WWII contract spending and labor and capital income.

Andrew Bossie

September 27, 2023

WWII: A case study of a large fiscal policy shock WWII and economic policy

- Model of a large government funded industrial buildup.
- Historical analogy for post-2008: Depression hysteresis broken by government pouring money into the economy to deal with a national emergency. (Mathy, 2018)

WWII and the Great Compression

- What are the distributional effects of the war?
- Top 1% share of income falls by 3.7 percentage points during the war.
- Evidence for mechanisms for postwar regional convergence in income.

Study in multipliers

- Evaluating the pent-up demand hypothesis.
- War helps bring mechanical complexity of open economy multipliers into focus.
- WWII multiplier is being driven by direct (political economy) and indirect (migration) mechanisms.

How did WWII End the Great Depression?

War cased extensive growth but the war did not induce intensive growth or change.

- County level: Intensive but not extensive effect on retail sales, income or housing. (Fishback, 2008; Fishback and Jaworski, 2016)
- County level: No effect on Southern economic development. (Jaworski, 2017)
- No effect on industrial composition in CA/WA/OR. (Rhode, 1994, 2003)
- No effect on productivity. (Field, 2008)
- No effect at all. (Higgs, 1999)
- Brunet (2020) state level wartime 2 year multiplier of .34 is an outlier by a large amount.

Empirical findings

In response to state level WWII contract spending:

- The war is a temporary positive shock to nominal manufacturing income.
- The war is a permanent negative shock to nominal nonmanufacturing nonfarm income.
 - Long run effect driven 50/50 by migration and direct effect of the war.
- Nominal capital income grows more slowly during and after the war.
 - Effect driven by migration until 1947 and the direct effect of the war after.
- Nominal farm proprietor and farm wage income grow more slowly.
 - Farm income is a very small part of income and war effect is marginal.
 - Wartime effect on farm proprietor income driven by the direct effect

Baseline Fixed Effects Specification

- WWII private contract spending's effect on the components of personal and corporate income.
- Size and historical exogenity of the war shock the central identifying assumptions.
 - Exogenous to political considerations endogenous to industrial structure (Rhode et al, 2017).
 - Census dummy interacted with time dummy to control for industrial structure (Allegretto et al, (2011)).
 - Census * y_t produces slightly better behaved results than income or manufacturing controls.
- Time and state fixed effects.
- Specification produces "relative" or "open economy" multipliers.

Identification Argument I Want to Make

This is a case study of a population: 48 states from 1940-1957

What is gained:

- Paper describes population parameters not statistics so "identification" is not an issue.
- 95% confidence intervals measure of spread (excluding 2/3 outliers)
- What is lost:
 - No claim to external validity.
 - Christina Romer (paraphrase): What we want to know is the effect of endogenous counter cyclical fiscal policy. What we can study are exogenous fiscal policy shocks at arbitrary points in the business cycle.
 - I would add here that military spending is even further removed.
 - WWII effect not even externally valid for WWIII.

Mediation Analysis

- Identified under size and historical exogeniety assumption. Controlling for Census division
- Three equation simultaneous equation model.
- Analogous to variance decomposition in VAR analysis.
 - Cholesky ordering: war spending -> excess migration -> income.
- Estimates the effect of war "mediated" through migration and direct political economy effect.

Migration Effect and Political Economy Effects

Political Economy Effect:

- Negative effect of war spending most obvious for capital income.
- Supporting evidence from corporate profits suggest large 1947 business cycle effect on capital income.
- Reconversion recession concentrated in war industries.
- Measured inequality falls in response to war spending. (Bossie and Kuehn, 2020)
- Union growth/NWLB correlated with war spending lowered inequality (Farber et al. 2020)
- Perhaps war contracts were not that profitable. (Wilson, 2010)
- Evidence from state level demand deposits is consistent with lower corporate incomes. (Bossie, 2020)

Political Economy Effect

Bossie and Kuehn (2020): War spending explains about half of the Great Compression.

Effect of war spending on capital income:

- Dividends: Evidence from IRS SOI Part II explains about 1/3rd of total capital income response.
- Interest: Bossie (2020) finds no effect of war spending on interest payments from national banks. This is expected under Regulation Q.
- Rent: Wartime rent controls had a direct effect on rental supply. (Fetter (2016))

The War's Business Cycle

Change in Employment Relative to 1944

	Octobe	r 1945	Novemb	er 1948
	Thousands	% of 1944	Thousands	% of 1944
Total Employment (1944 Total: 41.5mil)	-3,091	-7.5%	4,275	10.3%
Total War Manufacturing	-3270	-39.4%	-2423	-29.2%
Total Non-auto Transportation	-1704	-71.1%	-1965	-82.0%
Aircraft and Shipbuilding	-1571	-75.0%	-1835	-87.6%
Automobile Manufacturing	-255	-34.8%	55	7.5%
Iron and Steel	-455	-26.2%	-133	-7.7%
Electrical Machinery	-282	-36.9%	-230	-30.1%
Non-electrical Machinery	-306	-24.6%	-37	-3.0%
Total Nonwar Manufacturing	-218	-3.7%	1283	22.0%
Total Nonmanfacturing	-949	-5.2%	5243	28.6%
Mining	101	11.7%	75	8.7%
Construction	-158	-14.4%	1068	97.6%
Transport and Utilities	-63	-1.7%	268	7.1%
Trade	-541	-7.3%	2637	35.6%
Finance	-42	-3.1%	346	25.2%
Services	-246	-6.5%	849	22.4%
Civilian Government	236	3.9%	-312	-5.2%

Source 1949 Statistical Supplement to Survey of Current Business, Bossie (WP 2020)

National country banks grow faster



Migration Effects

Migration Effect:

- Negative effect of war spending on nonmanufacturing income is due to per capita income convergence of out migration states (South and Dust Bowl).
- Slower growth of nonmanufacturing income is widely spread across sectors. As well as state and local government spending.
- 25 million people migrate from 1940-1947. Half move across states. (Census, 1948)
- Wages for farm workers grow faster than other workers. (Bossie and Mason, 2020)

Migration

	Millions	% of Pop
Total Migrants	25.5	17.9%
Within States	13.1	9.2%
Between States	12.4	8.7%
Net by Census Region		
Northeast	-0.3	-0.8%
Midwest	-0.3	-0.8%
South	-1.5	-4.2%
West	2.1	14.0%
Change in Farm Population	-3.2	-13.1%
Source: Census, P-20-14 1948		

US Internal Migration: 1940-1947

Total Contract Spending and Income 1940-1947

Average total contract spending % of 1940 income: 211% Average total change in income 1940-1947: 145%



Total Contract Spending and Capital Income 1940-1947

Average total contract spending % of 1940 income: 211% Average total change in capital Income 1940-1947: 76%



Migration and Income 1940-1947

Average out-migration: -9.5% Average in-migration: 10%



Migration and total contract spending 1940-1947



Identification

Historically Exogenous

- Often correlated with Great Contraction.
- Correlation with 35-39 usually statistically zero.
- Exogenous to political considerations.
 - Rhode, Snyder and Stumpf, 2018
 - Koistinen, 2004
- Endogenous to industrial structure.
 - Census division controls for heterogeneous trends.

Regression specification

$$I_{it} = s_i + y_t + \delta_{1t}(y_t * WWI_i) + \delta_{2t}(y_t * CENSUS_j) + \delta_{3t}(y_t * KOREA_i) + \epsilon_i$$

Testing $WWI_i \rightarrow I_{it}$

The Effect of per capita nominal WWII military contract spending on the components of per capita nominal personal income 1940-1957.

Regression Specification

$I_{it} = s_i + y_t + \delta_{1t}(y_t * WWII_i) + \delta_{2t}(y_t * CENSUS_j) + \delta_{3t}(y_t * KOREA_i) + \epsilon_{it}$

 s_i = Fixed effect for state i. Controls for time invariant state characteristics.

 y_t = Fixed effect for year t. Controls for changes over time that affect all states. Monetary policy in particular.

Regression Specification

 $I_{it} = s_i + y_t + \delta_{1t}(y_t * WWI_i) + \delta_{2t}(y_t * CENSUS_j) + \delta_{3t}(y_t * KOREA_i) + \epsilon_{it}$

- CENSUS_j is a Census division dummy interacted with a time dummy to control for heterogeneous regional trends.
- Similar to minimum wage literature (Dube, Lester and Reich, 2010)

Census regions and divisions



Regression specification

 $I_{it} = s_i + y_t + \delta_{1t}(y_t * WWI_i) + \delta_{2t}(y_t * CENSUS_j) + \delta_{3t}(y_t * KOREA_i) + \epsilon_{it}$

- KOREA_i controls for the (very much correlated) shock of Korean War on "long run" effect of WWII.
- CITATION
 - Single observation per state like WWII_i.
 - KOREA_i = 0 before 1951. KOREA_i=Total Korean War Spending in state i 1951-1957.

Effect of interest

$$I_{it} = s_i + y_t + \delta_{1t}(y_t * WWII_i) + \delta_{2t}(y_t * CENSUS_j) + \delta_{3t}(y_t * KOREA_i) + \epsilon_{it}$$

Log of per capita component of income for state i and year t.

DC is dropped.

Components of Personal Income State Panel 1929-1957 (BEA: SH5A, SH7A)



Effect of interest

 $I_{it} = s_i + y_t + \delta_{1t}(y_t * WWI_i) + \delta_{2t}(y_t * CENSUS_j) + \delta_{3t}(y_t * KOREA_i) + \epsilon_{it}$

- WWII_i=log per capita and single observation per state of WWII contract spending.
- ▶ Notice *WWII*_i is not included by itself. It is time invariant.
 - Control function is absorbed by s_i .
 - Results are relative to 1940 so "mean effect" doesn't offer useful information.

Nominal effects

Both the income data and war spending data are in nominal terms.

- There is no credible state level defaltor. (Bossie WP 2020)
- Multiplier effect expressed as a percentage of average nominal income to capture rough real effects.
- Nationally per capita nominal income increased by 123% on average and the CPI increased 43% 1940-1947.
- Assuming inflation is the same across states (bad assumption) 2/3rds real 1/3rd inflation effect of the war.

Things to bear in mind:

- These multipliers are relative nominal growth rates relative to 1940.
- For ease of exposition I rely on two "empirical fictions"
 - I will often talk about a "nonwar states" and "war states" dichotomy.
 - No state received \$0 in war spending.
 - North Dakota: \$16.93. Average: 1212.24
- Average growth effect: average war shock/average income growth at time t.
 - Useful because per dollar multiplier is small but the size of the shock has a large total effect.
- FE war spending=total contract spending
- Mediation war spending=private contract spending.

State level WWII contract spending (ISPCR, Haines 2010)

Per capita contract spending June 1940-September 1945 (\$50,000+)

- Total Contract Spending 100% (\$1233)
- Heavy equipment supply: 65% (\$714)
- Nonequipment supply: 22% (\$262)
- Industrial facilities/investment: 8% (\$133)
- Military facilities/infrastructure: 5% (\$103)

Effect of interest

$$\textit{Multiplier}_t = \frac{\overline{WWII}}{\overline{I_t}}(\delta_{1t})$$

"Average Growth Effect" is an estimate of the effect of receiving an average amount of war spending on the growth of income in an "average state" relative to 1940.

Total Income Response



	Income			Private	Private Nonfarm Income		
	1943	1948	1957	1943	1948	1957	
Per dollar multiplier (cents)	-4.7	-13.4	-13.5	2.5	-5.7	-12.5	
Average relative growth effect	-10.1%	-20%	-11.5%	10.3%	13.5%	-16.2%	

Private Earnings Response



	Ма	Manufacturing			Nonmanufacturing		
	1943	1948	1957	1943	1948	1957	
Per dollar multiplier(cents)	4.5	0.9	-3.7	0.3	-4	-7.7	
Average growth effect	34.2%	-6.2%	-14.2%	-%	-14.4%	-15.2%	

Personal Ownership Income Response



		Capital		No	onfarm Pro	р
	1943	1948	1957	1943	1948	1957
Per dollar multiplier (cents)	-0.7	-2.9	-4.6	-0.0	-0.8	-1.5
Average growth effect	-50.2%	-55.1%	-31.4%	-0.8%	-10.7%	-12%

Corporate Profit Response



	Tota	l Net Inc	ome	Total Po	st-tax Net	Income
	1943	1948	1951	1943	1948	1951
Per dollar multiplier (cents)	-1.2	-5.2	-4.5	-0.9	-3.4	-3.1
Average growth effect	-13.6%	-52%	-31.6%	-36.8%	-54.8%	-52.4%

Corporate Profit Response



	D	ividends		Reta	ined Earr	nings
Den dellen nu kinken (sente)	1943	1948	1951	1943	1948	1951
Average growth effect	-0.4 -63.2%	-1 -146%	-1.1 -92%	-1.5 -45.8%	-4.1 -74.2%	-3.2 -69.2%

Mediation Analysis

 $I_{it} = s_i + y_t + \beta_{1t} (y_t * WWII_i) + \delta_{1t} (y_t * CENSUS_j) + \delta_{2t} (y_t * KOREA_i) + \epsilon_{it}$

$$MIGRATION_i = \alpha_1 (WWII_i) + \delta_{3j} CENSUS_j + \mu_i$$

$$I_{it} = s_i + y_t + \beta_{2t} (y_t * WWII_i) + \alpha_{2t} (y_t * MIGRATION)\delta_{5t} + (y_t * CENSUS_j) + \delta_{6t} (y_t * KOREA_i) + \sigma_{it}$$

Total Effect: β_{1t} Direct Effect: β_{2t} Indirect Effect: $\beta_{1t} - \beta_{2t} = \alpha_1 * \alpha_{2t}$

Private earnings response



	Manufacturing			Nonm	nanufac	turing
Migration Effect Direct Effect	1943 63.1% 37%	1948 33% 67%	1957 -19.67% 119.67%	1943 76.9% 23.1%	1948 42% 58%	1957 49.1 50.9%

Private Wages and Salaries Response



Wholesale and Retail Trade Wages and Salaries

	Transpo	ortation a	and Utilities	Wholesale and Retail Trade			
Migration Effect Direct Effect	1943 94.8% 5.1%	1948 31% 69%	1957 97.1% 2.9%	1943 77.9% 22.1%	1948 50.6% 49.4%	1957 91.8 8.2%	

Private Wages and Salaries Response



		Mining			Services	
	1943	1948	1957	1943	1948	1957
Migration Effect	1060%	181.6%	376.4%	34.8%	-15.7%	2.1%
Direct Effect	-960.6%	-81.6%	-276.43%	65.2%	115.7%	97.9%

Ownership Income



Dots indicate when effect is significant at a 5% significance level

	Cap	Capital income			m Proprie	tor Income
Migration Effect Direct Effect	1943 116.8% -16.8%	1948 26.7% 73.2%	1957 27.1% 62.9%	1943 110% -10%	1948 51.4% 48.6%	1957 80.1 19.8%

Corporate Profits



Dots indicate significance at the 5% level

	Corp	orate Di	vidends	Corpora	Corporate Post Tax Net Profits		
	1943	1948	1957	1943	1948	1957	
Migration Effect	63.1%	33%	-19.67%	76.9%	42%	49.1	
Direct Effect	37%	67%	119.67%	23.1%	58%	50.9%	

No clear evidence from farm income



	Farm Proprietor Income			Farm Payroll		
Per dollar multiplier (cents) Average growth effect	1943 -1.2 -18.8%	1948 -1.6 -16.3%	1957 -1.9 -44.9%	1943 -0.2 -20.3%	1948 -0.2 -13.4%	1957 -0.2 -20.9%

No clear evidence from farm income



	Military Payroll			State and Local Payroll		
	1943	1948	1957	1943	1948	1957
Per dollar multiplier (cents)	-0.6	-0.1	-0.1	-0.2	-0.6	-1
Average growth effect	-8%	-11.5%	-27.8%	-85.7%	-24.3%	-15.4%

Summary

War "shock" specification controls for state and year FE and disparate regional trends.

WWII contact spending causes across state:

- > Temporary wartime faster growth in manufacturing income.
- Permanently slower postwar growth in nonmanufacturing income.
- Permanently slower postwar growth in capital income.

Summary

Mediation Analysis

- Effect on total income is roughly 50/50 migration and direct effects.
- Capital income effect driven by migration until 1947 then direct effect after.
- Corporate retained earnings driven by direct effect but dividend payments driven by migration effect.
- Heterogeneous effect of migration across nonmanufacturing sectors. Migration mostly affects wages and salaries in:
 - Transportation and utilities
 - Wholesale and retail trade
 - State and local government
- Changes in farm income are not being driven by across state migration.