caring for it. Defecting can be either leaving the child altogether or being a delinquent parent in other ways.

The main contribution of this paper is to argue that subsistence requirements of the child can result in three cases depending on the resource strength of the parents: two-parent families may be maintained at "high-" and "low-resource" levels, but not at "middle-resource" levels. The rationale is that at high- and low-resource levels, defection by one parent can be credibly countered by defection by the other (mom). In the high-resource case, an abandoned mother can withdraw effort without seriously damaging the welfare of the child (e.g., less time for supervised homework). In the very-low-resource environment, an abandoned mother may not be able to support herself and her child and may therefore be better off also abandoning the child. In either case, the father's decision to leave would be punished by reduced contributions from the mother, amplifying the negative consequences of his decision. This is a typical prisoners' dilemma game and, as is now well known, socially beneficial cooperation can be sustained in a repeated setting if defection is punishable (the canonical reference being Axelrod [1984], also see Wahl and Nowak [1999] and references therein). Translated to parenting, the two-parent family may be maintained if parents match contributions: if one parent provides, so does the other; if one parent shirks, so does the other. In this way, the effect of each parent's action is amplified, thereby encouraging cooperation of

both parents. In the intermediate case, however, the abandoned mother may be able to maintain both the child and herself if she cooperates, but would lose the child if she reduced her contribution. In that case, a threat of defection is not be credible, limiting the ability of the mother to punish a delinquent father.

We present some empirical evidence for the U.S. using natality data for the years 1969-2008 and time use surveys for the years 1965, 1975, 1985, 2003, and 2012. We find that out-of-wedlock fertility and leisure patterns are largely consistent with our proposed model. Notably, in line with our model, but not with models emphasizing the role of public welfare (or female self sufficiency for other reasons), we find that out-of-wedlock fertility is non-monotone in maternal education, rising through the 11th year of completed schooling and then declining. In other words, instead of declining through out, out-wedlock fertility peaks at roughly the 20th percentile of the education distribution of mothers.

Furthermore, we find that the pattern of fertility as proxied by the proportion of nulliparous women (women giving birth to their first child) has changed. In 1969, the fraction of nulliparous mothers increased with the education level. In later years, however, this fraction increased through grade 11 and then followed a shallow-j pattern so that in 2008, the fraction of nulliparous mothers with 11 years of schooling was almost equal to that of women with more than four years of college. The rise in the ratio of nulliparous mothers with education through 11th grade coincides with the rise in out-of-wedlock fertility and is, we would argue, consistent with single mothers being "left holding the baby" rather than "welfare queens."

The decline in marriage reflects a number of trends that do not necessarily herald single motherhood or male defection from parenthood. Cohabiting but not married parents may shoulder the parenting burden equally, and fathers living apart from their children can still contribute to their upbringing. To shed some light on the practical significance of the decline in the traditional family, we also look at time use by gender and marital status. In particular, we analyze the changes in the time used for leisure and child care. We find large gender differences in leisure, and show that these differences are driven by the unmarrieds in the middle of the education distribution. Married men and women show expected differences in child care, but there is no overall gap in leisure. Among the unmarrieds, men do little child care and they enjoy a substantial leisure advantage over women. Ignoring 1965 (small sample size), the gap in leisure among the unmarrieds emerges between 1975 and 1985, is absent at the lower and higher ends of the education distribution, and is the greatest for high-school graduates.

2 Background

Our inquiry relates to a large literature on out-of-wedlock fertility and single motherhood that goes back to at least Myrdal [1944]. Wilson [1987] treatise on the urban poor pointed to a lack of "marriageable," i.e., employed, men. Thus measured, male scarcity increased between 1960 and 1980, a theme that chimed with stagnant or declining wages for low skilled men over the same period (e.g., Katz and Murphy [1992],

Juhn et al. [1993]. However, enter the 1980s and improved wage growth resulted in positive wage growth across the board between 1980 and 2005 [Autor and Dorn, 2013]. Still, out-of-wedlock fertility more than doubled over the same period.[1]

Single motherhood could be because men do not stay or because women want the child but reject the man. Papers emphasizing the male decision are Trivers [1972], Maynard Smith [1977], Akerlof et al. [1996], Willis [1999]. In Neal [2001] and Nechyba [2001], by contrast, the female is the decider. Edlund [2013] models marriage as trade in parental rights. A female reservation price above the male willingness to pay result in women keeping exclusive rights to the child, i.e., the child is born out of wedlock.

Akerlof et al. [1996] pointed to female controlled contraceptives and access to abortion as the reasons behind rising rates of out-of-wedlock fertility, decline in shot-gun marriages and feminization of poverty. In their model, men have no interest in children. With the diffusion of the pill and access to abortion, single motherhood rose because children went from being the fault of men to the choice of women. While single motherhood in their and our model is the result of male defection, we differ on two counts. First, in our model men care about children (but do not care about their partner) whereas in their model men may care about the partner but are indifferent to children. Second, our model predicts that the two-parent family may be sustained at the extremes of the resource distribution whereas, we believe, a reasonable interpretation of Akerlof et al. [1996] is that the two-parent family would be a high-end phenomenon (they do not model this explicitly, but assuming that guilt is easier to buy off for the rich, rich men would be more willing to marry).

By contrast, men care about children in Willis [1999], but in a quantity-quality trade-off, quantity may be favored, in which case out-of-wedlock fertility results. Many children requires many partners, all of whom can not be concurrent wives (assuming monogamy). Female sex ratios may make this route more tempting, and thus the high incarceration rate of Black inner-city males could have contributed to high out-of-wedlock fertility rates among African Americans. However, out-of-wedlock fertility has been rising steadily in places with balanced sex ratios, notably Western Europe.

Neal [2001] pointed to welfare payments as the reason for the rise of out-of-wedlock fertility. The typical never married woman in the 1960s was childless, in contrast with the ubiquity of non-marital childbearing of today. At the same time, the typical low-status woman has gone from being a married mother to being an unmarried mother. Viewed from that perspective, the change is the presence of the man, not the presence of the child. The role of welfare payments is disputed, however, given that the generosity in payments lines up poorly with trends in out-of-wedlock fertility. Still, welfare payments may have a role, but through oblique channels. For instance, it is possible that welfare payments can lessen social stigma, resulting in a continued growth of out-of-wedlock fertility despite a rollback of benefits [Nechyba, 2001].

In principle, the absence of a husband could be a good thing from the female

[1] Considering the entire period 1963-2005, wage growth was positive [Autor et al., 2008]. A reason to focus on wages rather than employment is that labor supply is endogenous to marital status, notably, unmarried men may work less. Wages, on the other hand, are largely outside the control of the individual.

perspective. Edlund [2013] pointed out that an unmarried mother is the sole default custodian, and most jurisdictions allow her to veto any attempt to establish paternity. Out-of-wedlock fertility results if women's income is sufficiently high relative to male income, since women are sellers and men buyers. However, the high rate of poverty among female-headed households chimes poorly with out-of-wedlock fertility as the result of women jettisoning men. In this paper, women's economic ascendancy also plays a role, but it backfires.

Turning to time use, our analysis of leisure time follows the work by Aguiar and Hurst [2007]. They combined data from different sources to study how time use and habits have changed over time. They found that between 1965 and 2003-2005 leisure time increased for both men and women, but the increase was driven by the low educated (the high educated actually decreased their leisure time). Meyer and Sullivan [2008] analyzed changes in consumption, income, and leisure of single and married mothers and found that between 1993 and 2003, compared to married mothers, single mothers increased market work, education, and leisure, and decreased non-market work and child care. Attanasio et al. [2012] also looked at consumption, income, and and leisure, and compared low-income and high-income individuals. They found that between 1985 and 2003-2007 higher-income individuals experienced a faster rise in consumption and a smaller increase in leisure. They found a similar qualitative pattern for men and women, although the pattern is more pronounced for men. Parker and Wang [2013] studied how parents living with their children spend their time, and found that between 1965 and 2011 the role of fathers and mothers converged, with fathers doing more housework and child care, and mothers doing more paid work outside the home. The amount of time spent with children went up for both fathers and mothers. Even though fathers increased their time with children more than mothers, however, mothers still spend about twice as much time with their children.

Our paper is also related to a large body of work in evolutionary biology. Internal fertilization combined with the ability of one parent to raise the young has been pointed out as an important reason why it is the mother, not the father, who is left holding the baby. In species with external fertilization, parental care (if positive) is often performed by the male [Dawkins and Carlisle, 1976]. Trivers [1972] highlighted children as public goods to their parents and the potential for the father's input to be facultative as sources of cooperation and conflict between the sexes. Maynard Smith [1977] linked family forms to the male and female pay-off functions, but did not elaborate on why the pay-off functions would take a particular form. His focus was on variation across animal species, although in principle the framework could be applied to variation in parenting patterns within a species. Like humans, birds have offspring that require parental care. Birds are notable for the high incidence of bi-parental care. A recent study of the Great Tit found parents to escalate/de-escalate feeding efforts in tandem with the partner's feeding efforts, despite the variability in nourishment to which this exposes the chicks [Johnstone et al., 2014]. Tit-for-tat as a winning strategy gained prominence with Axelrod's pathbreaking experiments [Axelrod, 1984]. Game theory has been applied to a number of topics in family economics, but to the best of our knowledge, ours

is the first paper to propose free riding as more tempting in the middle of the skill distribution as an explanation for male pullback in that income segment.

3 Model

A man and a woman who produce a child can care (cooperate) or not (defect) for their child. The terms care, contribute, and cooperate will be used interchangeably to denote an activity that raises child quality at some cost to the parent. For simplicity, to care ($e = 1$) costs $c > 0$, whereas not to care ($e = 0$) is assumed to be free.

Men and women can be of different quality i uniformly distributed on the unit interval for both sexes. Matching is positive assortative and we abstract from the decision to have a child: man i matches with woman i and they produce a child of quality q_k^i, where $k = 0, 1, 2$ indicates the number of caring parents,

$$0 < q_0^i < q_1^i < q_2^i. \tag{1}$$

Higher quality parents produce higher quality children at every level of combined parental effort:

$$q_k^i < q_k^j, \text{ for } i < j, \ k = 0, 1, 2. \tag{2}$$

Our key assumption is that there is a minimum child quality $\underline{q}$ below which parenthood becomes useless. This could be an absolute threshold set by physiological demands of survival or a socially determined threshold, for instance a level of child welfare that would trigger the loss of custody or intervention by child services. We could let $\underline{q}$ vary with the quality level of the parents as long as higher quality parents find it easier to surpass their particular $\underline{q}$, but we settle for the simpler formulation of a society-wide level.

The child is a public good to its parents and the individual parental pay-off is some function of child quality, net of the cost of any effort exhorted and subject to child quality being above the threshold quality $\underline{q}$. For simplicity, let us assume that the parental pay-off function is:

$$\pi(q_k^i, e) = \begin{cases} q_k^i - \mathbb{1}_e c & \text{if } q_k^i > \underline{q}; \\ 0 - \mathbb{1}_e c. & \text{if } q_k^i < \underline{q}, \end{cases} \tag{3}$$

where $c > 0$ is the cost of effort $e = 1$, and

$$\mathbb{1}_e = \begin{cases} 1 & \text{if } e = 1; \\ 0 & \text{if } e = 0. \end{cases}$$

To focus on the single vs dual-parenting outcome, we assume that all men and women are of sufficient quality to meet the threshold child quality if both parents contribute to the child, that is, $q_2^0 > \underline{q}$, and that the payoff to having a child is positive if both parents contribute to the child, that is $q_2^0 > c$. We further truncate the strategy

space by assuming that if the father decides to stay, the mother also stays.[2] Thus, the key question determining single motherhood in this framework is whether the father decides to leave or to stay.

For defection (father leaves) to be a threat to the two-parent outcome, it must be that

$$q_1^i > q_2^i - c, \tag{4}$$

and for the mother to defect in response to defection, it must be that

$$q_0^i > q_1^i - c, \tag{5}$$

which we assume henceforth. These restrictions are bounds on the production function limiting q_0^i and q_2^i to be within a distance c of q_1^i.

Tables (1)-(3) present the pay-offs to successively lower quality parents.

In case parents are of such high quality that even if a single mother neglects her child, the child's quality meets the subsistence standard, that is $\underline{q} < q_0$, then the pay-off matrix is as given in Table (1):

Table 1: High-Quality Parents

		Mom	
		Defect	Cooperate
Dad	Defect	q_0, q_0	$q_1, q_1 - c$
	Cooperate	n.a.	$q_2 - c, q_2 - c$

For lower quality parents, the single mother meets the threshold quality requirement only if she cares for the child. That is, $q_0 < \underline{q} < q_1$. In this case $\pi(q_0, 0) = 0$, and thus the payoffs are as given in Table (2). Note that if $q_1 - c > 0$, then the deserted mother will cooperate. In other words, the subsistence constraint may make it individually rational for a single mother to cooperate, a response that removes the check on paternal defection.

Table 2: Middle-Quality Parents

		Mom	
		Defect	Cooperate
Dad	Defect	$0, 0$	$q_1, q_1 - c$
	Cooperate	n.a.	$q_2 - c, q_2 - c$

For Table (2) to be the relevant pay-off matrix, single parenting must be feasible. That is, single parenthood presupposes a certain ability of single parents. Absent such ability, parenting, if observed would be dual. To see this, note that if $q_1 < \underline{q} \Rightarrow \pi(q_0, 0) = \pi(q_1, 1) = 0$, and the payoffs are as detailed in Table (3).

[2]This assumption is consistent with internal fertilization, which allow the father to abandon the child earlier than the mother.

Table 3: Low-Quality Parents

		Mom	
		Defect	Cooperate
Dad	Defect	$0, 0$	$0, -c$
	Cooperate	n.a.	$q_2 - c, q_2 - c$

Example: Let us assume that the cost of effort is 10 ($c = 10$) and that the subsistence threshold quality is 15 ($\underline{q} = 15$). Furthermore, let us focus on three couples – a high-, a medium- and a low-quality couple. Child qualities are assumed to be as given in Table (4):

Table 4: Child Quality

	Parent Quality		
k	High	Medium	Low
2	30	25	21
1	23	18	14
0	19	14	10

k is the number of co-operating (caring) parents.

The corresponding payoffs are in Table (5). From top to bottom, the panels illustrate the pay-off matrices of successively poorer parents. The payoffs for the high quality parents are an example of the classic prisoners dilemma. The socially optimal pair of strategies is that both parents care (cooperate). Unilateral deviation is privately rewarding in the one shot game. However, faced with defection, the abandoned parent is better off also defecting. The (defect,defect) outcome is worse than the (cooperate,cooperate) outcome for both parents. Thus, the threat of meeting defection with defection may maintain the two-parent family (cooperate,cooperate) in a repeated game.

For the low quality parents, there is no temptation to defect because the drop in child quality from defecting punishes the defecting parent sufficiently. As the example is set up, the defecting father is indifferent between whether the child is cared for by its mother or not, but one could easily think of a situation where he would be better off if the mother cared for the child and that could reinforce his staying with the mother since the mother has an incentive to not care for the child if faced with defection.

For the middle quality parents, however, socially suboptimal paternal defection is not parried by defection by the mother. The mother is clearly worse off if the father defects, but she is better off caring for the child than also defecting herself. Therefore, there is no credible punishment of defection and the father gains from so doing (his payoff goes from 15 to 18) at the expense of the mother (her payoff goes from 15 to 8) and the child (child quality goes from 25 to 18).

Proposition 1 *Assume that child qualities and paysoffs are as given in (1)-(3). Also assume that there exists a segment* $Q \subset I = [0, 1]$ *such that* $\forall i \in Q$ $q_1 - c > 0$.

Table 5: Payoffs

		Mom	
		Defect	Cooperate
a. High Quality Parents.			
$q_0 = 19 > \underline{q} = 15$			
Delinquent single parenthood feasible			
Dad	Defect	19,19	23,13
	Cooperate	n.a.	20,20
b. Middle Quality Parents			
$q_1 = 18 > \underline{q}15 > q_0 = 14$			
Delinquent single parenthood not feasible			
Dad	Defect	0,0	18,8
	Cooperate	n.a.	15,15
c. Low Quality Parents			
$\underline{q}15 > q_1 = 14$			
Single parenthood not feasible			
Dad	Defect	0,0	0,-10
	Cooperate	n.a.	11,11

Then, there exists a segment $S \subset Q$ such that $i \in S$ are single mothers and $i \notin S$ are two-parent families. S may be empty.

The model's predictions are summarized in Figure (1), where single motherhood results for parental qualities $i \in S = (L, H)$. The lower bound L is defined by $l : q_1^l = \underline{q}$ and the upper bound H is defined by $h : q_0^h = \underline{q}$. From the assumptions about child quality (increasing in parental quality and in number of parents who cooperate), we know that l and h are unique and that $l \leq h$. However, there may be corner solutions: $l < 0 \Rightarrow L = 0$; $h < 0 \Rightarrow H = 0$; $l > 1 \Rightarrow L = 1$; $h > 1 \Rightarrow H = 1$. If $L = H = 0$ or $L = H = 1$, then S is empty.

Unfortunately, and as is clear from this figure, the interval with single parents may be empty, at the lower, middle or upper end of the quality distribution depending on the child production function and the threshold quality level. Thus, the model does not predict the cross sectional pattern of single motherhood.

Still, it can provide a theoretical explanation for the observed pattern of single motherhood in the U.S. What accounts for the rise in single motherhood? Why was it in the 1960s so low and lacking the strong negative gradient with respect to socio-economic status as measured by education that is evident in later years? One possibility is that in the 1960s society fell into third case (Table 3). That is, social norms (and economic reality to some extent) were such that unmarried motherhood was untenable for most, not just for the indigent. Clearly, the 1960s was not a time where an unmarried mother and her child would have starved to death, but for a middle class woman unmarried motherhood could have resulted in a social death of sorts. Other than accounts from the time, we know that it was not uncommon for young unmarried mothers to give up their

children for adoption, a practice that in the late 1960s/early 1970s dropped drastically with greater access to birth control (primarily the Pill) and legalization of abortion. If most unwed mothers abandon their children, then most fathers choose to marry the mother of their children, our model predicts. Unmarried motherhood happens, but for reasons extraneous to the model proposed here. Fast forward a couple of decades and unmarried mothers no longer give up their children. Our model then predicts out-of-wedlock fertility not among the well off or the destitute, but in some middle, just-scraping-by, segment. Greater affluence in general, greater ability of women to provide in particular (from their wage work or public assistance), perhaps abetted by changes in social norms, are candidate explanations for the change since the 1960s.

4 Empirical Evidence

In this section we provide some empirical evidence regarding the evolution of out-of-wedlock fertility and leisure by socio-economic status and show that they are consistent with our model. We measure socio-economic status with educational attainment. A reason for choosing educational attainment rather than income or income-based measures is that education is a reasonable proxy for earning potential and avoids the obvious problem that lower household income for single mothers follows almost mechanically from the absence of a second (male) earner. An added advantage of using education when comparing men and women's leisure is that educational homogamy (higher in recent years) means that when we compare men and women at a given education level, we are to a high degree comparing people married to each other or, in the case of singles, people who could be married to each other.

We study out-of-wedlock fertility because it is well measured and may be a reasonable proxy for single motherhood. That is not to say that all unmarried mothers are or become single mothers, or that single mothers were all unmarried at the time of giving birth. Women giving birth while unmarried may marry or cohabitate with the child's father. Conversely, many single mothers are single via marriage and divorce. Still, the pattern of out-of-wedlock fertility, over time and in the cross-section, resembles that of single motherhood. It has seen a significant increase since the 1960s and it is predominant among the lower classes.

The decline in marriage does not necessarily imply male defection from parenthood. A cohabiting but not married father may shoulder the parenting burden as much as the mother, like a father living apart from his children may contribute to them. Thus, to understand the practical significance of the decline in the traditional family, we examine time use patterns by gender and marital status over the past six decades. To measure the effort (or lack of it) that parents put into raising their children, we analyze the time that men and women spend on leisurely activities. If parents were to adopt a tit-for-tat strategy, we would expect men and women to have a similar level of leisure time. On the other hand, if one of the parents were to defect, we would expect a gap in the leisure time of the two parents.

4.1 Out-of-Wedlock Fertility

We use NCHS's Vital Statistics Natality Birth Data, obtained from `http://www.nber.org/data/natality.html`.

Ideally, we would like to limit our sample to U.S.-born women because culture and education likely correlate. For instance, women with fewer years of education than legally mandated in the United States may have been raised outside the United States in environments that place more or less emphasis on non-marital child bearing. The natality data contain race but not country of origin of the mother, and therefore we settle for restricting our sample to white women.

Figure (2) shows that while in 1969, non-marital childbearing declined monotonically with education, in the later years a clear hump-shape appears with a peak at 11 years of education. Furthermore, the hump rises and moves to the left.

Figure (3) shows the successive years in the same graph. Two things jump out. First, out-of-wedlock fertility has barely moved among the 20 percent best educated mothers in the past four decades. Second, out-of-wedlock fertility is heavily concentrated among the 20 percent least educated educated.

Figure (4) shows out-of-wedlock fertility rates by grade completed and we see that the largest increase has been among mothers with one year short of high school (11th grade). 11th grade also stands out in the cross section, out-of-wedlock fertility rises or is flat through this grade, and then declines.

As for fertility, we calculate the proportion of nulliparous women (women giving birth to their first child) and find that the pattern with respect to education has changed. Figure (5) shows that while in 1969 the fraction of nulliparous mothers increased with the education level, in later years it increased through grade 11 and then followed a shallow-j pattern. In 2008, the fraction of nulliparous mothers among mothers with 11 years of schooling was almost equal to that of mothers with more than four-year college. The rise in the fraction of nulliparous mothers through 11th grade coincides with the rise in out-of-wedlock fertility, and is, we would argue, consistent with single mothers being "left holding the baby" rather than welfare queens.

4.2 Leisure and Child Care

Following Aguiar and Hurst [2007], we analyze time-use patterns drawing on different data sources. For the years 1965, 1975, and 1985, we use data provided by Aguiar and Hurst [2007]: Americas Use of Time (1965-1966); Time Use in Economics and Social Accounts (1975-1976); and Americans Use of Time (1985). For the years 2003 through 2012, we use the American Time Use Survey, 2003-2012. Aguiar and Hurst [2007] provided time use data for 1992-1994 based on the National Human Activity Patterns Survey. However, because these data do not contain information on the respondents marital status, we do not include them in our analysis.

Our measure of leisure corresponds to the first of the four measures proposed by Aguiar and Hurst, and only includes time spent on the activities that are pursued for personal enjoyment: socializing, relaxing, reading, watching tv, exercising, etc. We

restrict the analysis to respondents aged 25 to 45. Ideally, we would like to compare single mothers with the fathers of their children. However, because fathers not living with their children may not report the existence of their child, we compare unmarried women with unmarried men, under the assumption that for every unmarried mother there is an unmarried father. Similar to the restriction that we placed on the natality data, we would like to restrict our analysis to whites only. However, because the 1985 data does not contain information on respondents' race, we include all races. To confirm that the trends that we observe are not driven by immigrants, we also analyze the 2003-2012 data for whites only.

Figure (6) and (7) show that in the 1960s and 1970s there is little in terms of a leisure gender gap. However, by 1985 a gender gap in favor of men is emerging and in 2003 and 2012 there is a substantial gap in favor of men outside the lowest educated decile.

Figures (8) and (9) show men and women's leisure by marital status. Among the marrieds, there is no gender gap in leisure through 1985 and the gap that is evident in 2003 and 2012 is much smaller than the gap among the unmarried in the same years. For instance, in 2012, the gender gap among high school graduates was ten hours in favor of men among the unmarried. Figures (10) and (11) add child care to leisure hours. We can see that the gender gap in leisure is almost entirely driven by women doing more child care.

Women are also more likely to be engaged in child care while they do some other primary (leisurely) activity. Figures (12) and (13) compare the time that married and unmarried men and women spend on leisurely activity without the presence of a child. As it is clear from Figures (14) and (15), married men enjoy about 5 hours of leisure more than married women, while the gender gap for unmarried men and women is between 10 and 15 hours.

In sum, the gender gap in leisure appears to be driven by the unmarried. Unmarried men doing very little child care account for the unmarried women enjoying fewer hours of leisure than unmarried men. There is a gender gap in child care among marrieds as well, although it is less pronounced, and more importantly, women's doing more child care is offset by male activities other than leisure. Thus, the growing gender leisure gap, incipient in 1985 and manifest by 2003, can be attributed to a decline in marriage and to the leisure advantage of unmarried men.

5 Discussion/Results

TBA

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6 Graphs

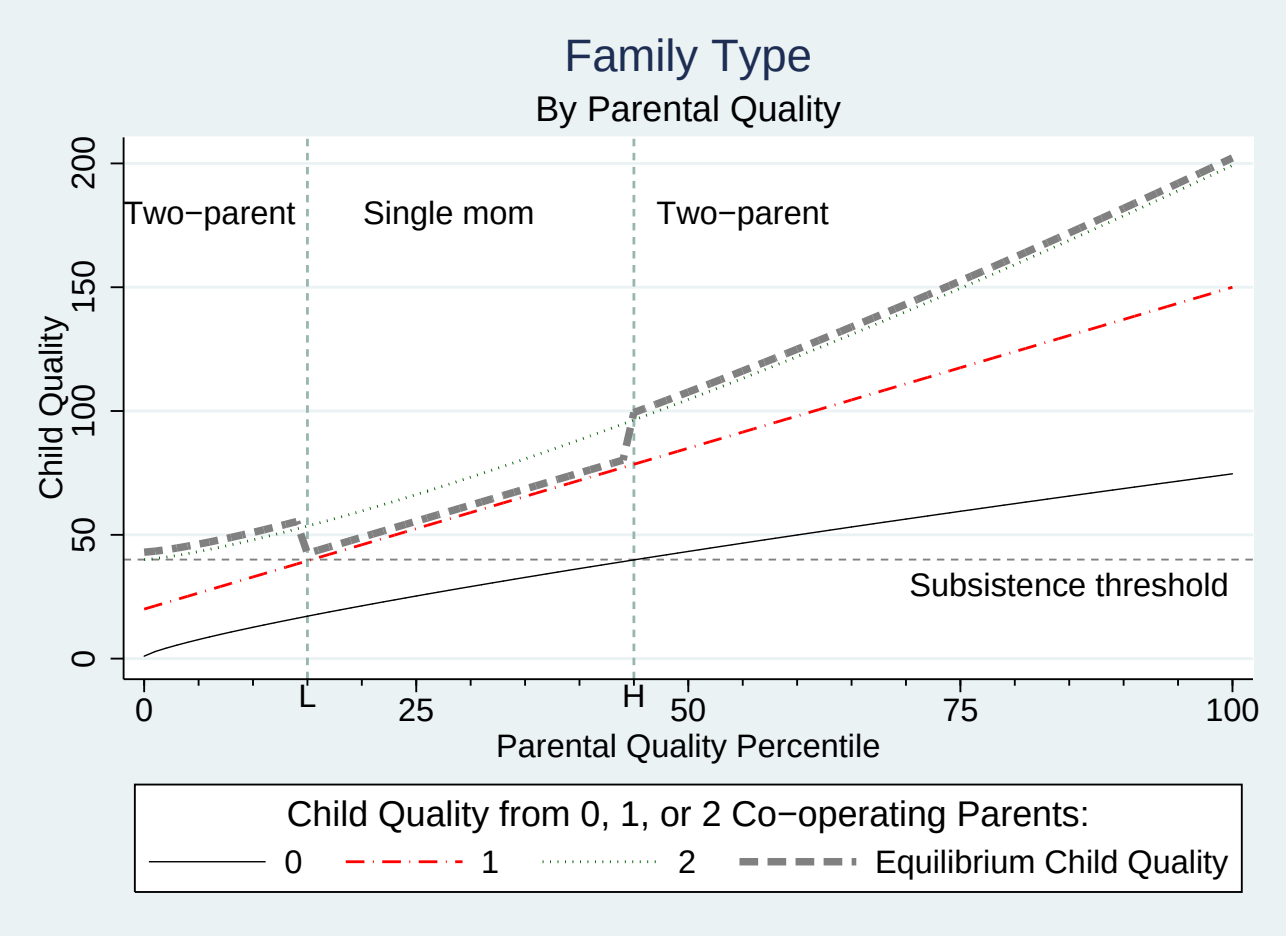

Figure 1: – FModel

Men of quality $i \in (L, H)$ interval defect resulting in single motherhood for women of the same quality. For parental qualities outside this interval, parenting is dual.

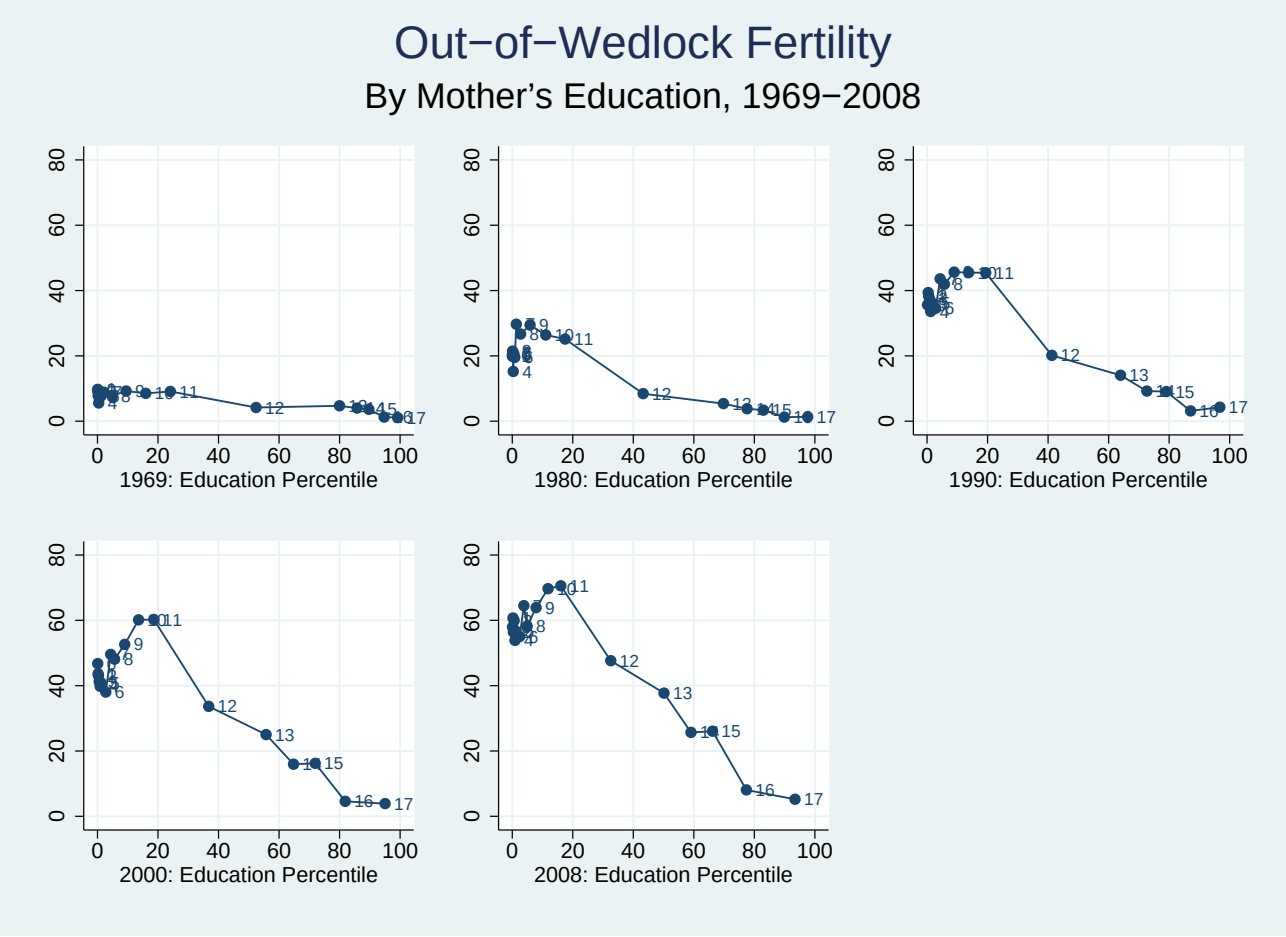

Figure 2: – EdOutPanel

The data point is the midpoint of the percentile. For instance, if 20 percent of women have just college and 10 percent have more than college, the respective data markers are at 80 and 95th percentile.

Each successive data point corresponds to one additional year of education, except the last one which is four-year college or more.

We exclude observations for which education or marital status is missing. For 1968 and 2009 and onwards, there is no information on maternal education.

Restricted to Whites only.

Source: National Center for Health Statistics (1969-2008)

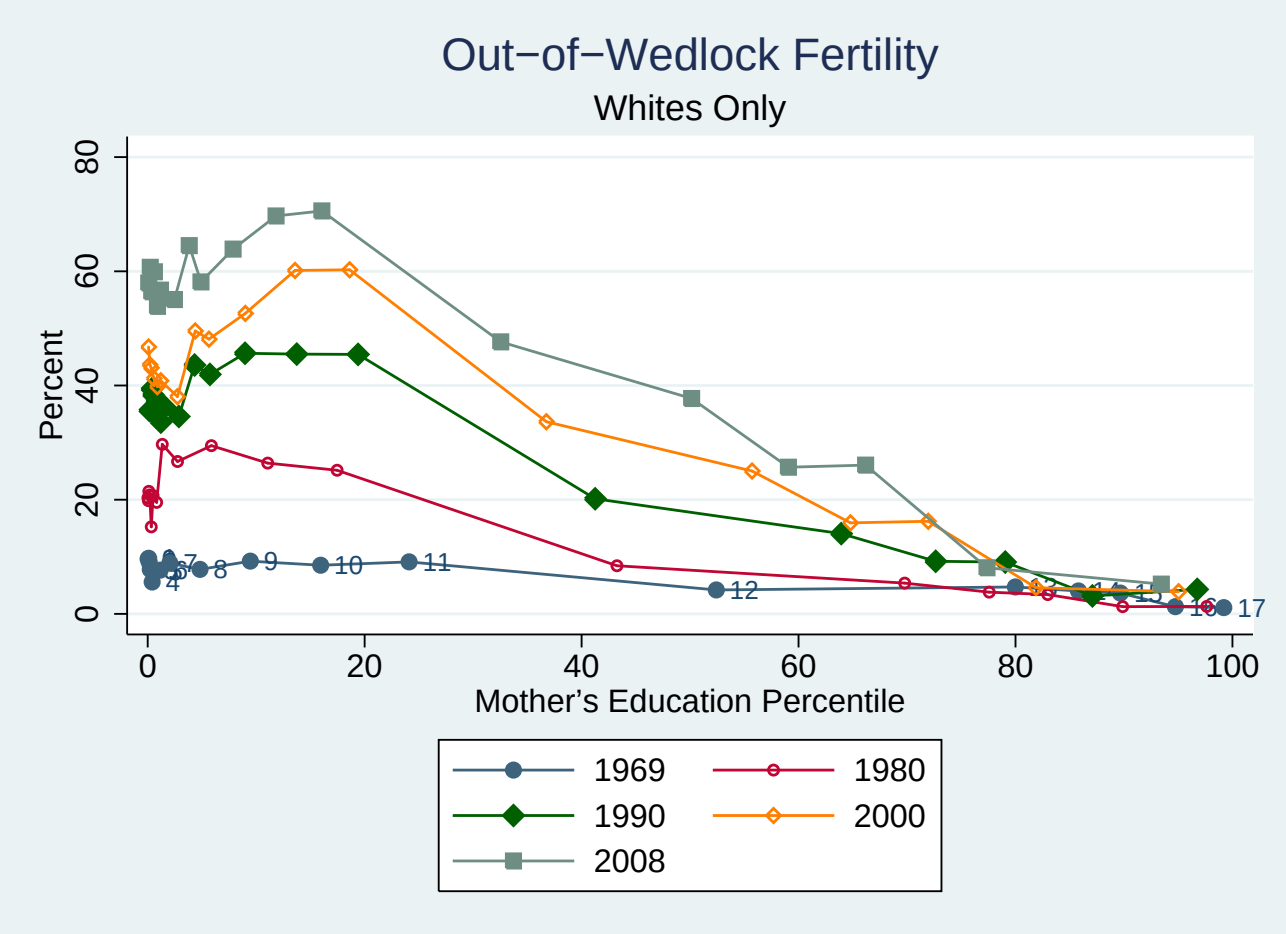

Figure 3: – EdOutPctl

The data point is the midpoint of the percentile. For instance, if 20 percent of women have just college and 10 percent have more than college, the respective data markers are at 80 and 95th percentile.

Each successive data point corresponds to one additional year of education, except the last one which is four-year college or more.

We exclude observations for which education or marital status is missing. For 1968 and 2009 and onwards, there is no information on maternal education.

Restricted to Whites only.

Source: National Center for Health Statistics (1969-2008)

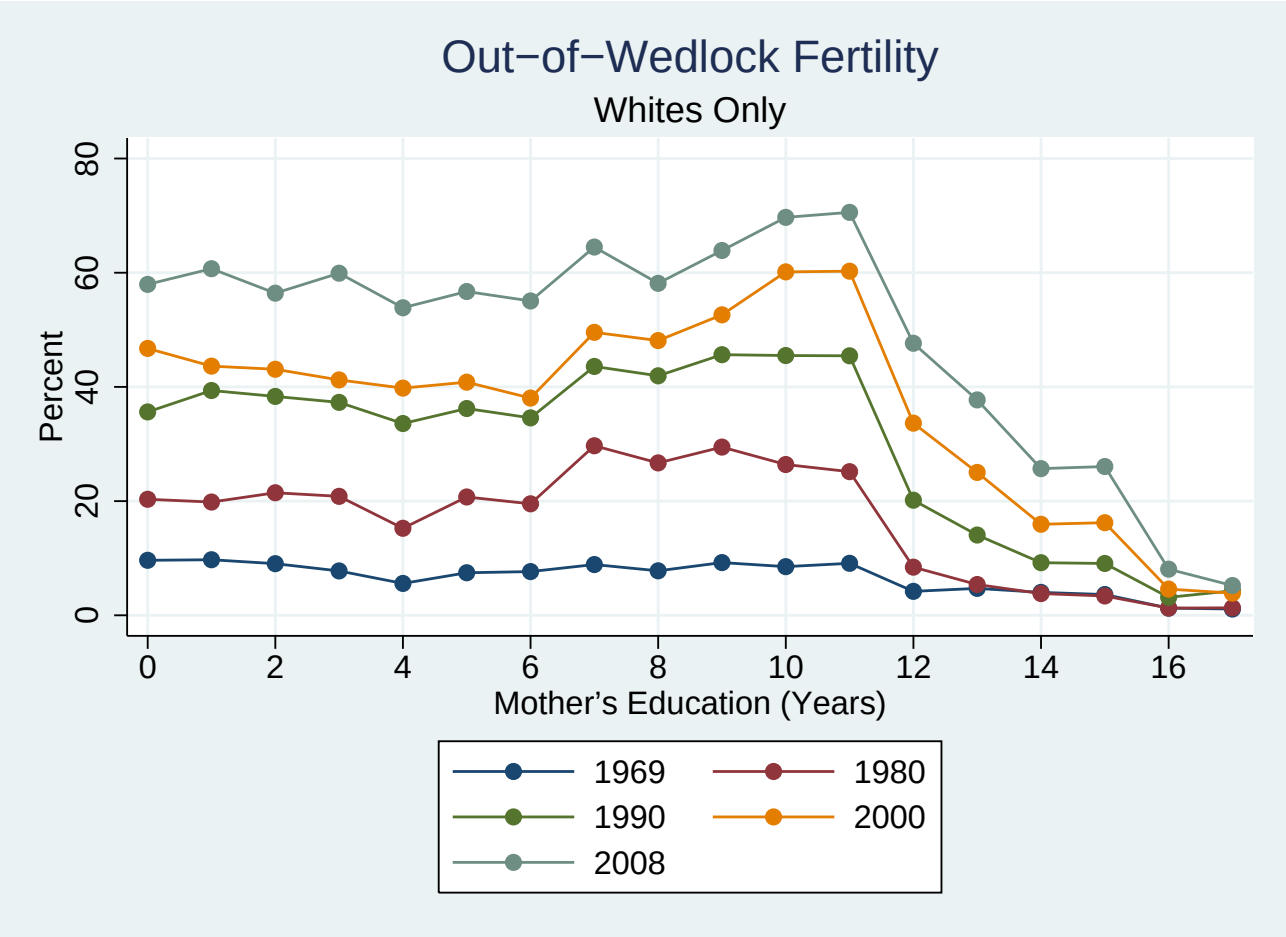

Figure 4: – EdOutEd

Each successive data point corresponds to years of education, except the last one which is four-year college or more.

We exclude observations for which education or marital status is missing. For 1968 and 2009 and onwards, there is no information on maternal education.

Restricted to Whites only.

Source: National Center for Health Statistics (1969-2008)

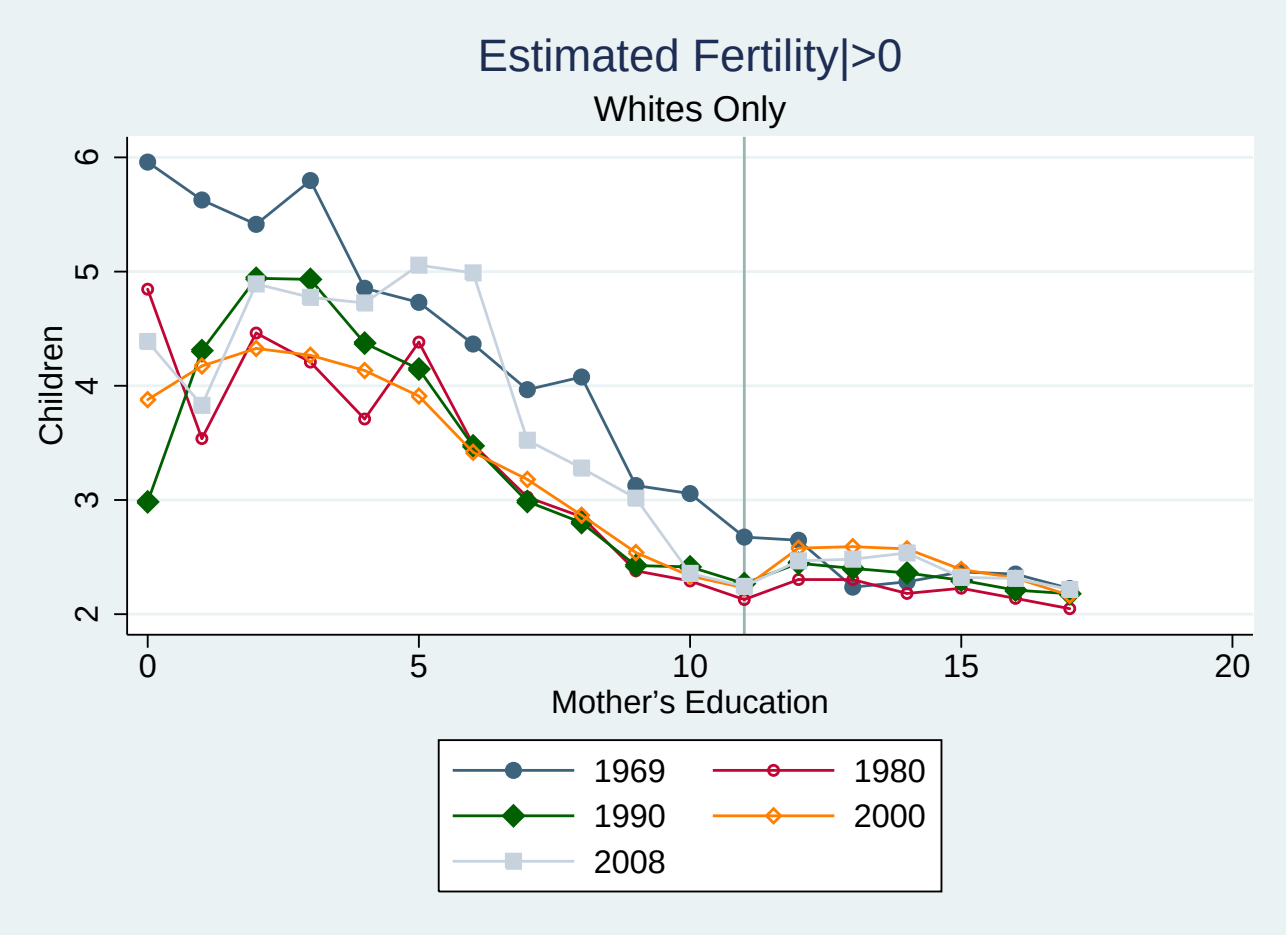

Figure 5: – Fertility

The graph shows the inverse of the fraction of births that are first births. In a world where women give birth to one child only, the fraction first births is 1 and its inverse is 1. This number thus gives an estimate of fertility in "steady state", conditional on giving birth.

For 1968 and 2009 and onwards, there is no information on maternal education. Restricted to Whites only.

Source: National Center for Health Statistics (1969-2008)

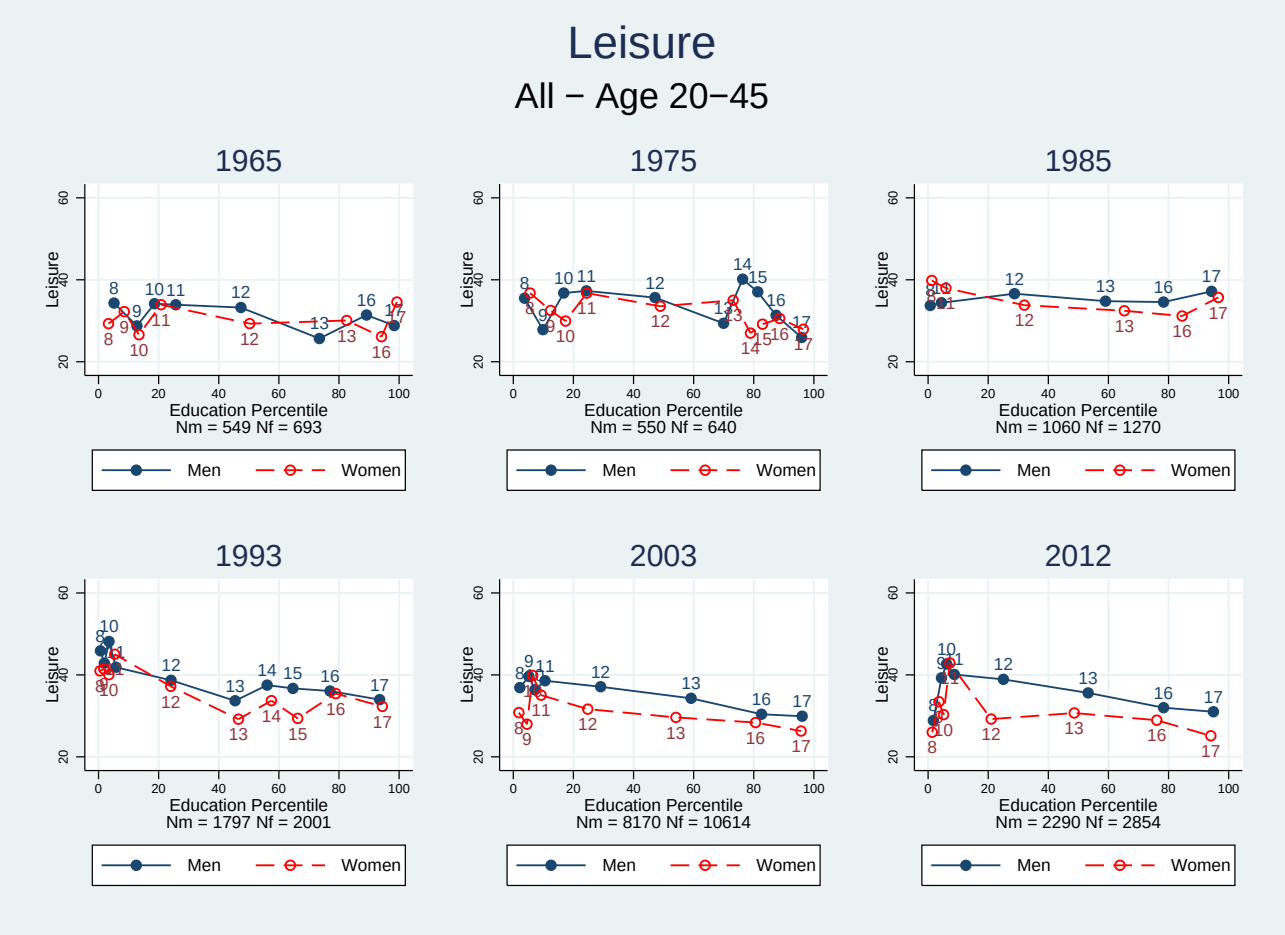

Figure 6: – Leisure1All

Leisure is measured as hours/week.

The data point is the midpoint of the percentile. For instance, if 20 percent of women have just college and 10 percent have more than college, the respective data markers are at 80 and 95th percentile.

Each successive data point corresponds to one additional year of education, except the last one which is four-year college or more and the first one which is 8 years or less.

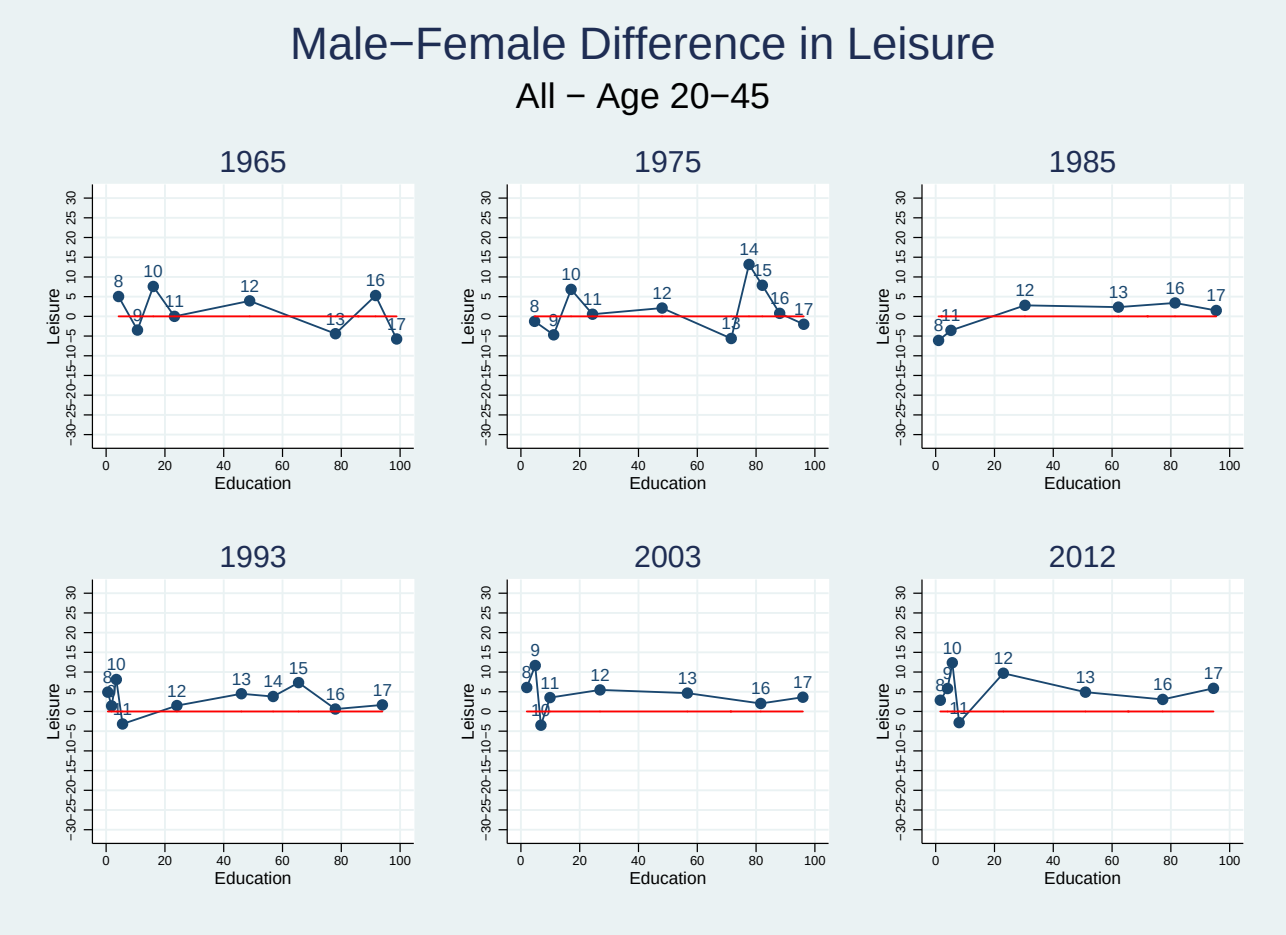

Figure 7: – diffLeisure1All

Leisure is measured as hours/week.

Each data point is the average of the midpoints of the percentiles for men and women.

Each successive data point corresponds to one additional year of education, except the last one which is four-year college or more and the first one which is 8 years or less.

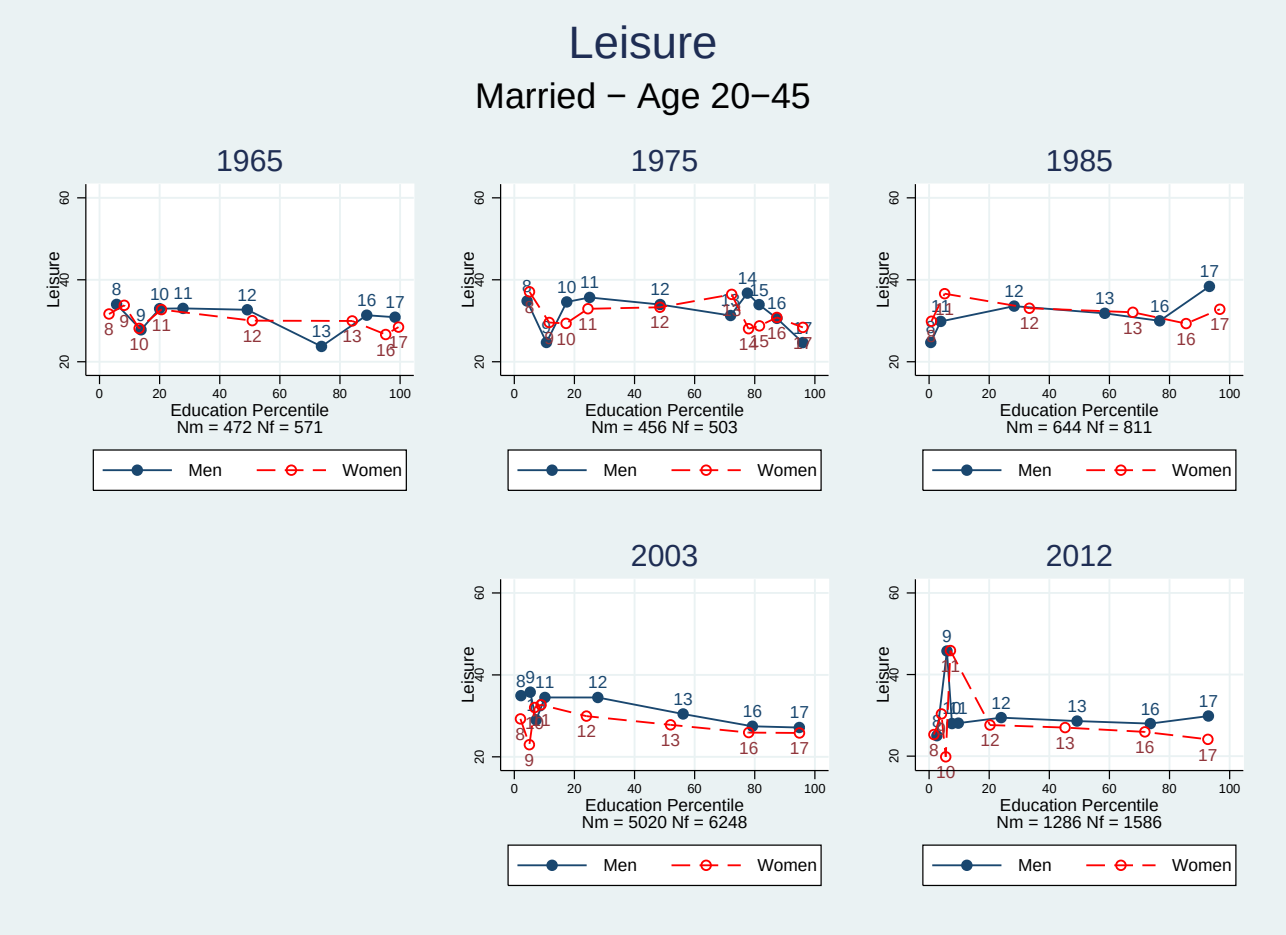

Figure 8: – Leisure1Married

Leisure is measured as hours/week.

The data point is the midpoint of the percentile. For instance, if 20 percent of women have just college and 10 percent have more than college, the respective data markers are at 80 and 95th percentile.

Each successive data point corresponds to one additional year of education, except the last one which is four-year college or more and the first one which is 8 years or less.

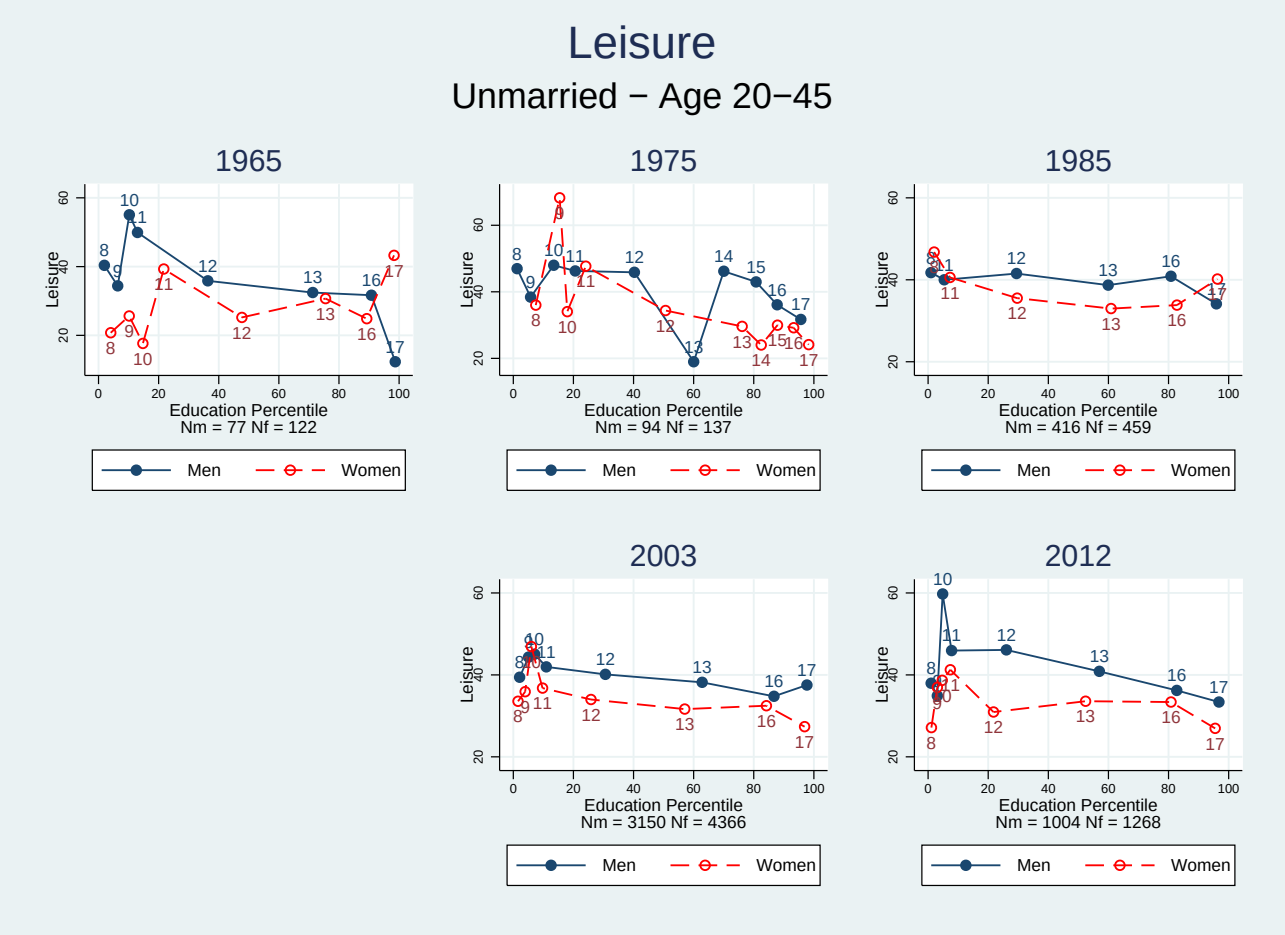

Figure 9: – Leisure1Unmarried

Leisure is measured as hours/week.

The data point is the midpoint of the percentile. For instance, if 20 percent of women have just college and 10 percent have more than college, the respective data markers are at 80 and 95th percentile.

Each successive data point corresponds to one additional year of education, except the last one which is four-year college or more and the first one which is 8 years or less.

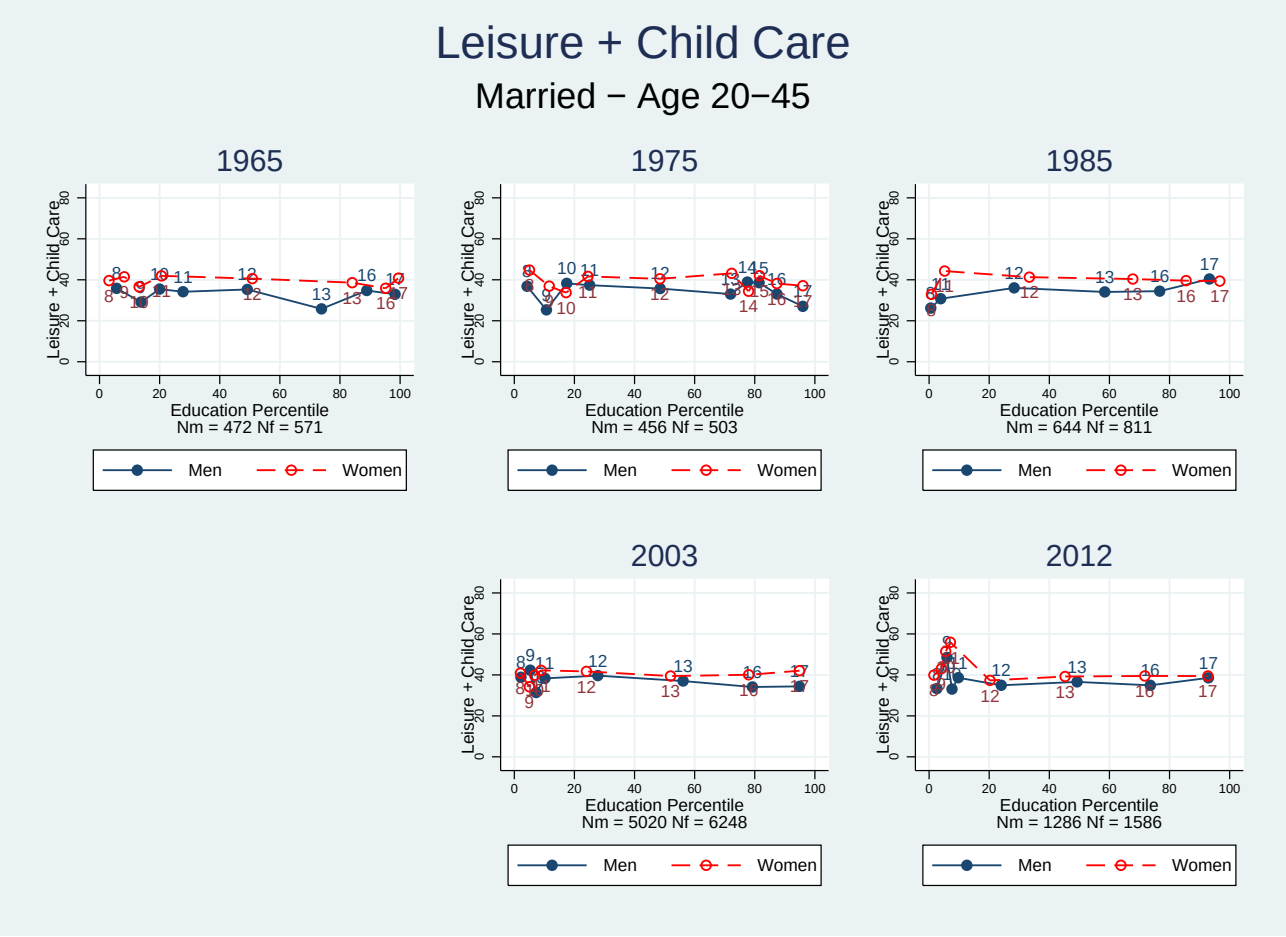

Figure 10: – LeisureCCMarried

Leisure and care are measured as hours/week.

The data point is the midpoint of the percentile. For instance, if 20 percent of women have just college and 10 percent have more than college, the respective data markers are at 80 and 95th percentile.

Each successive data point corresponds to one additional year of education, except the last one which is four-year college or more and the first one which is 8 years or less.

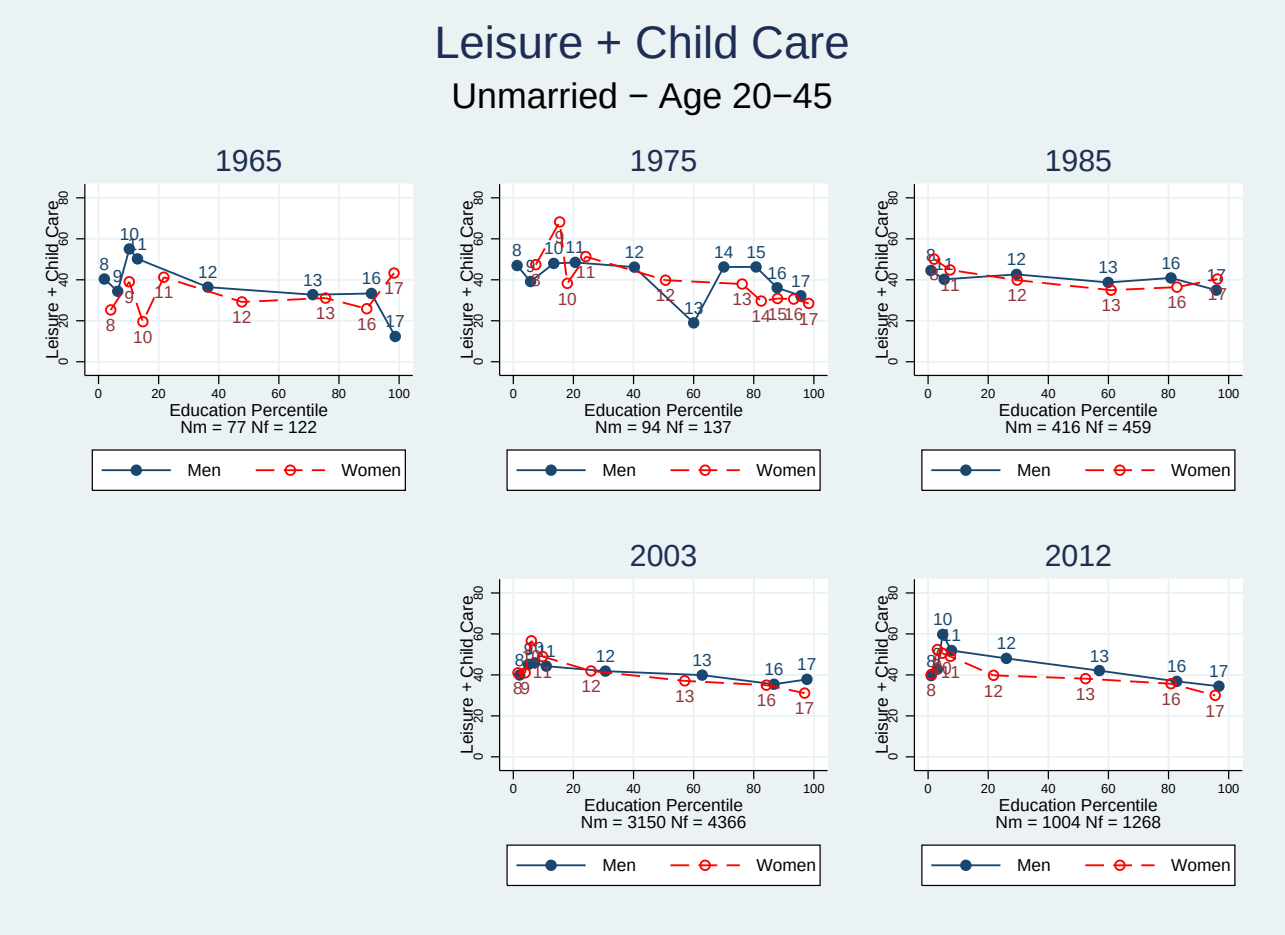

Figure 11: – LeisureCCUnmarried

Leisure and care are measured as hours/week.

The data point is the midpoint of the percentile. For instance, if 20 percent of women have just college and 10 percent have more than college, the respective data markers are at 80 and 95th percentile.

Each successive data point corresponds to one additional year of education, except the last one which is four-year college or more and the first one which is 8 years or less.

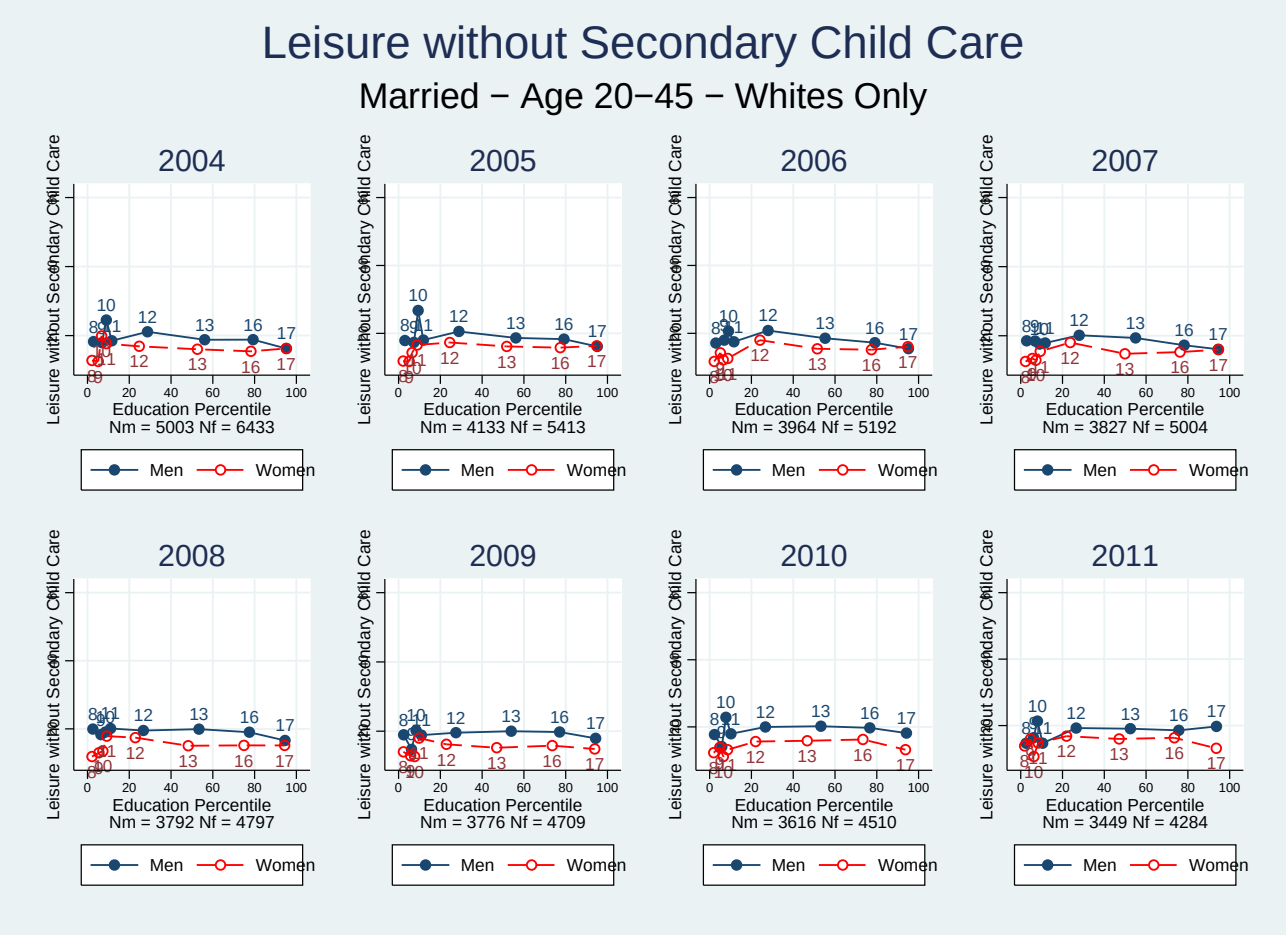

Figure 12: – Leisure1aloneMarried

Leisure is measured as hours/week and does not include the time spent while also looking after children. Each graph represents the three-year moving average centered in that year.

The data point is the midpoint of the percentile. For instance, if 20 percent of women have just college and 10 percent have more than college, the respective data markers are at 80 and 95th percentile.

Each successive data point corresponds to one additional year of education, except the last one which is four-year college or more and the first one which is 8 years or less.

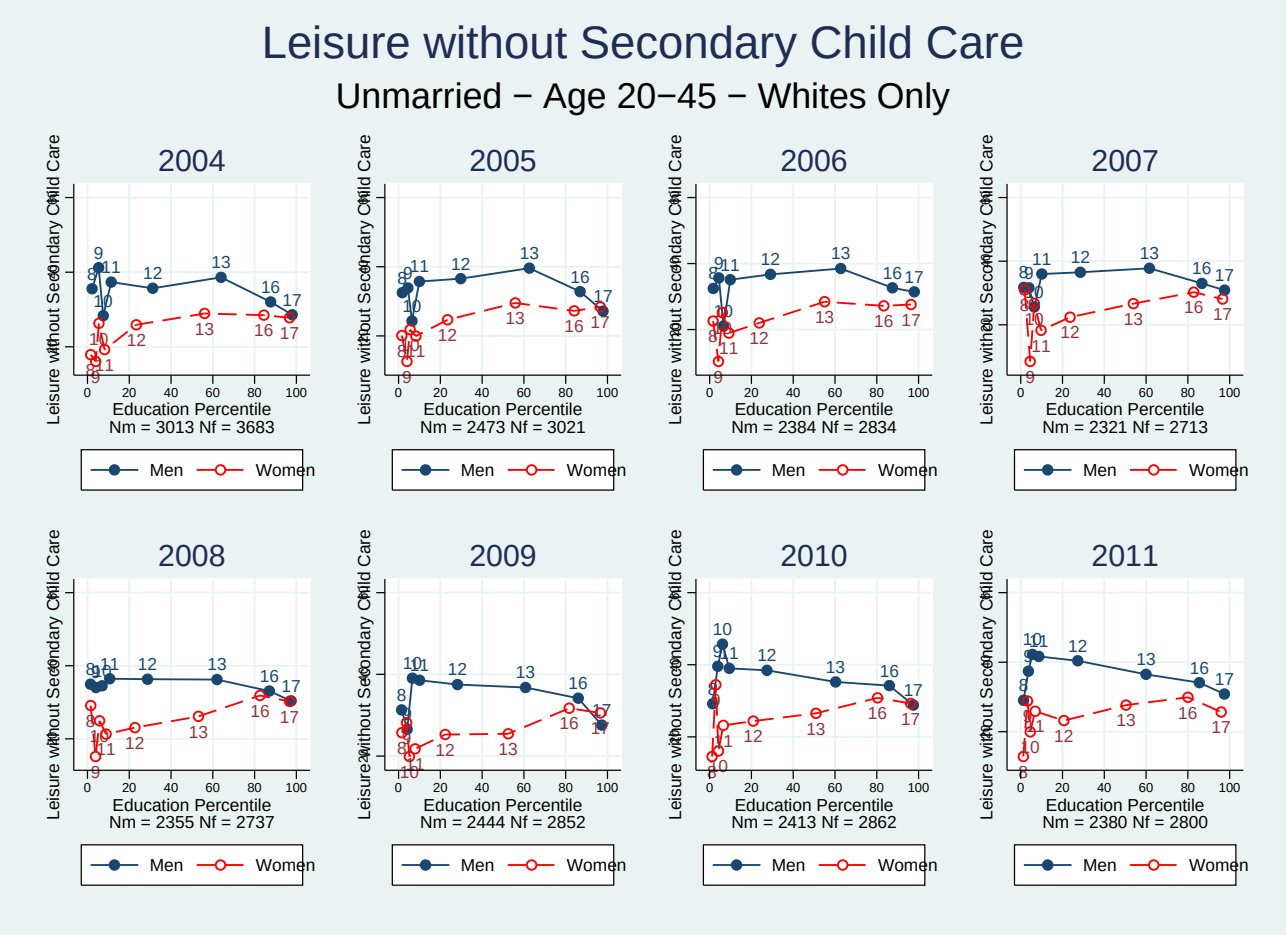

Figure 13: – Leisure1aloneUnmarried

Leisure is measured as hours/week and does not include the time spent while also looking after children. Each graph represents the three-year moving average centered in that year.

The data point is the midpoint of the percentile. For instance, if 20 percent of women have just college and 10 percent have more than college, the respective data markers are at 80 and 95th percentile.

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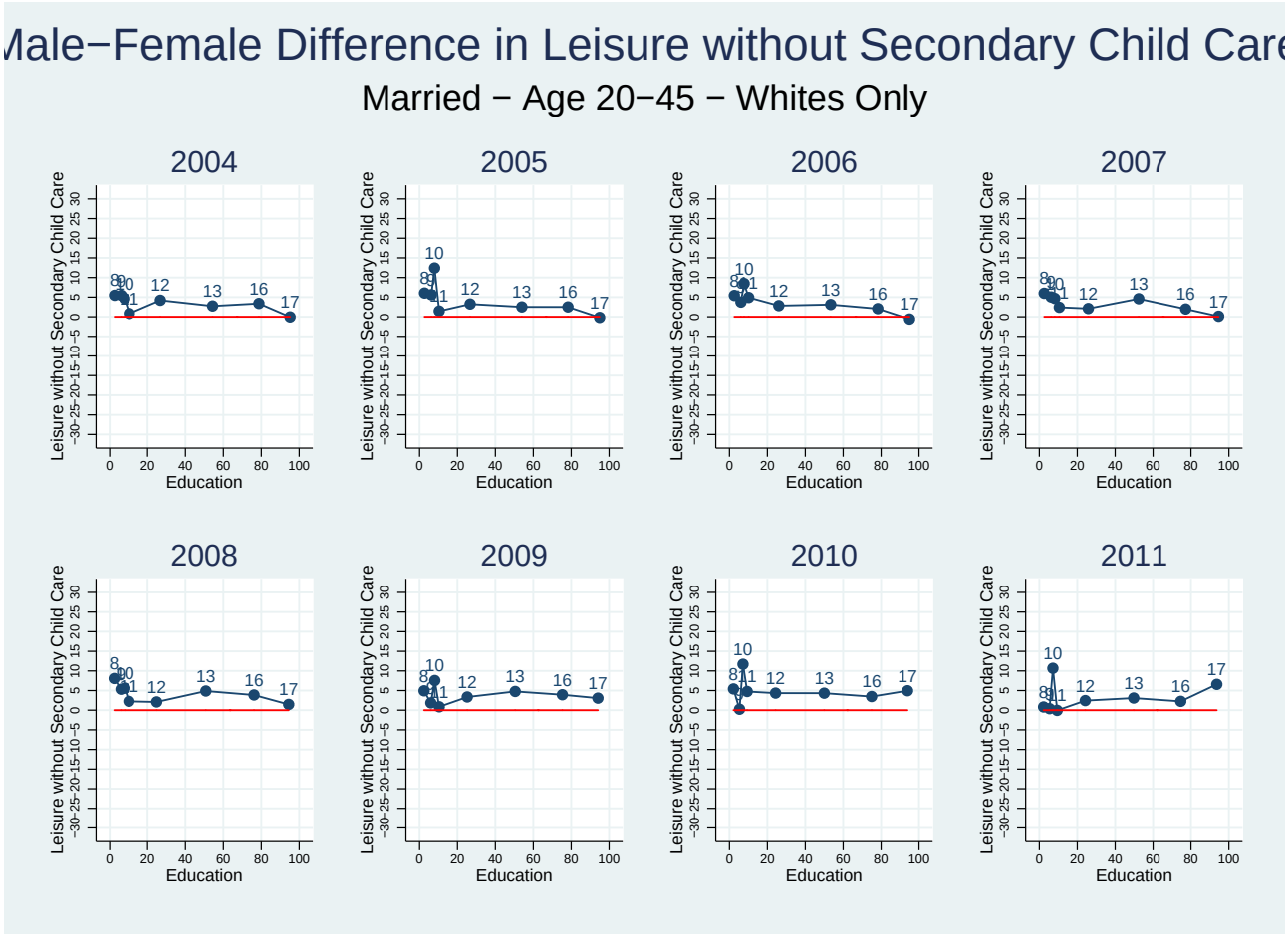

Figure 14: – diffLeisure1aloneMarried

Leisure is measured as hours/week and does not include the time spent while also looking after children. Each graph represents the three-year moving average centered in that year.

Each data point is the average of the midpoints of the percentiles for men and women. Each successive data point corresponds to one additional year of education, except the last one which is four-year college or more and the first one which is 8 years or less.

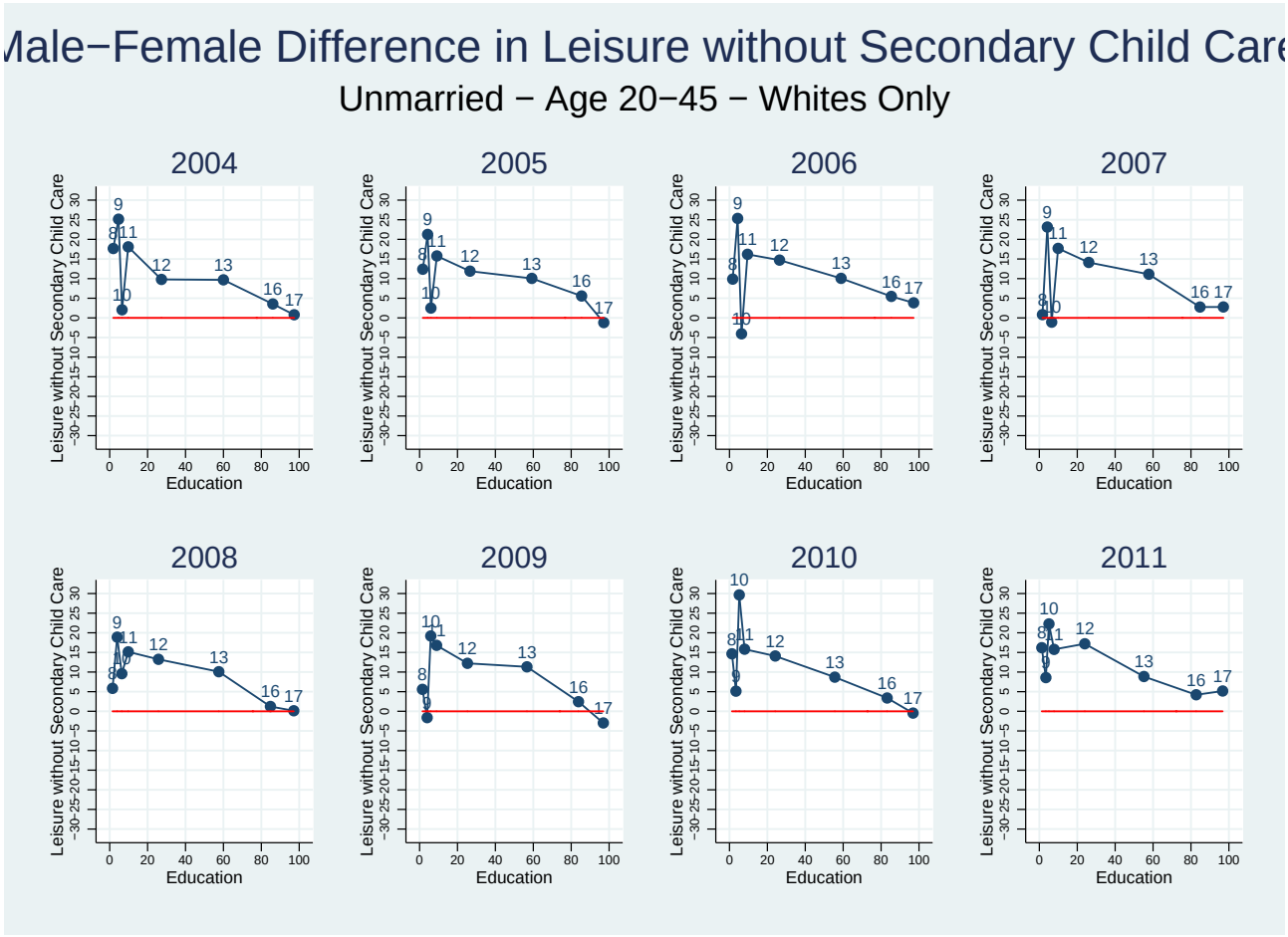

Figure 15: – diffLeisure1aloneUnmarried

Leisure is measured as hours/week and does not include the time spent while also looking after children.

Each data point is the average of the midpoints of the percentiles for men and women.

Each successive data point corresponds to one additional year of education, except the last one which is four-year college or more and the first one which is 8 years or less.