

Depressed in School

The Great Depression, Educational Attainment, and Productivity Growth

Jason Dunn

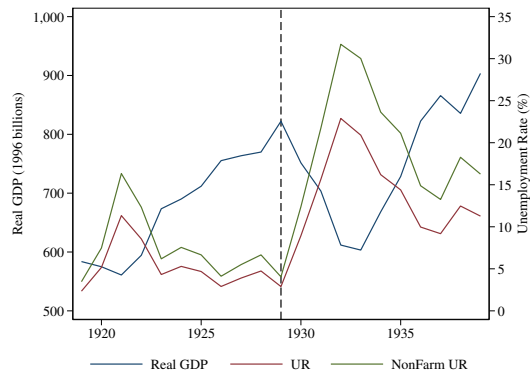
Boston University
Graduate Workshop in Economic History

October 9, 2026

The Great Depression

- Immediate consequence
 - Output: 35% below pre-trend in 1933
 - Unemployment: 23% (32% nonfarm) in 1932

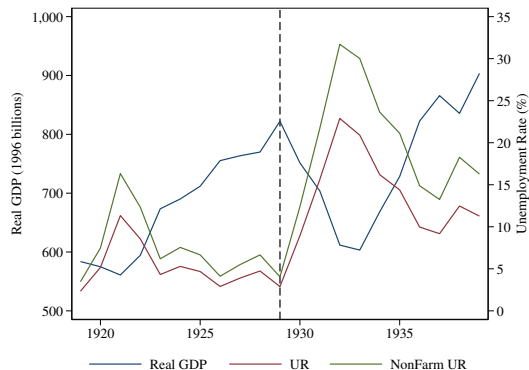
US Output and Unemployment, 1919-1939



The Great Depression

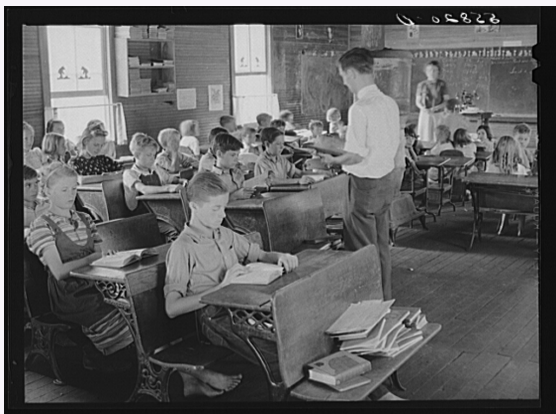
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 - New Deal

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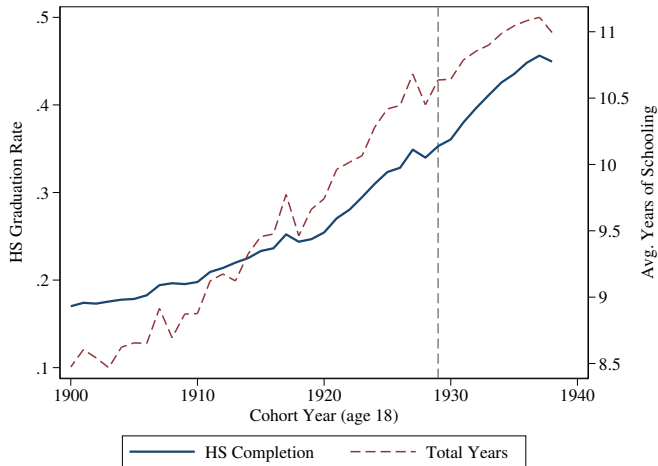


The Great Depression

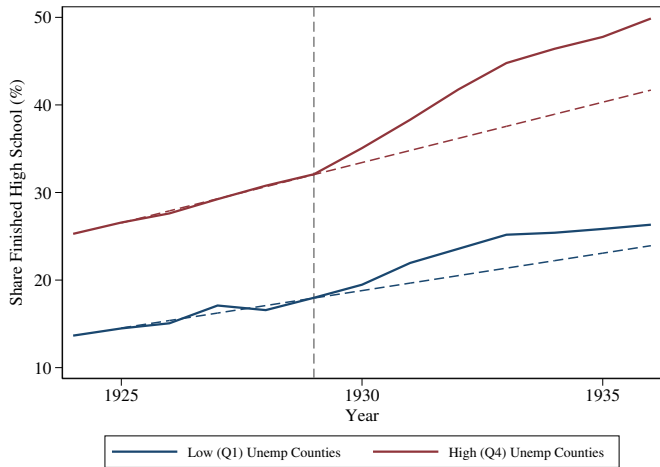
- Immediate consequence
 - Output: 35% below pre-trend in 1933
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- Secondary consequences
 - New Deal
 - Educational attainment...
 - Labor demand $\downarrow \Rightarrow$ opportunity cost of school $\downarrow \Rightarrow$ educational attainment $\uparrow$



National Educational Attainment



HS Attainment Across Space



This Paper/ Outline for Today

- Short run: GD Increased county HS attainment
 - Shift-share (Bartik) instrument on 1930 unemployment
 - First differences model
 - Pooled event study

This Paper/ Outline for Today

- Short run: GD Increased county HS attainment
 - Shift-share (Bartik) instrument on 1930 unemployment
 - First differences model
 - Pooled event study
- Long run
 - *Skill-directed* structural transformation
 - Workforce education
 - Productivity growth

- The Great Depression
 - (Fishback, 2017), (Fishback and Kachanovskaya, 2015), (Fishback et al., 2005), (Cheng et al., 2026), (Rosenbloom and Sundstrom, 1999)
 - ...and **(un)employment** (Boustan et al., 2010), (Rosenbloom and Sundstrom, 1999), (Margo, 1993)
 - ...and **education** (Goldin and Katz, 2008) and (Janas, 2026)
 - ...and **long run consequences** (Duque and Schmitz, 2025), (Moulton, 2017), (Mathy, 2018)
 - ...and **structural change** (Boyd, 2002) and (Boone and Wilse-Samson, 2023)
- Early 20th century US education
 - (Goldin, 1998), (Goldin and Katz, 2008), (Vidart, 2026), (Doxey et al., 2026), (Jaworski et al., 2026), (Bleemer and Quincy, 2026)
- Recessions/booms and education
 - (Black et al., 2005) (Charles et al., 2018) (Hershbein, 2012) (Barr and Turner, 2015) (Goodman and Winkelmann, 2025)

Empirical Framework

Baseline OLS: Framework

Theoretical Motivation: $U \uparrow (L_D \downarrow) \Rightarrow \text{opp cost of schooling} \downarrow \Rightarrow \text{Schooling} \uparrow$

$$\Delta HS_share_{cg} = \alpha + \beta U_{cg} + \mathbf{X}'_{cg} \Gamma + \delta_c + \gamma_g + \epsilon_{cg} \quad (1)$$

- $\Delta HSshare_{cg}$: HS attainment chg (1929-1933 18 y.o.'s) in county c and subgroup g
 - g : Sex (male v. female) $\times$ Race (white v. non-white) $\times$ HH SES (above v. below c median)
 - Linking full count census data, 1940 to 1930 [► Balance Table](#)
- U_{cg} : Unemployment rate in county c , subgroup g (1930 COP)

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Threats to Identification

- Reverse causality: Higher education $\rightarrow$ lower employment? (structural change)
- OVB: Other local shocks $\rightarrow$ employment **and** education (bank failures, agricultural droughts)

Shift-Share IV: Framework

- IV: Exogenous shocks to local economies
 - Addresses reverse causality and omitted local shocks

$$U_{cg} = \alpha + \gamma Z_{cg} + \mathbf{X}'_{cg} \Gamma + \delta_c + \gamma_g + \eta_{cg} \quad (2)$$

- Z_{cg} : Bartik instrument (1929-1931)

$$\Delta HS_share_{cg} = \beta_0 + \beta_1 \hat{U}_{cg} + \mathbf{X}'_{cg} \Gamma + \delta_c + \gamma_g + \epsilon_{cg} \quad (3)$$

- β_1 : LATE of unemployment on education
- Identifying assumptions [◀ here](#)

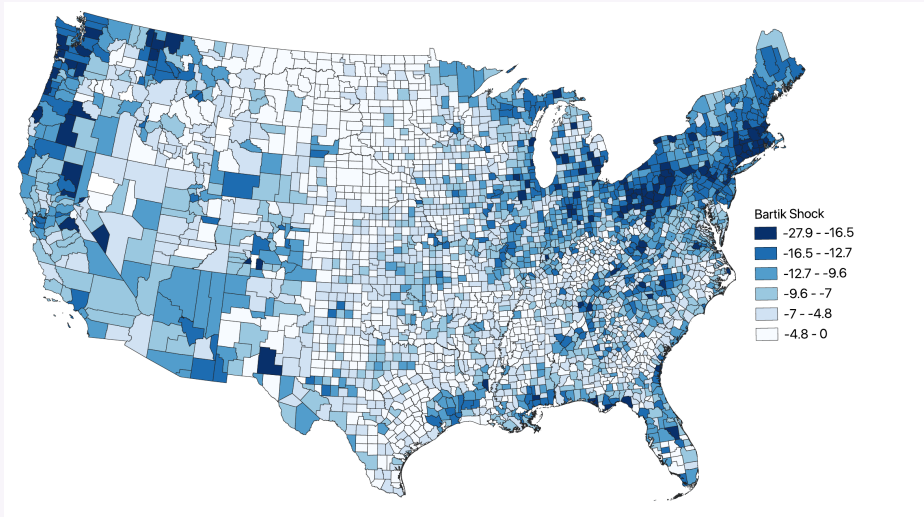
8 Sectors, 47 mfg industries

- Shares (1929 county) ◀ Full Count Census
 - Agriculture
 - Mining
 - Construction
 - FIRE
 - Other Services
 - Retail
 - Wholesale
 - Manufacturing
- Shifts (1929-1931 national)
 - Agriculture ◀ HSUS
 - Mining (HSUS)
 - Construction (HSUS)
 - FIRE (HSUS)
 - Other Services (HSUS)
 - Retail ◀ Business Survey
 - Wholesale (Business Survey)
 - Manufacturing ◀ COM

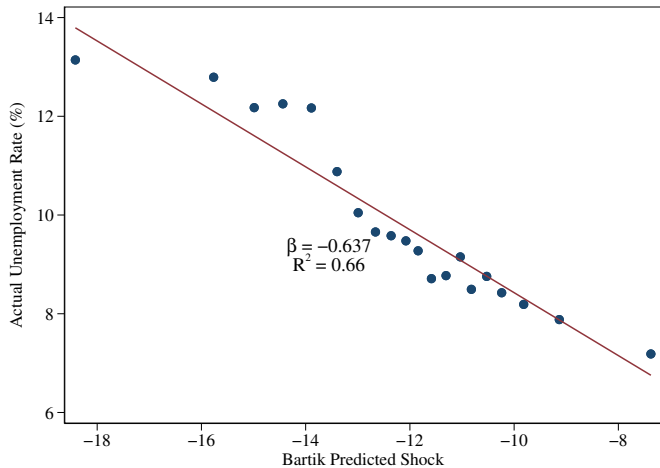
Crosswalk of COM to COP mfg industries: (Fiszbein et al., 2020)

Short Run Results

Bartik Shock Across Space

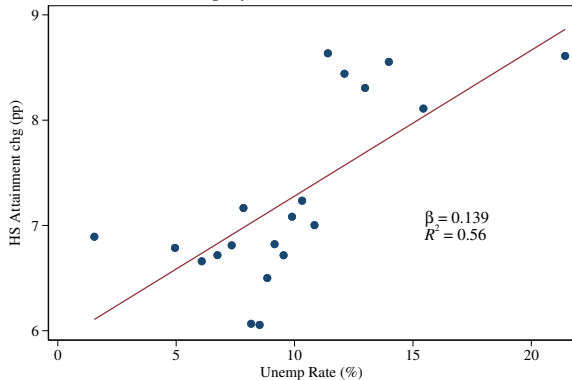


Bartik $\Rightarrow$ Unemployment

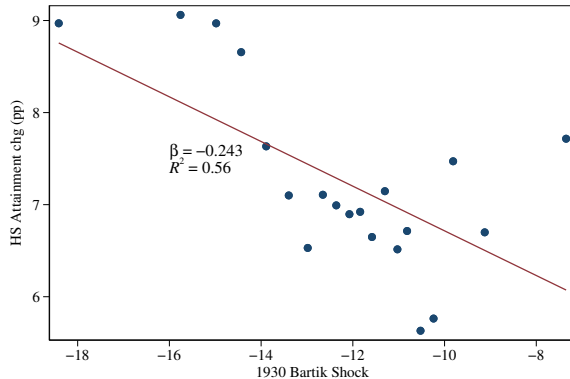


Baseline County Figures

Unemployment and HS Attainment



Bartik Shock and HS Attainment (Reduced Form)



◀ Raw Scatter

◀ Raw Scatter

Greater GD Shock $\Rightarrow$ More HS Attainment

	Effect on Δ HS share					
	OLS				IV	
Unemp rate, 1930	0.146*** (0.028)	0.035 (0.026)	0.139*** (0.024)	0.474*** (0.065)	0.681*** (0.118)	0.384*** (0.114)
HS share, 1929	-0.009 (0.015)	-0.075*** (0.015)	-0.591*** (0.018)	-0.038** (0.018)	-0.088*** (0.026)	-0.604*** (0.019)
HS change, 1925-29	-0.411*** (0.011)	-0.403*** (0.010)	-0.169*** (0.011)	-0.395*** (0.012)	-0.398*** (0.015)	-0.164*** (0.012)
Observations	13,975	13,953	13,953	13,972	13,949	13,949
R-squared	0.19	0.43	0.56			
First-Stage F				356.58	275.36	238.27
County FE		✓	✓		✓	✓
Subgroup FE			✓			✓

Results are Robust, IV seems valid 😊

Baseline Robustness

- Alternative IV construction ◀ 😊
- Alternative High School Change Windows ◀ 😊
- Alternative Fixed Effects ◀ 😊
- Alternative Weighting ◀ 😊

Validity of IV (Borusyak et al., 2022)

- Baseline F-stat of 250
- No dominant shocks, 22 effective shocks ◀ 😊
- Shocks balanced along baseline characteristics ◀ 😊

Effects Differ by Subgroup

Effect on Δ HS share

	Gender		Race		SES	
	Female	Male	Non-white	White	Low	High
Unemp rate, 1930	0.524* (0.267)	0.304*** (0.107)	0.358 (0.280)	0.403*** (0.119)	0.495*** (0.103)	-0.246 (0.583)
HS share, 1929	-0.641*** (0.025)	-0.510*** (0.027)	-0.771*** (0.047)	-0.623*** (0.025)	-0.619*** (0.027)	-0.812*** (0.024)
HS change, 1925-29	-0.149*** (0.022)	-0.170*** (0.014)	-0.066* (0.033)	-0.171*** (0.013)	-0.170*** (0.018)	-0.076*** (0.018)
Observations	6,076	7,514	1,751	11,720	7,575	6,033
First-Stage F	126.31	251.95	26.53	229.13	101.38	3.54
County FE	✓	✓	✓	✓	✓	✓
Subgroup FE	✓	✓	✓	✓	✓	✓

Pooled Event Study (with IV)

Young v. old, High v. low GD severity

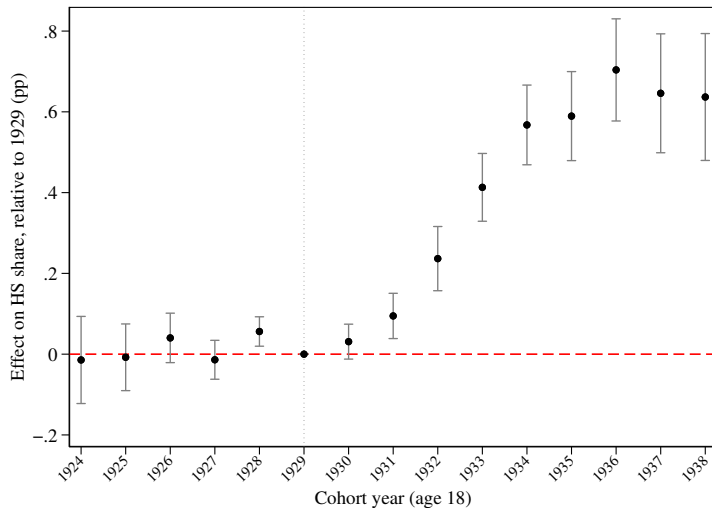
$$U_{cg} \times \mathbb{1}\{t = y\} = \pi_y (Z_{cg} \times \mathbb{1}\{t = y\}) + \theta_{cg} + \phi_t + \nu_{cgt} \quad (4)$$

- One first stage per cohort t (cohort indicator $\mathbb{1}\{t = y\}$)

$$HS_{cgt} = \sum_{y \neq 1929} \beta_y \widehat{W}_{cgy} + \theta_{cg} + \phi_t + \varepsilon_{cgt} \quad (5)$$

- HS_{cgt} : high-school share of cohort t in county c , subgroup g
- $W_{cgy} = U_{cg} \times \mathbb{1}\{t = y\}$
- β_y : effect of U_{cg} on that cohort's high-school share, relative to 1929

Effects increasing in 18 y.o. cohorts



Long Run Results

Theoretical Motivation: Education in the Long Run

- **The Human Capital Channel (Intensive)**
 - Additional schooling $\Rightarrow$ workers more skills, better reasoning, etc.
 - Increases marginal product of labor
- **Occupational Sorting (Extensive)**
 - Additional schooling $\Rightarrow$ workers able to sort into higher skill tasks/jobs/industries
- **Translating to Local Productivity (Aggregate)**
 - Firms' labor input becomes higher-skilled/more educated $\Rightarrow$ generates higher VA/N
 - Higher GD severity $\Rightarrow H_c \uparrow \Rightarrow VA/N \uparrow$

Greater GD Shock $\Rightarrow$ Workforce becomes more Educated

Effect on Workforce Δ HS Attainment

	OLS			IV		
Unemp rate, 1930	0.293*** (0.041)	0.133*** (0.044)	0.010 (0.023)	0.430*** (0.053)	0.417*** (0.138)	0.208* (0.114)
% Urban		0.005 (0.008)	-0.009 (0.006)		-0.020 (0.016)	-0.022* (0.011)
Workforce HS share, 1930		0.218*** (0.033)	0.198*** (0.026)		0.197*** (0.036)	0.191*** (0.030)
Observations	3,094	3,094	3,093	3,094	3,094	3,093
R-squared	0.202	0.408	0.661			
First-Stage F				434.78	179.66	71.78
State FE			✓			✓

$$U_c = \pi Z_c + \mathbf{X}'_c \Gamma + \delta_s + \eta_c$$

$$\Delta H_c = \beta U_c + \mathbf{X}'_c \Gamma + \delta_s + \varepsilon_c$$

Main driver: Young workers entering LF

Decomposition of Workforce Δ HS Attainment

	Aggregate	Stayer	Migration		Labor Force	
			Enterer	Exiter	Enterer	Exiter
Unemp rate, 1930	0.208* (0.114)	0.000 (.)	0.032* (0.018)	-0.006 (0.029)	0.212* (0.126)	-0.030* (0.015)
Workforce HS share, 1930	0.191*** (0.030)	0.000 (.)	0.052*** (0.013)	-0.015 (0.012)	0.145*** (0.024)	0.008* (0.004)
% Urban	-0.022* (0.011)	0.000 (.)	-0.006*** (0.002)	-0.003 (0.002)	-0.023* (0.012)	0.011*** (0.001)
Observations	3,093	3,093	3,093	3,093	3,093	3,093
First-Stage F	71.78	.	71.78	71.78	71.78	71.78
State FE	✓	✓	✓	✓	✓	✓

$$\Delta H_c = \underbrace{\bar{H}_{c,40}^{\text{stay}} - \bar{H}_{c,30}^{\text{stay}}}_{\text{Stay}} + \underbrace{s_{c,40}^{\text{in}} (\bar{H}_{c,40}^{\text{in}} - \bar{H}_{c,40}^{\text{stay}})}_{\text{In}} + \underbrace{s_{c,30}^{\text{out}} (\bar{H}_{c,30}^{\text{stay}} - \bar{H}_{c,30}^{\text{out}})}_{\text{Out}} + \underbrace{s_{c,40}^{\text{ent}} (\bar{H}_{c,40}^{\text{ent}} - \bar{H}_{c,40}^{\text{stay}})}_{\text{Entry}} + \underbrace{s_{c,30}^{\text{exit}} (\bar{H}_{c,30}^{\text{stay}} - \bar{H}_{c,30}^{\text{exit}})}_{\text{Exit}}$$

All industries are becoming more educated

Decomposition of Workforce Δ HS Attainment

	Aggregate	Within Industry	Between Industry	Interaction
	Aggregate	Within	Between	Interaction
Unemp rate, 1930	0.208* (0.114)	0.147** (0.073)	-0.026 (0.042)	0.086** (0.041)
Workforce HS share, 1930	0.191*** (0.030)	0.161*** (0.018)	0.124*** (0.022)	0.058*** (0.008)
% Urban	-0.022* (0.011)	-0.011 (0.007)	0.001 (0.004)	0.010*** (0.004)
Observations	3,093	3,093	3,093	3,093
First-Stage F	71.78	71.78	71.78	71.78
State FE	✓	✓	✓	✓

$$\Delta H_c = \underbrace{\sum_i s_{ci,30} (H_{ci,40} - H_{ci,30})}_{\text{Within}} + \underbrace{\sum_i H_{ci,30} (s_{ci,40} - s_{ci,30})}_{\text{Between}} + \underbrace{\sum_i (s_{ci,40} - s_{ci,30}) (H_{ci,40} - H_{ci,30})}_{\text{Interaction}}$$

Greater GD Shock $\Rightarrow$ Young workers take higher status jobs in 1940

Effect on 1940 Job SES, Youth Cohorts

	OccScore	SEI	Erscore	Edscore	Lido
Unemp rate, 1930	0.033*** (0.004)	0.002 (0.002)	0.054*** (0.003)	0.007** (0.003)	0.012*** (0.004)
County HS share, 1929	0.002*** (0.000)	0.003*** (0.000)	0.003*** (0.001)	0.006*** (0.001)	0.001*** (0.000)
HS change, 1925-29	-0.001*** (0.000)	-0.001*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.000 (0.000)
Workforce score, 1930	0.029*** (0.003)	0.019*** (0.001)	0.000*** (0.000)	0.001*** (0.000)	0.059*** (0.007)
Observations	5,720,577	5,621,292	5,680,687	5,680,687	5,244,545
First-Stage F	142.968	263.297	341.302	315.475	161.945
County+Subgroup+Cohort FE	✓	✓	✓	✓	✓

$$U_{cg} = \pi Z_{cg} + \mathbf{X}'_{cg} \Gamma + \alpha_c + \alpha_g + \alpha_t + \eta_i$$

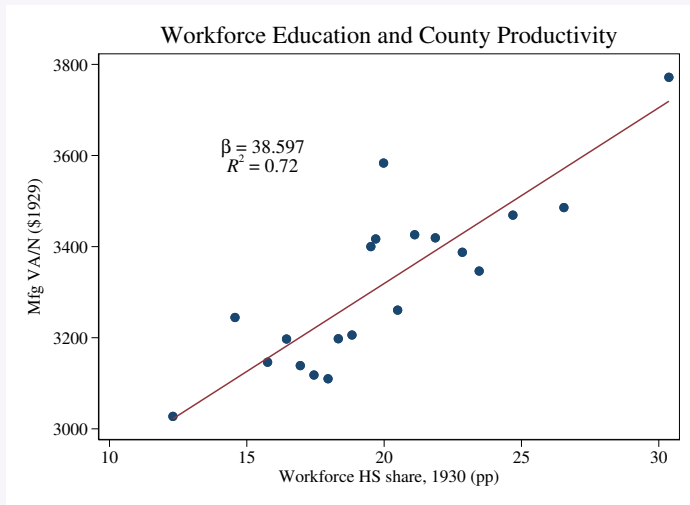
$$SES_i = \beta U_{cg} + \mathbf{X}'_{cg} \Gamma + \alpha_c + \alpha_g + \alpha_t + \varepsilon_i$$

Main Driver: Sorting out of Agriculture, into Services

Youth Probability of Industry Entry

	Agriculture		Manufacturing		Services	
	OLS	IV	OLS	IV	OLS	IV
Unemp rate, 1930	-0.002*** (0.000)	-0.005*** (0.002)	0.000 (0.000)	0.002 (0.001)	0.001** (0.000)	0.003*** (0.001)
County HS share, 1929	-0.000* (0.000)	-0.000** (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.001*** (0.000)	0.000*** (0.000)
HS change, 1925-29	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Industry share, 1930	0.007*** (0.000)	0.006*** (0.000)	0.006*** (0.000)	0.006*** (0.000)	0.005*** (0.000)	0.005*** (0.000)
Observations	5,726,396	5,726,396	5,726,396	5,726,396	5,726,396	5,726,396
R-squared	0.350		0.104		0.128	
First-Stage F		64.07		108.50		263.97
County+Subgroup+Cohort FE	✓	✓	✓	✓	✓	✓

Pre-Depression: Education $\Leftrightarrow$ Productivity



$$U_c = \alpha + \gamma Z_c + \mathbf{X}'_c \Gamma + \delta_s + \eta_c \quad (6)$$

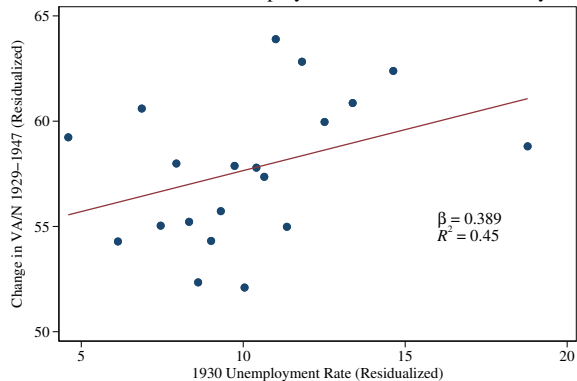
- Z_c : Bartik instrument (1929-1931)
- $\mathbf{X}'_c$: County-level controls
(VA/N_{29} , $\Delta VA/N_{29-19}$, $WorkforceHSshare_{30}$, $UrbanShare_{30}$)

$$\Delta VA/N_c = \beta_0 + \beta_1 \hat{U}_c + \mathbf{X}'_c \Pi + \delta_s + \epsilon_c \quad (7)$$

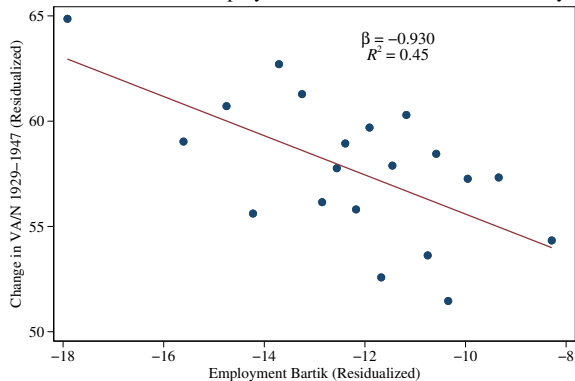
- $\Delta VA/N_c$: prod growth (1947-1929)
- β_1 : LATE of unemp on prod growth

Greater GD Shock $\Rightarrow$ More productivity growth

Baseline OLS: Unemployment and Labor Productivity



Reduced Form: Employment Shock and Labor Productivity



◀ Raw Scatter

◀ Raw Scatter

Greater GD Shock $\Rightarrow$ More productivity growth

Effect on $\Delta VA/N$

	OLS			IV		
Unemp rate, 1930	0.695*** (0.249)	0.415* (0.226)	0.389* (0.210)	1.309*** (0.421)	2.234*** (0.646)	2.039*** (0.679)
Level, 1929	-0.014*** (0.001)	-0.014*** (0.001)	-0.015*** (0.001)	-0.015*** (0.001)	-0.014*** (0.001)	-0.015*** (0.001)
Pretrend		-0.211*** (0.029)	-0.225*** (0.028)		-0.210*** (0.031)	-0.223*** (0.030)
% Urban		0.197*** (0.043)	0.139*** (0.036)		0.075* (0.042)	0.032 (0.038)
Workforce HS share, 1930			0.689*** (0.162)			0.650*** (0.158)
Observations	2,035	2,034	2,034	2,035	2,034	2,034
R-squared	0.324	0.438	0.448			
First-Stage F				285.34	54.18	57.10
State FE		✓	✓		✓	✓

Robustness and Additional Outcomes

Robustness to additional controls [◀ here](#)

- Changes in other variables (inputs, workers)
- Alternative years (1927 base, 1939 end, 1927-29 pretrend)
- New Deal spending
- WWII contracts

Additional outcomes [◀ here](#)

- Productivity (+), Value Added (-), Wages (+), Non-wage surplus (+), Workers (-)
- No effect: Output per worker, Inputs per worker, Firms

- Pushing long run mechanism
 - Causal identification?
 - Compulsory schooling laws
 - Pre-exposure potential schooling capacity (age shares, school revenues)
 - Contribution of education to productivity growth
 - Production function implied shares
- Framing
 - Education as mitigating force in recessions?

- Great Depression → HS attainment
- Short run: County cohort increases
- Long run
 - Higher educated workforce
 - Skill sorting in occupations
 - Greater increases in productivity

- Great Depression → HS attainment
- Short run: County cohort increases
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Thank You!

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References I

- Barr, A. and S. Turner (2015, April). Out of work and into school: Labor market policies and college enrollment during the Great Recession. *Journal of Public Economics* 124, 63–73.
- Black, D. A., T. G. McKinnish, and S. G. Sanders (2005, October). Tight Labor Markets and the Demand for Education: Evidence from the Coal Boom and Bust. *ILR Review* 59(1), 3–16.
- Bleemer, Z. and S. Quincy (2026). Junior Colleges and Local Development. *Working Paper*.
- Boone, C. D. A. and L. Wilse-Samson (2023, July). Structural Change and Internal Labor Migration: Evidence from the Great Depression. *The Review of Economics and Statistics* 105(4), 962–981.
- Borusyak, K., P. Hull, and X. Jaravel (2022). Quasi-Experimental Shift-Share Research Designs. *The Review of Economic Studies* 89(1 (324)), 181–213.
- Boustan, L. P., P. Fishback, and S. Kantor (2010, October). The Effect of Internal Migration on Local Labor Markets: American Cities during the Great Depression. *Journal of Labor Economics* 28(4), 719–746.
- Boyd, R. L. (2002). A “Migration of Despair”: Unemployment, the Search for Work, and Migration to Farms During the Great Depression. *Social Science Quarterly* 83(2), 554–567.
- Charles, K. K., E. Hurst, and M. J. Notowidigdo (2018, October). Housing Booms and Busts, Labor Market Opportunities, and College Attendance. *American Economic Review* 108(10), 2947–2994.

References II

- Cheng, D., M. J. Crucini, and H. T. Kim (2026, April). Which U.S. States Suffered a Greater Great Depression and Why?
- Doxey, A., E. Karger, and P. Nencka (2026, April). High Schools and the Uneven Rise in American Opportunity.
- Duque, V. and L. L. Schmitz (2025, November). Early-Life Exposure to the Great Depression and Long-Term Health and Economic Outcomes. *Journal of Human Resources* 60(6), 1937–1970.
- Fishback, P. (2017). How Successful Was the New Deal? The Microeconomic Impact of New Deal Spending and Lending Policies in the 1930s. *Journal of Economic Literature* 55(4), 1435–1485.
- Fishback, P., W. C. Horrace, and S. Kantor (2005, March). Did New Deal Grant Programs Stimulate Local Economies? A Study of Federal Grants and Retail Sales During the Great Depression. *Journal of Economic History* 65(1).
- Fishback, P. and V. Kachanovskaya (2015, March). The Multiplier for Federal Spending in the States During the Great Depression. *The Journal of Economic History* 75(1), 125–162.
- Fiszbein, M., J. Lafortune, E. G. Lewis, and J. Tessada (2020, November). Powering Up Productivity: The Effects of Electrification on U.S. Manufacturing.
- Goldin, C. (1998, June). America's Graduation from High School: The Evolution and Spread of Secondary Schooling in the Twentieth Century. *The Journal of Economic History* 58(2), 345–374.

References III

- Goldin, C. D. and L. F. Katz (2008, June). *The Race Between Education and Technology*. Harvard University Press.
- Goodman, J. and J. Winkelmann (2025). Labor Market Strength and Declining Community College Enrollment. *NBER Working Paper Series*.
- Hershbein, B. J. (2012, January). Graduating High School in a Recession: Work, Education, and Home Production. *The B.E. journal of economic analysis & policy* 12(1), Article 3.
- Janas, P. (2026, June). Crises and Educational Attainment. *The Journal of Economic History* 86(2), 501–536.
- Jaworski, T., C. T. Kitchens, and L. P. Rodgers (2026, April). Skill Formation, Child Labor, and the Schooling Consequences of the World War I Agricultural Boom.
- Margo, R. A. (1993, June). Employment and Unemployment in the 1930s. *Journal of Economic Perspectives* 7(2), 41–59.
- Mathy, G. P. (2018, January). Hysteresis and persistent long-term unemployment: the American Beveridge Curve of the Great Depression and World War II. *Econometrica* 12(1), 127–152.
- Moulton, J. G. (2017, October). The Great Depression of Income: Historical Estimates of the Longer-Run Impact of Entering the Labor Market during a Recession. *The B.E. Journal of Economic Analysis & Policy* 17(4).

References IV

- Rosenbloom, J. L. and W. A. Sundstrom (1999, September). The Sources of Regional Variation in the Severity of the Great Depression: Evidence from U.S. Manufacturing, 1919–1937. *The Journal of Economic History* 59(3), 714–747.
- Vidart, D. (2026, April). Learning by Mail: The Impact of Correspondence Schools in Early 20th Century America.

Census Linking Balance Table

Differences in Means of Linked v. Unlinked 1940 Samples

	Sex	HS Bin	Age	Race	Urban	Stayer	Northeast	Midwest	South	West
Panel A: Unweighted Balance										
matched	-0.193*** (0.000)	0.088*** (0.000)	-0.570*** (0.002)	-0.118*** (0.000)	-0.083*** (0.000)	0.117*** (0.000)	-0.029*** (0.000)	0.087*** (0.000)	-0.065*** (0.000)	0.006*** (0.000)
Observations	38,041,568	37,228,701	38,041,568	38,041,568	38,041,568	38,041,568	38,041,568	38,041,568	38,041,568	38,041,568
Panel B: Weighted Balance										
matched	0.003*** (0.000)	0.001*** (0.000)	0.021*** (0.002)	0.000 (0.000)	0.003*** (0.000)	-0.003*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	0.003*** (0.000)	0.002*** (0.000)
Observations	37,778,571	37,228,701	37,778,571	37,778,571	37,778,571	37,778,571	37,778,571	37,778,571	37,778,571	37,778,571

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IV Assumptions

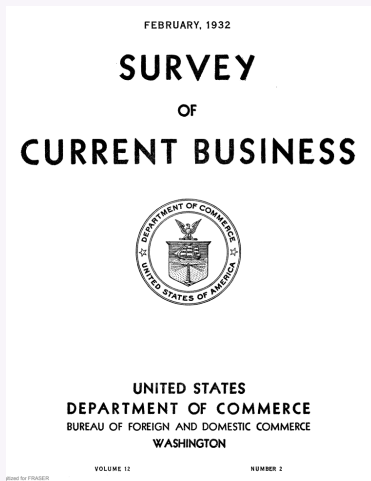
- Exogeneity (Requires only one of the following):
 - **Shares:** Initial industrial comp is uncorrelated with unobserved trends in education (Goldsmith-Pinkham et al., 2020)
 - **Shifts:** National industry shocks are uncorrelated with unobserved factors affecting local education (Borusyak et al., 2022)
- Exclusion
 - The predicted Bartik shock affects educational attainment *only* through changes in local unemployment
- Relevance
 - Strong predictor of actual local unemployment (First-stage $F > 10$)

Full Count Census Employment Data

- Agriculture: 105
- Mining: 200-240 (metal mining, coal mining, crude petroleum and natural gas extraction, nonmetallic mining and quarrying except fuel, mining not specified)
- Construction: 246
- FIRE: 716-756 (banking and credit agencies, security and commodity brokerage and investment companies, insurance, real estate, real estate-insurance-law offices)
- Other Services: 806, 808, 816, 817, 846-849 (advertising, miscellaneous business services, auto repair services and garages, miscellaneous repair services, laundering cleaning and dyeing services, dressmaking shops, shoe repair shops, miscellaneous personal services)
- Retail: 606-627
- Wholesale: 636-699
- Manufacturing: 307-489

$$\text{Interpolation: } emp_{29,c} \approx emp_{20,c} + \frac{9}{10}(emp_{30,c} - emp_{20,c})$$

Business Survey Employment Data



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SURVEY OF CURRENT BUSINESS MONTHLY BUSINESS STATISTICS—Continued

February, 1932

Earlier data for items shown here may be found in the 1931 Annual Supplement to the Survey	1931												1930
	December	November	October	September	August	July	June	May	April	March	February	January	December
Wholesale trade.....rel. to 1929..	83.7	81.1	81.2	80.1	80.5	80.8	87.1	87.1	87.4	87.4	88.2	89.5	92.0
Retail trade.....rel. to 1929..	106.2	90.9	89.8	86.6	81.8	83.9	89.1	89.9	90.1	87.8	87.1	90.0	115.1

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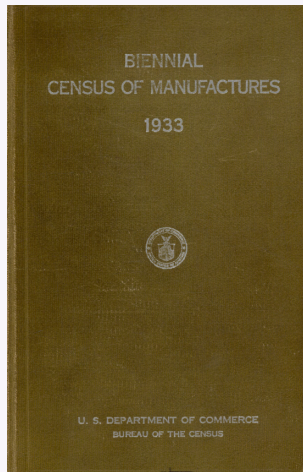
Table Ba831-839 Employees on nonagricultural payrolls, by industry: 1900-1940 (Lebergott)

- Construction: Contract construction
- FIRE: Finance, insurance, and real estate services
- Mining: Mining
- Other Services: Other private services

Table Ba470-477 - Labor force, employment, and unemployment: 1890-1990

- Agriculture: Farm Employed

COM Employment Data

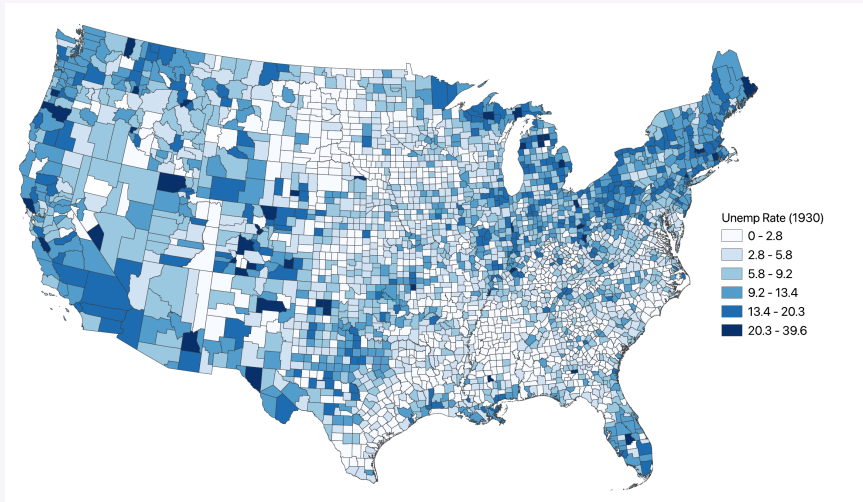


SUMMARY FOR GROUP 1.—FOOD AND KINDRED PRODUCTS: 1927 TO 1933—Con.

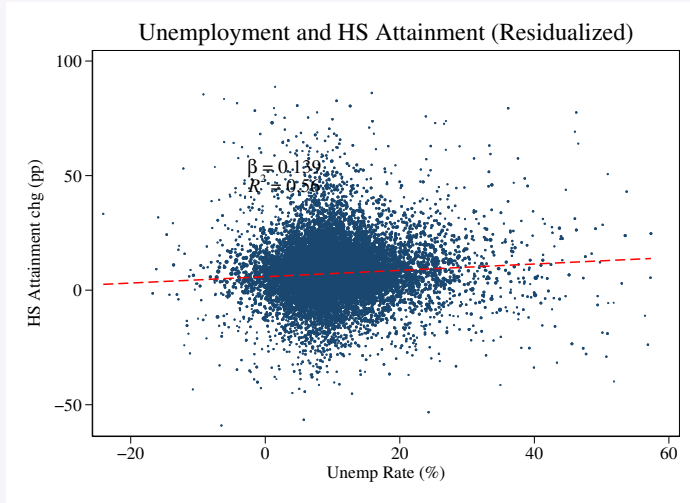
[See "Changes in classification," p. 42]

INDUSTRY	Cen- sus year	Num- ber of estab- lish- ments	Wage earn- ers (aver- age for the year)	Wages	Cost of materials, containers, fuel, and purchased electric energy	Value of products	Value added by manufac- ture ¹
Canned and preserved fish, crabs, shrimps, oysters, and clams.	1933 1931 1929 1927	264 304 348 337	9,993 8,591 13,612 12,630	\$4,472,985 5,222,490 8,799,058 8,105,581	\$26,248,486 28,403,818 53,239,911 42,891,556	\$40,559,806 42,351,747 80,848,513 65,082,187	\$14,311,320 13,947,929 27,608,602 22,199,631
Cheese.....	1933 1931 1929 1927	2,157 2,371 2,758 2,738	3,141 2,964 3,401 3,520	2,910,317 3,563,997 4,588,067 4,897,205	46,791,409 54,081,376 92,727,217 100,787,583	57,333,899 68,072,251 110,644,732 118,447,757	10,542,490 13,990,875 17,917,515 17,660,174
Condensed and evaporated milk.	1933 1931 1929 1927	436 485 535 464	6,331 6,121 7,065 7,390	6,100,070 7,256,004 8,795,629 9,190,599	96,698,147 109,397,438 163,786,818 159,680,081	131,086,300 148,598,031 209,109,700 200,086,091	34,388,153 39,200,593 45,322,882 40,406,010
Ice cream.....	1933 1931 1929 1927	2,118 2,948 3,150 2,961	14,367 17,819 22,399 21,927	16,144,678 25,416,338 33,803,044 33,107,615	66,314,733 110,503,763 155,964,386 150,602,029	158,396,304 268,514,553 328,413,911 301,644,991	92,071,571 158,010,790 172,449,525 151,042,962
Meat packing, wholesale....	1933 1931 1929 1927	1,078 1,209 1,277 1,230	113,193 106,707 122,505 119,095	112,265,704 134,529,752 165,867,420 161,583,827	1,202,539,178 1,839,259,101 2,974,127,757 2,663,740,403	1,490,065,488 2,180,823,462 3,434,654,098 3,057,215,718	287,546,310 341,563,561 460,526,341 393,475,316
Poultry killing, dressing, and packing, wholesale.¹	1933 1931 1929	437 497 485	7,471 6,982 7,769	4,862,362 5,944,204 7,284,558	51,852,752 77,696,847 106,865,506	66,156,977 97,560,080 130,161,230	14,304,225 19,893,233 23,295,724

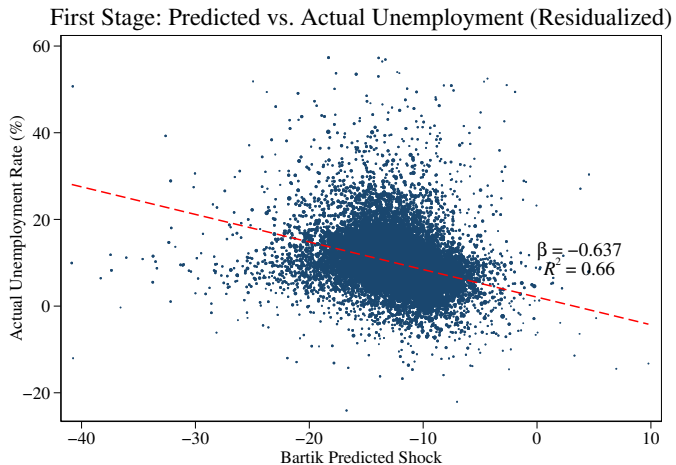
1930 Unemployment Across Space



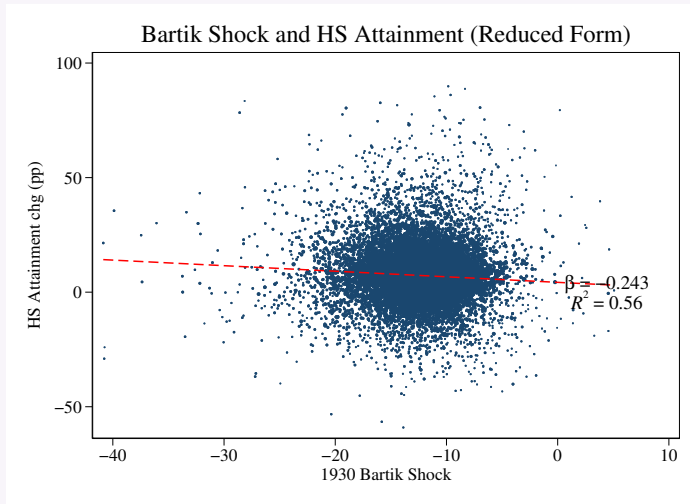
Raw OLS Scatterplot



IV First Stage Scatterplot



Reduced Form Scatterplot



County Robustness #1: Alternative IV Construction

Effect on Δ HS Attainment

	Baseline	4 Year Shifts	Mfg Only	19–25	26–64
Unemp rate, 1930	0.384*** (0.114)	0.532*** (0.119)	0.189 (0.152)	0.438*** (0.098)	0.426*** (0.100)
HS share, 1929	-0.604*** (0.019)	-0.612*** (0.020)	-0.594*** (0.019)	-0.607*** (0.019)	-0.607*** (0.019)
HS change, 1925-29	-0.164*** (0.012)	-0.161*** (0.012)	-0.168*** (0.011)	-0.164*** (0.012)	-0.163*** (0.012)
Observations	13,949	13,949	13,949	13,944	13,940
First-Stage F	238.27	157.88	33.51	221.50	179.87
Fixed Effects	County+Subgroup	County+Subgroup	County+Subgroup	County+Subgroup	County+Subgroup

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County Robustness #2: Alternative High School Year Changes

Effect on Δ HS Attainment

	1929-1933	1929-1931	1929-1932	1929-1934
Unemp rate, 1930	0.384*** (0.114)	0.336*** (0.114)	0.474*** (0.128)	0.408*** (0.104)
HS share, 1929	-0.604*** (0.019)	-0.585*** (0.026)	-0.613*** (0.026)	-0.624*** (0.023)
HS change, 1925-29	-0.164*** (0.012)	-0.171*** (0.014)	-0.165*** (0.013)	-0.167*** (0.013)
Observations	13,949	13,907	13,944	14,044
First-Stage F	238.27	233.99	237.28	235.33
Fixed Effects	County+Subgroup	County+Subgroup	County+Subgroup	County+Subgroup

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County Robustness #3: Alternative Fixed Effects

Effect on Δ HS Attainment

	County + Subgroup	County	Subgroup	State
Unemp rate, 1930	0.384*** (0.114)	0.681*** (0.118)	0.326*** (0.068)	0.614*** (0.086)
HS share, 1929	-0.604*** (0.019)	-0.088*** (0.026)	-0.183*** (0.043)	-0.098*** (0.022)
HS change, 1925-29	-0.164*** (0.012)	-0.398*** (0.015)	-0.335*** (0.021)	-0.379*** (0.012)
Observations	13,949	13,949	13,972	13,972
First-Stage F	238.27	275.36	358.67	384.19
Fixed Effects	County+Subgroup	County	Subgroup	State

County Robustness #4: Alternative Weighting

Effect on Δ HS Attainment

	Population	Labor Force	Census Links	No weights
Unemp rate, 1930	0.384*** (0.114)	0.299** (0.114)	0.343*** (0.104)	0.167 (0.199)
HS share, 1929	-0.604*** (0.019)	-0.552*** (0.022)	-0.595*** (0.021)	-0.692*** (0.019)
HS change, 1925-29	-0.164*** (0.012)	-0.181*** (0.013)	-0.173*** (0.011)	-0.100*** (0.012)
Observations	13,949	13,949	13,949	13,949
First-Stage F	238.27	330.02	245.96	118.85
Fixed Effects	County+Subgroup	County+Subgroup	County+Subgroup	County+Subgroup

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Bartik Validation #1: Shock Weight Diversity

Sector	Weight	Emp
Electrical machinery, equipment and supplies	0.0794	4,535,749
Printing, publishing, and allied ind.	0.0789	6,865,521
FIRE	0.0780	10,284,768
Services	0.0723	15,928,735
Motor vehicles and equipment	0.0640	5,288,551
Wholesale	0.0508	2,662,446
Meat products	0.0491	663,814
Retail	0.0466	29,871,022
Canning and preserving	0.0453	3,275,560
Misc machinery	0.0359	1,428,039
Apparel and accessories	0.0318	4,715,356
Fabricated steel products	0.0287	1,218,693
Railroad and misc transport equip.	0.0280	120,772
Misc manufacturing industries	0.0238	1,744,335
Construction	0.0232	3,828,130
Furniture and fixtures	0.0212	546,211
Misc wood products	0.0192	153,657
Misc chemicals and allied products	0.0164	363,780
Knitting mills	0.0162	1,493,369

Sector	Weight	Emp
Other primary iron/steel industries	0.0128	250,898
Dairy products	0.0110	97,845
Leather products, except footwear	0.0096	50,450
Beverage industries	0.0096	44,014
Grain-mill products	0.0094	40,241
Tobacco manufactures	0.0093	530,295
Misc nonmetallic mineral/stone	0.0093	34,178
Paperboard containers and boxes	0.0093	44,615
Fabricated nonferrous metal	0.0081	61,989
Ship/boat building and repairing	0.0076	118,319
Office and store machines	0.0075	48,009
Footwear, except rubber	0.0075	1,096,599
Leather: tanned, curried, finished	0.0066	100,438
Pulp, paper, and paper-board mills	0.0062	126,419
Misc fabricated textile products	0.0057	41,954
Petroleum refining	0.0052	67,218
Professional equipment	0.0051	38,502
Glass and glass products	0.0050	155,368
Mining	0.0049	2,124,454

Sector	Weight	Emp
Misc paper and pulp products	0.0047	13,834
Rubber products	0.0044	243,780
Misc textile mill products	0.0038	39,123
Carpets, rugs, floor coverings	0.0038	53,669
Photographic equipment/supplies	0.0038	36,494
Yarn, thread, and fabric	0.0035	2,439,871
Primary nonferrous industries	0.0032	87,468
Cement, concrete, gypsum, plaster	0.0019	9,406
Sawmills, planing mills, mill work	0.0019	162,343
Dyeing/finishing textiles	0.0019	58,711
Misc petroleum and coal products	0.0018	2,545
Structural clay/pottery products	0.0018	83,699
Synthetic fibers; drugs/medicines	0.0015	12,383
Watches, clocks, clockwork devices	0.0013	23,410
Aircraft and parts	0.0012	3,429
Agriculture	0.0009	2,609,327
Effective # shocks (1/HHI)		22.27
HHI		0.0449
# sectors (G)		54

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Dunn

Depressed in School

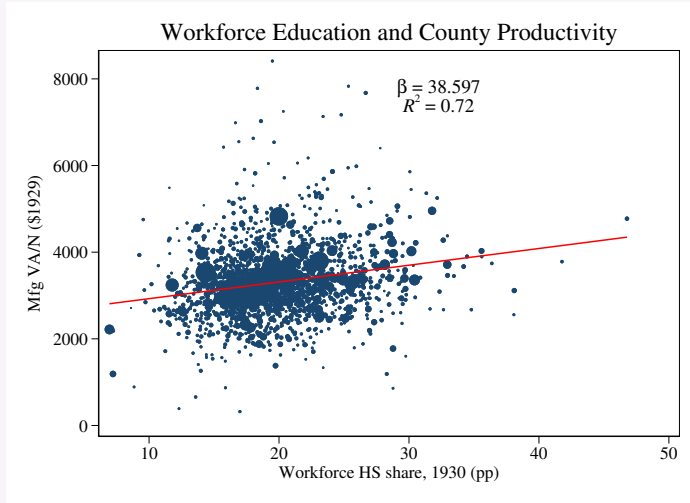
Appendix

Bartik Validation #2: Balance Test on Baseline Characteristics

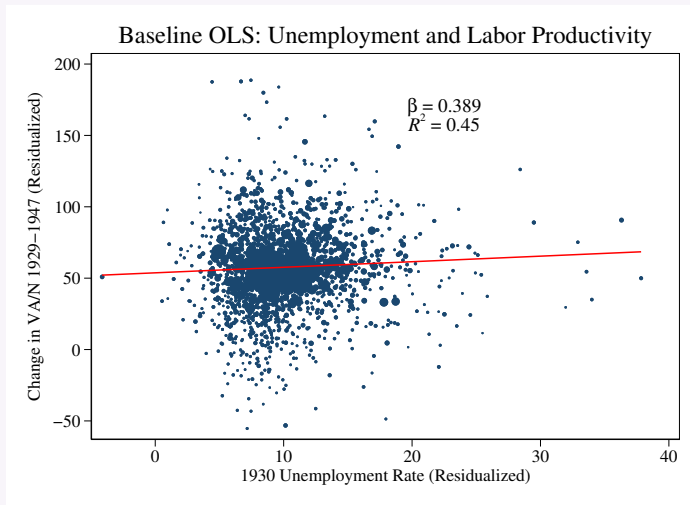
Shift Share Instrument Balance Test

County characteristic	$dEmp_{29-31}$	SE	N
Urban share	4.700	(3.365)	54
White share	-0.096	(1.020)	54
Male share	-0.870	(0.546)	54
Citizen share	-2.602	(2.029)	54
HS-age share	0.042	(0.249)	54
Mean age	0.426	(0.523)	54
Veteran share	-0.433*	(0.217)	54
HS share (1925)	-0.011	(0.013)	54
HS share (1929)	-0.003	(0.011)	54
HS pre-trend (1929-25)	0.008	(0.006)	54
ln(population)	0.255	(0.335)	54

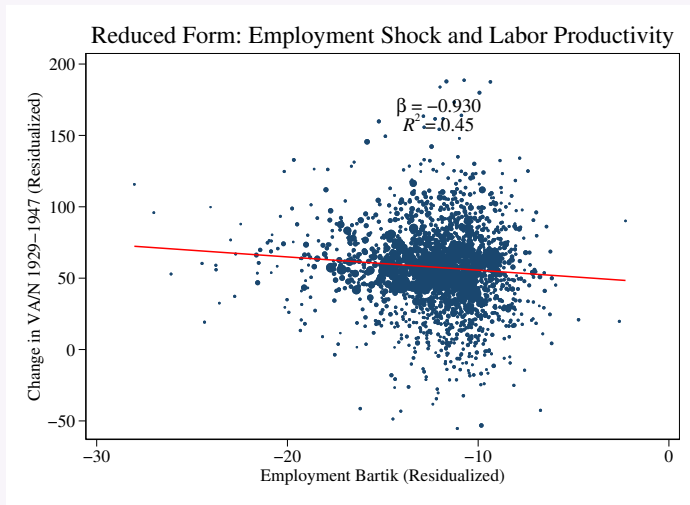
Education and Productivity Scatterplot



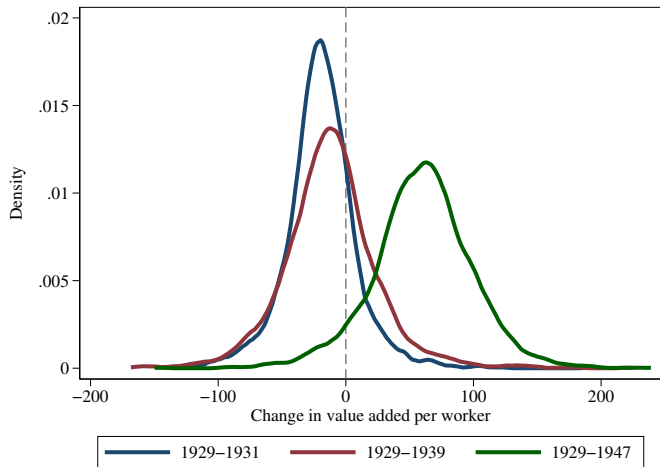
Unemployment and Productivity (OLS) Scatterplot



Unemployment and Productivity (RF) Scatterplot



Kernel Density Plot of Productivity Change



Effect on $\Delta VA/N$

	Baseline	Inputs	Workers	Demos	No mfg hubs	27 Base	39 End	27-29 Trend	New Deal	WWII
Unemp rate, 1930	2.039*** (0.679)	2.333*** (0.726)	1.691** (0.647)	1.925*** (0.646)	2.620*** (0.635)	1.823** (0.716)	0.659 (0.830)	1.987*** (0.644)	2.405** (0.904)	2.255*** (0.649)
Observations	2,034	2,034	2,034	2,034	1,917	1,586	2,034	1,586	2,029	2,034
R-squared										
First-Stage F	57.10	58.21	56.51	43.95	43.77	41.86	57.10	41.69	68.23	58.32
State FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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Additional Manufacturing Outcomes

Effect on ΔY

	VA/N	VA	Wages/N	Output/N	Inputs/N	(VA-W)/N	Firms	Workers
Unemp rate, 1930	2.039*** (0.679)	-2.503* (1.394)	3.230*** (0.566)	-0.506 (0.818)	-0.368 (1.077)	2.531*** (0.762)	1.424 (2.140)	-5.489*** (1.583)
Level, 1929	-0.015*** (0.001)	-0.000*** (0.000)	-0.054*** (0.008)	-0.003*** (0.000)	-0.004*** (0.000)	-0.031*** (0.002)	0.000 (0.000)	0.000 (0.000)
Pretrend	-0.223*** (0.030)	-0.087*** (0.030)	-0.173*** (0.039)	-0.092** (0.040)	-0.093** (0.037)	-0.161*** (0.025)	-0.160*** (0.056)	-0.119*** (0.043)
Workforce HS share, 1930	0.650*** (0.158)	1.844*** (0.482)	0.272* (0.144)	0.614** (0.238)	0.490 (0.333)	0.707*** (0.185)	1.479*** (0.276)	2.125*** (0.549)
% Urban	0.032 (0.038)	-0.148 (0.111)	0.004 (0.043)	0.101** (0.044)	-0.002 (0.064)	-0.025 (0.053)	-0.135 (0.187)	-0.018 (0.126)
Observations	2,034	2,034	2,034	2,034	2,034	2,033	2,034	2,034
First-Stage F	57.10	53.87	59.71	65.64	63.81	55.57	51.89	56.06
State FE	✓	✓	✓	✓	✓	✓	✓	✓

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