参赛队员姓名：Joanna Tan Yingxin

中学：上海协和国际外籍人员子女学校

省份：上海

国家/地区：中国/上海

指导教师姓名：Adam Hu

论文题目：Fertility Policy Relaxations and Female Labor Market Outcomes: Evidence from Universal Two-Child Policy in China

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参赛队员：**Joanna Tan Yingxin**　　指导老师：**Adam Hu**

Fertility Policy Relaxations and Female Labor Market Outcomes: Evidence from Universal Two-Child Policy in China

Joanna Tan Yingxin

Abstract

This paper examines the effect of fertility policy relaxations on female labor market outcomes, using evidence from the Universal Two-Child Policy in China and data from China Family Panel Studies (CFPS). We use event study and differences-in-differences methods to quantify the causal relationship of the Universal Two-Child Policy and women's employment and income. As previous fertility policies relaxations already allow couples where at least one partner is a single-child to have two children, we identify single-child women aged 20 to 50 as the control group and women of the same ages who have siblings as the treatment group. We find that the Universal Two-Child Policy had minimal effect on the employment of women who have siblings. However, compared with the control group, the average wages of the treatment group decreased. The differences-in-differences figures suggest that the decrease is due to the treatment group's inability to increase its income at the same rate as the control group.

Keywords: Fertility relaxation, Yearly income, Employment status

Contents

1 Introduction

Discrimination towards females in China is prevalent in the workplace due to women's disproportionate involvement in child-bearing and child-care (Agarwal et al., 2019). However, when policies limit child-bearing, women are free from both the social expectations to bear multiple children and the cyclical states of pregnancy and postnatal recovery. The opposite may be true when birth control policies further relax.

This paper studies the effect of birth control policies on female labor market outcomes. Incremental loosening of centralized family planning schemes (2013: Partial Two-Child Policy for single-child parents; 2016: Universal Two-Child Policy) allows us to isolate its impact on female labor market outcomes and investigate this question. The Universal Two-Child Policy in China aims to reduce the aging of the Chinese population and reestablish the socio-economic balance between the working-age and the elderly (Hesketh and Zhu, 1997). However, there are also other covert consequences from these birth-control policy relaxations. We hypothesize that when China implemented the Two-Child Policy, women of reproductive ages 20 to 50[1] faced heightened prejudice and inequality in income and employment, as women may have received political and filial pressure to leave the workforce to give birth to a second child. A comprehensive understanding of the Universal Two-Child Policy's effect on women is crucial to policymakers as essential aspects to consider when designing supplemental policies that help eliminate gender discrimination in the workforce.

To illustrate the effect, our investigation uses data from China Family Panel Studies (CFPS). CFPS is a biennial panel survey that includes four official rounds of surveys from 2010 to 2018 (2010, 2012, 2014, 2016, and 2018).[2] Since the implementation of the Universal Two-Child Policy was in 2016, the first two surveys reflect observations

[1] Female reproductive ages are defined as ages 15 to 50 by the World Health Organization. Most urban females of ages 15 to 20 in China attend school; thus, this paper uses ages 20 to 50 as reproductive ages. Data source: World Health Organization.

[2] We excluded observations from 2010 because the employment variable for that year was defined differently from other rounds of the survey.

from the pre-policy era, and the last two cover observations from the post-policy era, fully capturing the changes that occurred due to the implementation. The variables we examine are employment status, yearly income, whether or not an individual is a single child, and demographic variables such as gender, birth year, and highest education achieved.

We apply the event study and the differences-in-differences methodology on employment status and annual wage. Before the Universal Two-Child policy, China enacted the Partial Two-Child Policy for couples where at least one of the parties is a single-child in 2013. Thus, the Universal Two-Child policy does not change the status quo for single-child women. Hence, the control group is single-child women of the reproductive ages of 20 to 50, and the treatment group is females of the same ages who have siblings, who were not affected by previous two-child policies.

In 2012 and 2014, the treatment group and the control group's parallel differences-in-differences trends and the corresponding close-to-zero coefficients evince that single-child females are a valid control group. After 2016, both groups' employment status's trends remain parallel, indicating that the policy had minimal effect on the employment status of females. However, after 2016, both the event study and the differences-in-differences methodology indicated that the Universal Two-Child Policy has a significant negative impact on the yearly income of women who have siblings. From the differences-in-differences figure, we conclude that the wages of females who have siblings were increasing, but were unable to rise at the same rate as the wages of single-child females.

As a placebo test, we replicate the analysis using females above child-bearing ages. As we expect, the event study figure demonstrates that the policy has limited and statistically insignificant effects on employment and yearly income. These results suggest that the Universal Two-Child Policy restricts its impact on females of reproductive ages 20 to 50, confirming our hypothesis.

The effects of birth control policies on female labor market outcomes are widely studied. Hesketh and Zhu (1997) examine the benefits of women under the One-Child Policy, which includes women being able to return to their previous posts instead of being con-

fined in the domestic sphere for so long until they were no longer able to assimilate back into the workforce. However, the study by Hesketh and Zhu (1997) leaves questions about female labor market outcomes after birth control policy relaxations, which this paper aims to investigate.

The studies that resemble this paper the most are by Agarwal et al. (2019) and Zhang and Li (2017), which investigate the Universal Two-Child Policy's effect on women's employment and the potential consequences of the Universal Two-Child Policy, respectively. Our analysis is different from the study by Agarwal et al. (2019), as Agarwal et al. (2019) focused on comparing men and women's employment statuses and wages. In contrast, this paper identifies single-child women as the control group and women who have siblings as the treatment group. Since the Partial Two-Child Policy allow single-child women to have two children, they were not affected by the Universal Two-Child Policy. The study by Zhang and Li (2017) pioneered the discussion of increased gender discrimination due to the fertility policy relaxations and cautioned against overlooking the underlying problems to the Universal Two-Child Policy. Because their study was done shortly after the implementation of the policy, Zhang and Li (2017) were unable to discuss the quantitative outcomes of the policy change in the longer term.

Other papers that study the Universal Two-Child Policy mostly focus on women's intent on having two children and assessing various factors that influence this decision. Wang and Hesketh (2018), with data from Zhejiang Province, and Liu et al. (2020), with data from 11 provinces, report that economic constraints are one of the prominent reasons for low child-bearing intent. This paper differs from these studies as we conduct a quantitative analysis of the effects on female labor market outcomes on a national level using CFPS data that covers 25 provinces and offers 33,600 individual samples.

The rest of this paper is as follows. Section 2 discusses the progression of China's family planning policies, from the restrictive One-Child Policy to the Universal Two-Child Policy. Section 3 introduces the data we use as well as the procedures we take to clean the variables of interest. Section 4 examines the empirical framework we develop.

Section 5 analyzes the main results; Section 6 presents placebo tests on females above reproductive age and males of ages 20 to 50; Section 7 concludes.

2 Background

Implemented in 1980, the One-Child Policy restricts married couples in China to have only one child (Short and Fengying, 1998). Out of many negative consequences, the most devastating are the aging population adding increasing strain on state welfare, gendered population disparity achieved through illegal "sex-selective abortions," female infanticide, and "the collapse of a credible government birth reporting system"(Wang, 2005). Since 2014, China has become the country with the most elderly population in the world (Jiang, 2015). By 2015, the elderly population in China, aged 65 and above, has reached up to 221 million people, about 16.15% of the total population. [3] Eventually, the perpetually compromised quality of life became a national concern.

Thus, China attempted to counter the effects of the aging population by allowing couples comprised of single-child parents or ethnic minorities to be exempted from the One-Child Policy and have up to two children.

Later, China further relaxed birth control policies. The Universal Two-Child Policy, nationally implemented on January 1st, 2016, allows all legal couples in China to have two children, regardless of whether or not the couples have siblings. The policy's communique suggests that China "should promote the balanced development of the population" and take action to reduce the aging of the population.[4] Because of the previous policies, the Universal Two-Child Policy does not affect couples where at least one is single-child or is of minority ethnicity.

[3] Data source: National Bureau of Statistics.
[4] Data source: The Central Committee of the Communist Party of China.

3 Data

Our analysis uses the China Family Panel Studies (CFPS) as the primary data source. CFPS is a biennial, national survey of Chinese individuals, families, and communities with panel data from 2010 through 2018. CFPS covers 25 provinces, resulting in approximately 33,600 individual observations and 14,960 family observations, varying by year.

Our focus is on data from individuals' yearly income and current employment status. CFPS collects yearly income such that it includes income earned from all sources. To eliminate income from sources other than work, we set annual income to zero if the individual reports to be unemployed. We also excluded self-employed individuals to reflect the majority of the population. Lastly, we dropped all observations from the year 2010 because the employment variable was defined differently from other rounds of the survey.

Additionally, CFPS includes demographic information such as gender, year of birth, and the highest level of education attained. We hypothesize the Universal Two-Child Policy to affect women who were able to give birth to a second child. For our main analysis, we include only women of reproductive ages 20 to 50. For placebo tests, we investigate women above reproductive ages and men of ages 20 to 50.

We reclassify the levels of education into four categories: primary school or below, middle school, high school, and college or above.

Only the 2010 wave contains data on whether or not the individual has siblings. Thus, we limit the sample to individuals who are present in the 2010 wave. [5]

We expect wage discrimination to happen more prominently in urban and non-agricultural regions and couples in these regions to be under loosened policies. Thus, we restrict the sample to only individuals located in urban regions and individuals with non-agricultural careers.[6] Similarly, couples of minority ethnicity were also allowed to have two children

[5] Since we focus on the adult sample, the number of siblings for each observation should not change over time.

[6] After restricting to only individuals located in urban regions, about 2% of the remaining observations are individuals employed in agricultural jobs.

under previous policies. Therefore, we further reduce the sample to individuals who are not of minority ethnicity. [7] Finally, as working individuals in China cannot be a full-time student at the same time, we exclude all individuals who attended school during 2010 through 2018.

The resulting sample contains 9,334 observations from across the years 2012 to 2018. Each individual is between the ages of 20 to 50, female, of Han ethnicity, and located in an urban region, not self-employed nor currently at school. Table 1 summarizes sample statistics.

4 Empirical Framework

To demonstrate the effect of the Two-Child Policy, we use the difference-in-differences methodology that compares the annual income and employment status of single child females with females who have siblings with the following equation:

$$Y_{it} = \beta_0 Post_t + \beta_1 Sc_i + \beta_2 Post_t \times Sc_i + \beta_3 X_{it} + \mu_i + \lambda_t + \epsilon_{it} \quad (1)$$

The subscripts *i* and *t* represent individual and year, respectively. Y_{it} represents the dependent variables, yearly income, and employment status. $Post_t$ is a dummy variable that represents pre- and post-Universal Two-Child Policy, while Sc_i is a dummy variable that represents whether or not the individual is a single child. The coefficient of interest is β_3, indicating the magnitude of the effect of the Universal Two-Child Policy on the income and employment of single child women. Controlled individual factors (X_{it}) include the highest education achieved and the birth year. We add an individual fixed effect (μ_i) and year fixed effect (λ_t) to account for time-invariant individual factors as well as any yearly

[7] Only about 20% of the total number of observations include ethnicity information.

shocks.

Additionally, we use the event study methodology to measure the impact of the Two-Child Policy:

$$Y_{it} = \sum_{t=2012,2016,2018} \beta_t Year_t \times Sc_i + \beta_3 Edu_{it} + \beta_4 X_{it} + \mu_i + \lambda_t + \epsilon_{it} \quad (2)$$

where Sc_i and Edu_{it} are dummy variables for whether or not the individual is a single child and the highest education level achieved. $Year2012_t \times Sc_i$, $Year2016_t \times Sc_i$, and $Year2018_t \times Sc_i$ denote dummy variables for the respective years interacting with whether or not the individual is a single child. The coefficients of interest are β_1, β_2, and β_3. We expect β_1 to be 0, and β_2 and β_3 to demonstrate the effect of the policy. The year 2014 is omitted as it is the basis of reference. The controls and fixed effects applied in Equation (2) are the same as those applied in Equation (1).

5 Main Results

5.1 Effects on Employment Status

First, we analyze the Universal Two-Child Policy's effect on the employment status of females who have siblings using the event study methodology, shown in Figure 1 Panel (a). Before the policy, which was in effect in 2016, the coefficients of interest are close to zero and statistically insignificant, proving the parallel trend. Based on the data we observed in 2016 and 2018, we do not find effects on employment status, as the coefficients of interest remain close to zero and statistically insignificant. Table III serves as a robustness check of this result. Column (1) includes only the year fixed effect and no other fixed effects or controls. The results demonstrate statistical insignificance. Column (2) shows that the policy had little influence on employment status after adding demographic

controls such as gender, highest education achieved, and birth year. Column (3) and column (4) include province fixed effect and individual fixed effect, respectively. Both of these columns also demonstrate little statistical significance.

Next, Figure 1 Panel (b) examines the effect of the policy using the differences-in-differences methodology. In addition to minimal year-specific effects, as shown through the event study methodology, figure 1 panel (b) indicates that the event has a minimal and statistically insignificant effect on employment status overall since both females who are single-child and have siblings demonstrate similar overall trends. Table IV displays coefficients from the Differences-in-Differences regression. Column (1) does not include any specification controls and denotes statistically insignificant effects post-policy. Column (2) adds demographic controls, which are the same as those added for the event study methodology. The coefficient of interest is -0.027, which is statistically insignificant. Column (3) includes province fixed effect and demographic controls. This more stringent specification also indicates that the coefficient of interest is statistically insignificant. Column (4) and column (5) both add year fixed effect and demographic controls. Column (4) uses province fixed effect, while column (5) uses individual fixed effect. Both columns display the minimal impact of the policy on the employment status of women who have siblings.

Therefore, the results imply that the Universal Two-Child Policy has minimal effect on the employment status of females who have siblings.

5.2 Effects on Yearly Income

Now, we examine the effect of the policy on the yearly income of females who have siblings. Table V illustrates the overall trend using the differences-in-differences methodology. Each column uses the same specification controls as the differences-in-differences regression done for employment status. The overall effect is statistically significant on the yearly income of women who have siblings, reinforced by each column of Table V,

even when we add the most stringent specifications.

Figure 2 Panel (a) demonstrates the usage of the event study methodology. Years before the implementation of the policy are close to zero, displaying the parallel trend. Although the coefficients of interest in 2016 indicate minimal effect, the coefficients in 2018 illustrate the negative effect of the policy on the yearly incomes of females who have siblings. Table VI corroborates with this result and reports the fixed effects and controls we use. Each column uses the same specification controls as the event study regression done for employment status. Column (1) indicates a 1% statistically significant effect in 2018. Column (2) confirms the results suggested by Column (1), implying a strong negative and statistically significant effect on the incomes of females who have siblings in 2018. Column (3) and column (4) again reinforces these results, even after adding province fixed effect and individual fixed effect, respectively.

There are two possible explanations for the negative impact on the incomes of women who have siblings. First, the yearly income of these women could have decreased due to the policy, explaining the negative event study coefficient in 2018. Another possible explanation is that the annual income in 2018 generally increased all women, but the wages of working females who have siblings either increased at a slower rate than the general increasing trend or stayed the same. Figure 2 Panel (b) illustrates the differences-on-differences methodology used on yearly income. As shown through the figure, the average annual income of females who have siblings did not decrease. Rather, it increased at a significantly slower rate compared to single-child females. As a robustness check, we apply the similar differences-in-differences methodology on only positive yearly income. Figure 3 indicates that the results are similar, implying that the yearly incomes of women who have siblings were significantly negatively affected by the Universal Two-Child Policy due to the inability of their income to increase as fast as the general trend.

6 Placebo Test

6.1 Effects on Females Above Reproductive Ages

Because the Two-Child Policy supposedly affects only females who are of child-bearing age, we predict the policy's effect on females aged 51 and above to be minimal. Figure 4 Panel (a) displays the event study methodology used for on the employment status of females aged 51 and above. The coefficients of interest for 2012 and 2014 remain close to zero, proving the parallel trend. The coefficients of interest for 2016 and 2018, which are years after the policy has been implemented also are close to zero, proving the statistically insignificant effect of the policy on females who are above fertility age. Figure 4 Panel (b) illustrates the overall trend of the employment status of females above fertile ages using the differences-in-differences methodology. The results are also statistically insignificant as the two trends remain parallel. The annual income of females above fertility age also remains unaffected by the policy, as shown through Figure 5 Panels (a) and (b), which displays the event study methodology and the differences-in-differences methodology, respectively.

6.2 Effects on Males of Ages 20 to 50

Further, we hypothesize the effect of the Universal Two-Child Policy on male employment and income to be insignificant as males are not as involved in child-birth and care process. Figure 6 Panel (a) depicts the analysis of male employment using event study methodology. The coefficients close to zero confirms that the effect is statistically insignificant. Figure 6 Panel (b) indicates an overall increase and parallel trend between single-child males and males who have siblings. Figure 7 panel (a) exhibits an unexpected negative effect of the policy on men's yearly income similar to that of the policy on women's yearly income, although Figure 7 panel (b) signifies a parallel trend.

We propose two possibilities for the Universal Two-Child Policy's effect on males.

Firstly, the policy may have a similar effect on males and females, not just on females as we hypothesized, due to the increasing involvement of fathers in birth and child-care (Li, 2020). The change in the role of fathers from traditional financial supporters to caregivers may place a heavier burden on men, negatively impacting their yearly income. A second possibility is that an unaccounted event occurred in 2016 that impacted the income of both males and females of ages 20 to 50. In this case, the estimated effect of income cannot be fully attributed to fertility relaxation. Therefore, we should cautiously interpret the results of the female sample.

7 Conclusion

This paper examines the effect of the Universal Two-Child Policy on women's employment status and wages using data from CFPS. By performing event study and differences-in-differences analysis on employment status and yearly income, using demographic specifications, we discover a significantly negative impact on wages of women aged 20 to 50 who have siblings, compared to the control group of single-child women. We do not find the policy to have a significant effect on women's employment status. Our study confirms that the wages of the treatment group generally increased, but the rate of increase for the control group was significantly higher.

From the placebo test on males of ages 20 to 50, we find unexpected negative effects on their wages, indicating two possibilities. First, Chinese family structures may have shifted away from the traditional stereotypes of mothers staying in the domestic sphere and fathers financially supporting the family. Men may have been more involved in child-care than generally assumed, which affected their wages. Second, there may have been an unaccounted event that affected both male and female incomes. As such, the results from female samples should be carefully interpreted. We encourage further research into the two possibilities proposed.

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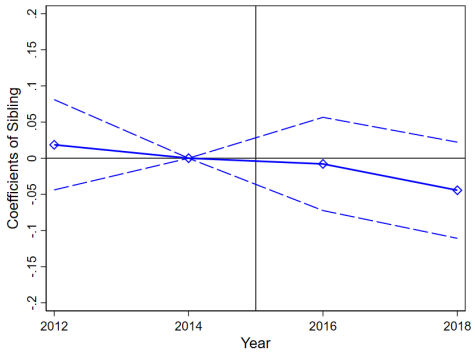
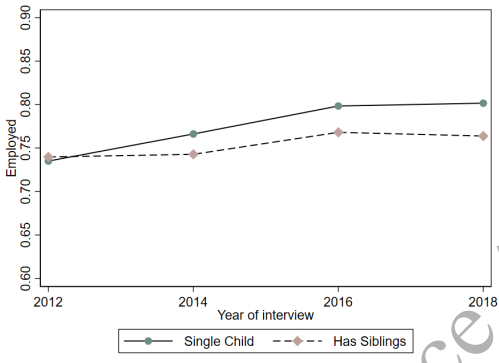
Figure 1: Methodology for Employment Status of Females of Reproductive Age

(a) Event Study



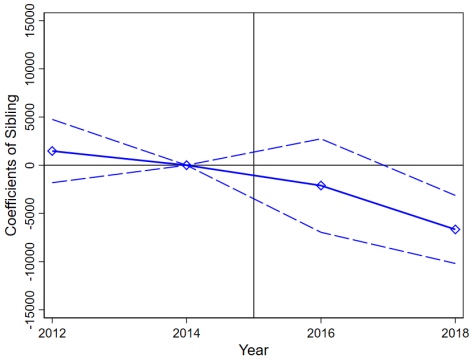
(b) Differences-in-Differences



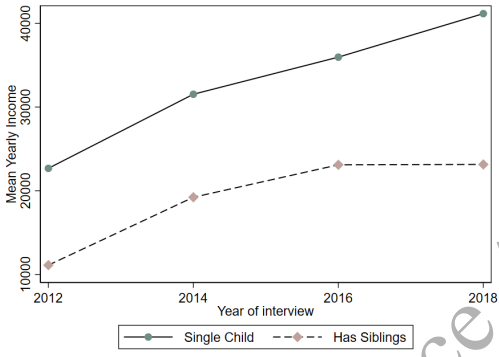
Notes: The graphs plot event-study (Panel (a)) and differences-in-differences (Panel (b)) estimates, respectively, of the effects of the Universal Two-Child Policy on employment status of females of fertile ages 20 - 50. Panel (a) includes the corresponding 95% confidence intervals. The Employed variable in *Differences-in-Differences* is a dummy variable, with 1 representing employed and 0 representing unemployed. The vertical line illustrates the year of the policy's implementation.

Figure 2: Methodology for Yearly Income of Females of Reproductive Age

(a) Event Study



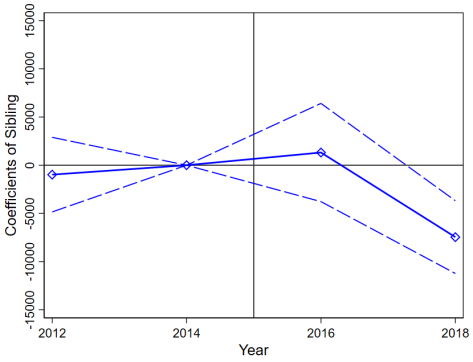
(b) Differences-in-Differences



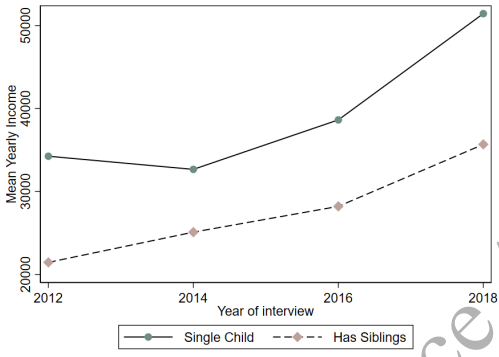
Notes: The graphs plot event-study (Panel (a)) and differences-in-differences (Panel (b)) estimates, respectively, of the effects of the Universal Two-Child Policy on yearly income of females of fertile ages 20 - 50. Panel (a) includes the corresponding 95% confidence intervals. The vertical line illustrates the year of the policy's implementation.

Figure 3: Methodology for Positive Yearly Income of Females of Reproductive Age

(a) Event Study



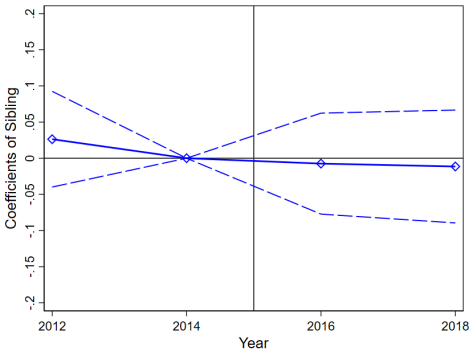
(b) Differences-in-Differences



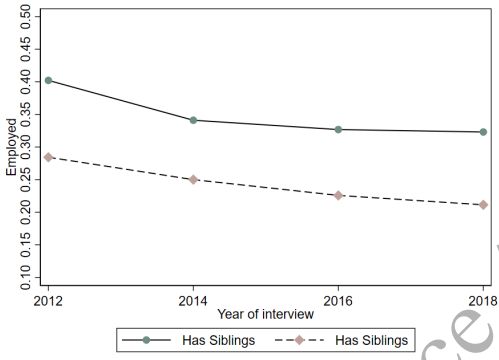
Notes: The graphs plot event-study (Panel (a)) and differences-in-differences (Panel (b)) estimates, respectively, of the effects of the Universal Two-Child Policy on yearly income of females of fertile ages 20 - 50, using only positive income. Panel (a) includes the corresponding 95% confidence intervals. The vertical line illustrates the year of the policy's implementation.

Figure 4: Methodology for Employment Status of Females Above Reproductive Age

(a) Event Study



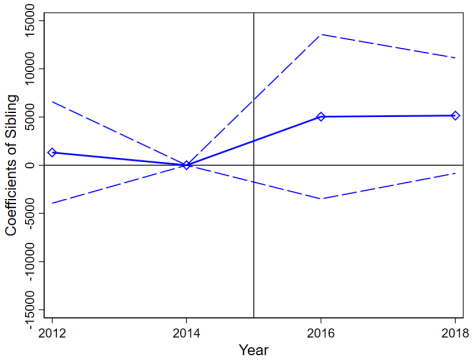
(b) Differences-in-Differences



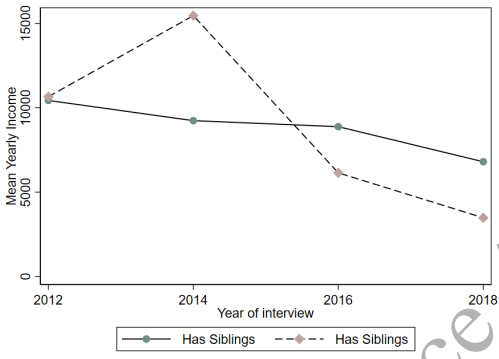
Notes: The graphs plot event-study (Panel (a)) and differences-in-differences (Panel (b)) estimates, respectively, of the effects of the Universal Two-Child Policy on employment status of females of ages 51 and above. Panel (a) includes the corresponding 95% confidence intervals. The Employed variable in *Differences-in-Differences* is a dummy variable, with 1 representing employed and 0 representing not employed. The vertical line illustrates the year of the policy's implementation.

Figure 5: Methodology for Yearly Income of Females Above Reproductive Age

(a) Event Study



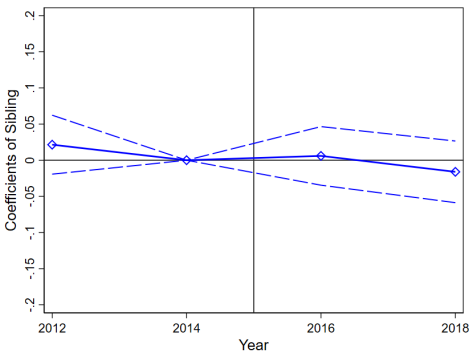
(b) Differences-in-Differences



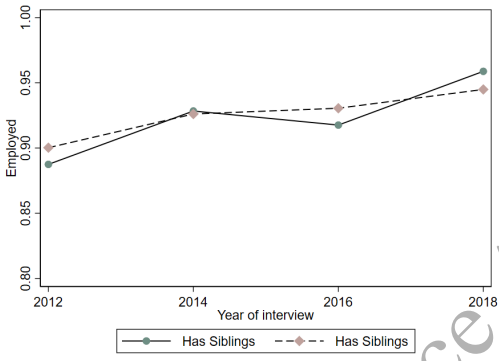
Notes: The graphs plot event-study (Panel (a)) and differences-in-differences (Panel (b)) estimates, respectively, of the effects of the Universal Two-Child Policy on yearly income of females of ages 51 and above. Panel (a) includes the corresponding 95% confidence intervals. The vertical line illustrates the year of the policy's implementation.

Figure 6: Methodology for Employment Status of Males of Ages 20 - 50

(a) Event Study



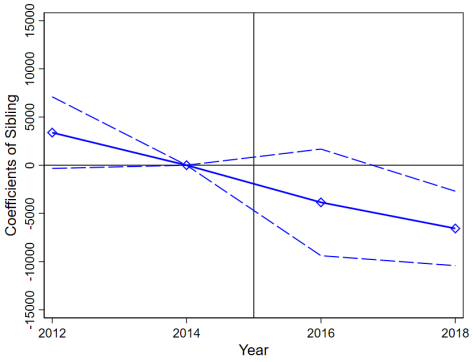
(b) Differences-in-Differences



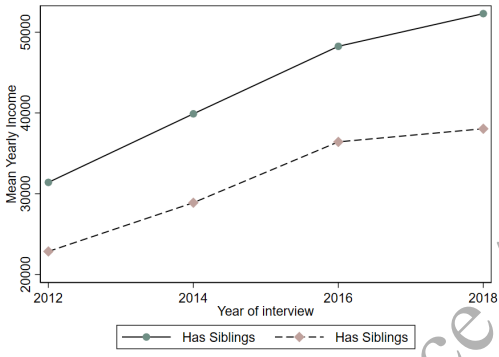
Notes: The graphs plot event-study (Panel (a)) and differences-in-differences (Panel (b)) estimates, respectively, of the effects of the Universal Two-Child Policy on employment status of males of ages 20 - 50. Panel (a) includes the corresponding 95% confidence intervals. The Employed variable in *Differences-in-Differences* is a dummy variable, with 1 representing employed and 0 representing not employed. The vertical line illustrates the year of the policy's implementation.

Figure 7: Methodology for Yearly Income of Males of Ages 20 - 50

(a) Event Study



(b) Differences-in-Differences



Notes: The graphs plot event-study (Panel (a)) and differences-in-differences (Panel (b)) estimates, respectively, of the effects of the Universal Two-Child Policy on yearly income of males of ages 20 - 50. Panel (a) includes the corresponding 95% confidence intervals. The vertical line illustrates the year of the policy's implementation.

Table I: Summary Statistics of Females Aged 20 - 50

Variable	Mean	Std. Dev.	Min.	Max.	N
Male	0	0	0	0	9334
Birth Year	1976.857	7.7	1966	1995	9334
Employed	0.755	0.43	0	1	9334
Income	19420.087	22563.268	0	132000	6593
Sibling	0.116	0.321	0	1	9334
Middle School	0.31	0.462	0	1	9334
High School	0.179	0.383	0	1	9334
College or above	0.216	0.411	0	1	9334

Notes: Every observation represents an individual. The sample is used for event study and differences-in-differences analysis on women of reproductive ages 20 to 50. The variables Male, Employed, and Sibling are dummy variables, representing female or male, employed or unemployed, and whether or not the individual has siblings. Middle School, High School, and College or above are variables that represent the highest education received by the individual. The number of observations for the yearly income variable is less than other variables due to missing observations in the data.

Table II: Event Study Regression for Employment Status of Females of Ages 20 - 50

Dependent Variable: Employed	(1)	(2)	(3)	(4)
Year 2012 X Sibling	0.028	0.034	0.040	0.019
	(0.038)	(0.037)	(0.036)	(0.032)
Year 2016 X Sibling	-0.007	-0.003	-0.009	-0.008
	(0.040)	(0.039)	(0.039)	(0.033)
Year 2018 X Sibling	-0.014	-0.014	-0.017	-0.044
	(0.040)	(0.039)	(0.039)	(0.034)
Sibling	-0.023	0.001	-0.005	
	(0.027)	(0.027)	(0.027)	
Middle School		-0.010	0.006	0.093**
		(0.011)	(0.011)	(0.043)
High School		0.040***	0.061***	0.156**
		(0.013)	(0.014)	(0.065)
College or above		0.191***	0.212***	0.143*
		(0.013)	(0.014)	(0.080)
Birth Year		-0.006***	-0.007***	
		(0.001)	(0.001)	
Province FE	No	No	Yes	No
Year FE	Yes	Yes	Yes	Yes
Individual FE	No	No	No	Yes
Controls	No	Yes	Yes	Yes
Observations	9334	9334	9334	9334
R-Squared	0.001	0.035	0.069	0.657

Notes: The outcome variable is employment status. Specifications control for province fixed effects, year fixed effects, individual fixed effects, and demographic factors such as gender, highest level of education achieved, and birth year. Standard errors are shown in parentheses. ***significant at the 0.01 level, ** significant at the 0.05 level, * significant at the 0.1 level.

Table III: Differences-in-Differences Regression for Employment Status of Females of Ages 20 - 50

Dependent Variable: Employed	(1)	(2)	(3)	(4)	(5)
Post X Sibling	-0.026	-0.027	-0.034	-0.034	-0.034
	(0.028)	(0.027)	(0.027)	(0.027)	(0.024)
Post	0.050*	0.050*	0.054**		
	(0.026)	(0.026)	(0.025)		
Sibling	-0.008	0.019	0.016	0.016	
	(0.019)	(0.019)	(0.019)	(0.019)	
Middle School		-0.010	0.006	0.006	0.092**
		(0.011)	(0.011)	(0.011)	(0.043)
High School		0.040***	0.061***	0.061***	0.155**
		(0.013)	(0.014)	(0.014)	(0.065)
College or above		0.191***	0.211***	0.212***	0.144*
		(0.013)	(0.014)	(0.014)	(0.080)
Birth Year		-0.006***	-0.007***	-0.007***	
		(0.001)	(0.001)	(0.001)	
Province FE	No	No	Yes	Yes	No
Year FE	No	No	No	Yes	Yes
Individual FE	No	No	No	No	Yes
Controls	No	Yes	Yes	Yes	Yes
Observations	9334	9334	9334	9334	9334
R-Squared	0.001	0.034	0.069	0.069	0.657

Notes: The outcome variable is employment status. Specifications control for year fixed effects, individual fixed effects, and demographic factors such as gender, highest level of education achieved, and birth year. Standard errors are shown in parentheses. ***significant at the 0.01 level, ** significant at the 0.05 level, * significant at the 0.1 level.

Table IV: Differences-in-Differences Regression for Yearly Income of Females of Ages 20 - 50

Dependent Variable: Income	(1)	(2)	(3)	(4)	(5)
Post X Sibling	-4,671.704***	-4,360.978***	-4,811.322***	-4,747.730***	-6,379.438***
	(1,673.836)	(1,473.873)	(1,378.277)	(1,359.744)	(1,375.189)
Post	13,569.891***	12,974.352***	13,421.964***		
	(1,569.820)	(1,382.351)	(1,292.383)		
Sibling	-11,822.787***	-2,273.172**	1,640.819*	1,557.389*	
	(1,038.925)	(961.478)	(925.849)	(913.045)	
Middle School		4,259.370***	4,111.927***	4,147.504***	1,274.773
		(620.128)	(590.357)	(582.514)	(2,128.951)
High School		12,635.714***	11,697.963***	11,618.391***	5,637.615*
		(726.174)	(694.582)	(685.306)	(3,372.495)
College or above		28,174.697***	26,176.594***	25,990.004***	11,881.083***
		(708.101)	(684.078)	(675.609)	(4,034.997)
Birth Year		-26.424	-8.425	-12.693	
		(33.611)	(31.803)	(31.506)	
Province FE	No	No	Yes	Yes	No
Year FE	No	No	No	Yes	Yes
Individual FE	No	No	No	No	Yes
Controls	No	Yes	Yes	Yes	Yes
Observations	6593	6593	6593	6593	6593
R-Squared	0.081	0.288	0.382	0.400	0.811

Notes: The outcome variable is yearly income. Specifications control for year fixed effects, individual fixed effects, and demographic factors such as gender, highest level of education achieved, and birth year. Standard errors are shown in parentheses. ***significant at the 0.01 level, ** significant at the 0.05 level, * significant at the 0.1 level.

Table V: Event Study Regression for Yearly Income of Females of Ages 20 - 50

Dependent Variable: Income	(1)	(2)	(3)	(4)
Year 2012 X Sibling	743.069	819.939	1,118.006	1,471.673
	(2,115.886)	(1,861.095)	(1,735.419)	(1,675.828)
Year 2016 X Sibling	-557.812	900.360	191.450	-2,110.043
	(2,935.457)	(2,583.098)	(2,408.487)	(2,474.073)
Year 2018 X Sibling	-5,708.092**	-5,712.322***	-5,775.826***	-6,663.952***
	(2,267.338)	(1,994.419)	(1,858.694)	(1,800.038)
Sibling	-12,310.551***	-2,913.463*	869.418	
	(1,663.022)	(1,494.262)	(1,408.785)	
Middle School		4,337.953***	4,161.799***	1,415.436
		(613.530)	(582.332)	(2,129.340)
High School		12,579.966***	11,610.242***	5,608.854*
		(718.423)	(685.060)	(3,371.291)
College or above		28,079.151***	26,025.566***	11,752.185***
		(701.420)	(675.497)	(4,035.295)
Birth Year		-34.347	-13.804	
		(33.393)	(31.500)	
Province FE	No	No	Yes	No
Year FE	No	No	Yes	Yes
Individual FE	No	No	No	Yes
Controls	No	Yes	Yes	Yes
Observations	6593	6593	6593	6593
R-Squared	0.101	0.305	0.400	0.812

Notes: The outcome variable is yearly income. Specifications control for province fixed effects, year fixed effects, individual fixed effects, and demographic factors such as gender, highest level of education achieved, and birth year. Standard errors are shown in parentheses. ***significant at the 0.01 level, ** significant at the 0.05 level, * significant at the 0.1 level.

A Appendix

Table A.I: Summary Statistics of Males Aged 20 - 50

Variable	Mean	Std. Dev.	Min.	Max.	N
Male	1	0	1	1	7770
Birth Year	1977.193	7.907	1966	1994	7770
Employed	0.925	0.263	0	1	7770
Income	32885.111	28054.721	0	132000	5938
Single Child	0.19	0.392	0	1	7770
Middle School	0.314	0.464	0	1	7770
High School	0.207	0.406	0	1	7770
College or above	0.248	0.432	0	1	7770

Notes: Every observation represents an individual. The sample is used for event study and differences-in-differences analysis on men of ages 20 to 50. The variables male, employed, and sibling are dummy variables, representing female or male, employed or unemployed, and whether or not the individual has siblings. Middle school, high school, and college or above are variables that represent the highest education received by the individual. The number of observations for the yearly income variable is less than other variables due to missing observations in the data.

Table A.II: Summary Statistics of Females Aged 51 and Above

Variable	Mean	Std. Dev.	Min.	Max.	N
Male	0	0	0	0	10664
Birth Year	1952.351	9.08	1919	1965	10664
Employed	0.345	0.475	0	1	10664
Income	9439.556	15000.544	0	132000	5174
Single Child	0.062	0.241	0	1	10664
Middle School	0.231	0.421	0	1	10664
High School	0.149	0.356	0	1	10664
College or above	0.034	0.182	0	1	10664

Notes: Every observation represents an individual. The sample is used for event study and differences-in-differences analysis on women above the reproductive ages of 20 - 50. The variables male, employed, and sibling are dummy variables, representing female or male, employed or unemployed, and whether or not the individual has siblings. Middle school, high school, and college or above are variables that represent the highest education received by the individual. The number of observations for the yearly income variable is less than other variables due to missing observations in the data.

Table A.III: Event Study Regression for Employment Status of Females Above Reproductive Age

Dependent Variable: Employed	(1)	(2)	(3)	(4)
Year 2012 X Sibling	0.027	0.017	0.028	0.026
	(0.050)	(0.046)	(0.045)	(0.034)
Year 2016 X Sibling	0.010	0.016	0.019	-0.007
	(0.054)	(0.050)	(0.048)	(0.036)
Year 2018 X Sibling	0.021	0.022	0.030	-0.011
	(0.057)	(0.053)	(0.051)	(0.040)
Sibling	0.091**	0.029	0.015	
	(0.036)	(0.034)	(0.033)	
Middle School		-0.180***	-0.130***	-0.155
		(0.011)	(0.011)	(0.157)
High School		-0.221***	-0.158***	0.105
		(0.013)	(0.013)	(0.339)
College or above		-0.075***	0.009	
		(0.024)	(0.023)	
Birth Year		0.021***	0.019***	
		(0.000)	(0.000)	
Province FE	No	No	Yes	No
Year FE	Yes	Yes	Yes	Yes
Individual FE	No	No	No	Yes
Controls	No	Yes	Yes	Yes
Observations	10664	10664	10664	10664
R-Squared	0.008	0.155	0.211	0.761

Notes: The outcome variable is employment status. Specifications control for province fixed effects, year fixed effects, individual fixed effects, and demographic factors such as gender, highest level of education achieved, and birth year. Standard errors are given in parentheses. ***significant at the 0.01 level, ** significant at the 0.05 level, * significant at the 0.1 level.

Table A.IV: Differences-in-Differences Regression for Employment Status of Females Above Reproductive Age

Dependent Variable: Employed	(1)	(2)	(3)	(4)	(5)
Post X Sibling	0.001	0.009	0.009	0.009	-0.023
	(0.039)	(0.036)	(0.034)	(0.034)	(0.027)
Post	-0.049	-0.082**	-0.084**		
	(0.037)	(0.035)	(0.033)		
Sibling	0.105***	0.037	0.029	0.030	
	(0.025)	(0.023)	(0.023)	(0.023)	
Middle School		-0.179***	-0.129***	-0.130***	-0.155
		(0.011)	(0.011)	(0.011)	(0.157)
High School		-0.220***	-0.156***	-0.158***	0.104
		(0.013)	(0.013)	(0.013)	(0.339)
College or above		-0.074***	0.010	0.009	
		(0.024)	(0.023)	(0.023)	
Birth Year		0.021***	0.019***	0.019***	
		(0.000)	(0.000)	(0.000)	
Province FE	No	No	Yes	Yes	No
Year FE	No	No	No	Yes	Yes
Individual FE	No	No	No	No	Yes
Controls	No	Yes	Yes	Yes	Yes
Observations	10664	10664	10664	10664	10664
R-Squared	0.005	0.152	0.208	0.211	0.761

Notes: The outcome variable is employment status. Specifications control for year fixed effects, individual fixed effects, and demographic factors such as gender, highest level of education achieved, and birth year. Standard errors are given in parentheses. ***significant at the 0.01 level, ** significant at the 0.05 level, * significant at the 0.1 level.

Table A.V: Differences-in-Differences Regression for Yearly Income of Females Above Reproductive Age

Dependent Variable: Income	(1)	(2)	(3)	(4)	(5)
Post X Sibling	4,121.143*	3,540.478*	2,044.454	2,180.257	4,198.513*
	(2,323.642)	(2,025.624)	(1,929.928)	(1,930.292)	(2,213.834)
Post	-7,104.828***	-5,824.783***	-4,068.487**		
	(2,272.105)	(1,983.520)	(1,891.230)		
Sibling	-1,151.902	-1,978.636**	-680.298	-668.750	
	(1,007.517)	(882.658)	(845.954)	(845.515)	
Middle School		7,083.970***	5,743.121***	5,680.461***	
		(465.522)	(456.756)	(457.442)	
High School		14,205.102***	12,400.683***	12,326.692***	
		(548.970)	(539.867)	(540.557)	
College or above		32,083.688***	30,345.646***	30,338.638***	
		(998.043)	(965.975)	(965.400)	
Birth Year		-15.456	43.233**	51.668**	
		(22.060)	(21.368)	(21.985)	
Province FE	No	No	Yes	Yes	No
Year FE	No	No	No	Yes	Yes
Individual FE	No	No	No	No	Yes
Controls	No	Yes	Yes	Yes	Yes
Observations	5174	5174	5174	5174	5174
R-Squared	0.009	0.248	0.325	0.326	0.843

Notes: The outcome variable is yearly income. Specifications control for province fixed effects, year fixed effects, individual fixed effects, and demographic factors such as gender, highest level of education achieved, and birth year. Standard errors are given in parentheses. ***significant at the 0.01 level, ** significant at the 0.05 level, * significant at the 0.1 level.

Table A.VI: Event Study Regression for Yearly Income of Females Above Reproductive Age

Dependent Variable: Income	(1)	(2)	(3)	(4)
Year 2012 X Sibling	6,001.659**	5,079.944**	4,630.683*	1,322.101
	(2,869.215)	(2,500.651)	(2,381.938)	(2,686.121)
Year 2016 X Sibling	8,964.203*	7,869.092*	5,814.373	5,036.653
	(4,775.728)	(4,161.224)	(3,958.807)	(4,352.830)
Year 2018 X Sibling	9,549.070***	8,037.002**	6,255.641**	5,149.379*
	(3,622.883)	(3,156.935)	(3,003.539)	(3,054.479)
Sibling	-6,225.729**	-6,288.086***	-4,632.026**	
	(2,654.444)	(2,313.490)	(2,206.971)	
Middle School		6,987.472***	5,679.980***	
		(466.323)	(457.370)	
High School		14,082.982***	12,312.147***	
		(549.757)	(540.516)	
College or above		32,074.615***	30,347.113***	
		(997.038)	(965.245)	
Birth Year		-1.919	50.984**	
		(22.731)	(21.984)	
Province FE	No	No	Yes	No
Year FE	No	No	Yes	Yes
Individual FE	No	No	No	Yes
Controls	No	Yes	Yes	Yes
Observations	5174	5174	5174	5174
R-Squared	0.011	0.250	0.327	0.843

Notes: The outcome variable is yearly income. Specifications control for province fixed effects, year fixed effects, individual fixed effects, and demographic factors such as gender, highest level of education achieved, and birth year. Standard errors are given in parentheses. ***significant at the 0.01 level, ** significant at the 0.05 level, * significant at the 0.1 level.

Table A.VII: Event Study Regression for Employment Status of Males of Ages 20 - 50

Dependent Variable: Employed	(1)	(2)	(3)	(4)
Year 2012 X Sibling	0.015	0.015	0.017	0.022
	(0.021)	(0.021)	(0.021)	(0.021)
Year 2016 X Sibling	0.015	0.017	0.016	0.006
	(0.021)	(0.021)	(0.021)	(0.021)
Year 2018 X Sibling	-0.012	-0.010	-0.010	-0.016
	(0.022)	(0.021)	(0.021)	(0.022)
Sibling	-0.002	0.014	0.009	
	(0.015)	(0.015)	(0.015)	
Middle School		0.023***	0.027***	0.077**
		(0.008)	(0.008)	(0.037)
High School		0.035***	0.038***	0.057
		(0.009)	(0.009)	(0.049)
College or above		0.083***	0.082***	0.016
		(0.009)	(0.009)	(0.056)
Birth Year		-0.000	-0.001	
		(0.000)	(0.000)	
Province FE	No	No	Yes	No
Year FE	Yes	Yes	Yes	Yes
Individual FE	No	No	No	Yes
Controls	No	Yes	Yes	Yes
Observations	7770	7770	7770	7770
R-Squared	0.005	0.016	0.035	0.557

Notes: The outcome variable is employment status. Specifications control for province fixed effects, year fixed effects, individual fixed effects, and demographic factors such as gender, highest level of education achieved, and birth year. Standard errors are shown in parentheses. ***significant at the 0.01 level, ** significant at the 0.05 level, * significant at the 0.1 level.

Table A.VIII: Differences-in-Differences Regression for Employment Status of Males of Ages 20 - 50

Dependent Variable: Employed	(1)	(2)	(3)	(4)	(5)
Post X Sibling	-0.006	-0.004	-0.006	-0.005	-0.014
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Post	0.030**	0.028**	0.027**		
	(0.014)	(0.014)	(0.014)		
Sibling	0.006	0.022**	0.018	0.017	
	(0.011)	(0.011)	(0.011)	(0.011)	
Middle School		0.023***	0.027***	0.027***	0.075**
		(0.008)	(0.008)	(0.008)	(0.037)
High School		0.034***	0.038***	0.038***	0.057
		(0.009)	(0.009)	(0.009)	(0.049)
College or above		0.082***	0.082***	0.082***	0.015
		(0.009)	(0.009)	(0.009)	(0.056)
Birth Year		-0.000	-0.001	-0.001	
		(0.000)	(0.000)	(0.000)	
Province FE	No	No	Yes	Yes	No
Year FE	No	No	No	Yes	Yes
Individual FE	No	No	No	No	Yes
Controls	No	Yes	Yes	Yes	Yes
Observations	7770	7770	7770	7770	7770
R-Squared	0.002	0.014	0.032	0.034	0.557

Notes: The outcome variable is employment status. Specifications control for year fixed effects, individual fixed effects, and demographic factors such as gender, highest level of education achieved, and birth year. Standard errors are shown in parentheses. ***significant at the 0.01 level, ** significant at the 0.05 level, * significant at the 0.1 level.

Table A.IX: Differences-in-Differences Regression for Yearly Income of Males of Ages 20 - 50

Dependent Variable: Income	(1)	(2)	(3)	(4)	(5)
Post X Sibling	-3,906.253**	-3,914.707**	-4,714.322***	-4,722.760***	-7,700.918***
	(1,794.243)	(1,674.584)	(1,595.288)	(1,584.881)	(1,574.531)
Post	15,926.403***	15,666.018***	16,036.112***		
	(1,611.068)	(1,504.698)	(1,432.510)		
Sibling	-9,600.775***	-2,692.181**	1,938.783*	1,937.236*	
	(1,146.923)	(1,130.383)	(1,124.851)	(1,117.759)	
Middle School		7,520.622***	5,602.278***	5,571.980***	323.116
		(919.576)	(887.043)	(881.155)	(3,306.082)
High School		12,059.985***	9,432.450***	9,431.314***	-4,988.706
		(1,017.208)	(987.679)	(981.444)	(4,361.484)
College or above		27,571.952***	24,300.011***	24,228.778***	-3,541.623
		(1,001.207)	(979.509)	(973.870)	(5,086.155)
Birth Year		60.397	114.286***	114.199***	
		(45.009)	(43.702)	(43.652)	
Province FE	No	No	Yes	Yes	No
Year FE	No	No	No	Yes	Yes
Individual FE	No	No	No	No	Yes
Controls	No	Yes	Yes	Yes	Yes
Observations	5938	5938	5938	5938	5938
R-Squared	0.075	0.195	0.278	0.288	0.784

Notes: The outcome variable is yearly income. Specifications control for year fixed effects, individual fixed effects, and demographic factors such as gender, highest level of education achieved, and birth year. Standard errors are shown in parentheses. ***significant at the 0.01 level, ** significant at the 0.05 level, * significant at the 0.1 level.

Table A.X: Event Study Regression for Yearly Income of Males of Ages 20 - 50

Dependent Variable: Income	(1)	(2)	(3)	(4)
Year 2012 X Sibling	2,453.574	2,512.827	2,406.135	3,384.256*
	(2,294.992)	(2,140.892)	(2,031.811)	(1,896.569)
Year 2016 X Sibling	-825.518	-1,825.582	-2,849.099	-3,854.826
	(3,115.284)	(2,906.589)	(2,762.125)	(2,821.324)
Year 2018 X Sibling	-3,249.662	-2,786.588	-3,616.706*	-6,560.403***
	(2,346.082)	(2,188.721)	(2,078.133)	(1,970.409)
Sibling	-11,005.404***	-4,166.351**	611.804	
	(1,699.881)	(1,627.379)	(1,581.696)	
Middle School		7,526.715***	5,571.243***	442.876
		(915.324)	(881.207)	(3,306.594)
High School		12,117.563***	9,442.310***	-4,960.774
		(1,012.797)	(981.528)	(4,360.040)
College or above		27,572.362***	24,226.961***	-3,379.941
		(997.501)	(973.976)	(5,084.982)
Birth Year		55.260	113.828***	
		(45.038)	(43.655)	
Province FE	No	No	Yes	No
Year FE	No	No	Yes	Yes
Individual FE	No	No	No	Yes
Controls	No	Yes	Yes	Yes
Observations	5938	5938	5938	5938
R-Squared	0.084	0.203	0.288	0.784

Notes: The outcome variable is yearly income. Specifications control for province fixed effects, year fixed effects, individual fixed effects, and demographic factors such as gender, highest level of education achieved, and birth year. Standard errors are shown in parentheses. ***significant at the 0.01 level, ** significant at the 0.05 level, * significant at the 0.1 level.