The G.I. Bill & Vocational Training

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All-California Economic History Job Market Conference
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Vocational school is in vogue

The popularity of vocational school (trade school) is surging

- Enrollment ↑ 5% 2020–2023; 16% 2022–2023 {National Student Clearinghouse} (2025)
- April 2025 workforce survey: 33% suggest trade school to H.S. graduates (vs. 28% for college)

Policymakers continue to invest millions & researchers are compiling new data (e.g., 2022 National Training, Education, and Workforce Survey (NTEWS) Pilot)

State and federal investment in trade school

CNBC

Fri, Sep 15 2017

Why California is investing over $200 million in vocational education

DIR State of California Department of Industrial Relations EST. 1927

Release Number: 2024-98 **Date:** November 22, 2024

California Awards $24.7 Million to Supercharge Apprenticeship Growth in New Industries

U.S. DEPARTMENT OF LABOR

News Release

US DEPARTMENT OF LABOR AWARDS $86 MILLION TO 14 STATES FOR INVESTMENT IN SKILLS TRAINING PROGRAMS FOR CRITICAL IN-DEMAND, EMERGING INDUSTRIES

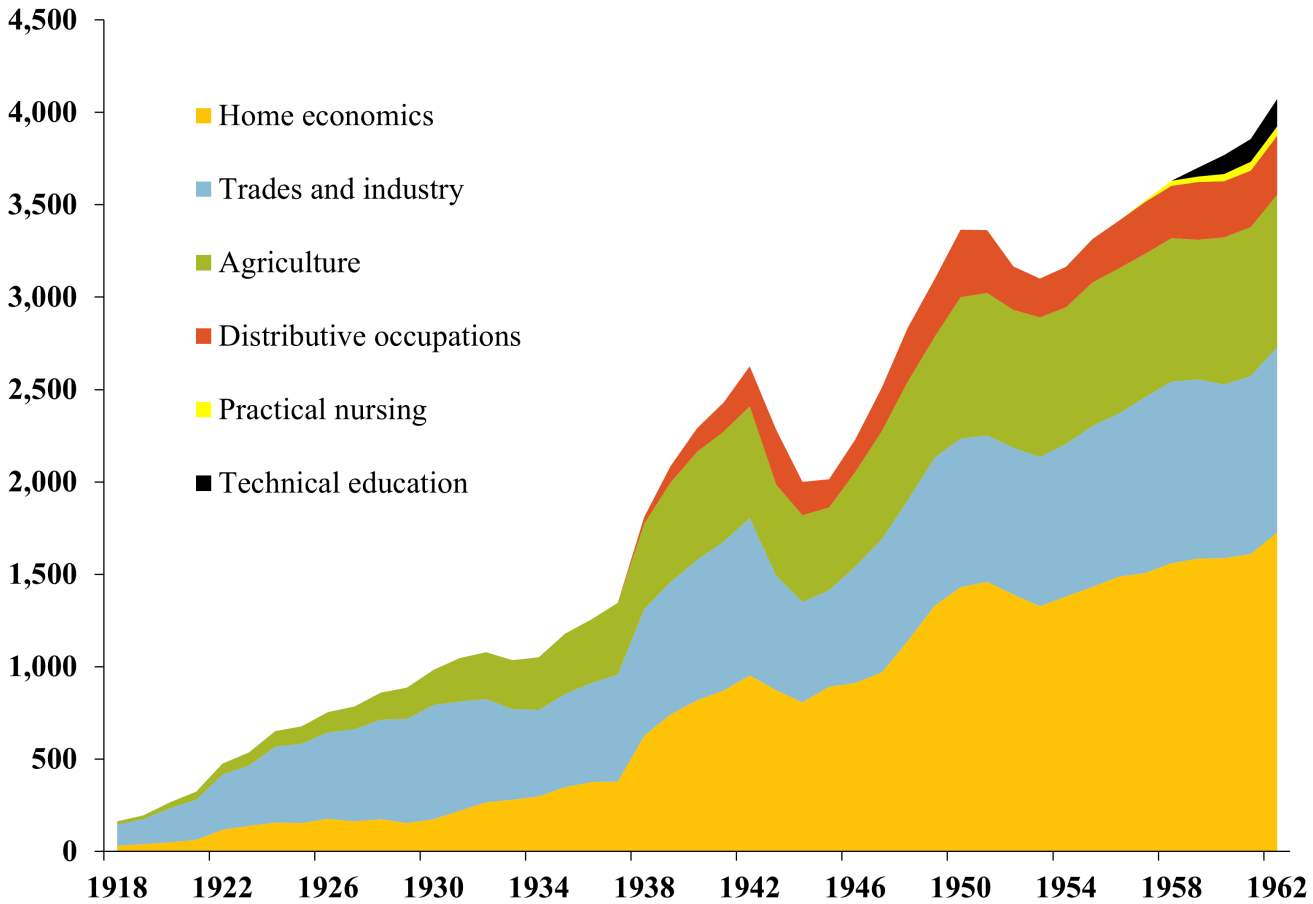
-September 30, 2025

Trade school lessons from history

This paper: **To what extent did the G.I. bill send workers to vocational school after WWII and the Korean War, and was there an effect on employment and earnings?**

- G.I. Bill – subsidies for veterans; started 1944, continues today
  - We know: ↑ in all types of education/training
  - Don't know: but-for benefits, expect a similar increase?
- Historical study of trade school $\longrightarrow$ long-run outcomes

Vocational school enrollment, 1918-1962



*Units: thousands of students
Source: Digest of annual reports of state boards for vocational education to the Office of Education, Division of Vocational Education, 1918-1962.

Overview of this paper

1. Measure trade school take-up in response to subsidies
   - WWII & Korean War G.I. Bills $\longrightarrow$ training stipends
   - Exogenous variation in eligibility
   - Trade school completion $\uparrow$ 4–9% (WWII), 3–7% (Korea)
2. Estimate returns to trade school completion
   - G.I. Bill instrument predicts training
   - Modest effects on wages, employment, and occupation choice

Contributions

1. G.I. Bill effects
   - This paper: **New causal evidence on the G.I. Bill's impact on trade school enrollment**
   - So far, evidence of increased college and high school attainment (Bound and Turner (2002); Thomas (2017), home ownership rates (Fetter (2013)), and marital sorting (Larsen et al. (2015))
2. Returns to trade school
   - This paper: **New U.S. estimates, novel use of nationwide policy setting, long-run effects**
   - Most studies are outside U.S. (Aguirre (2021), Bertrand et al. (2021), Carruthers and Jepsen (2021), Zilic (2018), Hanushek et al. (2017)) or measure short-term effects (LaForest (2023), Meer (2007))

The Mid-20th Century G.I. Bills

"*An Act to provide Federal Government aid for the readjustment in civilian life of returning WWII veterans*"
– (June 22, 1944, Public Law 346) Statement to Congress

"*An Act to provide vocational readjustment and to restore lost educational opportunities to certain persons who served in the Armed Forces [...]*"
– (July 16, 1952, Public Law 550)

	WWII	Korean War
Benefits (monthly)	Tuition + $50-120 stipend	$110-160 lump sum
Service period	Sep. 1940-Jul. 1947	Jun. 1950-Jan. 1955
Duration of Benefits	up to 4 years	up to 3 years
Expiration	1956	1965

Demand exceeded expectations

- High take-up + not only college Definition
  - Total utilization: 51% (WWII) and 44% (Korea)
  - Non-college shares: 71% (WWII) and 49% (Korea)

G.I. Bill Education Benefits Utilization

			Level of training received			
Conflict	Eligible	Received	College	Less than college	On-the-Job	Farm
World War II	15,440,000	**7,800,000**	*2,230,000*	*3,480,000*	*1,400,000*	*690,000*
Korean War	5,509,000	**2,391,000**	*1,213,000*	*860,000*	*223,000*	*95,000*

Source: Bound and Turner (2002), Appendix B2.

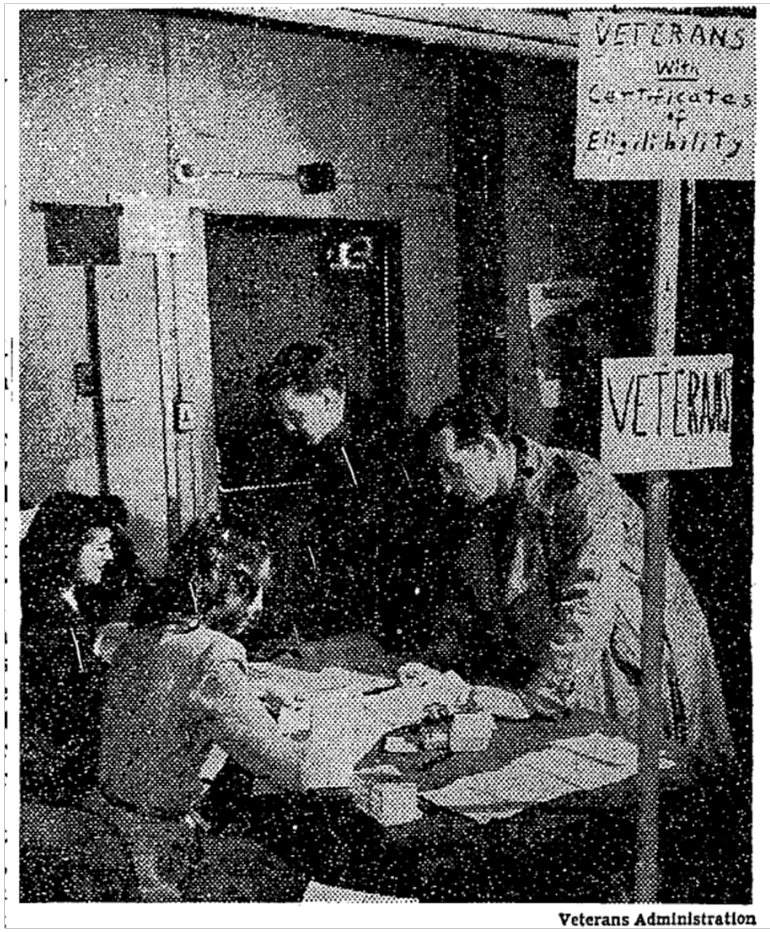
New York Times - 1956

G. I. SCHOOL LAW ENDS WEDNESDAY

7,800,000 Veterans Trained in World War II Plan — Korean Benefits Go On

Indeed, officials at the highest government levels predicted that a total of 500,000 veterans might take advantage of the bill. It was not long, though, before they revised their estimates and guessed perhaps 1,000,000.

Actually, even this highest estimate, which was met with skepticism in 1945, soon proved too conservative.



Veterans Administration

Oldest student

Empirical strategy – big picture

Military service $\rightarrow$ benefit eligibility $\rightarrow$ vocational school take-up

- Challenges:
  - Selection into military
  - Don't observe benefit utilization
- Key facts:
  - Min. enlistment age of 18
  - Born after 1929 (WWII) or 1935 (Korea) – too young to have served

Solution: Birth cohort $\approx$ benefit eligibility

Data sources

U.S. Census (Ruggles et al. (2024))

- 1970, 1% samples Details
  - Vocational training: completion + field of training Survey form
  - Veteran status (WWII, Korea)
  - Race, birth state/country, birth quarter
- 1940, 1% sample
  - State industry shares (manufacturing, agriculture, construction)
  - State urban/rural shares

Biennial Survey of Education, 1939 (Lleras-Muney (2002))

- Pre-WWII state characteristics
  - Population, education expenditures, manufacturing employment/wages

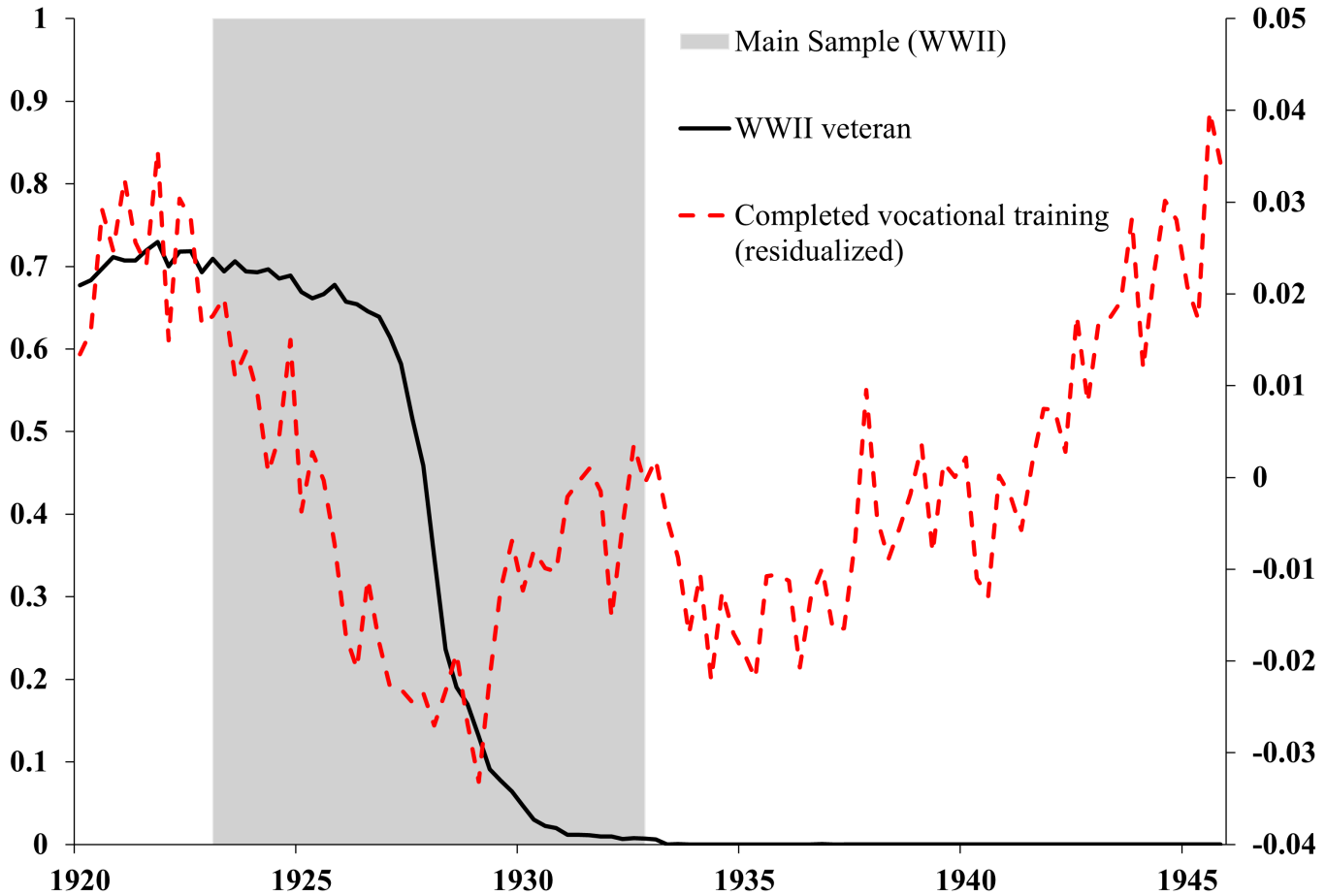
Sample construction

Sample restrictions:

- Drop allocated responses
- Black and white men only
- Exclude vets who served both conflicts
- Birth year ranges for each G.I. Bill analysis
  - WWII: 1923–1932 $\longrightarrow$ 304,607 obs.
  - Korea: 1929–1939 $\longrightarrow$ 321,460 obs.

Identification - WWII sample

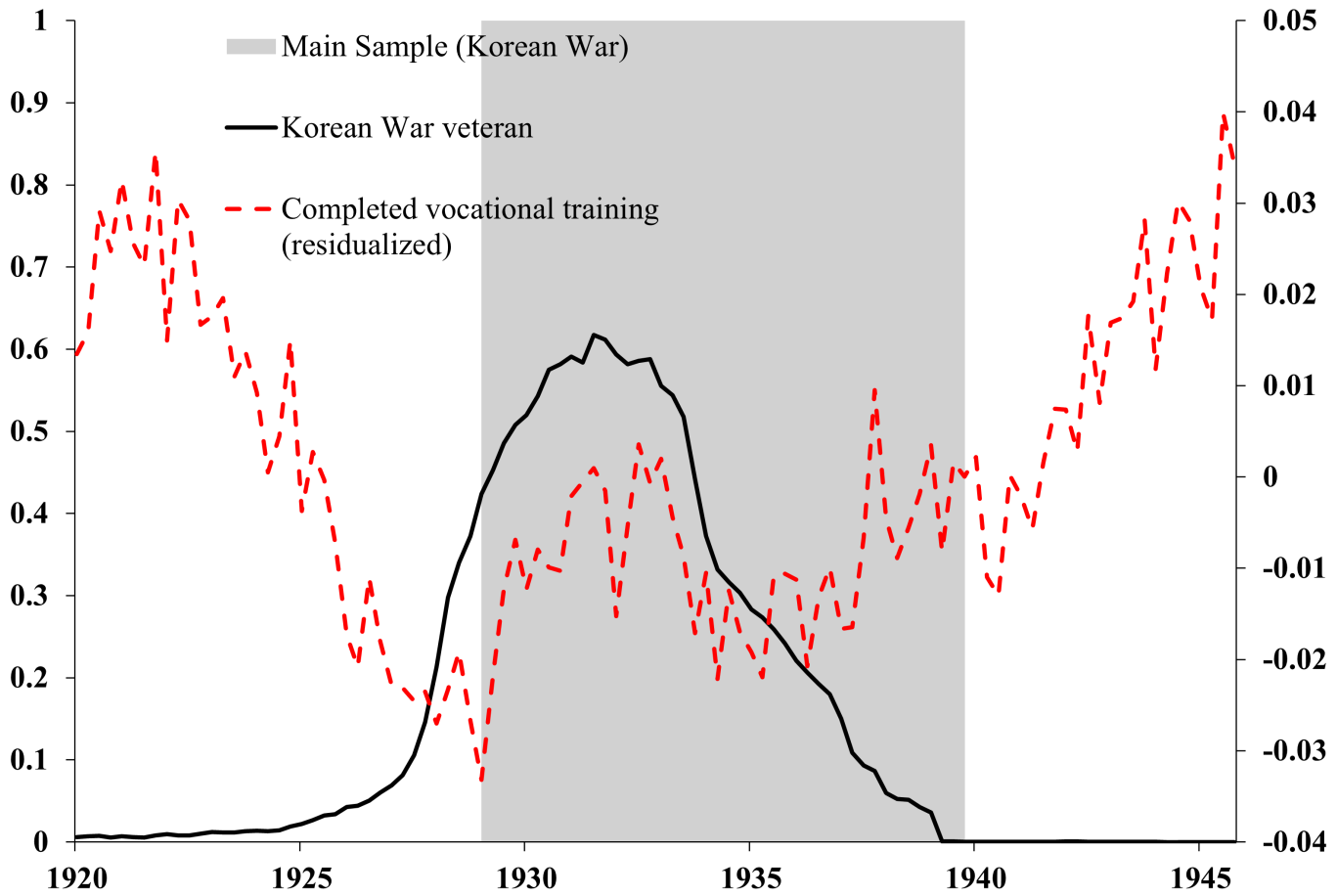
Share of WWII veterans & vocational school completion by birth cohort



Raw means

Identification - Korean War sample

Share of Korean War veterans & vocational school completion by birth cohort



Raw means

Linear Probability Model

$$Y_{ics} = \beta_1 WWII_c + \beta_2 Korea_c + \mathbf{Z}'_{ics}\delta + e_{ics}$$

- Y_{ics}: Vocational school completion
- WWII_c: cohort fraction of WWII veterans
- Korea_c: cohort fraction of Korean War veterans
  - s: state of birth
  - c: quarter of birth
- Controls $\mathbf{Z}$ include:
  - Race
  - State of birth fixed effects; state characteristics
  - Linear & quadratic trend: birth year – 1929 + birth quarter/4

Important considerations for identification

- Key coefficients: β_1 and β_2
  - Effects of 100-pp $\uparrow$ in WWII/Korean War service share on prob. of completing trade school
  - Indirect effect of subsidies on training take-up
- G.I. Bill is a "bundled treatment":
  - Tuition assistance, home loan guarantee, disability rehabilitation
  - Experience/training in armed forces
    - Can't isolate subsidy effect

Vocational training rates

Vocational Training completion rates

	Born 1923-32			Born 1929-39		
	All	White	Black	All	White	Black
No vocational training	**68.45%**	67.70%	76.65%	**69.18%**	68.39%	77.28%
Any vocational training	**31.55%**	32.30%	23.35%	**30.82%**	31.61%	22.72%
N	**304,607**	279,100	25,507	**321,460**	292,940	28,520

Vocational training fields

Vocational Training completion rates by field of study

	Born 1923-32			Born 1929-39		
	All	White	Black	All	White	Black
Trades & Crafts	**56.31%**	56.23%	57.45%	**54.77%**	54.92%	52.67%
Business	**13.25%**	13.43%	10.54%	**13.68%**	13.77%	12.42%
Engineering & Drafting	**12.93%**	13.35%	6.62%	**14.02%**	14.41%	8.50%
Agriculture & Home Econ.	**3.51%**	3.51%	3.53%	**2.67%**	2.66%	2.81%
Nursing & Health	**2.48%**	2.40%	3.58%	**2.71%**	2.57%	4.72%
Other	**5.36%**	5.29%	6.43%	**5.98%**	5.94%	6.48%
Not reported	**6.17%**	5.79%	11.85%	**6.17%**	5.73%	12.39%
N	**96,110**	90,154	5,956	**99,079**	92,599	6,480

Vocational training and years of school

Vocational Training completion rates by years of education

Panel A: Born 1923-32				
	$\leq$ 12 years	12 years	13-15 years	16 years
Trades & Crafts	69.66%	62.21%	41.51%	26.83%
Business	6.02%	12.97%	22.00%	19.15%
Engineering & Drafting	5.05%	10.43%	22.42%	26.30%
Agriculture & Home Economics	4.51%	3.63%	2.19%	2.61%
Nursing & Health	1.38%	1.67%	2.59%	7.24%
Other	4.95%	4.49%	5.14%	9.26%
Not reported	8.43%	4.60%	4.16%	8.60%
N	27,780	39,950	15,643	12,737

Panel B: Korea

G.I. Bill effects on vocational school completion

Effect of G.I. Bill on vocational school, 1923-1932 birth cohorts

	Any Training	Trades	Any Training	Trades
Fraction WWII	0.088***	0.050**	0.086***	0.046*
	(0.020)	(0.018)	(0.021)	(0.018)
Fraction Korea	0.148***	0.079**	0.142***	0.073**
	(0.024)	(0.023)	(0.024)	(0.023)
Black	-0.125*	-0.037	-0.095*	-0.026
	(0.050)	(0.043)	(0.046)	(0.040)
Black x Fraction WWII	0.058	-0.007	0.052	-0.002
	(0.073)	(0.062)	(0.068)	(0.059)
Black x Fraction Korea	0.052	-0.029	0.040	-0.026
	(0.087)	(0.073)	(0.082)	(0.069)
N	304,607	304,607	302,166	302,166
Fixed Effects	No	No	Yes	Yes
Mean dependent variable	0.316	0.178	0.315	0.178

Korea

Differences by geography

Effect of G.I. Bill on vocational school, southern states

	Any Training	Trades	Any Training	Trades
Fraction WWII	0.121*	0.043	0.105*	0.033
	(0.045)	(0.040)	(0.045)	(0.040)
Fraction Korea	0.178**	0.053	0.153*	0.041
	(0.059)	(0.051)	(0.059)	(0.052)
Black	-0.111*	-0.036	-0.089	-0.027
	(0.051)	(0.052)	(0.052)	(0.054)
Black x Fraction WWII	0.018	-0.010	0.010	-0.014
	(0.077)	(0.076)	(0.078)	(0.078)
Black x Fraction Korea	-0.002	-0.034	-0.016	-0.041
	(0.091)	(0.092)	(0.092)	(0.094)
N	87,914	87,914	87,121	87,121
Fixed Effects	No	No	Yes	Yes
Mean dependent variable	0.283	0.155	0.282	0.155

Korea

2SLS Model

If vocational training is endogenous, labor market effects biased

Take-up regressions suggest G.I. Bills shifted workers into training

$\Longrightarrow$ 2SLS identifies LATE:

$$\text{Training}_{ics} = \alpha_1 * \mathit{WWII}_c + \alpha_2 * \mathit{Korea}_c + \mathbf{Z'}_{ics} * \gamma + \nu_{ics}$$

$$Y_{ics} = \beta_1 * \widehat{\text{Training}}_{ics} + \mathbf{Z'}_{ics} * \delta + e_{ics}$$

- Y_{ics}: log hourly wages; employed (0/1); below poverty (0/1); employed in manufacturing/construction (0/1)
- Controls and predictors as defined in LPM

Estimated returns to trade school, WWII sample

Labor market effects of vocational training, 1923-1932 birth cohorts

	OLS			2SLS		
	Log Wage	Poverty	Employed	Log Wage	Poverty	Employed
Voc. Train.	0.060***	-0.024***	0.020***	0.1930	0.317*	0.2280
	(0.003)	(0.001)	(0.001)	(0.343)	(0.156)	(0.150)
Black	-0.330***	0.126***	-0.082***	-0.289**	0.229***	-0.0190
	(0.006)	(0.002)	(0.002)	(0.106)	(0.047)	(0.045)
N	242,434	297,950	302,166	242,434	297,950	302,166
Mean dep. variable	1.403	0.062	0.932	1.403	0.062	0.932
First stage F-stat.	-	-	-	2913.27	3675.70	3819.83

Estimated returns to trade school, Korea sample

Labor market effects of vocational training, 1929-1939 birth cohorts

	OLS			2SLS		
	Log Wage	Poverty	Employed	Log Wage	Poverty	Employed
Vocational training	0.055***	-0.024***	0.021***	0.2490	-0.1320	0.0410
	(0.003)	(0.001)	(0.001)	(0.194)	(0.078)	(0.077)
Black	-0.296***	0.125***	-0.082***	-0.240***	0.093***	-0.076***
	(0.005)	(0.002)	(0.002)	(0.056)	(0.023)	(0.022)
N	259,726	313,485	318,834	259,726	313,485	318,834
Mean dependent variable	1.363	0.065	0.938	1.363	0.065	0.938
First stage F-stat.	-	-	-	3821.18	4826.03	5079.96

Effects on occupational choice, WWII sample

Occupational choice effects of vocational training, 1923-1932 birth cohorts

	OLS		2SLS	
	Construction	Manufacturing	Construction	Manufacturing
Vocational training	0.015***	0.013***	-0.387*	0.2530
	(0.001)	(0.002)	(0.196)	(0.262)
Black	0.0000	0.014***	-0.122*	0.0870
	(0.002)	(0.004)	(0.059)	(0.079)
N	302,166	302,166	302,166	302,166
Mean dependent variable	0.100	0.301	0.100	0.301
First stage F-stat.	-	-	3819.83	3819.83

Effects on occupational choice, Korea sample

Occupational choice effects of vocational training, 1929-1939 birth cohorts

	OLS		2SLS	
	Construction	Manufacturing	Construction	Manufacturing
Vocational training	0.014***	0.009***	-0.245*	-0.0790
	(0.001)	(0.002)	(0.102)	(0.146)
Black	-0.0020	0.021***	-0.078**	-0.0050
	(0.002)	(0.003)	(0.030)	(0.043)
N	318,834	318,834	318,834	318,834
Mean dependent variable	0.098	0.304	0.098	0.304
First stage F-stat.	-	-	5079.96	5079.96

Concluding discussion

- New evidence on causal effects of G.I. Bill on vocational training
  - Access to benefits increased trade school enrollment
  - Strong outcomes in South
  - Reduction in direct & opportunity costs of training
- Future research:
  - Use results as historical benchmark
  - Selection effects into/out of trade school; marginal worker deciding on college

Thank you for your attention!

Contact: pmolligo@gmail.com

Definitions

Vocational Education: Educational programs directly related to preparation of individuals for employment in occupations requiring less than a baccalaureate or advanced degree (1990 Perkins Act).

Back

G.I. Bill: "All public or private elementary, secondary, and other schools furnishing education for adults, business schools and colleges, scientific and technical institutions, colleges, **vocational schools**, junior colleges, teachers colleges, normal schools, professional schools, universities, and other educational institutions, and [...] other establishments providing apprentice or other training on the job [...]"
– 1944 Servicemen's Readjustment Act, Chapter 4, Education of Veterans

Back

G.I. Bill origins

FDR statement to Congress, November 23, 1943:

> *"What our servicemen and women want, more than anything else, is the assurance of satisfactory employment upon their return to civil life... The goal after the war should be the maximum utilization of our human and material resources."*

Back

Oldest student

MAJOR, 'OVER 60,' TAKES G. I. COURSE

Peter Rodyenko, Philosopher and Soldier, Caps a World Career on Long Island

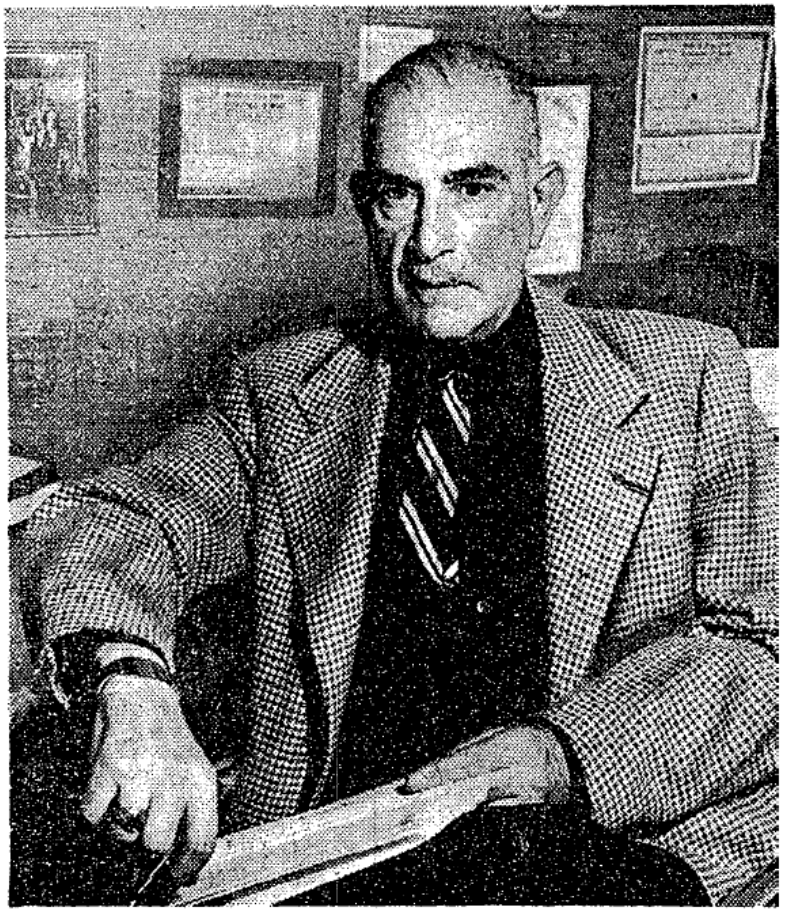
Four evenings out of every seven, Maj. Peter Rodyenko squeezes his six-foot frame into a midget British car and drives purposefully from his home at Plandome, L. I.

Monday and Wednesday evenings he heads for Oyster Bay and Fridays for Hicksville, to attend Long Island University classes in philosophy and history. A fourth night he goes to Mitchell Air Force Base for Civil Air Patrol duties.

Often unorthodox and always positive about his ideas, the major sounds off in class about Spinoza or Kant or illustrates a point in a discussion of world affairs with an anecdote about his experiences with the Chinese Army from 1912 to 1919.

The major is the oldest student, so far as is known, attending college under the G. I. Bill of Rights. He smilingly admits to being "over 60." Records of his birth in Austria

OLDEST COLLEGE STUDENT UNDER G. I. BILL



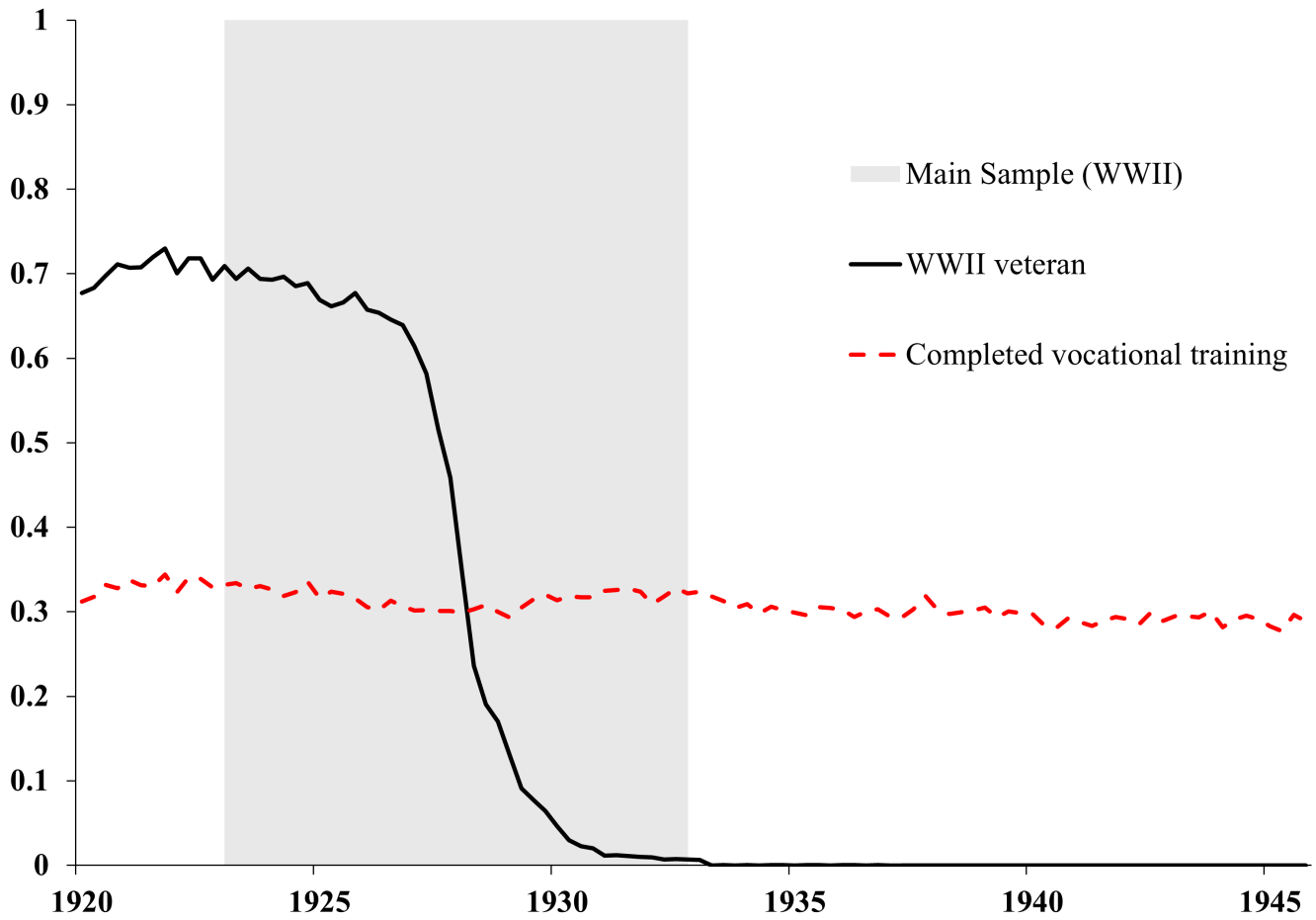
Maj. Peter Rodyenko at his home in Plandome, L. I.

The New York Times

Back

Identification - WWII sample, raw means

Share of WWII veterans & vocational school completion by birth cohort



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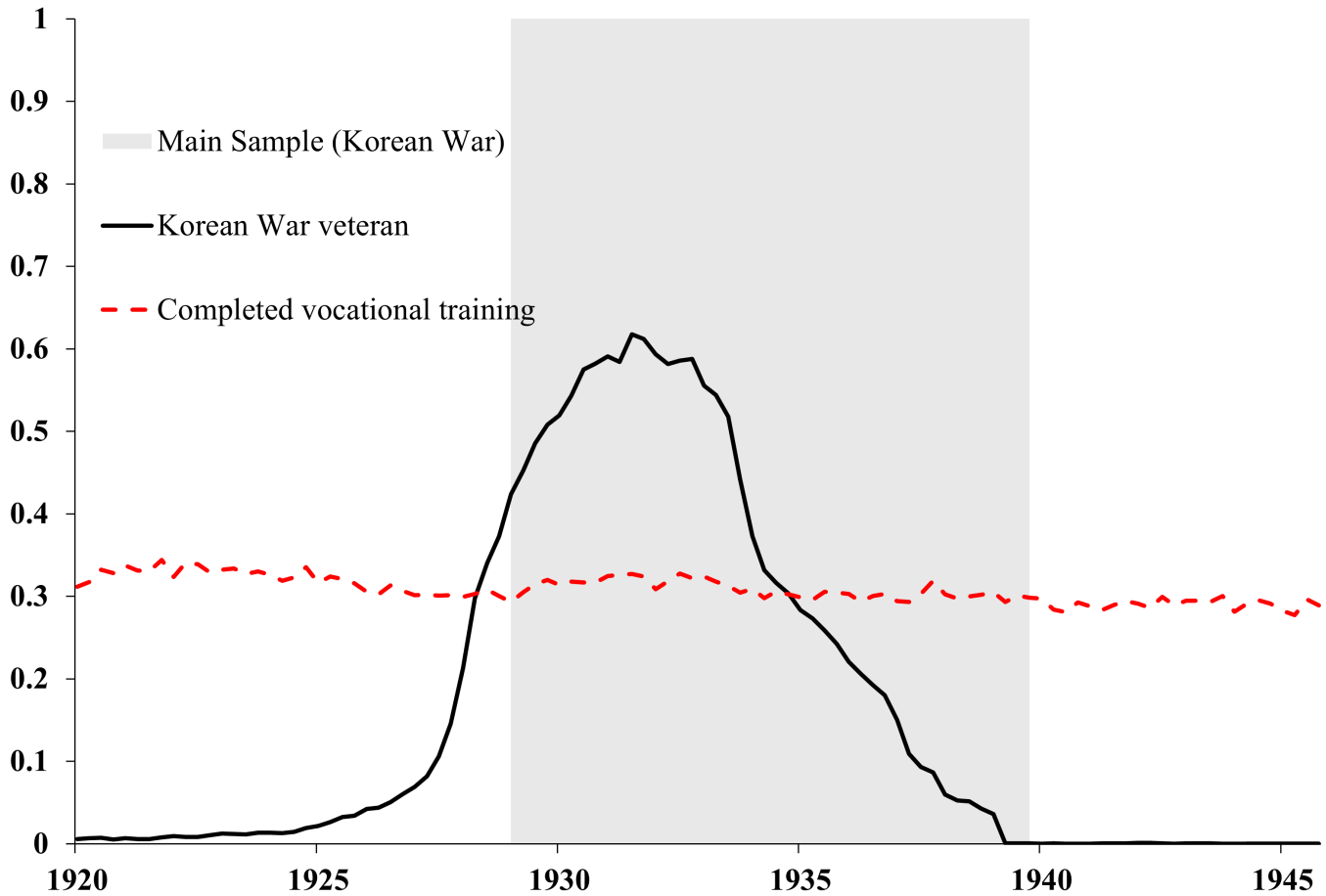
Identification - Korean War sample, raw mean

Share of Korean War veterans & vocational school completion by birth cohort



Back

1970 U.S. Census

Two different survey forms, not linked

- Form 1:
  - 3 samples, each 5% of population (state, metro area, neighborhood)
  - Vocational school completion
    - *SCHLVOC*: respondent ever completed a vocational training program
    - If yes, main field of training (Business, nursing/health, trades/crafts, engineering/drafting, agriculture/home economics
- Form 2:
  - 3 samples, each 15% of population (state, metro area, neighborhood)
  - Veteran status by conflict (*VETWWII*, *VETKOREA*)

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Vocational school Census question

Question text on Census:

27(a). Has this person ever completed a vocational training program? For example, in high school; as apprentice; in school of business, nursing or trades; technical institute; or Armed Forces schools.*

- *Yes*
- *No (skip to 28)*

**Count only programs that he finished. Do not count courses which are not part of an organized program of study. Do not count training he got on-the-job, in company schools, in college after the second year, or by correspondence.*

27(b). What was his main field of vocational training? Fill one circle.

- *Business, office work*
- *Nursing, other health fields*
- *Trades and crafts (mechanic, electrician, beautician, etc.)*
- *Engineering or science technician; draftsman*
- *Agriculture or home economics*
- *Other field - Specify*

Back

Vocational training and years of school

Vocational Training completion rates by years of education

Panel B: Born 1929-39				
	$\leq$ 12 years	12 years	13-15 years	16 years
Trades & Crafts	69.44%	62.36%	40.30%	24.17%
Business	5.96%	12.60%	20.60%	20.41%
Engineering & Drafting	5.17%	10.92%	24.44%	24.97%
Agriculture & Home Economics	2.41%	2.87%	1.98%	3.30%
Nursing & Health	1.58%	1.75%	2.94%	7.61%
Other	5.58%	4.92%	5.68%	10.78%
Not reported	9.85%	4.58%	4.05%	8.75%
N	21,167	46,685	18,021	13,206

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G.I. Bill effects on vocational school, Korean War

Effect of G.I. Bill on vocational school, 1929-1939 birth cohorts

	Any Training	Trades	Any Training	Trades
Fraction Korea	0.063***	0.032*	0.069***	0.036**
	(0.017)	(0.013)	(0.017)	(0.013)
Fraction WWII	-0.167*	-0.045	-0.140	-0.024
	(0.078)	(0.065)	(0.076)	(0.063)
Black	-0.081***	-0.054***	-0.052***	-0.038***
	(0.003)	(0.003)	(0.004)	(0.003)
Black x Fraction Korea	-0.016	0.003	-0.015	0.003
	(0.012)	(0.007)	(0.012)	(0.007)
Black x Fraction WWII	-0.181**	-0.060*	-0.173**	-0.062*
	(0.059)	(0.029)	(0.062)	(0.025)
N	321,460	321,460	318,834	318,834
Fixed Effects	No	No	Yes	Yes
Mean dependent variable	0.308	0.169	0.308	0.169

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G.I. Bill effects on vocational school, Korean War, south

Effect of G.I. Bill on vocational school, 1929-1939 birth cohorts, south

	Any Training	Trades	Any Training	Trades
Fraction Korea	0.087**	0.050*	0.090**	0.049*
	(0.031)	(0.023)	(0.032)	(0.023)
Fraction WWII	-0.091	-0.032	-0.067	-0.029
	(0.153)	(0.115)	(0.157)	(0.118)
Black	-0.109***	-0.064***	-0.094***	-0.058***
	(0.005)	(0.005)	(0.006)	(0.005)
Black x Fraction Korea	-0.003	0.013	-0.001	0.013
	(0.015)	(0.013)	(0.015)	(0.014)
Black x Fraction WWII	-0.173*	-0.048	-0.166*	-0.046
	(0.065)	(0.063)	(0.062)	(0.062)
N	95,420	95,420	95,420	95,420
Fixed Effects	No	No	Yes	Yes
Mean dependent variable	0.268	0.142	0.268	0.142

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U.S. Manufacturing employment, 1939-1980

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U.S. Construction employment, 1939-1980

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