



# DOES COMPULSORY SCHOOL ATTENDANCE AFFECT SCHOOLING AND EARNINGS?

JOSHUA D. ANGRIST  
ALAN B. KRUEGER

主讲人：刘灵子

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# 01 | 主要内容及贡献

# 主要内容

- 研究义务教育政策对教育和收入的影响。
- 义务教育政策：每个男性基础教育的毕业年龄必须为**16**或者**17**周岁。由于每个男性的入学年龄不同，因此在义务教育政策下，每个男性受教育时间存在差异。
- 义务教育政策 → 教育时间 → 收入

# 主要内容及贡献

- 义务教育政策 → 教育时间

作者将男性的出生月份（12个月）分为四个季度，同年不同季度出生的男性入学时间不同，但毕业时间相同。在此基础上，作者研究出生季度差异是否会对教育时间产生影响。

- 教育时间 → 收入

作者将男性的出生季度作为IV，研究教育时间差异对收入的影响。

- 贡献：良好的IV，解决遗漏变量的影响。



02

# 义务教育政策对教育的影响

# 义务教育政策对教育的影响

- 作者将男性的出生月份（12个月）分为四个季度，同年不同季度出生的男性入学时间不同，但义务教育政策要求其毕业时间相同。因此，作者首先观测不同季度出生的男性其教育时间是否有差异。
- 方式：1. 图表直观展示；2. 剔除年份影响的图表展示；3. 数据回归。

# 义务教育政策对教育的影响

- 1. 图表

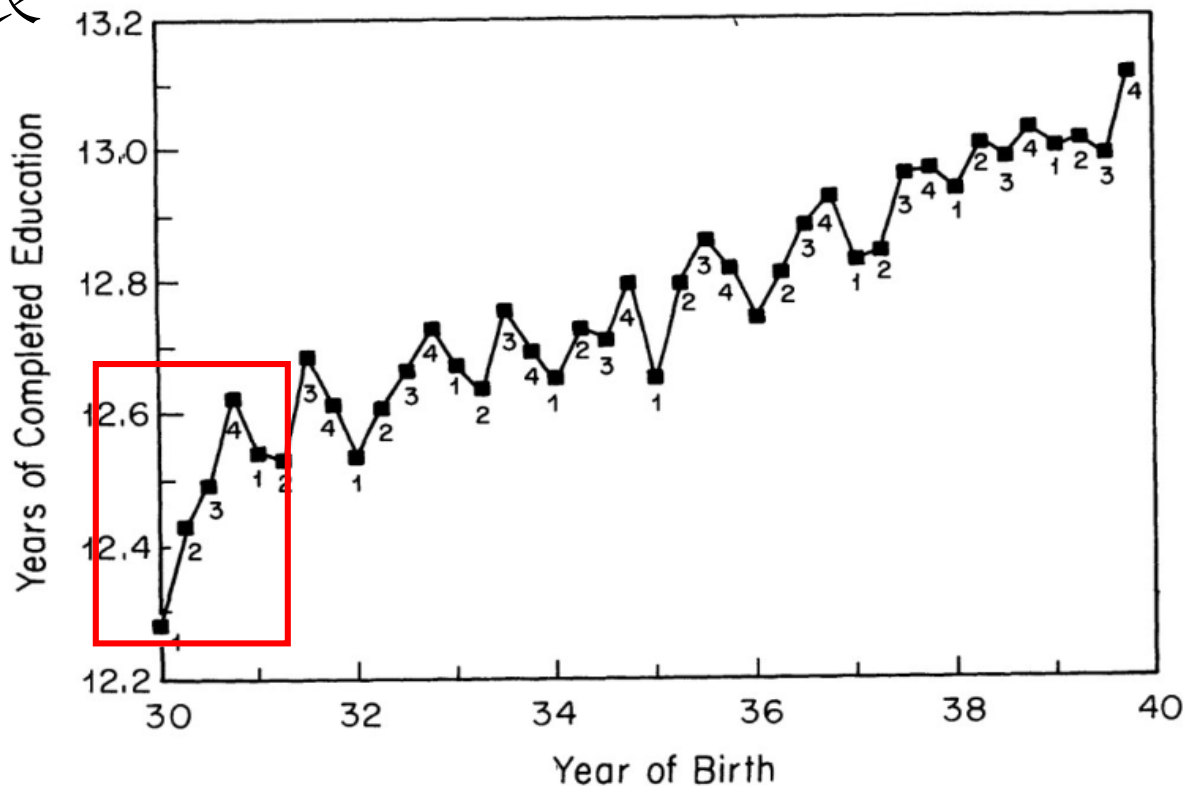


FIGURE I  
Years of Education and Season of Birth  
1980 Census  
*Note.* Quarter of birth is listed below each observation.



# 义务教育政策对教育的影响

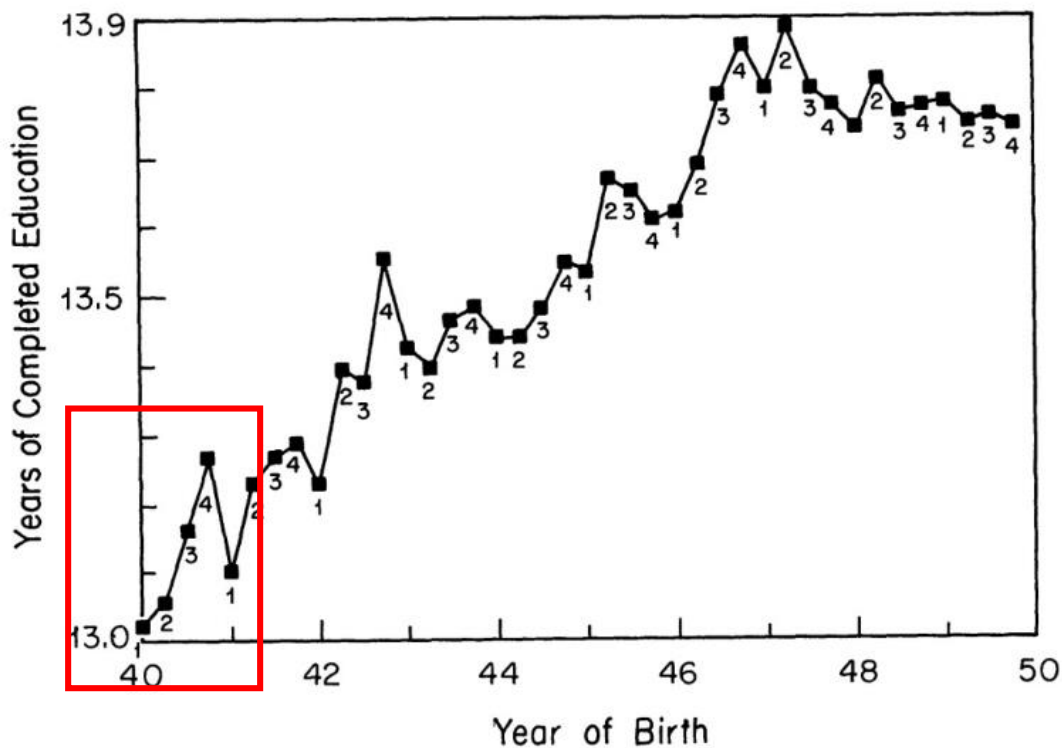


FIGURE II  
Years of Education and Season of Birth  
1980 Census  
*Note.* Quarter of birth is listed below each observation.

# 义务教育政策对教育的影响

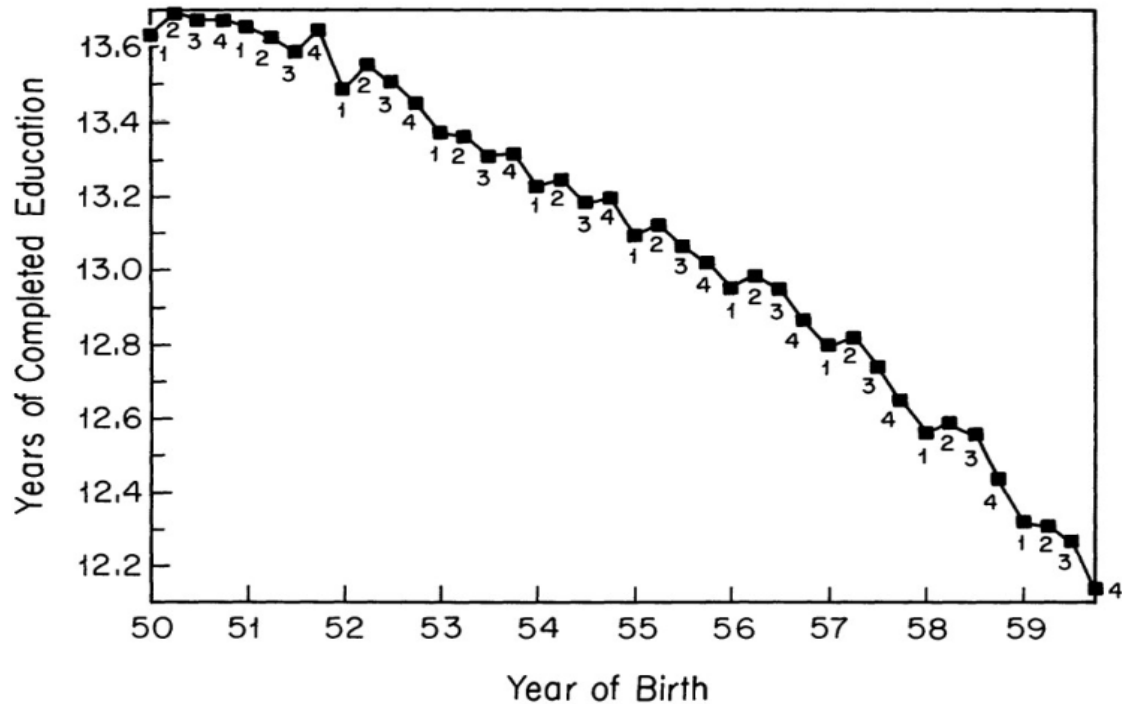


FIGURE III  
Years of Education and Season of Birth  
1980 Census  
*Note.* Quarter of birth is listed below each observation.

# 义务教育政策对教育的影响

- 2. 剔除年份影响的图表展示，用  $(E_{cj} - MA_{cj})$  表示偏离程度，其中，

$$MA_{cj} = (E_{-2} + E_{-1} + E_{+1} + E_{+2})/4,$$

$$MA_{1944,1} = (E_{1943.3} + E_{1943.4} + E_{1944.2} + E_{1944.3})/4。$$

# 义务教育政策对教育的影响

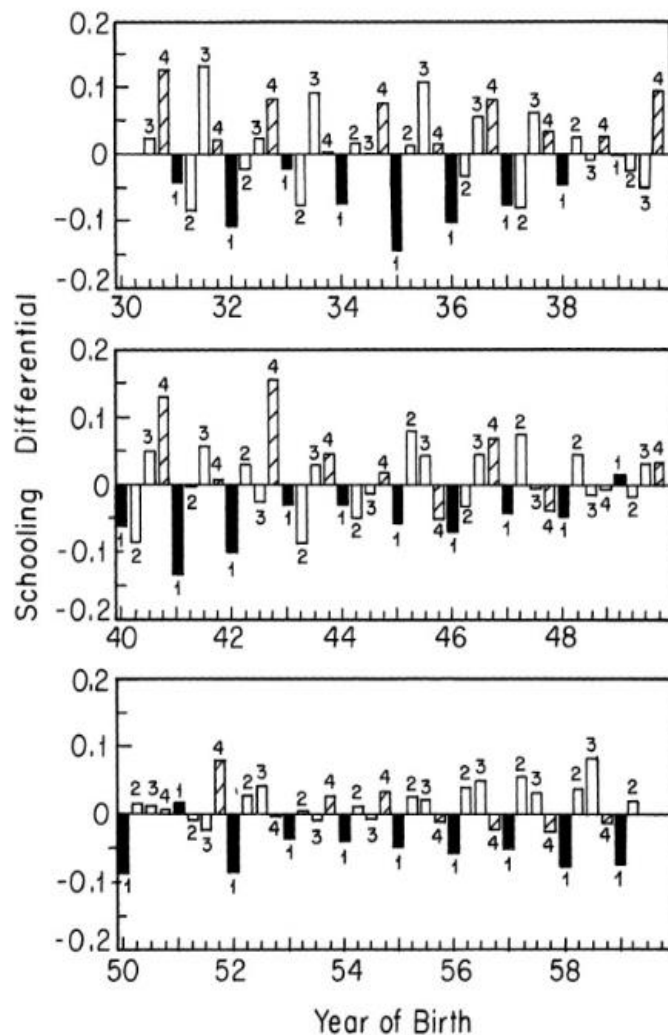


FIGURE IV  
Season of Birth and Years of Schooling  
Deviations from  $MA(+2, -2)$

# 义务教育政策对教育的影响

- 3. 数据回归

$$(E_{icj} - MA_{cj}) = \alpha + \sum_j^3 \beta_j Q_{icj} + \epsilon_{icj}$$

for  $i = 1, \dots, N_c$ ;     $c = 1, \dots, 10$ ;     $j = 1, 2, 3$ ,

TABLE I  
THE EFFECT OF QUARTER OF BIRTH ON VARIOUS EDUCATIONAL  
OUTCOME VARIABLES

Outcome variable	Birth cohort	Mean	Quarter-of-birth effect <sup>a</sup>			<i>F</i> -test <sup>b</sup> [ <i>P</i> -value]
			I	II	III	
Total years of education	1930–1939	12.79	-0.124 (0.017)	-0.086 (0.017)	-0.015 (0.016)	24.9 [0.0001]
	1940–1949	13.56	-0.085 (0.012)	-0.035 (0.012)	-0.017 (0.011)	18.6 [0.0001]
High school graduate	1930–1939	0.77	-0.019 (0.002)	-0.020 (0.002)	-0.004 (0.002)	46.4 [0.0001]
	1940–1949	0.86	-0.015 (0.001)	-0.012 (0.001)	-0.002 (0.001)	54.4 [0.0001]
Years of educ. for high school graduates	1930–1939	13.99	-0.004 (0.014)	0.051 (0.014)	0.012 (0.014)	5.9 [0.0006]
	1940–1949	14.28	0.005 (0.011)	0.043 (0.011)	-0.003 (0.010)	7.8 [0.0017]
College graduate	1930–1939	0.24	-0.005 (0.002)	0.003 (0.002)	0.002 (0.002)	5.0 [0.0021]
	1940–1949	0.30	-0.003 (0.002)	0.004 (0.002)	0.000 (0.002)	5.0 [0.0018]
Completed master's degree	1930–1939	0.09	-0.001 (0.001)	0.002 (0.001)	-0.001 (0.001)	1.7 [0.1599]
	1940–1949	0.11	0.000 (0.001)	0.004 (0.001)	0.001 (0.001)	3.9 [0.0091]
Completed doctoral degree	1930–1939	0.03	0.002 (0.001)	0.003 (0.001)	0.000 (0.001)	2.9 [0.0332]
	1940–1949	0.04	-0.002 (0.001)	0.001 (0.001)	-0.001 (0.001)	4.3 [0.0050]

TABLE I  
THE EFFECT OF QUARTER OF BIRTH ON VARIOUS EDUCATIONAL  
OUTCOME VARIABLES

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			I	II	III	
Total years of education	1930–1939	12.79	-0.124 (0.017)	-0.086 (0.017)	-0.015 (0.016)	24.9 [0.0001]
	1940–1949	13.56	-0.085 (0.012)	-0.035 (0.012)	-0.017 (0.011)	18.6 [0.0001]
High school graduate	1930–1939	0.77	-0.019 (0.002)	-0.020 (0.002)	-0.004 (0.002)	46.4 [0.0001]
	1940–1949	0.86	-0.015 (0.001)	-0.012 (0.001)	-0.002 (0.001)	54.4 [0.0001]
Years of educ. for high school graduates	1930–1939	13.99	-0.004 (0.014)	0.051 (0.014)	0.012 (0.014)	5.9 [0.0006]
	1940–1949	14.28	0.005 (0.011)	0.043 (0.011)	-0.003 (0.010)	7.8 [0.0017]
College graduate	1930–1939	0.24	-0.005 (0.002)	0.003 (0.002)	0.002 (0.002)	5.0 [0.0021]
	1940–1949	0.30	-0.003 (0.002)	0.004 (0.002)	0.000 (0.002)	5.0 [0.0018]
Completed master's degree	1930–1939	0.09	-0.001 (0.001)	0.002 (0.001)	-0.001 (0.001)	1.7 [0.1599]
	1940–1949	0.11	0.000 (0.001)	0.004 (0.001)	0.001 (0.001)	3.9 [0.0091]
Completed doctoral degree	1930–1939	0.03	0.002 (0.001)	0.003 (0.001)	0.000 (0.001)	2.9 [0.0332]
	1940–1949	0.04	-0.002 (0.001)	0.001 (0.001)	-0.001 (0.001)	4.3 [0.0050]

# 义务教育政策对教育的影响

- 证明义务教育政策的有效性/强制性



**TABLE 11**  
**PERCENTAGE OF AGE GROUP ENROLLED IN SCHOOL BY BIRTHDAY AND LEGAL**  
**DROPOUT AGE<sup>a</sup>**

Date of birth	Type of state law <sup>b</sup>		Column (1) - (2)
	School-leaving age: 16 (1)	School-leaving age: 17 or 18 (2)	
Percent enrolled April 1, 1960			
1. Jan 1–Mar 31, 1944 <u>(age 16)</u>	87.6 (0.6)	91.0 (0.9)	-3.4 (1.1)
2. Apr 1–Dec 31, 1944 <u>(age 15)</u>	92.1 (0.3)	91.6 (0.5)	0.5 (0.6)
3. Within-state diff. (row 1 - row 2)	-4.5 (0.7)	-0.6 (1.0)	-4.0 (1.2)
Percent enrolled April 1, 1970			
4. Jan 1–Mar 31, 1954 (age 16)	94.2 (0.3)	95.8 (0.5)	-1.6 (0.6)
5. Apr 1–Dec 31, 1954 (age 15)	96.1 (0.1)	95.7 (0.3)	0.4 (0.3)
6. Within-state diff. (row 1 - row 2)	-1.9 (0.3)	0.1 (0.6)	-2.0 (0.6)
Percent enrolled April 1, 1980			
7. Jan 1–Mar 31, 1964 (age 16)	95.0 (0.1)	96.2 (0.2)	-1.2 (0.2)
8. Apr 1–Dec 31, 1964 (age 15)	97.0 (0.1)	97.7 (0.1)	-0.7 (0.1)
9. Within-state diff. (row 1 - row 2)	-2.0 (0.1)	-1.5 (0.2)	0.5 (0.3)



# 03 | 教育时间对收入的影响

# 教育时间对收入的影响

## 1. 数据确定

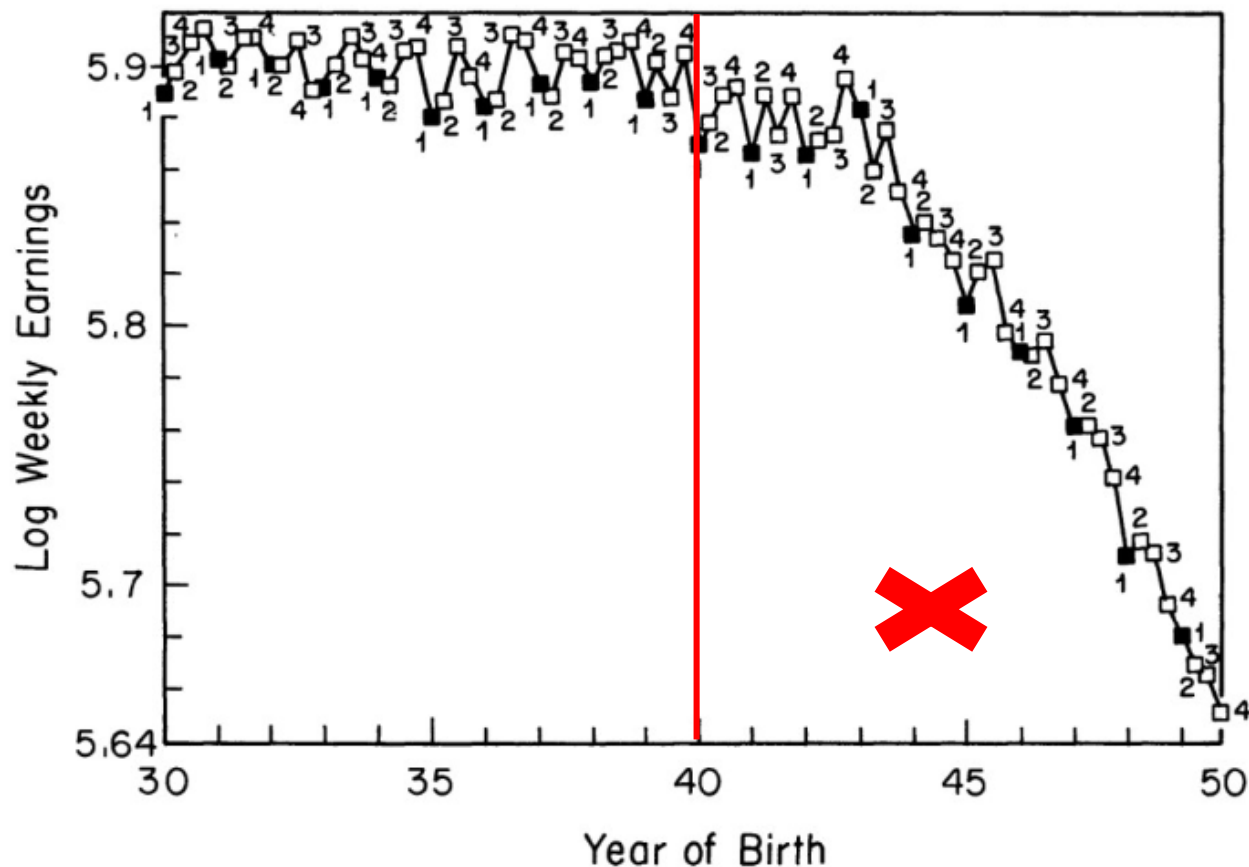


FIGURE V  
Mean Log Weekly Wage, by Quarter of Birth  
All Men Born 1930-1949; 1980 Census

# 教育时间对收入的影响

## • 2. Wald统计量

TABLE III  
PANEL A: WALD ESTIMATES FOR 1970 CENSUS—MEN BORN 1920–1929<sup>a</sup>

	(1) Born in 1st quarter of year	(2) Born in 2nd, 3rd, or 4th quarter of year	(3) Difference (std. error) (1) – (2)
ln (wkly. wage)	5.1484	5.1574	-0.00898 (0.00301)
Education	11.3996	11.5252	-0.1256 (0.0155)
Wald est. of return to education			0.0715 (0.0219)
OLS return to education <sup>b</sup>			0.0801 (0.0004)

Panel B: Wald Estimates for 1980 Census—Men Born 1930–1939

	(1) Born in 1st quarter of year	(2) Born in 2nd, 3rd, or 4th quarter of year	(3) Difference (std. error) (1) – (2)
ln (wkly. wage)	5.8916	5.9027	-0.01110 (0.00274)
Education	12.6881	12.7969	-0.1088 (0.0132)
Wald est. of return to education			0.1020 (0.0239)
OLS return to education			0.0709 (0.0003)

# 教育时间对收入的影响

- 3.两阶段最小二乘

$$(1) \quad E_i = X_i\pi + \sum_c Y_{ic} \delta_c + \sum_c \sum_j Y_{ic} Q_{ij} \theta_{jc} + \epsilon_i$$

$$(2) \quad \ln W_i = X_i\beta + \sum_c Y_{ic} \xi_c + \rho E_i + \mu_i$$

- X: 控制变量
- Y: 年份的虚拟变量
- Q: 季度的虚拟变量

# 教育时间对收入的影响

TABLE IV  
OLS AND TSLS ESTIMATES OF THE RETURN TO EDUCATION FOR MEN BORN 1920–1929: 1970 CENSUS<sup>a</sup>

Independent variable	(1) OLS	(2) TSLS	(3) OLS	(4) TSLS	(5) OLS	(6) TSLS	(7) OLS	(8) TSLS
Years of education	0.0802 (0.0004)	0.0769 (0.0150)	0.0802 (0.0004)	0.1310 (0.0334)	0.0701 (0.0004)	0.0669 (0.0151)	0.0701 (0.0004)	0.1007 (0.0334)
Race (1 = black)	—	—	—	—	0.2980 (0.0043)	-0.3055 (0.0353)	-0.2980 (0.0043)	-0.2271 (0.0776)
SMSA (1 = center city)	—	—	—	—	0.1343 (0.0026)	0.1362 (0.0092)	0.1343 (0.0026)	0.1163 (0.0198)
Married (1 = married)	—	—	—	—	0.2928 (0.0037)	0.2941 (0.0072)	0.2928 (0.0037)	0.2804 (0.0141)
9 Year-of-birth dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8 Region of residence dummies	No	No	No	No	Yes	Yes	Yes	Yes
Age	—	—	0.1446 (0.0676)	0.1409 (0.0704)	—	—	0.1162 (0.0652)	0.1170 (0.0662)
Age-squared	—	—	-0.0015 (0.0007)	-0.0014 (0.0008)	—	—	-0.0013 (0.0007)	-0.0012 (0.0007)
$\chi^2$ [dof]	—	36.0 [29]	—	25.6 [27]	—	34.2 [29]	—	28.8 [27]

a. Standard errors are in parentheses. Sample size is 247,199. Instruments are a full set of quarter-of-birth times year-of-birth interactions. The sample consists of males born in the United States. The sample is drawn from the State, County, and Neighborhoods 1 percent samples of the 1970 Census (15 percent form). The dependent variable is the log of weekly earnings. Age and age-squared are measured in quarters of years. Each equation also includes an intercept.

# 04 | 义务教育政策是否 对收入产生影响

# 义务教育政策是否对收入产生影响

- 1.男性的入学年龄是否对教育产生影响；
- 2.出生的季度（时间）是否于父母的社会地位有关；
- 3.通过OLS回归验证出生季度对收入无显著影响；
- 4.通过OLS回归验证出生季度对大学毕业生的收入无显著影响。





# 05 | 小结

# 小结

- 证明IV和被解释变量不具有相关性
- 变量解释



谢谢!

THANK YOU!

