

The Causal Effect of Growing up in a Two-Parent Household on Child's Adult Earnings

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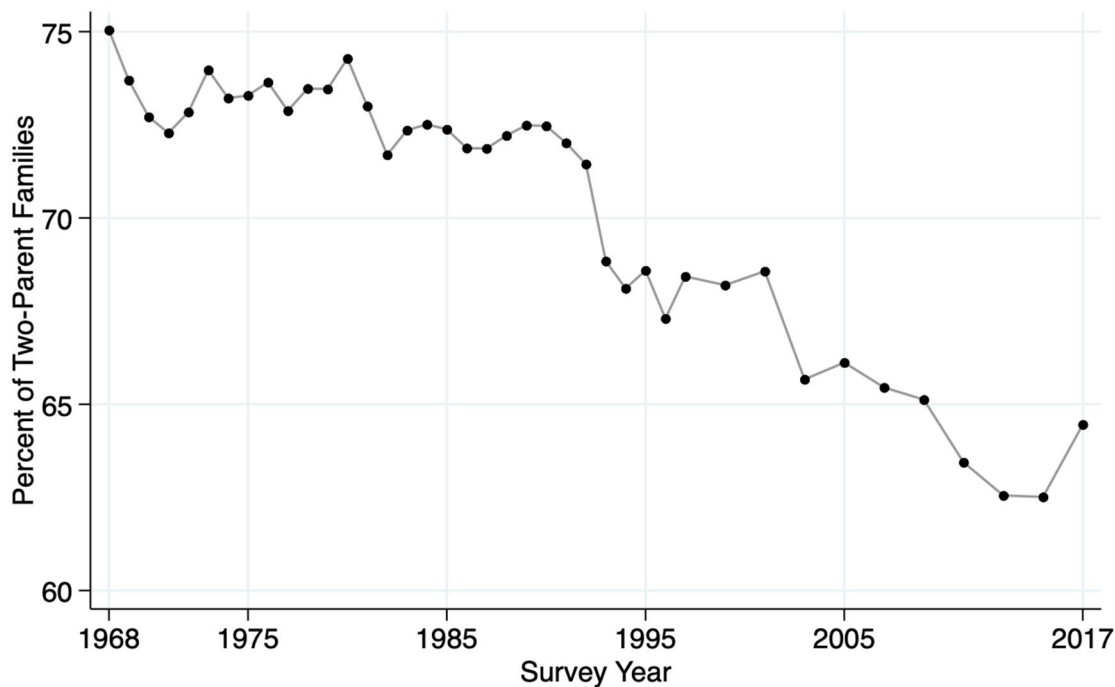
Abstract

The children who grew up in two-parent households for their entire childhood earn more than the other children reared in non-intact parental families. The causal effect of growing up in a two-parent household on the child's adult earnings is the hourly earnings difference between the children who grew up in intact families and their counterparts raised by parents who have ever divorced, separated, or widowed, holding relevant factors constant and accounting for endogeneity issues. I identify the causal effect by using the following specification strategies. First, I control the parental income and educational attainment, along with the child's demographic characteristics (gender, age, race, region, and tenure), to disentangle the childhood family intactness effect from the other parental influence. Second, I take into account the unobserved clan-specific heterogeneity, such as family traditions and genetic characteristics, by fitting the clan fixed effects (FE) models. Third, I use two instrumental variables (IVs), the state divorce rate and the no-fault divorce law effectiveness, for the endogenous childhood family structure and adopt the two-stage least squares (2SLS) approach to further alleviate the omitted variable bias. The estimates are around 0.16, suggesting that the children who grew up in a two-parent household earn about 16% more in adulthood than their counterparts from non-intact families, other things equal. The effect goes through three channels. The child's education, health, and marital behavior are the mediator variables representing the three observable channels through which childhood family intactness affects the child's adult earnings. The effect of growing up in a two-parent family on the child's adult earnings varies with parental income and education. The effect is larger and more significant for sons than for daughters. The heterogeneous pattern of the effect is consistent with the parental utility maximization model's predictions. Growing up in a two-parent household not only has a positive and significant effect on the child's adult earnings in absolute values, but it also encourages intergenerational relative-earnings improvement. An intact childhood family lowers the probability of the intergenerational relative-earnings worsening by 6.72% and increases the probability of the intergenerational relative-earnings improvement by 6.67%.

Keywords: growing up in a two-parent household, child's adult earnings, clan fixed-effects (FE), intergenerational relative-earnings change

The Causal Effect of Growing up in a Two-Parent Household on Child's Adult Earnings

A stable parental marriage plays an essential role in the child's well-being. Unfortunately, the percentage of two-parent families has dropped over time in the United States, as illustrated in Figure 1. The Panel Study of Income Dynamics (PSID) surveys show that among all the families with at least one child under 18 years of age, the percentage of two-parent families declined gradually from 75% in 1968 to 64% in 2017. Would the childhood family structure influence the children's labor market outcomes? As far as the child's adult earnings are concerned, they are associated with whether the child grew up in a two-parent household. In the paper, I define the children growing up in a two-parent household as they lived with both parents for all 16 years of their childhood. If the parents had ever experienced divorce, separation, being widowed, or being a single parent at any time during the child's childhood, the child is not categorized as growing up in a two-parent household. Table 1 shows that the mean hourly earnings are significantly different between the two groups of adult children defined by whether growing up in a two-parent household. Take the male children as an example. Adult sons growing up in two-parent households for their entire childhood earned 11.03 dollars per hour more than the other adult sons in 2017.



Notes: 1. The sample families are families of at least one child under 18 years of age.
2. Data are from PSID surveys 1968-2017.

Figure 1. The Percentage of Two-Parent Families over Time, 1968-2017.

Group: Male Workers (N=1,809)		
	Mean	Std.Err.
Growing up in a two-parent household (N=946)	32.32	0.98
Otherwise (N=863)	21.29	0.61
Difference	11.03	1.16
H0: Difference=0	t = 9.73, P-value = 0.0000	
Group: Female Workers (N=2,173)		
	Mean	Std.Err.
Growing up in a two-parent household (N=1,064)	25.03	0.69
Otherwise (N=1,085)	19.20	0.43
Difference	5.83	0.81
H0: Difference=0	t = 7.18, P-value = 0.0000	

Notes: Sample workers were from 25 to 54 years of age in the 2017 PSID survey. Their hourly earnings are calculated as annual labor income divided by annual work hours. Annual labor income is the sum of wages and salaries, bonuses, overtime, tips, commissions, and other labor income. Their parent's marital status during childhood is collected from previous PSID surveys from 1968 to 2009.

Table 1. Mean Hourly Earnings by Growing Up in a Two-Parent Household for Male and Female Workers, 2017.

Research Questions

The association or correlation between growing up in a two-parent family and the child's adult earnings does not necessarily mean causality. It could be due to a relevant factor, such as the parent's educational attainment, that influences both the child's adult earnings and her childhood family structure. In the paper, I intend to answer the following questions. First, could growing up in a two-parent household explain the child's adult earnings? And second, through which channels does childhood family structure affect the child's earnings? I need to tackle three identification issues to find a causal relationship. First, I should disentangle the two-parent household effect from the other parental influence. Second, I must consider the endogeneity problems due to the unobserved family heterogeneity. Third, I need to consider whether there is other omitted variable bias.

Background Information

There is a lack of consensus about the parent's presence effect on the child's adult earnings. Lang and Zagorsky (2001) find no evidence in the United States that parental presence affects the child's adult income after using a variety of background controls, including parental

educational attainment and the child's race and regional dummies. Corak (2001) finds that in Canada, parental divorce lowers the adult earnings of sons by 3%, but there is no influence on daughters. Kane et al. (2010) find that in the United States, an absence of a biological parent for reasons other than death reduces a child's lifetime earnings between 3 and 12 percent.

It is generally accepted that parental divorce has a detrimental effect on the child's educational attainment and marital behavior (Keith and Finlay, 1988; Corak, 2001; Dronkers and Härkönen, 2008; Le Forner, 2020). Le Forner (2020) finds that parental separation is linked to poorer educational attainment for their children in France, from 32% to 12% of a standard deviation lower. The effect varies with age, and it is more detrimental to boys. Corak (2001) finds that children from divorced families are more likely to put off marriage and, once married, more likely to suffer separation and divorce.

As long as intergenerational earnings mobility is concerned, children of divorced parents are more likely to fall into a lower earnings distribution in adulthood. Bratberg et al. (2014) show that children of divorced parents tend to move downward in the earnings distribution compared to children from intact families in Norway. Couch and Lillard (1997) find that sons from families whose divorced parents had relatively low earnings have a greater chance of having low earnings themselves in the United States.

When it comes to identifying the parental marital effect, sibling fixed-effects models, difference-in-differences (DID) method, and instrumental variables (IVs) estimation are used to establish the causal relationship. Le Forner (2020) uses a sibling-differences model to estimate the divorce effect on the child's educational attainment. Corak (2001) treats parental death as an exogenous variable and uses DID method to estimate the true impact of divorce on the child's adult earnings and marital behavior.

I use data from the Panel Study of Income Dynamics (PSID) to estimate the causal effect of growing up in a two-parent household on the adult earnings for children of prime working age (25 to 54 years old) in the United States. To the best of my knowledge, it is the first attempt to apply the clan fixed-effects (FE) model combined with the two-stage least squares (2SLS) method to the individual-level data and measure the causal effect of growing up in a two-parent household on the child's adult earnings. The paper provides four main contributions. First, I define growing up in a two-parent household by looking at their child's entire childhood instead of at a certain point in time. Second, it is the first time to make use of the clan-descendant structure of the PSID data and introduce the clan fixed effects (FE) method. Third, I use the state-level divorce rates and no-fault divorce law effectiveness as instrumental variables and employ the two-stage least squares (2SLS) approach. Fourth, it is the first attempt to look into the mechanism behind the effect and conduct the mediation analysis. I treat the child's education, health, and marriage as three channels through which growing up in two-parent household influences the child's adult earnings. I find a positive and significant two-parent household causal effect on the child's adult earnings after controlling for other parental influence and accounting for endogeneity problems. The purpose of this research is to add the causal effect of childhood family structure on the child's adult earnings to the relatively scarce intergenerational studies. It could be seen as a complement to the existing literature and helps better understand the parental factors behind the child's labor market success.

Theoretical Model, Assumption, and Hypothesis

Parental Utility Maximization Model and its Predictions

I follow the idea of the Becker-Tomes (1979) model and modify it to accommodate the parent's marital stability variable. The following utility maximization model describes the parent's marriage-specific investment behavior. The decision-making parent chooses her own composite consumption c_p and her child's future earnings capacity y_c to maximize her utility subject to the household resources constraint,

$$\begin{aligned} \text{Max } U_p &= c_p^{1-\alpha} y_c^\alpha, \alpha \in (0,1), \\ \text{s. t. } c_p + I_p &= \theta V_p, \theta \in (0,1), \\ &\theta = \theta(m), \end{aligned} \tag{1}$$

where m is parent's marital status measure and $m \in [0,1]$. A higher value of m implies a more stable marriage. In the empirical part of this paper, I use a dummy variable to measure marital stability. $m = 1$ if parents maintained married or permanently cohabiting during their child's childhood, i.e., the child grew up in a two-parent household; $m = 0$ if parents have ever divorced or separated. I_p is parent's investment in the child. V_p represents parental household resources. θ is the accessibility parameter or the efficiency parameter of household resources. θ is a function of marital status m , and $\partial\theta/\partial m > 0$. α is the importance of the child's future earnings relative to the parent's own consumption. The choice of the utility function and the assumption are based on the following four property rights views on the marriage-specific investments in children.

Incentives to Invest in Children

The parent's incentives come from two sources: financial benefit and psychological well-being. The former is the returns to investment the parents expect to obtain after children grow up. The higher the returns, the stronger the parent's incentives. The parents can rely on their children in case they encounter financial difficulties in the future. In the parent's utility function, the child's future earnings capability becomes part of the parent's utility because parents will benefit from it. The incentives can also be seen as a result of altruistic behavior, as in the Becker-Tomes model (1979). That is, the parents care about their children's future income and happiness because of altruism. Parents often enjoy this type of psychological well-being. Both the financial benefit explanation and the altruistic assumptions lead to the same utility model setup, i.e., parents are concerned about both their own consumption and their child's future earnings capability, as shown in model (1).

Control over Household Resources

The ownership of and the access to household resources make it possible for the parents to invest in children's education and nutrition. Parents face resource constraints when they are making decisions. The more resources they control, the more investment they can make in their children. The household resources constraint equation reflects the marital relationship between spouses. The couples living together are more likely to have access to each other's resources than those living apart, i.e., $\partial\theta/\partial m > 0$.

Transaction Cost of Household Production and Efficiency of Using Household Resources

The efficiency of using household resources could be different between married couples and divorced parents. Marriage as an arrangement of rights and power over household resources could reduce transaction costs of producing household goods. The most valuable household goods, without a doubt, are their children. Compared to divorced parents, married parents have lower monitoring and enforcement costs due to trust and proximity. A two-parent household can also exploit the comparative advantage and benefit from household-market specialization. This is the reason why the efficiency of using household resources is higher for married parents than for divorced parents. The parameter θ can be seen as the efficiency parameter of the household resources. The transaction cost theory provides another justification for the assumption of $\partial\theta/\partial m > 0$.

Risk of Losing the Returns to Investment and Outside-Marriage Options

A breakdown of marital relations leading to a divorce would prevent parents from investing in their children because the spouses know that they may lose the returns to investment after the divorce. The marriage-specific investment by one partner bears the risk of expropriation by the other partner if the divorce happens. The parents in marital difficulties face the uncertainty of the future, which decreases marriage-specific investment. Moreover, investment options outside the marriage are available for people experiencing a marital breakdown. These outside-marriage options include the opportunity of starting a new relationship or raising children from a new family. The investment in original children may be shifted to those outside-marriage options. Thus, the effective household resources for the original children could be higher in intact families. It offers the third reason for $\partial\theta/\partial m > 0$.

Child's adult earnings y_c are related to the parent's investment I_p as

$$y_c = wI_p, \quad (2)$$

where w is the returns to parent's investment. I rewrite the household resources constraint using equations (2) as

$$c_p + (y_c/w) = \theta V_p. \quad (3)$$

The interior solution for the child's adult earnings is:

$$y_c^* = \alpha\theta wV_p. \quad (4)$$

The equilibrium child's adult earnings y_c^* depend on a variety of factors, such as the parental household resources V_p , the household resources efficiency measure $\theta(m)$, and the relative importance of child α . Let's take a look at how the child's adult earnings change with whether the child grew up in a two-parent household. First, the marginal effect of growing up in a two-parent household on the child's adult earnings is positive. $\partial y_c^*/\partial m = wV_p\alpha(\partial\theta/\partial m) > 0$ because $\partial\theta/\partial m > 0$ by assumption. It predicts that the children from intact parental families earn more than their counterparts reared by non-intact families. Second, this marginal effect increases with household resources V_p because $\partial(\partial y_c^*/\partial m)/\partial V_p = w\alpha(\partial\theta/\partial m) > 0$. For high-income households, family intactness has a greater effect on the child's adult earnings than the

low-income households. Since educational attainment is usually positively related to income, the effect should also be more significant for better-educated parents. Third, the two-parent household effect on the child's adult earnings is positively related to the relative importance of the child's well-being α because $\partial(\partial y_c^*/\partial m)/\partial \alpha = wV_p(\partial \theta/\partial m) > 0$. If parents care about their children differently based on gender, the two-parent household effect on son's and daughter's adult earnings would be different in magnitude or significance.

The theoretical model predicts that childhood family structure is crucial in determining the child's adult earnings, and the effect may vary with the parental household income, parental education, and the child's gender. Based on the model's prediction, I propose the two-parent household hypothesis on the child's adult earnings.

Two-Parent Household Hypothesis on Child's Adult Earnings

H1. Positivity of two-parent household effect on child's adult earnings.

Growing up in a two-parent household for entire childhood has a positive effect on the child's adult earnings, holding other factors constant.

H2. Heterogeneity of two-parent household effect on child's adult earnings.

The two-parent household effect on the child's adult earnings is higher for wealthier or better-educated parents, and it could be different between sons and daughters.

H3. Mechanism of two-parent household effect on child's adult earnings.

The analysis of the parent's investment in the child implies that growing up in a two-parent household could affect the child's adult earnings through three observable channels. The first channel is the "child's education" channel. Parents living together invest more in their child's education, and better educational attainment results in higher earnings. The second channel is the "child's health" channel. The children who grow up in intact families receive better nutrition than the children raised by divorced or separated parents. Health in adulthood will affect earnings. The third channel is the "intergenerational marriage persistence" channel. The parent's marital status shapes the child's marital attitude and behavior.

Identification Challenges, Specification Strategies, and Summary Statistics

The econometric model that links the child's adult earnings to whether they grew up in two-parent households is given as (5). For the j descendant of the i clan,

$$\ln(\text{child's adult earnings}_{ij}) = \beta_0 + \beta_1 \text{growing up in a two_parent household}_{ij} + \beta_2 X_{ij} + \epsilon_{ij}, \quad (5)$$

$$\text{where } \epsilon_{ij} = \mu_i + e_{ij} .$$

All the variables are measured at the individual level. The sample children were of the prime working-age (25 to 54 years old) in the United States who earned labor income in 2016 (reported in the survey year 2017). The dummy variable

growing up in a two_parent household_{ij} is equal to 1 if parents lived together and maintained married or cohabiting for all their offspring's 16 years of childhood. It is equal to 0 if parents have ever experienced the other marital status, such as divorce, separation, being widowed, or being single, during their offspring's childhood years. It is the key explanatory variable of interest in this research. The way to construct the dummy variable can be found in Appendix Figure 1. There are rare cases in which the parent reported "married" in the two consecutive surveys, but she got divorced, separated, or widowed and then remarried between these two consecutive surveys (PSID surveys were annual from 1968 to 1997 and biennial from 1997 to 2017). In these cases, their children were not growing up in a two-parent household for their entire childhood. After sample weights adjustment, 59.70% of the adult children grew up in a two-parent household for their entire childhood, and 40.30% of the adult children did not live with both parents for their entire childhood, as is shown in Table 2. The logarithm of the adult child's hourly earnings reported in the 2017 PSID survey is the outcome variable. The hourly earnings are the annual labor income divided by annual work hours. Annual labor income is the sum of wages and salaries, bonuses, overtime, tips, commissions, and other labor income. The first row in Table 3 confirms that the mean hourly earnings between the two groups of children defined by whether growing up with both parents are significantly different from each other. The vector X_{ij} in equation (5) represents the control variables in the model, which includes parent's household income, parental educational level, child's gender, age, race, region, and job tenure. Notice that the parent's marital status and household income data were collected in real time every year (every two years after 1997) from 1968 (the first wave) to 2009, when the children were between 1 and 16 years old. The data are more accurate than the retrospective surveys. In Table 3, all the sample means have been adjusted using the sample weights to correct the oversampling of poor families in PSID that results in a disproportionately large number of low-income households and African Americans. Using sample weights makes the statistics and estimates more representative of the US population. To identify the causal effect of growing up in a two-parent household on the child's adult earnings, I face at least three challenges. I come up with three specification strategies to alleviate the bias due to endogeneity issues.

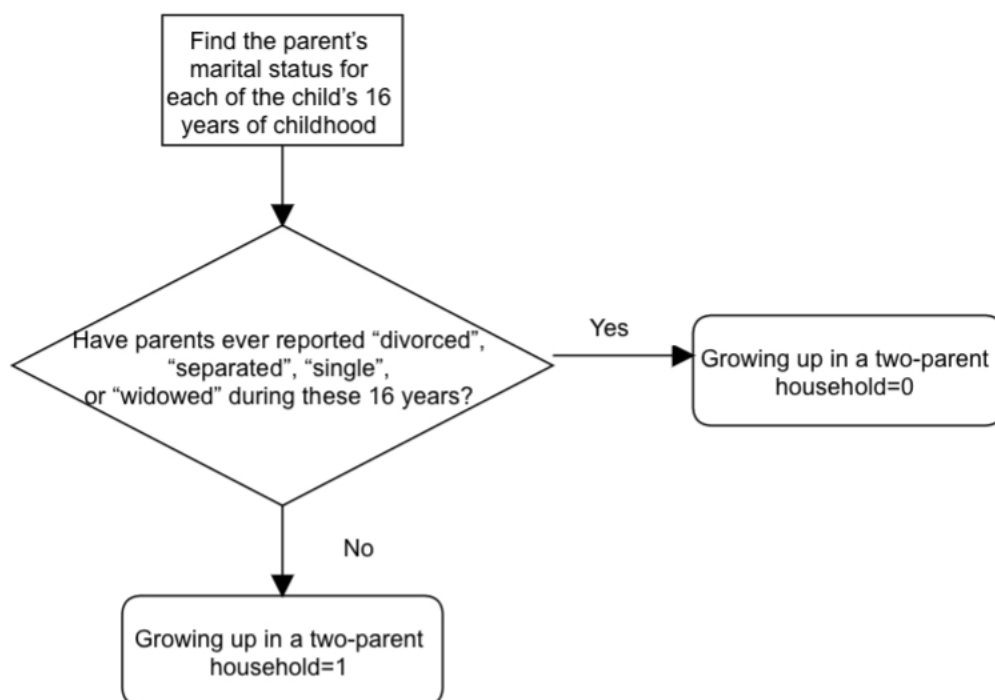


Figure 1. Construction of Dummy Variable “Growing Up in a Two-Parent Household”

Growing Up in a Two-Parent Household	Num. of Obs.	Percent	Percent with Sample Weights
Yes	2,024	50.83%	59.70%
No	1,958	49.17%	40.30%
Total	3,982	100%	100%

Notes: The dummy variable, growing up in a two-parent household, is constructed using parent’s marital status information from PSID surveys from 1968 to 2009 when the child was during 1 and 16 years of age. The statistics in the last column are adjusted using sample weights.

Table 2. Growing Up in a Two-Parent Household for Entire Childhood

	Whole Sample (N= 3,982)	Growing Up in a Two-Parent Household		Comparison of the Two Groups Difference in Means (Std. Err.)
	Mean	Yes Mean	No Mean	
Outcome Variable				
Ln(Child's Hourly Earnings)	3.08	3.21	2.90	0.31*** (0.032)
Control Variables				
Ln(Parental Household Income)	11.05	11.27	10.72	0.55*** (0.026)
Parental Educational Attainment				
Less than high school	6.46%	5.26%	8.24%	-2.98%*** (0.011)
High school graduate	33.09%	29.06%	39.06%	-10.00%*** (0.021)
Some college education	20.52%	19.27%	22.37%	-3.10* (0.018)
College graduate or above	39.93%	46.41%	30.34%	16.07%*** (0.021)
Ave. Num. of Children in Parental Household	2.42	2.48	2.33	0.15*** (0.043)
Child's Age				
	38.99	39.61	38.07	1.54*** (0.398)
Child's Gender				
Male	49.48%	50.09%	48.59%	1.50% (0.022)
Female	50.52%	49.91%	51.41%	-1.50% (0.022)
Child's Race				
White	82.50%	89.71%	71.83%	17.88%*** (0.016)
African-American	14.40%	6.86%	25.57%	-18.71%*** (0.015)
Asian	1.11%	1.66%	0.29%	1.37%*** (0.004)
Other	1.99%	1.77%	2.31%	-0.54% (0.006)
Child's Region				
Northeast	19.30%	21.42%	16.16%	5.26%*** (0.018)
North Central	23.90%	24.05%	23.68%	0.38% (0.018)
South	35.47%	33.71%	38.08%	-4.37%** (0.021)
West	20.31%	19.64%	21.30%	-1.66% (0.018)
Other	1.02%	1.18%	0.78%	0.39% (0.004)
Child's Job Tenure	6.44	6.87	5.81	1.06*** (0.341)
Mediator Variables				
Child's Years of Schooling	14.54	14.96	13.92	1.04*** (0.089)
Child's Health Status				
Excellent or Very Good	57.95%	61.99%	51.97%	10.02%*** (0.022)
Other	42.05%	38.01%	48.03%	-10.02%*** (0.022)
Child's Marital Status				
Married	51.39%	56.51%	43.79%	12.72%*** (0.022)
Other marital status	48.61%	43.49%	56.21%	-12.72%*** (0.022)
Instrumental Variables				
No-Fault Divorce Law Effectiveness				
In Effect	60.28%	48.58%	77.63%	-29.05%*** (0.021)
Not In Effect	39.72%	51.42%	22.37%	29.05%*** (0.021)
State Divorce Rate	6.01%	5.42%	6.78%	-1.36%*** (0.001)

Notes: The adult child's hourly earnings and the parental household income have been converted to 2017 US dollars using the Personal Consumption Expenditure index (PCE).

All the sample means have been adjusted using the individual cross-sectional weights of the 2017 PSID survey.

***: p-value<0.001; **: p-value<0.01; *: p-value<0.1.

Table 3. Summary Statistics (Sample Means after Adjusted using Sample Weights)

Disentangle Effect of Growing Up in a Two-Parent Household from Other Parental Influence

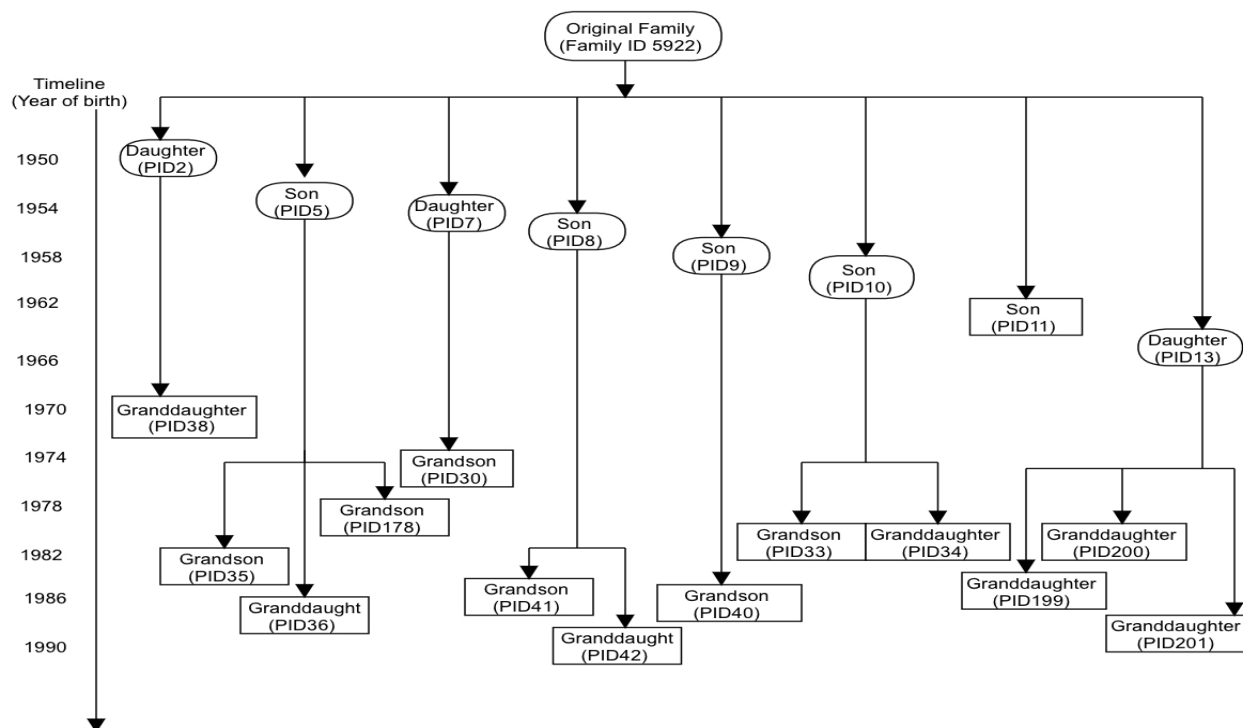
Does the childhood family structure or growing up in a two-parent household causally affect the child's adult earnings, or does the correlation reflect some other parental factors? If parental income and parental educational attainment are omitted from the model, it will lead to biased estimates because they are determinants of the child's adult earnings, and they are also correlated with parental marital status. From Table 3, we know that for the adult children from intact families, 46.41% of them have at least one parent who is a college graduate, while the percentage is only 30.34% for the children who did not always live with both parents in their childhood. The parents in non-intact families have a lower level of educational attainment than the parents who maintained an intact marriage during their offspring's childhood. The intact families also have more household resources on average. The household income consists of three components: the household taxable income, the household transfer income, and the household social security income. It is the average over the 16 years of the offspring's childhood. Each year's household income has been adjusted to 2017 US dollars using the personal consumption expenditures price index (PCE). I use per-parent household income because I assume that the consumption expenditures of two parents would be twice the expenditures of one parent. The household resources the parent can use for her own consumption and the investment in her child are the amount after taking away spouse's expenditures. I include parental household income and parental educational attainment in the model to isolate the effect of growing up in a two-parent family from the parental income and education effects. I also hold the child's demographic characteristics constant. The child's age, gender, race, current region, and tenure at the present job are not randomly distributed between the children living with both parents in their entire childhood and the other children. Table 3 illustrates the differences. For instance, in the sample, the adult children who grew up in two-parent families are about 1.5 years older than their counterparts ever reared in a one-parent household on average. I also find a disparity in the race composition between the two groups of adult children. There is a higher proportion of whites in the group of children who grew up in a two-parent household for their entire childhood. Whites compose 89.71% of them. The proportion is 71.83% in the other group of children. There is a 17.88% difference between them. The percentage of African Americans in the group of children who were not always living with both parents in their childhood is 25.57%, which is much higher than the entire sample average, 14.40%. Since the child's demographic characteristics could be correlated with both their earnings and their childhood family structure, leaving them out of the model could lead to bias. In addition to parental income, parental education, child's gender, age, and race, I include the average number of children in the parental household in the model to account for the concern that household investment in each child may decrease with more children. The child's current region is added to the model to control for the region earnings difference. The child's job tenure with the current employer would affect her hourly earnings too, so I put it in the model.

Unobserved Clan-Specific Heterogeneity and Clan Fixed-Effects (FE) models

There is something in common that runs in the blood through generations of descendants. It is the unobserved clan-specific heterogeneity, such as family traditions or genetic characteristics. They affect both the child's adult earnings and childhood family structure. For example, patience is an unmeasured virtue that is closely related to an intact family. Children inherit their parent's patience. The child's patience has a positive impact on her job performance and earnings. Patience is such an unobserved clan-specific heterogeneity that could bias the OLS estimates if we do not consider it. Genetic traits, such as attractiveness, could be passed down from parents to children. Attractiveness could be positively associated with both the intactness of parental household and the child's adult earnings. If patience or attractiveness is omitted from the model, it will lead to an upward bias. I take advantage of the clan-descendant structure of the PSID survey data and fit the clan fixed-effects (FE) models to take into account the unobserved clan-specific factors.

Family-Descendant Structure of the Sample

PSID surveys began in 1968 with 4,802 original families. The surveys traced children as they grew older and formed their own families, making it possible to link children's information to their parents'. The descendants of 1,337 original families reported their earnings in the 2017 PSID survey. I call all the descendants from the same original family a clan. The number of descendants of each clan ranges from 1 to 18, with an average of 2.8. I draw the family tree of a clan in Figure 2 to illustrate the structure of the data. In this clan, fourteen descendants were surveyed when they became the heads or the spouses of the heads in 2017. I put them into rectangles. The descendants could be siblings or cousins. They could be the same generation or different generations. PID11, for example, is the uncle of the other respondents. I assume that some unobserved factors are clan-specific and descendant-invariant, i.e., they are identical for all descendants within the same clan but varying across different clans. In the regression model (5), the composite error term ϵ_{ij} contains the clan fixed effects μ_i and the idiosyncratic component e_{ij} . In the clan FE model, we obtain the within-estimator by performing demeaning within clans over descendants so that the clan-specific heterogeneity μ_i could be removed from the model. Thus, the clan FE model allows growing in a two-parent household to be correlated with the clan-specific heterogeneity μ_i but we still have a consistent estimate of the two-parent household effect on the child's adult earnings.



Notes: PID stands for the unique person ID in PSID surveys.

Individuals in squares were surveyed in 2017 and their earnings and other information were collected.

Their parent's marital status and other information were collected from 1968 to 2015 PSID surveys.

Figure 2. Family Tree of a Clan.

Unobserved Idiosyncratic Factors and Instrumental Variable (IV) Estimation

Even after the clan fixed effects (FE) have been accounted for, the unobserved idiosyncratic factors e_{ij} that affect the child's adult earnings could still be correlated with the childhood family structure and therefore lead to bias. An instance of such unobserved omitted variables could be the parent's social network. Parents with intact marriages are more likely to have a stronger network of friends who could help their children with their jobs. In this case, the effect of growing up in a two-parent household on the child's earnings will be overestimated using OLS because the parent's social network is positively correlated with childhood family intactness and the child's adult earnings. Another example of omitted variable bias comes from the "bad" kids' story. Parents could divorce because their kids are "bad" in the sense that they cause too much aggravation to the parents. These "bad" kids do poorly in the labor market and earn less than the "good" kids in adulthood. If the kid's quality is omitted from the model, it will cause upward bias because it is associated with both childhood family structure and child's adult earnings in the same direction. On the other hand, there could be omitted variables that result in a downward bias of the OLS estimates. Some child's personality traits, such as endurance or adversity quotient (AQ), develop from an unhappy childhood environment. Having a happy childhood with both parents is negatively related to the child's AQ formation, and AQ is usually

positively associated with earnings capacity. As a result, the two-parent household effect on the child's adult earnings will be underestimated. Notice that these unobserved factors are different between individuals and therefore could not be eliminated by using the clan fixed effects model. To alleviate the bias, I find instrumental variables (IVs) for the endogenous childhood family structure and perform the two stage least squares (2SLS) estimation. The idea of 2SLS is that in the first stage, the endogenous variable, growing up in a two-parent household, is projected onto the instrumental variable space. The projected variation is exogenous in the sense that it is not correlated with the error term e_{ij} , and therefore it leads to consistent estimates. In the fixed effects (FE) framework, the 2SLS model and the requirements for Z_{ij} as a valid IV is

$$\ln(\text{child's earnings}_{ij}) = \beta_0 + \beta_1 \text{growing up in two_parent household}_{ij} + \beta_2 X_{ij} + \mu_i + e_{ij}, \quad (7)$$

$$\text{Instrument relevance: } \text{Cov}(Z_{ij}, \text{growing up in two_parent household}_{ij}) \neq 0, \quad (8)$$

$$\text{Instrument exogeneity: } \text{Cov}(Z_{ij}, e_{ij}) = 0. \quad (9)$$

Estimation Results

OLS, Clan FE, and 2SLS Estimates of Two-Parent Household Effect on Child's Adult Earnings

I present the pooled OLS models, the clan fixed effects (FE) models, and the two-stage least squares (2SLS) models as an attempt to consistently estimate the causal effect of growing up in a two-parent household on the child's adult earnings.

OLS Estimates of Two-Parent Household Effect on Child's Adult Earnings

The OLS estimates for the effect of growing up in a two-parent household on the child's hourly earnings decline as more control variables are added to the model, as shown in Table 4. It is 0.326 when the "growing up in a two-parent household" dummy is the only explanatory variable. It reflects the gross correlation between childhood family structure and the child's adult earnings. It reduces to 0.257 when the number of children in the parental household and the child's demographic characteristics are added. As the parental household income and educational attainment are included in the model, the two-parent household effect declines to 0.168. It is statistically significant at the 1% level. The OLS estimate implies that the children who grew up in two-parent households earn 16.8% (or precisely 18.3%) more than the other children who did not grow up in a two-parent family for their entire childhood, holding relevant factors constant. In other words, for two children with the same age, gender, race, region, tenure, and they have parents with the same average household income during childhood and same educational level, the one from an intact family earns eighteen percent more than the other from a non-intact family.

Dependent variable Ln(Child's hourly earnings)			
Specifications	OLS_1	OLS_2	OLS_3
Explanatory variables			
Growing up in a two-parent household	0.326*** (0.034)	0.257*** (0.034)	0.168*** (0.034)
Ln(Parental income)	-	-	0.303*** (0.045)
Parental educational attainment			
Some high school education	-	-	base
High school graduate	-	-	0.027 (0.063)
Some college education	-	-	0.120* (0.072)
College graduate or above	-	-	0.201*** (0.070)
Child's gender			
Female	-	base	base
Male	-	0.168*** (0.033)	0.187*** (0.032)
Child's age			
	-	0.086*** (0.020)	0.104*** (0.020)
Square of child's age			
	-	-0.001*** (0.0003)	-0.001*** (0.0003)
Child's tenure			
	-	0.021*** (0.003)	0.020*** (0.003)
Child's race			
White	-	base	base
African-American	-	-0.191*** (0.041)	-0.020 (0.042)
Asian	-	0.508** (0.199)	0.397** (0.177)
Child's region			
Northeast	-	base	base
North Central	-	-0.184*** (0.047)	-0.115** (0.045)
South	-	-0.080* (0.047)	-0.045 (0.045)
West	-	0.106* (0.056)	0.089* (0.053)
Num. of children in parental household	-	-0.020 (0.017)	-0.004 (0.016)
Number of obs.	3,982	3,982	3,982
R-squared	0.049	0.172	0.249

Notes: ***: p-value<0.01; **: p-value<0.05; *: p-value<0.1. Robust standard errors are in parentheses.

All regressions are fitted with sample weights.

- : variable is not included in model.

Table 4. OLS Estimates of Two-Parent Household Effect on Child's Adult Earnings

Clan Fixed Effects (FE) and Random Effects (RE) Estimates of Two-Parent Household Effect on Child's Adult Earnings

The clan random-effects (RE) model gives an estimate of 0.143, while the clan fixed-effects (FE) model yields an estimate of 0.077. In the clan RE model, both within-clan variation and between-clan variation are used. In the clan FE model, only the within-clan variation is used. Using only within variation leads to less-efficient estimation with larger standard errors, smaller z-statistics, and lower significance. However, the clan FE model has its advantages. The clan FE model takes into account the unobserved clan-specific heterogeneity, i.e., the clan fixed effects μ_i . If the clan fixed effects are correlated with whether the children grew up in two-parent households (usually they are), only the clan FE model provides a consistent estimate. The choice between RE and FE models is a trade-off between efficiency and consistency. In the research, the Breusch-Pagan test confirms the presence of clan-specific heterogeneity, and the Hausman test prefers the clan FE to RE. As shown in Table 5, on average, the children who grew up in two-parent households for their entire childhood earn 7.7% (or precisely 8.0%) more than their counterparts reared in non-intact families, holding both observed factors and unobserved clan-specific factors constant. The clan fixed effects estimate is lower than the pooled OLS estimate, which implies the presence of clan-specific omitted variables, such as patience and attractiveness.

Dependent variable Ln(Child's hourly earnings)			
Specifications	Clan FE	Clan RE	Pooled OLS
Explanatory variables			
Growing up in a two-parent household	0.077** (0.035)	0.143*** (0.024)	0.168*** (0.034)
Ln(Parental income)	0.130*** (0.030)	0.231*** (0.031)	0.303*** (0.045)
Child's gender			
Female	base	base	base
Male	0.103*** (0.026)	0.120*** (0.022)	0.187*** (0.032)
Child's age	0.074*** (0.019)	0.077*** (0.014)	0.104*** (0.020)
Square of child's age	-0.001*** (0.0002)	-0.001*** (0.0002)	-0.001*** (0.0003)
Other parental and child control variables	✓	✓	✓
Sigma_u	0.515	0.175	-
Sigma_e	0.603	0.603	-
rho (fraction of variance due to u)	0.422	0.077	-
Breusch-Pagan LM test: Pooled OLS vs. Panel effects			
H0: No clan-specific heterogeneity	Chi-sq=9.30, p-value=0.02		
Hausman test: Fixed-effects vs. Random-effects			
H0: diff. in coef. not systematic	Chi-sq=57.39, p-value=0.000		
Number of obs.	3,982	3,982	3,982
R-squared	0.231	0.265	0.249

Notes: ***p-value<0.01; **p-value<0.05; *p-value<0.1. Robust standard errors are in parentheses.

✓ : variables are included in model. Other parental and child control variables include parental educational attainment, number of children in parental household, child's race, region, and tenure.

Table 5. Clan Fixed-Effects (FE) and Random-Effects (RE) Estimates

2SLS Estimates of Two-Parent Household Effect on Child's Adult Earnings.

Two candidates of the instrumental variables (IVs) for the endogenous explanatory variable, growing up in a two-parent household, are the state divorce rate and the no-fault divorce law effectiveness at the parent's critical marital moment. The parent's critical marital moment is defined as the divorced or separated year for the ever-divorced or ever-separated parents. It is the child's birth year for the other parents. The first IV, the state-level divorce rate of each year, is calculated using data from the Current Population Survey (CPS). The second IV is a dummy variable of the no-fault divorce law that took effect in different years in different states. It is equal to 1 if the law was in effect at the parent's critical marital moment; it is equal to

0 if the law had not been passed. The two-stage least squares (2SLS) method is adopted to further alleviate the omitted variable bias. Column 1 of Table 6 uses one IV, while column 2 uses both IVs. I employ the 2SLS method in the fixed effects framework in columns 3 and 4. The first stage regressions verify a strong correlation between the instrumental variables and the childhood family structure. As the first column of Table 6 shows, a one percentage point increase in the state divorce rate is associated with a fifteen percentage point decrease in the probability of children growing up in a two-parent household in that state. The state-level divorce rate is highly correlated with the individual-level probability of growing up in a two-parent household. The second column shows that the no-fault divorce law effectiveness influences parent's marital behavior. The implementation of the no-fault divorce law reduces the probability of growing up in a two-parent household by 20.3% when it is jointly used as IVs with the state divorce rate. The first stage summary statistics confirm that the IVs are not weak instruments for three reasons. First, they are statistically significant, and the F statistics are high enough to reject any criteria of a weak instrument. Second, the IVs have decent prediction ability for childhood family structure. They correctly predict more than 60% of the observations alone, while the percentage of correct predictions is around 73% using all the regressors. Third, the IVs have explanatory power. Take the second column as an example. The two IVs explain 19.3% of the variation of the endogenous variable, while all the regressors together explain 30.7%. On the other hand, the state-level divorce rate and the no-fault divorce law effectiveness are not likely to affect the child's adult earnings directly or indirectly through any channels other than through parental marriage. This exclusion restriction requirement is very likely to be satisfied because the state-level divorce rates in the parent's generation have little to do with the individual-level child's adult earnings after they grew up. The child's unobserved qualities and characteristics would not change the state divorce rates at the time when they were children. The no-fault divorce law implementation is a government policy that was introduced not based on the child's adult earnings or the omitted variables that determine the child's earnings. The reduced form subset regressions provide support for this argument. I show the subset regression results in Appendix Table 3. I discuss the evidence of exclusion restriction in the robustness check and discussion section. The second stage gives the 2SLS estimates of the two-parent household effect on the child's adult earnings. It is 0.157 with one IV, and it is 0.161 with both IVs. An ideal specification is a combination of 2SLS and clan FE because childhood family structure is allowed to be correlated with both clan-specific and descendant-specific unobserved factors and the estimates are still consistent. The disadvantage, however, is its relatively larger standard errors and lower significance. It provides an estimate of 0.158 with one IV and 0.132 with both IVs. The 2SLS estimates are slightly smaller than the OLS estimates. The upward bias and the downward bias caused by omitted variables offset each other to some extent. After controlling for the observed parental and child factors, the unobserved clan heterogeneity, and the other omitted variables, I have identified the causal effect of growing in a two-parent household on the child's adult earnings. I summarize the estimates from OLS, clan FE, and 2SLS in Table 7. The positive effect of growing up in a two-parent household on the child's adult earnings is evidence of hypothesis H1.

Specification	2SLS	2SLS	2SLS+FE	2SLS+FE
First Stage (Linear Equation)				
Endogenous variable	Prob(parent's marital stability)			
Exogenous variables				
State divorce rate	-15.444*** (0.729)	-13.273*** (0.770)	-12.585*** (1.056)	-11.581*** (1.070)
No-fault divorce law				
In effect	-	-0.203*** (0.031)	-	-0.181*** (0.036)
Not in effect	-	base	-	base
All exogenous variables in second stage	✓	✓	✓	✓
IV statistics in first stage				
F statistics for IV significance (P-value)	449.34 (0.000)	258.41 (0.000)	142.09 (0.000)	101.78 (0.000)
Percentage of correctly predicted obs. (partial vs total)	64.9% vs 73.9%	64.9% vs 74.8%	65.2% vs 72.6%	64.5% vs 73.2%
Partial R-sq. vs Total R-sq.	0.173 vs 0.289	0.193 vs 0.307	0.116 vs 0.254	0.118 vs 0.263
Second Stage (Linear Equation)				
Dependent variable	Ln(Child's hourly earnings)			
Explanatory variables				
Growing up in a two-parent household	0.157** (0.080)	0.161** (0.077)	0.158 (0.103)	0.132 (0.096)
Ln(Parental income)	0.305*** (0.045)	0.304*** (0.045)	0.124*** (0.031)	0.125*** (0.030)
Child's gender				
Female	base	base	base	base
Male	0.187*** (0.032)	0.187*** (0.032)	0.104*** (0.026)	0.103*** (0.026)
Child's age	0.104*** (0.020)	0.104*** (0.020)	0.074*** (0.018)	0.074*** (0.019)
Square of child's age	-0.001*** (0.0003)	-0.001*** (0.0003)	-0.001*** (0.0002)	-0.001*** (0.0002)
Other parental and child control variables	✓	✓	✓	✓
Number of obs.	3,982	3,982	3,982	3,982
R-squared	0.249	0.249	0.234	0.234

Notes: ***p-value<0.01; **p-value<0.05; *p-value<0.1. Robust standard errors are in parentheses.

2SLS regressions are fitted with sample weights.

✓ : variables are included in model. Other parental and child control variables include parental educational attainment, number of children in parental household, child's race, region, and tenure.

Table 6. 2SLS Estimates of Two-Parent Household Effect on Child's Adult Earnings

Dependent variable	Ln(Child's hourly earnings)			
	OLS	FE	2SLS	2SLS+FE
Explanatory variables				
Growing up in a two-parent household	0.168*** (0.034)	0.077** (0.035)	0.161** (0.077)	0.132 (0.096)
Other parent and child control variables	✓	✓	✓	✓
Number of obs.	3,982	3,982	3,982	3,982
R-squared	0.249	0.231	0.249	0.234

Notes: ***p-value<0.01; **p-value<0.05; *p-value<0.1. Robust standard errors are in parentheses.

✓ : variables are included in model. Other parent and child control variables include parental income, parental educational attainment, the number of children in parental household, child's age and its squared term, child's gender, race, region, and job tenure. OLS and 2SLS regressions are fitted with sample weights. In 2SLS 2SLS+FE models, state divorce rate and no-fault divorce law effectiveness are IVs for childhood family structure.

Table 7. OLS, Clan FE, and 2SLS Estimates of Two-Parent Household Effect.

OLS, Clan FE, and 2SLS Estimates of Parent's Divorce Effect on Child's Adult Earnings

The positive effect of growing up in a two-parent household and the negative divorce effect on the child's adult earnings are the two sides of the coin. I estimate the latter and find that it is consistent with the former. The dummy variable "parents ever divorced" is defined as parents who had ever divorced during their offspring's 16 years of childhood. Table 8 lists the pooled OLS, the clan fixed effects (FE), and the 2SLS estimates of the effect of ever-divorce on the child's adult earnings. In the OLS model, the negative divorce effect on the child's earnings is -0.171. After controlling for the clan fixed effects (FE), the estimated divorced effect is -0.095. In the two-stage least squares (2SLS) models, I use both the state divorce rate and the implementation of the no-fault divorce law as IVs for the "parents ever divorced" group of children because the law was most likely to affect parent's decision to divorce. I treat the other four categories of parental marital status as exogenous. This IV setting is supported by Gruber, J. (2004). He finds a sizable and significant impact of no-fault divorce laws (the unilateral divorce regulations in his paper) on the likelihood of being divorced but could not find evidence for the impact on the other marital status. In my research, the first stage regression of the 2SLS shows that a one percentage point increase in the state divorce rate is associated with a twelve-percentage point increase in the probability of parents experiencing divorce during their offspring's childhood. The implementation of the no-fault divorce law increases the probability of parental divorce by 18.2%. The IVs have strong explanatory power and are not weak instruments (see Appendix Table 1). The 2SLS method gives an estimated divorce effect of -0.165, meaning that the children of ever-divorced parents earn 16.5% (or precisely 17.9%) less than the children from intact parental households, other things equal. This effect is significantly different from zero at the 10% level. The combination of clan FE and 2SLS provides an estimate of -0.102 for the divorce effect, although it is not significant due to the smaller variation

employed in the clan fixed-effects specification. The positive parental effect of growing up in a two-parent household and the negative parental divorce effect are in agreement with each other in size.

Dependent variable	Ln(Child's hourly earnings)			
	OLS	FE	2SLS	2SLS+FE
Specifications				
Explanatory variables				
Parental Marital Status				
Parents maintained married	base	base	base	base
Parents ever divorced	-0.171*** (0.036)	-0.095** (0.039)	-0.165* (0.089)	-0.102 (0.109)
Parents ever separated	-0.152*** (0.055)	-0.094* (0.054)	-0.149** (0.064)	-0.097 (0.073)
Parents ever single	-0.134* (0.072)	0.047 (0.063)	-0.131 (0.085)	0.043 (0.087)
Parents ever widowed	-0.229 (0.196)	-0.071 (0.147)	-0.227 (0.205)	-0.074 (0.155)
Other parent and child control variables	✓	✓	✓	✓
Number of obs.	3,982	3,982	3,982	3,982
R-squared	0.250	0.233	0.250	0.233

Notes: Other parent and child control variables include parental income, parental educational attainment, the number of children in parental household, child's age and its squared term, child's gender, race, region, and job tenure.
 ✓ : variables are included in model.
 ***p-value<0.01; **p-value<0.05; *p-value<0.1. Robust standard errors are in parentheses.
 The OLS and 2SLS regressions are fitted with sample weights.

Table 8. OLS, Clan FE, and 2SLS Estimates of Parent's Divorce Effect on Child's Adult

OLS, Clan FE, and 2SLS Estimates of Effect of Years of Living with Both Parents

When I use the “years of living with both parents during childhood” as the key explanatory variable instead of the dummy variable of whether growing up in a two-parent household, I find consistent results. Table 9 shows that one more year of living with both parents during childhood increases the child's adult earnings by 1.2% on average, according to the OLS model. For the children who grew up in two-parent households, they lived with both parents for all 16 years of childhood. For the other children, they spend an average of 5.48 years with both parents. The difference between these two groups of children is 10.52 years. Thus, the adult earnings gap is 13% ($0.012 \times 10.52 = 0.126$) between them, which is comparable to the estimates using growing up in a two-parent household dummy as the explanatory variable of interest.

Dependent variable	Ln(Child's hourly earnings)			
	OLS	FE	2SLS	2SLS+FE
Explanatory variables				
Years of living with both parents during childhood	0.012*** (0.003)	0.003 (0.003)	0.029** (0.014)	0.026 (0.019)
Parent and child control variables	✓	✓	✓	✓
Number of obs.	3,982	3,982	3,982	3,982
R-squared	0.245	0.226	0.234	0.212

Notes: ***p-value<0.01; **p-value<0.05; *p-value<0.1. Robust standard errors are in parentheses.

✓ : variables are included in model.

Parent and child control variables include parental income, parental educational attainment, the number of children in parental household, child's age and its squared term, child's gender, race, region, and job tenure. The OLS and 2SLS regressions are fitted with sample weights.

Table 9. OLS, Clan FE, and 2SLS Estimates of Effect of Years of Living with Both Parents

Mechanism of Growing Up in a Two-Parent Household Effect

Childhood family structure impacts the child's adult earnings through different channels. The child's educational attainment, health, and marital status are the three endogenous mediator variables that represent the mechanism through which childhood family structure affects the child's adult earnings. As the path diagram (Figure 3) shows, the total effect can be decomposed into the direct effect and the indirect effects. The former is the effect on the child's earnings after ruling out the three indirect effects. The latter is the influence going through the "investment in child's education" channel, the "investment in child's health" channel, and the "intergenerational marriage persistence" channel. The mediator variables provide the causal mechanism linking childhood family structure to the child's adult earnings. The structural equations model (SEM) is given as follows.

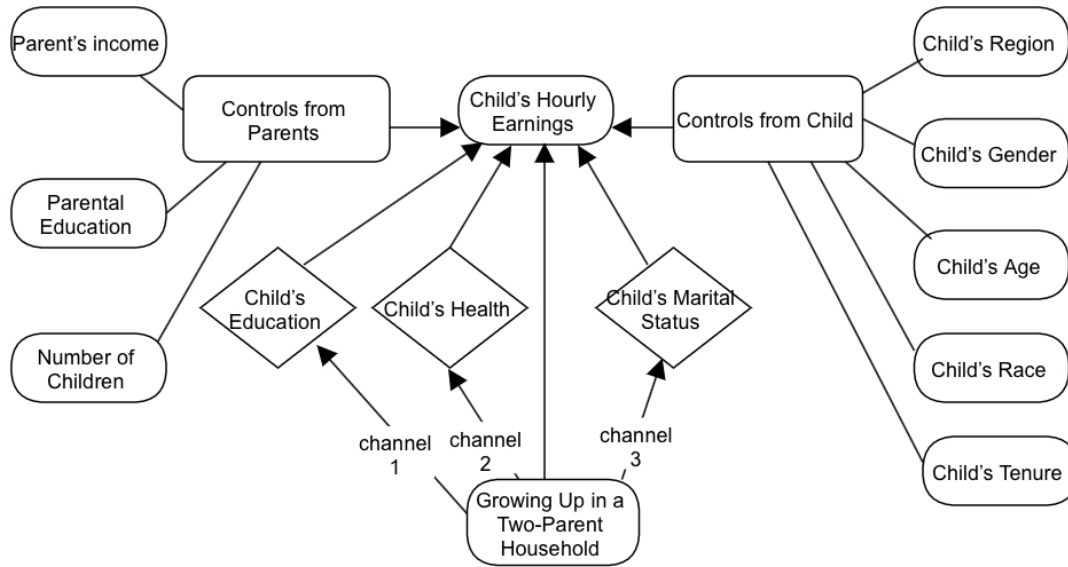


Figure 3. Path Diagram of Regressions for Direct and Indirect Effects

Direct Childhood Family Structure Effect Model

The coefficient β_1 is the direct effect of growing up in a two-parent household on the child's earnings after controlling for the child's education, health and marital status, meaning that ruling out the indirect effects through the three observable channels. The direct effect represents the influence of childhood family structure on the child's earnings through the unobserved endowment inheritance that could not be captured by the three observable channels. The control variables vector X_{ij} includes parental income, parental educational attainment, the number of children in the parental household, child's age and its squared term, gender, race, region, and tenure. The coefficients, β_3 , β_4 , β_5 , are the partial effects of the child's education, health, and marital status on her hourly earnings, respectively.

$$\begin{aligned} \ln(\text{child_hourly_earnings}_{ij}) = & \beta_0 + \beta_1 \text{growing_up_in_two_parent_household}_{ij} + \mathbf{X}_{ij} \beta_2 \\ & + \beta_3 \text{child_schooling}_{ij} + \beta_4 \text{child_health}_{ij} + \beta_5 \text{child_marital_status}_{ij} \\ & + \varepsilon_{ij} \end{aligned}$$

"Investment in Child's Education" Channel Model

The coefficient γ_1 is the partial effect of growing up in a two-parent household on the child's educational attainment. It represents the "investment in child's education" channel through which childhood family structure affects the child's earnings. The composite indirect

effect of growing up in a two-parent household on the child's adult earnings through this channel can be calculated as $\gamma_1 \times \beta_3$.

$$child_schooling_{ij} = \gamma_0 + \gamma_1 growing_up_in_two_parent_household_{ij} + \mathbf{X}_{ij}\gamma_2 + u_{ij}$$

“Investment in Child's Health” Channel Model

The coefficient ψ_1 is the partial effect of growing up in a two-parent household on the child's health. It represents the “investment in child's health” channel through which childhood family structure affects the child's earnings. The composite indirect effect of growing up in a two-parent household on the child's earnings through this channel can be calculated as $\psi_1 \times \beta_4$.

$$child_health_{ij} = \psi_0 + \psi_1 growing_up_in_two_parent_household_{ij} + \mathbf{X}_{ij}\psi_2 + \pi_{ij}$$

“Intergenerational Marriage Persistence” Channel Model

The intergenerational marriage persistence coefficient λ_1 reflects how strong childhood family structure shapes their child's attitude and behavior towards marriage. The composite indirect effect of growing up in a two-parent household on the child's earnings through this channel can be calculated as $\lambda_1 \times \beta_5$.

$$child_marital_status_{ij} = \lambda_0 + \lambda_1 growing_up_in_two_parent_household_{ij} + \mathbf{X}_{ij}\lambda_2 + v_{ij}$$

Decomposition of Growing Up in a Two-Parent Household Effect on Child's Earnings

It turns out that the indirect effects through the three observable paths account for more than half of the total effect of growing up in a two-parent household on the child's adult earnings. Take the clan fixed effects (FE) specification as an example (see the last column of Table 10). First, after controlling for child's education, health, and marital status, as well as all the parental and child demographic control variables, the direct effect of growing up in a two-parent household on the child's earnings is 0.023, which is positive but not significant. Most of the effect has been mediated through the child's educational attainment, health, and marital status. Second, according to the “investment in child's education” channel regression, the children from intact families have 0.437 more years of schooling on average than those from non-intact families, other variables being fixed. From the direct effect regression, one more year of schooling increases hourly earnings by 9.9%. Therefore, the indirect effect of growing up in a two-parent household on the child's earnings through the “investment in child's education” channel is equal to the partial effect of growing up in a two-parent household on the child's schooling times the partial effect of the child's education on her earnings, i.e., $0.437 \times 0.099 = 0.043$. It suggests that a 4.3% earnings gap between the children from intact families and the children from non-intact families can be explained by the “investment in child's education” mechanism. Third, the “investment in child's health” channel model implies that children who grew up in two-parent families are 4.1 percentage points more likely to have excellent or very good health in adulthood than the children who did not always live with both parents. Having good health increases hourly earnings by 9.4%. Therefore, the indirect effect of growing up in a two-parent household on the child's adult earnings through the investment in the child's health channel is equal to $0.041 \times 0.094 = 0.004$. Fourth, according to the “intergenerational marriage persistence” regression, the children with parents maintaining married during their childhood are 5.5 percentage points more likely to maintain their marriage in adulthood than those whose

parents got divorced or separated. It is consistent with previous findings that children whose parents divorced are more likely to divorce themselves as adults (Dronkers and Härkönen, 2008). From the direct effect regression, married workers have 12.3% more earnings than unmarried workers. Thus, the indirect effect of growing up in a two-parent household on the child's earnings through the "intergenerational marriage persistence" channel is equal to the partial effect of growing up in a two-parent household on the child's marriage times the partial effect of the child's marriage on earnings, i.e., $0.055 \times 0.123 = 0.007$. Finally, the sum of indirect effects from the three channels is 0.054, which means 5.4% of the earnings gap can be explained by these three mechanisms. The total effect of growing up in a two-parent household on the child's earnings is 0.077. The share of the indirect effects that are mediated through the three intergenerational transmission mechanisms is 70.1% ($0.054/0.077=70.1\%$). In the OLS specification, the indirect effects also account for more than half of the total effect. The decomposition of the total two-parent household effect on the child's adult earnings provides evidence for hypothesis H3.

Specification	Pooled OLS	Clan FE
Direct Marital Stability Effect Model		
Dependent variable: Ln(Child's hourly earnings)		
Explanatory variables:		
Growing up in a two-parent household ($\hat{\beta}_1$)	0.081** (0.033)	0.023 (0.033)
Years of child schooling ($\hat{\beta}_3$)	0.099*** (0.009)	0.099*** (0.008)
Child's health ($\hat{\beta}_4$)		
Excellent or very good	0.122*** (0.032)	0.094*** (0.026)
Other	base	base
Child marital status ($\hat{\beta}_5$)		
Married	0.118*** (0.032)	0.123*** (0.027)
Other marital status	base	base
Parental and child control variables	✓	✓
"Investment in Child's Education" Channel Model		
Dependent variable: Child's schooling		
Explanatory variables:		
Growing up in a two-parent household ($\hat{\gamma}_1$)	0.703*** (0.092)	0.437*** (0.108)
Parental and child control variables	✓	✓
"Investment in Child's Health" Channel Model		
Dependent variable: Child's health		
Explanatory variables:		
Growing up in a two-parent household ($\hat{\psi}_1$)	0.079*** (0.025)	0.041 (0.029)
Parental and child control variables	✓	✓
"Intergenerational Marriage Persistence" Channel Model		
Dependent variable: Child's marital status		
Explanatory variables:		
Growing up in a two-parent household ($\hat{\lambda}_1$)	0.070*** (0.025)	0.055** (0.027)
Parental and child control variables	✓	✓
Decomposition of Total Effect of Growing Up in Two-Parent Household on Child's Adult Earnings		
Direct effect ($\hat{\beta}_1$)	0.081**	0.023
Indirect effect via education channel ($\hat{\gamma}_1 \times \hat{\beta}_3$)	0.070***	0.043***
Indirect effect via health channel ($\hat{\psi}_1 \times \hat{\beta}_4$)	0.010***	0.004*
Indirect effect via marriage channel ($\hat{\lambda}_1 \times \hat{\beta}_5$)	0.008***	0.007**
Total effect ($\hat{\beta}_1 + \hat{\gamma}_1 \times \hat{\beta}_3 + \hat{\psi}_1 \times \hat{\beta}_4 + \hat{\lambda}_1 \times \hat{\beta}_5$)	0.168***	0.077**
Share of indirect effects in total effect	52.05%	70.10%

***p-value<0.01; **p-value<0.05; *p-value<0.1. Robust standard errors are in parentheses.
✓ : variables are included in model.

Table 10. Direct and Indirect Effects of Growing Up in a Two-Parent Household on Child's Earnings

Heterogeneous Pattern of Growing Up in a Two-Parent Household Effect on Child's Earnings

The effect of growing up in a two-parent household on the child's adult earnings is neither identical for all parental families nor for all children. It varies with different parental factors and child characteristics. The theoretical model predicts that it increases with parental income, and it may be different between sons and daughters. In this part, I test the predictions by including the interaction terms of childhood family structure and parental or child factor in the model. The heterogeneous pattern of the two-parent household effect on the child's earnings is in agreement with the theoretical model's prediction and hypothesis H2.

Growing Up in Two-Parent Household Effect and Parental Household Income

Including the interaction term between childhood family structure and parental household income in the pooled OLS model helps me find out how the two-parent household effect changes with parental income. I plot the fitted child's hourly earnings against the parental household income for the two groups of children of different childhood family structures in the left panel of Figure 4. The vertical distance between the two lines is the hourly earnings gap between them. It becomes larger and more significant as parental household income increases. This pattern can also be seen in the right panel of Figure 4. The two-parent household effect on the child's adult earnings increases with the parental household income. It is 0.134 for children who grew up in families with the median annual income (55,598 in 2017 USD). For those families in the 75th income percentile (83,543 in 2017 USD), the two-parent household effect rises to 0.177. For the very wealthy parental households in the 90th income percentile (116,111 in 2017 USD), childhood family structure plays a much bigger and more significant role in determining their child's adult earnings. There is a 21.4% earnings gap between the two groups of adult children. The finding that the positive effect of growing up in a two-parent household on the child's earnings increases with parental household income is parallel to the finding by Bernardi and Boertien (2016). They find that the negative parental separation effects on the child's educational attainment are stronger for high-income families. The childhood family stability and the parental income reinforce each other in raising the child's adult earnings.

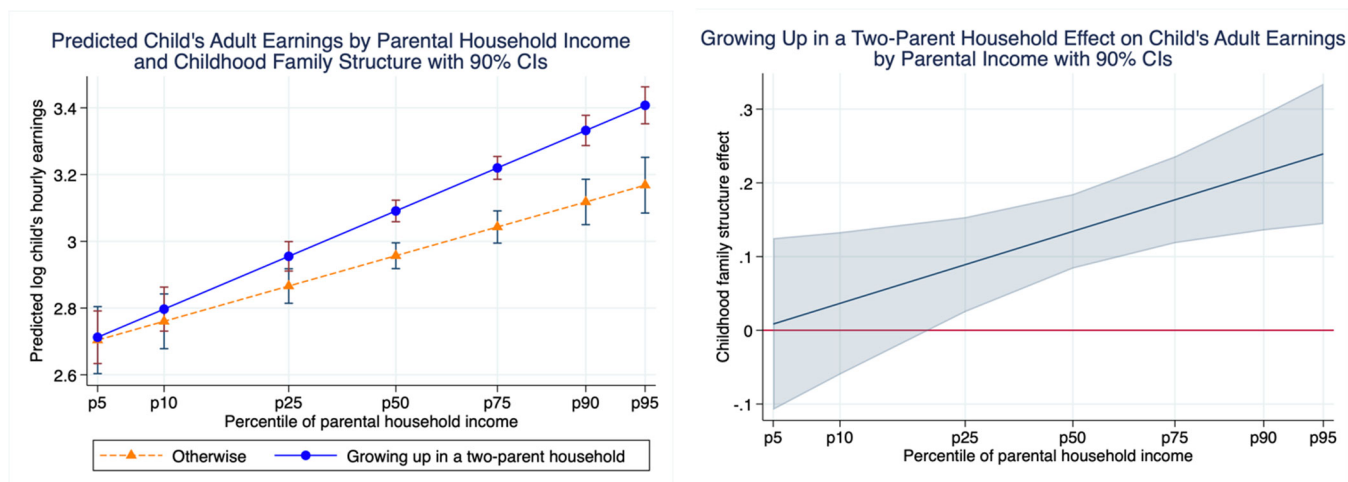


Figure 4. Predicted Child's Hourly Earnings by Childhood Family Structure and Parental Household Income (Left Panel); Two-Parent Household Effect on Child's Hourly Earnings by Parental Household Income (Right Panel)

Growing Up in Two-Parent Household Effect and Parental Educational Attainment

I add the interaction term between childhood family structure and parental educational attainment to the model. As is shown in the left panel of Figure 5, the earnings gap between the two groups of children is larger and more significant for the children who have better-educated parents. In other words, growing up in a two-parent household has a more distinct effect on the child's adult earnings if either of the parents has received a college education. Thus, the childhood family structure effect on the child's earnings differs by parental socioeconomic status measured by income and education. It is evidence of hypothesis H2.

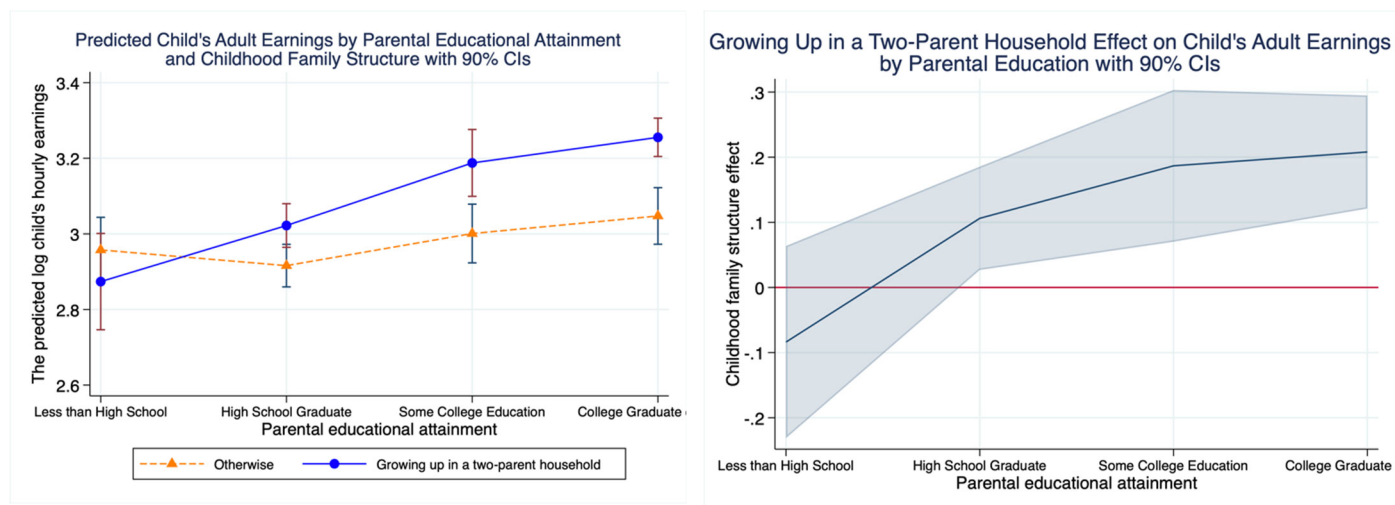


Figure 5. Predicted Child's Hourly Earnings by Childhood Family Structure and Parental Educational Attainment (Left Panel); Two-Parent Household Effect on Child's Hourly Earnings by Parental Educational Attainment (Right Panel)

Growing Up in Two-Parent Household Effect and Child's Gender

The left panel of Figure 6 shows the difference in the child's hourly earnings for sons and daughters with different childhood family structures. The effect of growing up in a two-parent household on the child's adult earnings is more substantial and statistically significant for sons than for daughters. There is a 20.4% difference in earnings between sons from intact families and those reared by divorced or separated parents. The earnings disparity due to childhood family structure is smaller and barely significant among daughters. This finding is parallel to the one of Le Forner (2020), in which the negative divorce effect on the child's education is more significant for boys. My finding is evidence of hypothesis H2. We can also interpret the graph by focusing on the children who grew up in two-parent households during their childhood. Among them, there is a noticeable gender earnings gap. By contrast, there is no such obvious gender earnings gap among children from non-intact families.

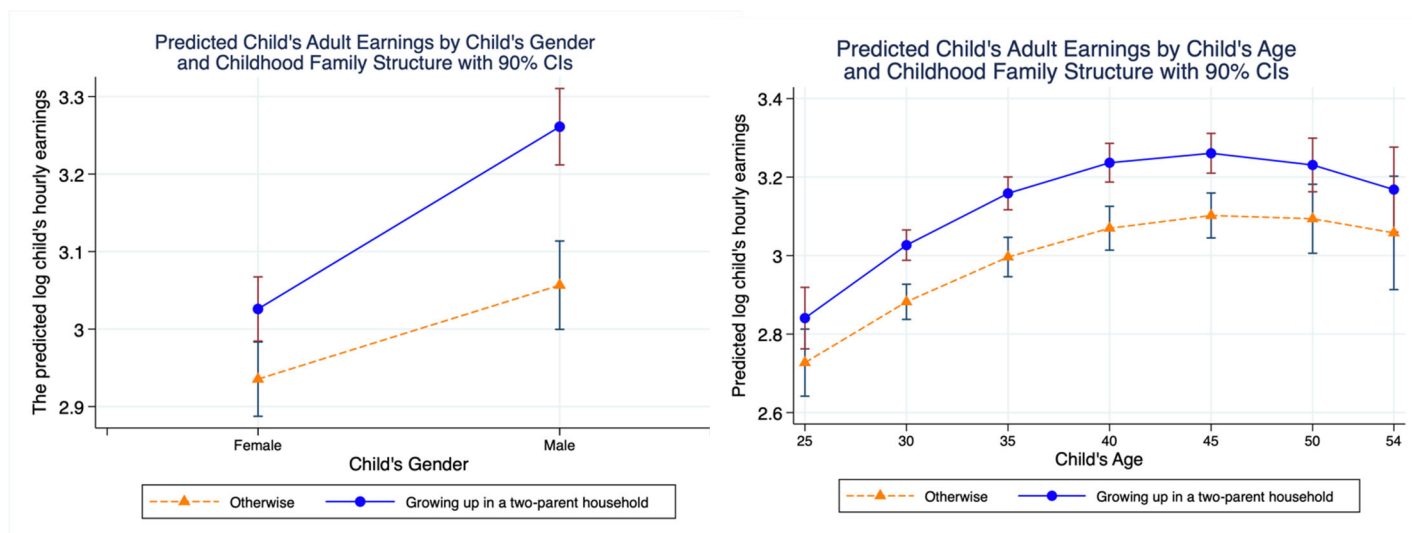


Figure 6. Predicted Child's Hourly Earnings by Childhood Family Structure and Child's Gender (Left Panel); Predicted Child's Earnings-Age Profile by Childhood Family Structure (Right Panel)

Growing Up in a Two-Parent Household and Child's Earnings-Age Profile

The child's earnings-age profile is significantly different between the two groups of children at the range from 28 to 49 years of age at the 10% significance level, as the right panel of Figure 6 shows. The two-parent household effect is relatively large and significant in the middle of the children's careers.

In summary, the pattern of heterogeneity of the childhood family structure effect on the child's adult earnings verifies the theoretical model's prediction and hypothesis H2. The pooled OLS estimate of the effect is around 0.16 on average, but it varies considerably with different factors. Generally speaking, it is greater and more significant: (1) for the children whose parental households had more resources during their childhood; (2) for the children whose parents are well educated; (3) for sons; and (4) for those who are in the middle of their career. For instance, a

son who grew up in a two-parent household whose parent is a college graduate earns 21.6% more on average than his counterparts with the same background but grew up in divorced or separated families. By contrast, a daughter from an intact family whose parent is a high school graduate does not significantly earn more than her counterparts from non-intact families.

Growing Up in a Two-Parent Household and Intergenerational Relative-Earnings Change

Intergenerational Relative-Earnings Change

The relative earnings are measured by the quintile in the earnings distribution of the sample. The first quintile is the lowest quintile of the earnings distribution, while the fifth quintile is the highest of the earnings distribution. Each individual is at an earnings quintile based on the relative position of their earnings in the earnings distribution. The intergenerational relative-earnings change is defined as the change in the earnings quintiles between parents and children. An intergenerational relative-earnings improvement occurs when the child's relative earnings are at a higher quintile than her parents. An intergenerational relative-earnings worsening occurs when the child's relative earnings are at a lower quintile than her parents. Figure 7 depicts the intergenerational relative-earnings change between parents and children in the sample. Around 43.7% of the children are at a higher earnings quintile than their parents, implying an intergenerational relative-earnings improvement. About 42.2% of the children experience intergenerational relative-earnings worsening. The relative earnings for the rest of the children are the same as their parents.

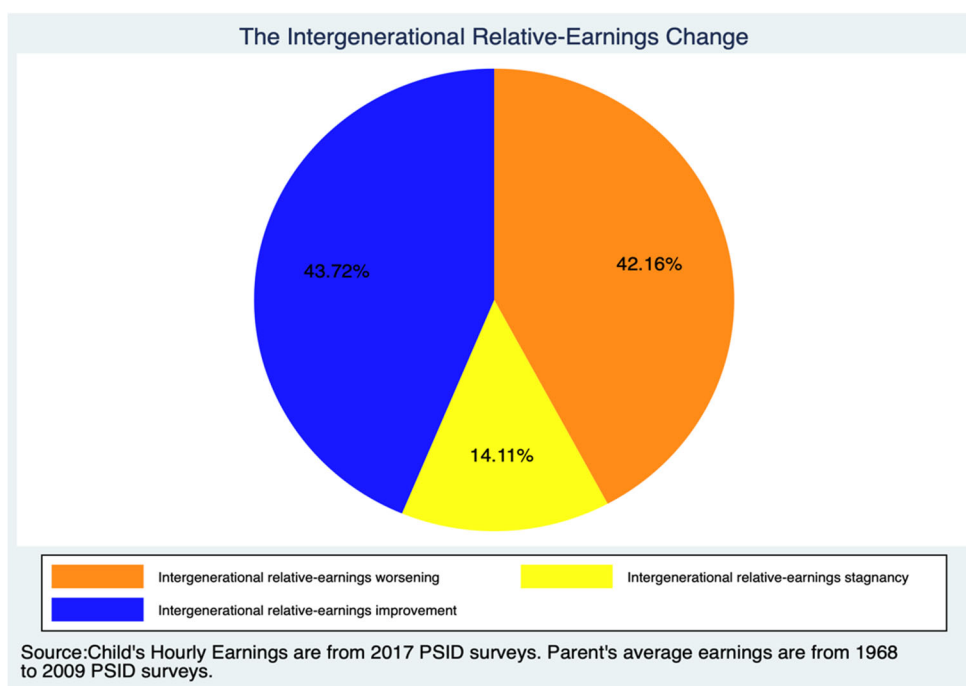


Figure 7. Intergenerational Relative-Earnings Change

Effect of Growing Up in a Two-Parent Household on Intergenerational Relative-Earnings Change

There are three categories of the dependent variable: intergenerational relative-earnings improvement, stagnancy, and worsening. Growing up in a two-parent household is the key explanatory variable of interest. Including parental household income, parental educational attainment, number of children in the parental household, child's age (and its squared term), gender, region, race, and tenure in the model, I fit an ordered probit regression to estimate the two-parent household effect on the intergenerational relative-earnings change. The result can be better interpreted using a graph. Figure 8 shows that the children who grew up in two-parent households always have a higher probability than their counterparts of improving the intergenerational relative-earnings. Children from intact families are also less likely to become worse in the relative earnings position than their parents. Having an intact family in childhood lowers the probability of the intergenerational relative-earnings worsening by 6.72% and increases the relative-earnings improvement by 6.67%, holding relevant factors constant (see Table 11). The finding agrees with Bratberg et al. (2014) in that children of divorced parents tend to move downward in the earnings distribution compared to children from intact families. Growing up in a two-parent household not only increases the child's adult earnings in absolute values, but it also has a positive and significant effect on the intergenerational relative-earnings improvement.

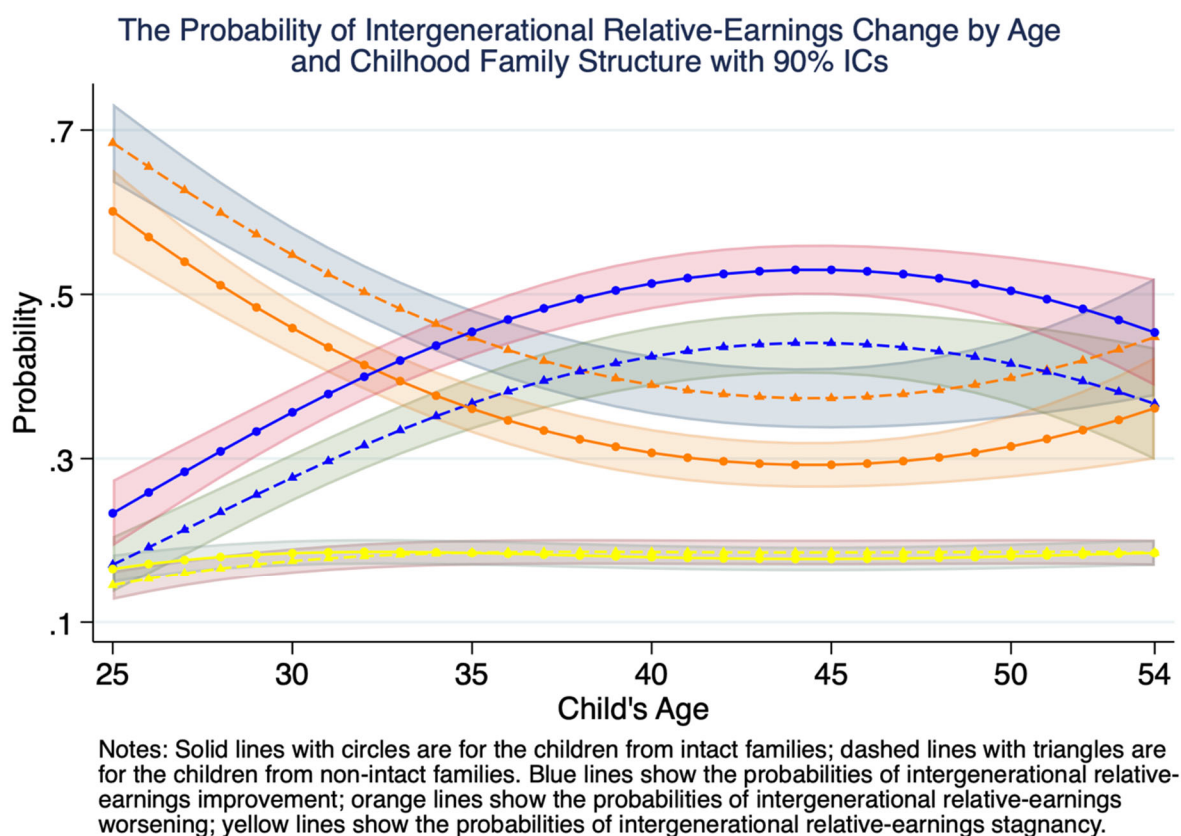


Figure 8. Probability of Intergenerational Relative Earnings Change by Child's Age and Childhood Family Structure

Dependent variable Prob(intergenerational relative-earnings change)			
Explanatory variables			
Growing up in a two-parent household		0.224***	(0.062)
Parental income quintile		-0.266***	(0.013)
Parental education			
Less than high school		base	
High school graduate		0.021	(0.109)
Some college education		0.238*	(0.122)
College graduate and above		0.316***	(0.120)
Num. of children in parental household		✓	
Child's gender			
Female		base	
Male		0.306***	(0.057)
Child's age and its squared term		✓	
Child's race		✓	
Child's region		✓	
Child's tenure		✓	
Marginal Effects of Growing Up in Two-Parent Household on Intergenerational Relative-Earnings Change			
	Worsening	Stagnation	Improvement
Growing up in a two-parent household	-0.0672*** (0.0184)	0.0006 (0.0006)	0.0667*** (0.0181)
Number of obs.	3,982		

Appendix Table 2. Ordered Probit Regression

Robustness Check and Discussion

In this section, I first present the evidence that the IV is very likely to satisfy the exclusion restriction requirement. Then, I consider the child's self-selection into the labor force and compare the two-parent household effect among children at different earnings quantiles. I also look at the effects in three childhood periods. Finally, I discuss the concern about the possible endogeneity of parental income and education.

Evidence on IV's Exclusion Restriction

The two conditions for a valid IV are the relevance requirement and the exclusion restriction. The former has been verified in the first stage of the 2SLS. The state-level divorce rates and the no-fault divorce law effectiveness are highly correlated with the endogenous variable, whether the child grew up in a two-parent household. The exclusion restriction could not be verified directly. I intend to give some evidence based on reduced form regressions. Since I find a significant effect of growing up in a two-parent household on the son's adult earnings, I focus on the male children here. Take the no-fault divorce law implementation as an example. First, I regress the son's adult earnings on the no-fault divorce law effectiveness dummy variable and all the other exogenous variables, including the parent's household income, parent's educational attainment, the child's age, gender, race, region, and tenure. The no-fault divorce law has a significant negative effect on the child's adult earnings (see the first column in Table 12). The result agrees with the findings of Gruber, J. (2004) in that the no-fault divorce law influences the child's adult earnings when the parent's marital status is not controlled in the model. In my research, I assume that the effect goes through the parent's marital behavior and whether the child grew up in a two-parent household. When I add the two-parent household dummy variable to the model, I find that the no-divorce law effectiveness variable is no longer significant, which is evidence that the law has no direct effect on the child's adult earnings after controlling for the childhood family structure variable. I show it in the second column of the table. Then I show that the no-fault divorce law is most likely to influence the child's adult earnings through the parent's marital status rather than the other factors. These other factors include the change in relationship or bargaining power between couples without the dissolution of the marriage. I compare two groups of adult sons. One group is the subset of those who grew up in a two-parent household for their entire childhood and those whose parents divorced during their childhood. Another group is the subset of those who grew up in a two-parent household for their entire childhood and those whose parent was widowed during their childhood. If the assumption that the no-fault divorce law influences the child's adult earnings only through the parent's marital behavior is true, then I should find a significant effect for the first subset but not the second subset. The results in the third and fourth columns of Table 12 are in line with the assumption.

Dependent variable: Child's adult earnings				
Subset	1	2	3	4
Explanatory variables				
No-fault divorce law implementation	-0.151** (0.074)	-0.091 (0.078)	-0.158** (0.075)	-0.122 (0.097)
Growing up in a two-parent household	-	0.166*** (0.055)	-	-
Other parent and child control variables	✓	✓	✓	✓
Number of obs.	1,534	1,534	1,181	803
R-squared	0.235	0.245	0.209	0.203

Notes: ***p-value<0.01; **p-value<0.05; *p-value<0.1. Robust standard errors are in parentheses.

✓ : variables are included in model. - : variable is not included in model.

Other parent and child control variables include parental income, parental educational attainment, the number of children in parental household, child's age and its squared term, child's gender, race, region, and job tenure. Regressions are fitted with sample weights.

Table 12. Reduced Form Subset Regression

Child's Self-Selection into Labor Force

Only the adult children who participate in the labor force can earn labor income and appear in the earnings regression. Some children choose not to work in adulthood. Nearly 14% of the adult children were unemployed in the sample. If the childhood family structure has a very different effect between the employed children and the unemployed children, the estimates could not represent the entire population of adult children. The solution is to follow the Heckman two-step procedure. In the first step, the adult child's probability of working is regressed on all the regressors in the earnings regression and two additional exogenous variables, the adult child's family non-labor income and the number of her children. I obtain the inverse Mills ratio from the selection regression and then add it into the earnings regression in the second step. Thus, the child's willingness to working can be held constant, and the self-selection bias can be corrected. The estimate of the childhood family intactness effect on the child's adult earnings is 0.166, which is slightly smaller than the pooled OLS estimate without the self-section correction, 0.168. The inverse Mills ratio is not significant in the earnings regression (see Table 13). In the clan fixed effects (FE) model, the estimate after self-section correction also becomes a little bit lower. The sample selection problem is either negligible or tiny in this research.

Dependent variable	Ln(Child's hourly earnings)			
	Pooled OLS	Pooled OLS with Correction	Clan FE	Clan FE with Correction
Explanatory variables				
Growing up in a two-parent household	0.168*** (0.034)	0.166*** (0.035)	0.077** (0.035)	0.074** (0.036)
Other parent and child control variables	✓	✓	✓	✓
Inverse Mills Ratio	-	-0.266 (0.166)	-	-0.587*** (0.135)
Number of obs.	3,982	3,982	3,982	3,982
R-squared	0.249	0.252	0.231	0.230

Notes: ***p-value<0.01; **p-value<0.05; *p-value<0.1. Robust standard errors are in parentheses.

✓ : variables are included in model. - : variables are not included in model.

Parental and child control variables include parental income, parental educational attainment, the number of children in parental household, child's age and its squared term, child's race, region, gender, and tenure.

Table 13. Pooled OLS and Clan FE with Self-Selection Correction

Quantile Regression

I run a simultaneous-quantile regression for the 25th, 50th, and 75th percentiles of the child's hourly earnings. The estimates are 0.114, 0.122, and 0.148, respectively (see Table 14). The higher the hourly earnings the children have, the higher the parent's marital stability effect seems to be. However, the null hypothesis that the effects of growing up in a two-parent household are equal to each other at the three quantiles is not rejected (F-statistics=0.58, p-value=0.56), implying that the effect is not significantly different between the high-earnings children and the low-earnings children.

Dependent variable: Ln(Child's hourly earnings)	25th percentile	50th percentile	75th percentile
Explanatory variables			
Growing Up in a Two-Parent Household	0.114*** (0.028)	0.122*** (0.026)	0.148*** (0.026)
Parental and child control variables	✓	✓	✓
F-Test H0: Effects are same at all percentiles.	F-statistic=0.58, P-value=0.56		
Number of Obs. =3,982			
R-squared	0.152	0.156	0.168

Notes: ***p-value<0.01; **p-value<0.05; *p-value<0.1. Robust standard errors are in parentheses.

✓ : variables are included in model. - : variable is not included in model.

Other parent and child control variables include parental income, parental educational attainment, the number of children in parental household, child's age and its squared term, child's gender, race, region, and job tenure. Regressions are fitted with sample weights.

Table 14. Quantile Regression

Three Childhood Periods

I divide the childhood years (1 to 16 years of age) into three periods: period 1 (1 to 6 years of age), period 2 (7 to 12 years of age), and period 3 (13 to 16 years of age). Then I construct the childhood family structure dummy variable for each of the three childhood periods and use them together in the model as explanatory variables. It appears that in the third childhood period, growing up in a two-parent household has the highest effect on the child's adult earnings (Table 15). However, the F tests show that the coefficients for the three periods are not significantly different from each other (F-statistic=2.22, p-value=0.11 for simple OLS; F-statistic=2.04, p-value=0.13 for multiple OLS).

Dependent variable: Ln(child's hourly earnings)	Simple OLS	Multiple OLS
Parents maintained stable marriage in childhood period 1 (1-6 years of age)	0.195*** (0.051)	0.017 (0.045)
Parents maintained stable marriage in childhood period 2 (7-12 years of age)	0.049 (0.050)	0.026 (0.045)
Parents maintained stable marriage in childhood period 3 (13-16 years of age)	0.196*** (0.042)	0.129*** (0.039)
Parental and child control variables	-	✓
F test H0: Effects in three periods are same.	F-statistic=2.22, P-value=0.109	F-statistic=2.04, P-value=0.130
Num. of obs.	3,472	3,472

Notes: ***p-value<0.01; **p-value<0.05; *p-value<0.1. Robust standard errors are in parentheses.

Regressions are fitted with sample weights.

✓ : variables are included in model. - : variables are not included in model.

Parental and child control variables include parental income, parental educational attainment, the number of children in parental household, child's age and its squared term, child's race, child's region, child's gender, and child's tenure.

Table 15. OLS Estimates for Three Childhood Periods

Exogeneity of Parental Income and Parental Education

I treat parental income and parental educational attainment as exogenous explanatory variables. Parents usually complete their education before they have children or even before they have a marriage. The factors that influence their child's adult earnings are not likely to affect the educational level they obtain. This is true, especially in the clan fixed effects model when the unobserved genetic characteristics have been controlled. The parental household income during the offspring's childhood is related to the parent's marital status and child's factors. It is more likely to be endogenous. There are two solutions to this issue. First, I can drop it because I have parental educational attainment in the model, which can be seen as a proxy for parental income. However, the effect of growing up in a two-parent household will absorb part of the parental income effect and become larger. For the purpose of disentangling the childhood family intactness effect from the other parental influence, I tend to include both parental income and education in the model and use the second method to alleviate the possible endogeneity of the parental income. The second method is using the two instrumental variables, the state divorce rate and the no-fault divorce law effectiveness, for the two possible endogenous explanatory variables, the childhood family structure and the parental income. The 2SLS specification gives an estimate of 0.155. It is close to the estimate of 0.161 when parental income is treated as an exogenous variable, as shown in Table 16.

Dependent variable	Ln(Child's hourly earnings)	
Specification	2SLS_1	2SLS_2
Explanatory variables		
Growing Up in a Two-Parent Household	0.161** (0.077)	0.155* (0.084)
Parental and child control variables	✓	✓
Number of obs.	3,982	3,982
R-squared	0.249	0.231

Notes: ***p-value<0.01; **p-value<0.05; *p-value<0.1. Robust standard errors are in parentheses.

Regressions are fitted with sample weights.

✓ : variables are included in model. Parental and child control variables include parental household income, parental educational attainment, the number of children in parental household, child's age and its squared term, child's gender, race, tenure and region. 2SLS_1 uses the state divorce rate and the no-fault divorce law effectiveness as IVs for the two-parent household dummy. 2SLS_2 uses the two IVs for the two-parent household dummy and the parental household income.

Table 16. 2SLS Estimates of Two-Parent Household Effect on Child's Earnings

Conclusion

The marriage-specific investment in children is affected by parent's marital status because the access to household resources and the incentive to invest could be different between the parents maintaining an intact marriage and the parents with an unstable marriage. The efficiency of the use of household resources also differs between them. Based on the utility maximization model, I propose the two-parent household hypothesis on the child's earnings, emphasizing the positivity, the heterogeneity, and the mechanism of the childhood family intactness effect on the child's adult earnings. The causal effect of growing up in a two-parent household on the child's adult earnings remains positive and significant for various specifications and approaches, such as OLS, clan FE, and 2SLS. It can be identified because I have alleviated the endogeneity problems using three specification strategies. First, I disentangle the childhood family intactness effect from the parent's income and education influence and control for the child's demographic characteristics. Second, I fit the clan fixed-effects (FE) models to account for the unobserved clan-specific heterogeneity. Third, I adopt the two-stage least squares (2SLS) method as an attempt to account for other omitted variables. The empirical results are consistent with the theoretical model's prediction and the hypothesis. The effect of growing up in a two-parent household on the child's adult earnings is 0.168 in OLS, 0.077 in clan FE, 0.161 in 2SLS, and 0.132 in 2SLS+FE. Taking the estimate from 2SLS as an example, the children of prime working ages in the United States who grew up in two-parent households earn 16.1% (or precisely 17.5%) more than their counterparts reared in non-intact families, holding relevant factors constant and correcting the omitted variable bias. Childhood family intactness not only increases the child's hourly earnings in absolute values, but it also has a positive and significant effect on the intergenerational relative-earnings improvement. The disparity and mobility in the child's adult earnings demonstrate the benefit of growing up in a two-parent household.

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