

Is the 1918 influenza pandemic  
over?

Long-term effects of in utero  
influenza exposure in the post 1940  
U.S. population

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CRISTÓBAL MENESES

TÓPICOS DE MICROECONOMETRIA

# Literatura

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## En área económica

- Case, Fartig y Paxson (2005): Cigarillo en madres embarazadas y bajo peso al nacer predicen peor desempeño académico.
- Roley(2005), Black(2005) y Oreopolous(2006): diferencia de peso entre gemelos condiciona desempeño escolar, laboral y de salud.
- Angrist-Krueger (1991) Efecto cíclico del mes de nacimiento en educación

# Literatura

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## En epidemiología

- Hambruna finlandesa de 1966-68 y asedio de Stalingrado: Sin efectos a largo plazo observados debido a la larga duración y mortalidad.
- Hambruna Holandesa de 1944: hambruna de 5 meses por ocupación nazi.
  - (Stein, 1975): Desorden del sistema nervioso central
  - (Rosebloom, 2000): Mortalidad por falla cardíaca
  - (Neugebauer, Hoek y Susser, 1999): desarrollo tardío (no perinatal) de problemas de salud.

# Literatura en la influenza

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La influenza de 1918 ha sido señalada factor de riesgo en .Parkinson y *encephalitis lethargica* (Collier (1974);Ravenholt-Foege(1982)), aunque es discutido por McHall(2001). Relacion entre jovenes adultos por Azambuja(2004) y Mamelund(2004). Estos analisis tienden a sufrir de dos problemas:

- (i)Designación arbitraria de tratados y controles
- (ii)Hipotesis alternativas vagamente definidas

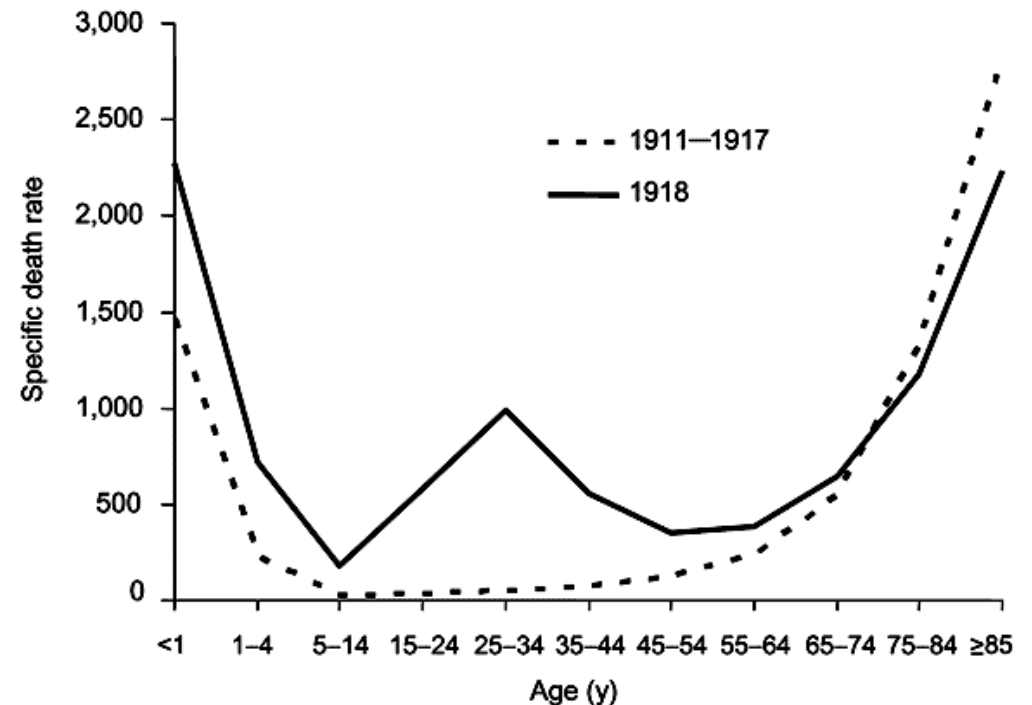
Excepcion a esto en perdida de audicion por Heider (1934)

# La pandemia

Cerca del 28% del país es infectado (Jordan 1927) entre octubre 1918 y enero 1919. De estos, los estados más afectados son Pensilvania, Montana, Maryland y Colorado.

No parece haber una regla para describir la infección.

Mutación de la enfermedad hace que tome una forma de W, golpeando mayormente niños, ancianos y personas entre 25-30 años



# Estadística descriptiva

TABLE 1  
MALE OUTCOME MEANS

	1960 CENSUS		1970 CENSUS		1980 CENSUS	
	Born 1919	Surrounding Cohorts <sup>a</sup>	Born 1919	Surrounding Cohorts <sup>a</sup>	Born 1919	Surrounding Cohorts <sup>a</sup>
Age	40.3 [1.08]	40.3 [.43]	50.2 [1.08]	50.2 [.43]	60.2 [1.08]	60.2 [.43]
High school graduate	.486 [.500]	.509 [.500]	.516 [.500]	.537 [.499]	.550 [.498]	.564 [.496]
Years of education	10.6 [3.6]	10.7 [3.5]	10.8 [3.5]	11.0 [3.5]	11.0 [3.7]	11.2 [3.7]
Total income	39,288 [27,260]	39,909 [27,827]	50,285 [39,218]	51,389 [39,750]	42,144 [33,961]	42,952 [34,829]
Wage income	37,862 [21,789]	38,711 [23,135]	48,964 [32,993]	49,848 [33,291]	29,459 [31,972]	29,950 [32,548]
Poor	.289 [.454]	.283 [.450]	.130 [.336]	.124 [.330]	.145 [.352]	.141 [.348]
Neighbors' income <sup>b</sup>			51,359 [17,564]	52,310 [18,064]		
Socioeconomic status	35.0 [24.0]	35.6 [24.3]	37.3 [24.4]	38.1 [24.5]	34.5 [26.3]	35.0 [26.4]
Disability limits work			.107 [.309]	.102 [.302]	.266 [.442]	.256 [.436]
Disability prevents work			.048 [.214]	.047 [.211]	.166 [.372]	.158 [.364]
Years of disability			1.4 [3.9]	1.3 [3.8]		
Social Security income			41 [281]	43 [295]	1,138 [3,319]	1,096 [3,261]
Welfare income			91 [930]	82 [850]	177 [1,282]	162 [1,206]
Observations	10,310	21,864	29,093	59,410	44,345	93,759

NOTE.—Standard errors are in brackets. All income figures are given in 2005 dollars.

<sup>a</sup> Born in 1918 or 1920.

<sup>b</sup>  $N = 9,587$  and  $19,897$ .

Datos anonimizados de censos de 1960-80. estos son los primeros censos nacionales con trimestre de nacimiento explicito.

# Modelo

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Ocupamos el modelo base

$$y_i^c = \beta_0 + \beta_1 * I(YOB = 1919) + \beta_2 * YOB + \beta_3 * YOB^2 + \epsilon_i,$$

Con  $y_i^c$  nuestra variable de interés para el individuo  $i$  en el censo  $c$ ,  $YOB$  el año y  $\epsilon$  una medida de error.  $\beta_1$  atrapa la separación del individuo de la tendencia cuadrática de  $YOB$ .

# Resultados

TABLE 2  
DEPARTURE OF 1919 MALE BIRTH COHORT OUTCOMES FROM 1912–22 TREND

OUTCOME	CENSUS YEAR		
	1960	1970	1980
High school graduate	-.021*** [.005]	-.020*** [.003]	-.014*** [.003]
Years of education	-.150*** [.038]	-.176*** [.023]	-.117*** [.019]
Total income	-573* [295]	-1,236*** [253]	-1,065*** [191]
Wage income	-812*** [261]	-875*** [233]	-688*** [179]
Poor (below 150% of the poverty level)	.010** [.005]	.009*** [.002]	.006*** [.002]
Neighbors' income ( $N = 102,948$ )		-875*** [197]	
Socioeconomic status (Duncan's socioeconomic index)	-.640** [.259]	-.808*** [.157]	-.816*** [.137]
Disability limits work		.006*** [.002]	.005** [.002]
Disability prevents work		.004*** [.001]	.001 [.002]
Years of disability		.092*** [.025]	
Social Security income		1 [2]	83*** [19]
Welfare income		12** [6]	17** [7]
Observations	114,031	308,785	471,803

NOTE.—Robust standard errors are in brackets. All income figures are given in 2005 dollars.

- \* Significant at 10 percent.
- \*\* Significant at 5 percent.
- \*\*\* Significant at 1 percent.

TABLE 3  
1912–22 CENSUS OUTCOMES AMONG WOMEN (Census Years 1960, 1970, and 1980)

	SAMPLE MEAN			1919 COHORT DEPARTURE		
	1960	1970	1980	1960	1970	1980
High school graduate	.504 [.500]	.523 [.499]	.542 [.498]	-.028*** [.005]	-.021*** [.003]	-.015*** [.002]
Years of education	10.5 [3.0]	10.7 [3.0]	10.8 [3.2]	-.163*** [.032]	-.123*** [.019]	-.071*** [.015]
Total income	8,282 [12,718]	13,372 [18,138]	13,385 [16,952]	244* [135]	-139 [112]	-235** [93]
Wage income	15,682 [12,019]	21,212 [15,926]	6,911 [13,405]	50 [190]	-90 [138]	-62 [76]
Poor (below 150% of the poverty level)	.284 [.451]	.170 [.376]	.231 [.421]	.012** [.005]	.009*** [.002]	0 [.002]
Neighbors' income ( $N = 111,057$ )		51,007 [17,418]			-449** [189]	
Socioeconomic status (Duncan's socioeconomic index)	22.5 [24.2]	25.7 [25.1]	19.8 [25.1]	-.176 [.253]	-.461*** [.155]	-.470*** [.124]
Disability limits work		.066 [.247]	.240 [.427]		0 [.002]	.002 [.002]
Disability prevents work		.078 [.268]	.184 [.388]		.004** [.002]	.003 [.002]
Years of disability		1.2 [3.6]			.028 [.021]	
Social Security income		50 [299]	2,460 [3,583]		1 [2]	-50*** [13]
Welfare income		139 [1,087]	269 [1,360]		18** [7]	11* [7]
Observations	118,471	331,985	550,108	118,471	331,985	550,108

NOTE.—Robust standard errors are in brackets. All income figures are given in 2005 dollars.

- \* Significant at 10 percent.
- \*\* Significant at 5 percent.
- \*\*\* Significant at 1 percent.



# Observacion: La Critica de Brown

Efecto ingreso y efecto de la primera guerra mundial mayormente ignorado por el modelo de Almond.

TABLE 4  
1912–22 CENSUS OUTCOMES AMONG NONWHITES (Census Years 1960, 1970, and 1980)

	SAMPLE MEAN			1919 COHORT DEPARTURE <sup>a</sup>		
	1960	1970	1980	1960	1970	1980
High school graduate	.224 [.417]	.246 [.431]	.276 [.447]	-.032*** [.010]	-.026*** [.006]	-.013*** [.005]
Years of education	8.1 [3.8]	8.5 [3.7]	8.5 [4.0]	-.241*** [.086]	-.225*** [.051]	-.116*** [.043]
Total income	13,641 [14,718]	18,839 [20,249]	16,013 [18,625]	38 [281]	-441* [266]	-574*** [217]
Wage income	17,006 [13,338]	23,484 [18,390]	10,047 [17,398]	-127 [319]	-430 [294]	-500** [206]
Poor (below 150% of the poverty level)	.598 [.490]	.398 [.489]	.422 [.494]	.024** [.011]	.01 [.007]	.004 [.006]
Neighbors' income (N = 20,228)		0 [0]			175 [346]	
Socioeconomic status (Duncan's socioeconomic index)	15.7 [17.2]	18.4 [19.2]	15.3 [20.5]	-.415 [.384]	-.866*** [.264]	-.364 [.224]
Disability limits work		.096 [.295]	.358 [.479]		-.003 [.004]	.009** [.005]
Disability prevents work		.120 [.325]	.276 [.447]		.009** [.004]	.009* [.005]
Years of disability		1.7 [4.2]			.033 [.057]	
Social Security income		70 [356]	2,368 [3,842]		1 [5]	-2 [35]
Welfare income		427 [1,937]	705 [2,220]		51* [29]	20 [26]
Observations	23,008	60,390	104,391	23,008	60,390	104,391

NOTE.—Robust standard errors are in brackets. All income figures are given in 2005 dollars.

<sup>a</sup> Regressions include a gender dummy.

\* Significant at 10 percent.

\*\* Significant at 5 percent.

\*\*\* Significant at 1 percent.

# Educacion

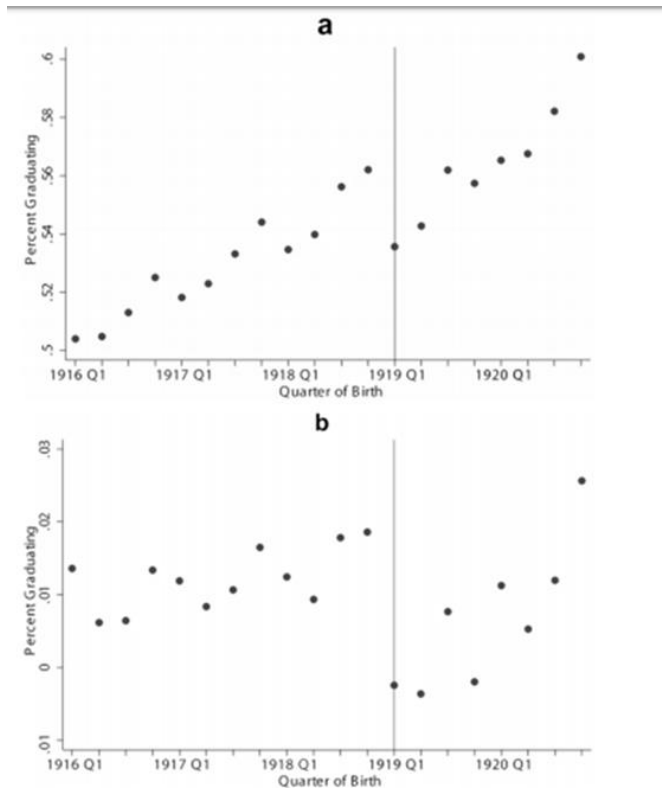


FIG. 5.—a, 1980 high school graduation rate by quarter of birth. b, Regression-adjusted 1980 high school graduation rate by quarter of birth.

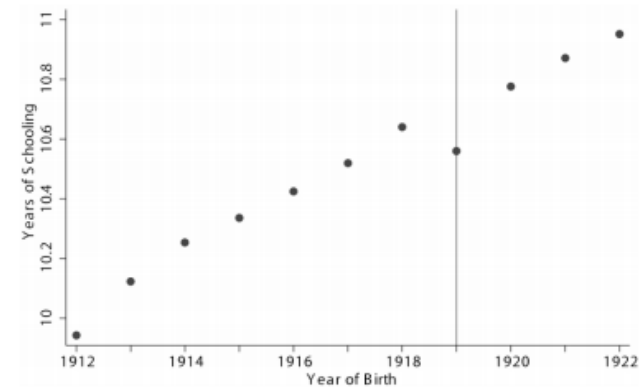
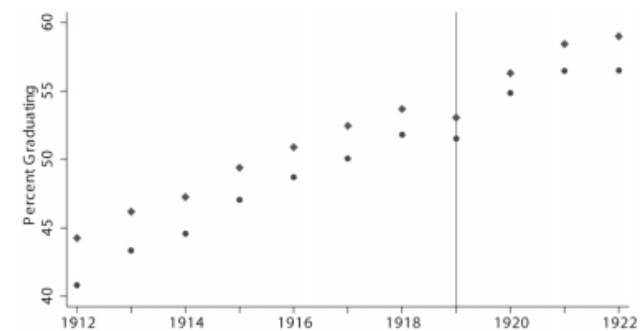


FIG. 3.—1960 average years of schooling: men and women born in the United States



# Ingreso y discapacidad

Ingreso anual entre 700 y 900 dólares(2005)  
menos por nacer en 1919.

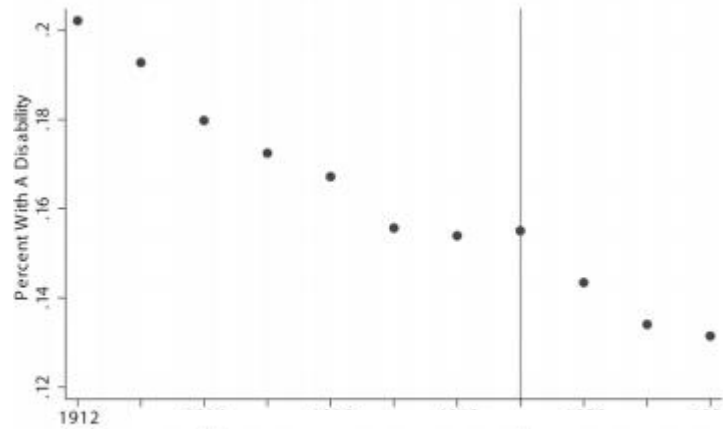


FIG. 6.—1!

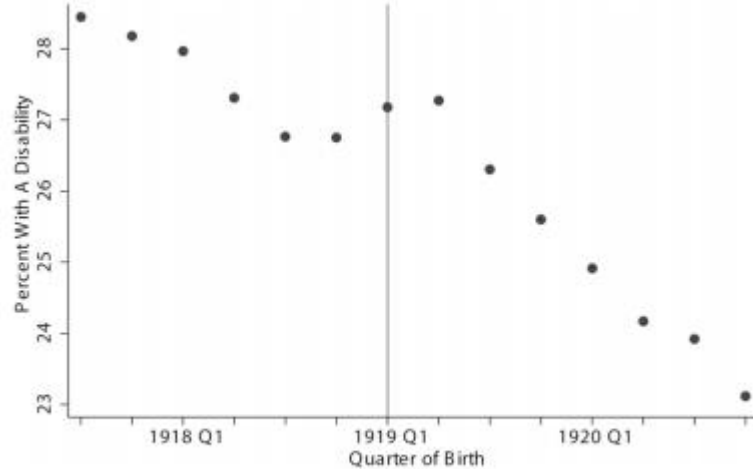


FIG. 7.—1980 male disability rate: physical disability limits work

# Efectos Fijos

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Ocupando Sydenstricker(1918), construimos un indicador de virulencia tal que:

$$y_i^c = \beta_0 + \beta_1 * I(YOB = 1919) + \beta_2 * YOB + \beta_3 * YOB^2 + \beta_4 * Virulencia_d + \lambda_d + \epsilon_i$$

estimadores tienen dirección esperada mas no significancia en la mayoría de los casos.

Data es obtenida de múltiples fuentes, logrando un 3% pero baja calidad.

# Conclusiones

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Efecto de salud pre-natal afecta al desempeño escolar, laboral y productivo.

Diferencia económica entre razas se podría estar perpetuando a través de el canal de la salud materna.