Assessing the Effects of the WWII Bond Campaigns on Household Savings

NBER WWII Conference

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Did WWII bond drives increase total saving, or just shift saving from other vehicles?

- Massive war bond drives successfully pushed Americans to invest in E bonds during WWII
- But did war bond campaigns increase overall saving (as intended), or simply shift saving from other assets (e.g. bank deposits)?
- We examine county-level variation in bank deposit flows and E bond purchases in 1944
- Since counties with higher E bond purchases may have higher deposit flows for many reasons, we use an IV (liberty bond participation) for E bond purchases

"The recurrent bond campaigns with their appeal to patriotism may have contributed also to the high rate of saving, but we are inclined to be skeptical that they had much effect on the amount of saving. If they had any effect, it was probably on the form in which savings were held—more in government securities relative to other assets."

– Friedman & Schwartz (1963, p. 559)

Preview of results

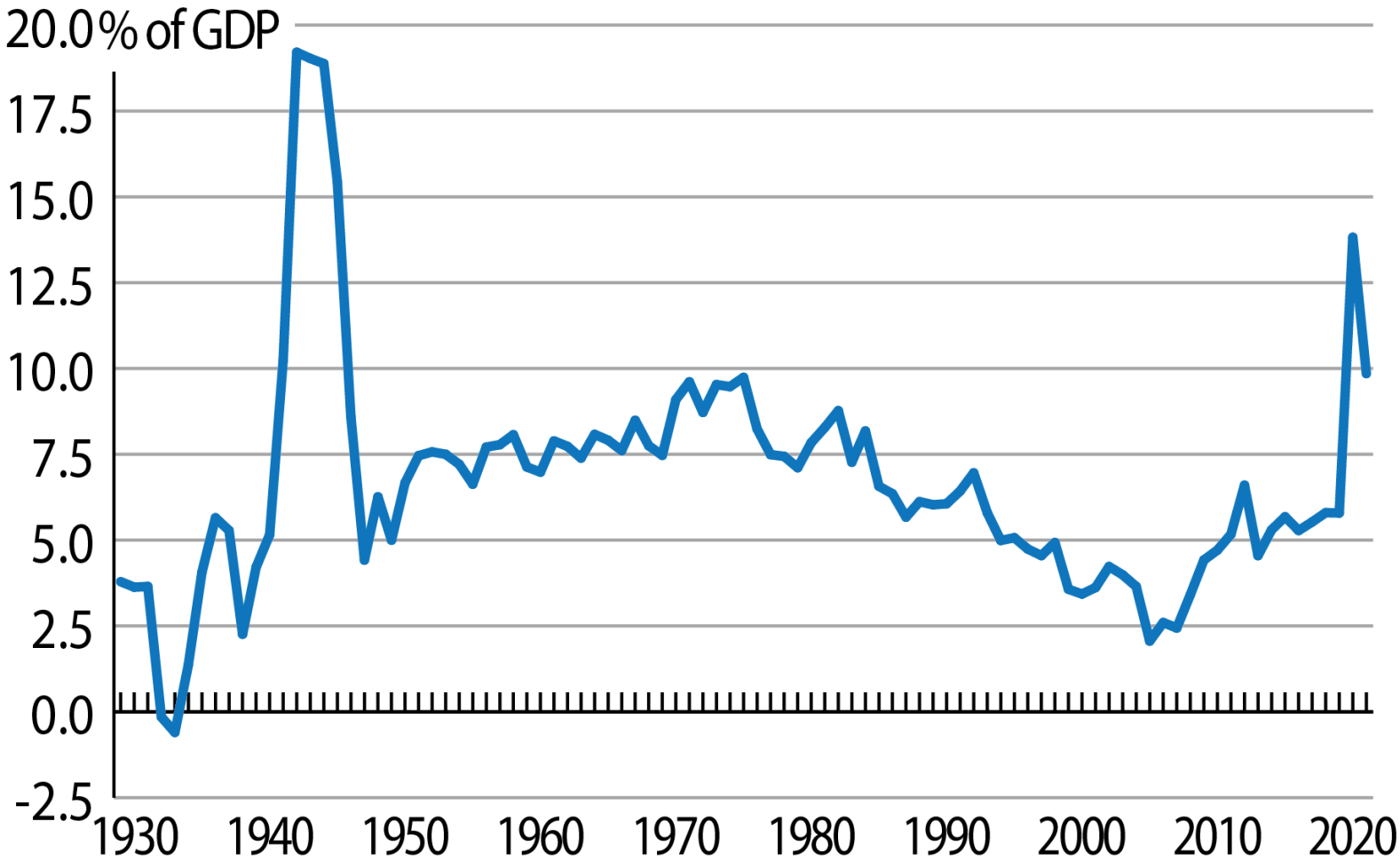
- For every additional $100 per capita in E bond purchases in a county, deposit flows decreased by $65 per capita
- But $\hat{\beta} = -0.65 < -1$, i.e. still short of total substitution
- Suggests total saving increased by $35 for every $100 in E bond purchases, a large positive effect on saving
- Payroll savings plans may have boosted total saving while bond drives did not
  - In counties where participation in payroll savings plans was likely low, we see total substitution between E bond purchases and bank deposit flows
  - But in counties where participation in payroll savings plans was likely concentrated, we see less substitution: deposit flows decreased by only $35 for each $100 in E bond purchases

Roadmap

- Household saving during WWII
  - Why did Americans save so much?
  - What form did savings take?
- E bond campaigns and sales
- How did E bond campaigns affect bank deposits?
  - OLS
  - IV for bond drive participation
  - Heterogeneity: exposure to payroll savings plans

I. Household Saving in WWII

Net Household Saving as a Share of GDP (US)



Source: FRED/Bureau of Economic Analysis

(Potential) motives for high wartime saving

1. Extraordinary economic expansion increased incomes
2. Rationing and conversion of manufacturing led to scarcity of consumption goods
3. Bond drives, payroll deductions for bond purchases, and associated marketing campaigns encouraged Americans to save

This paper: did motive #3 contribute to increased total saving?

Motive #1: wartime economic expansion

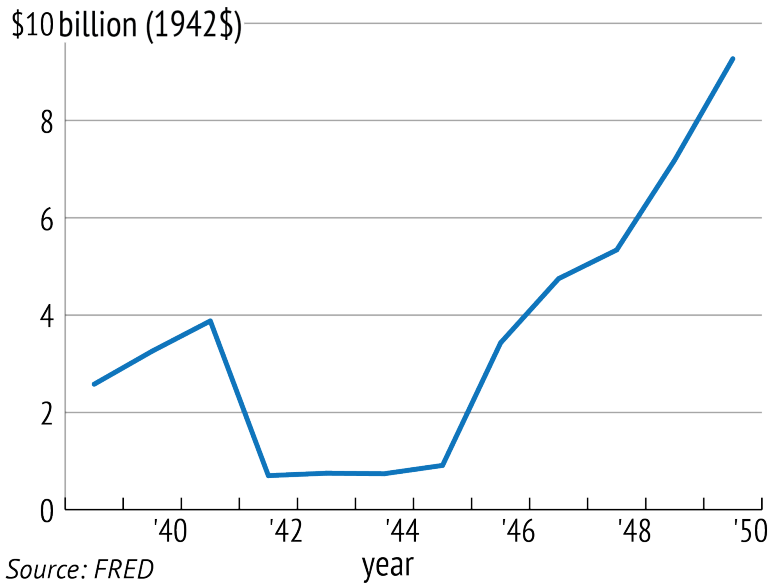
- In nominal terms, the U.S. spent $340 billion on national defense over 1940-1945 (around $5.7 trillion in 2015 dollars)
- Real GDP grew by more than 75% over this period, at an average annual rate of 11.8%
- Total non-farm civilian employment (CES) grew from 32.4 million in 1940 to 40.5 million in 1945, despite Armed Forces growing by almost 12 million
- Unemployment rate $< 2\%$ from September 1942 through December 1945
- Also a wartime farm boom

$\Rightarrow$ As income $\uparrow$, savings $\uparrow$ as a share of income

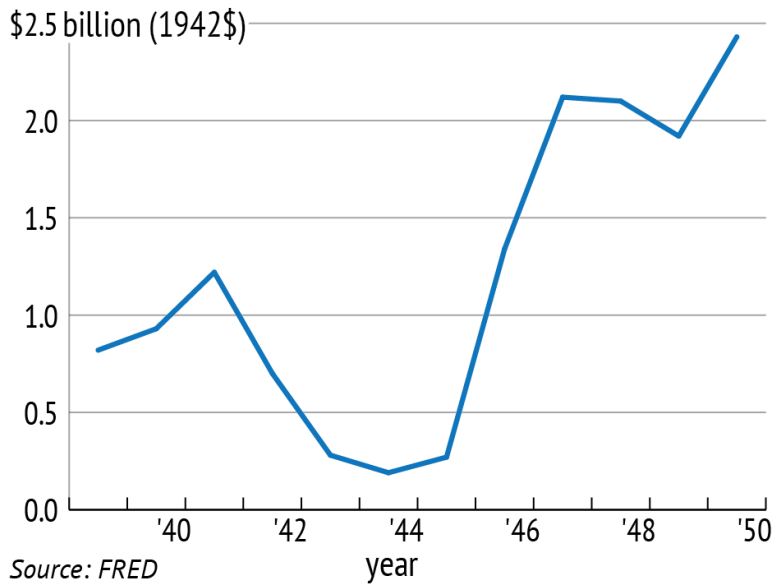
Sources: BEA, BLS, Census

Motive #2: binding constraints on wartime consumption

Motor Vehicle Purchases



Household Appliance Purchases



Both figures show aggregate consumer spending for the U.S.

Motive #3: bond campaigns

Sources: Hennepin County Library, digital collections;
San Jose State University, Charles B. Burdick War Poster Collection;
National Archives, WWII poster collection

Campaigns promoted saving in general, not just war bonds

Cartoons drawn by Theodore Geisel (Dr. Seuss) discouraged consumption as wasteful and unpatriotic

Images are from "Spend, Sucker Spend: The Squander Bug Taunts," *Minute Man*, 1 December 1943, pg. 10

Accounting for WWII Saving

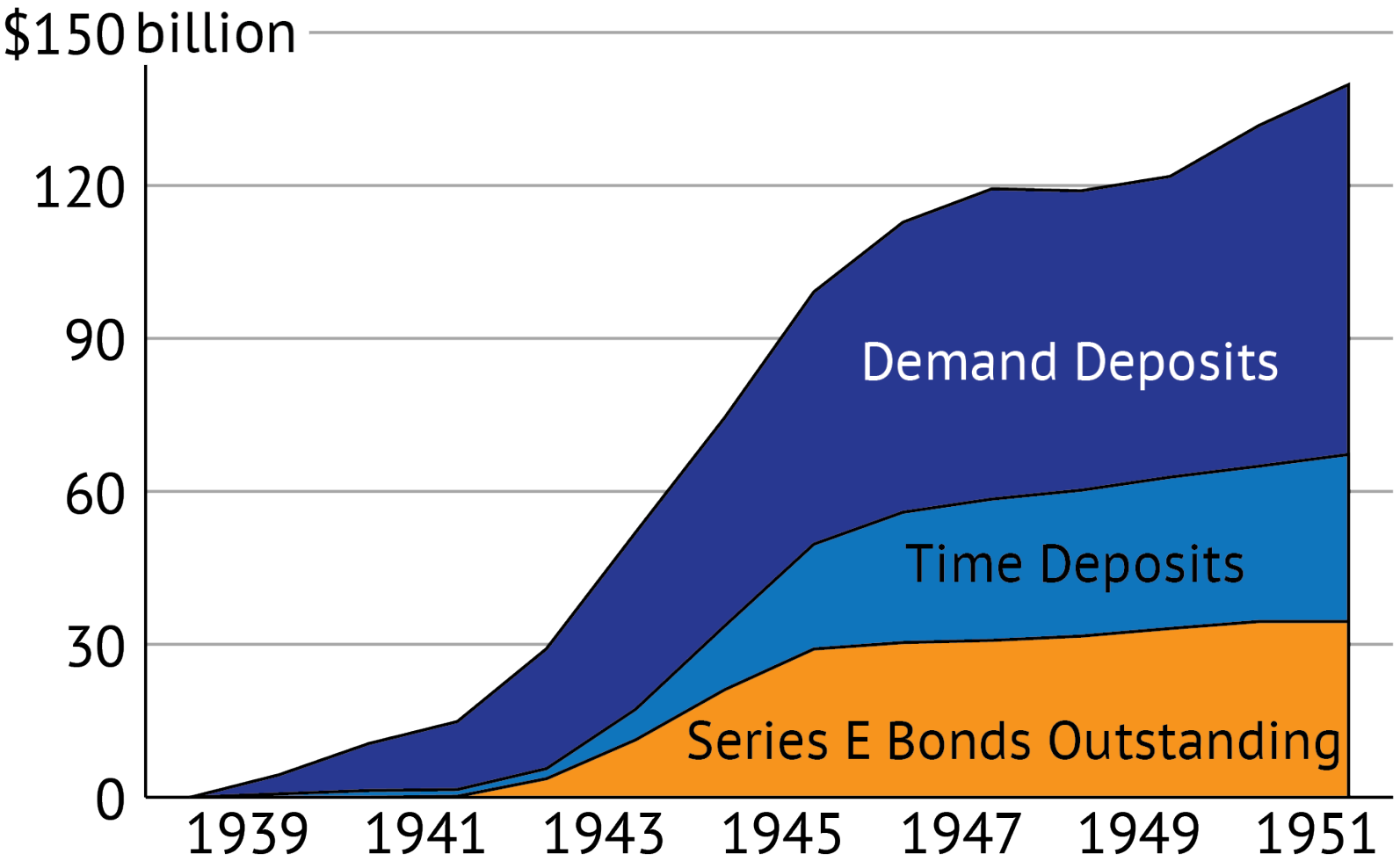
Net private saving December 1941 to December 1945: $172 billion

- Deposit holdings of individuals, partnerships, and corporations account for $60 billion (35%)
- Holdings of US government securities account for $54 billion (31%), including E bonds
- Increased currency (cash) holdings account for another $20 billion (12%)

- Our data: 1944 E bond purchases, deposit holdings

$\Rightarrow$ Significant data limitations, but majority of new saving held in liquid assets

Growth in liquid asset holdings during WWII



Source: Monthly Treasury Bulletins, Reports of the Comptroller of the Currency

Deposits include all deposits held by individuals, partnerships, or corporations

II. E Bond Marketing and Sales

How did WWII E Bonds work?

- Average annual return of $\approx 2.9\%$, 10 year maturity
  - Highest annual return of any government bond during WWII
  - Other federal bonds with similar maturities had annual returns $\approx 2.5\%$
- Purchase restricted to individuals (no institutional investors)
  - Purchases limited to \$5,000 maturity value per person per calendar year
  - F & G bonds could be purchased by wealthy households and institutional investors, higher denominations but lower returns
- Non-transferable but could be (and were) redeemed early
  - Could name a beneficiary who inherited the bond if you died

Why were E-Bonds sold?

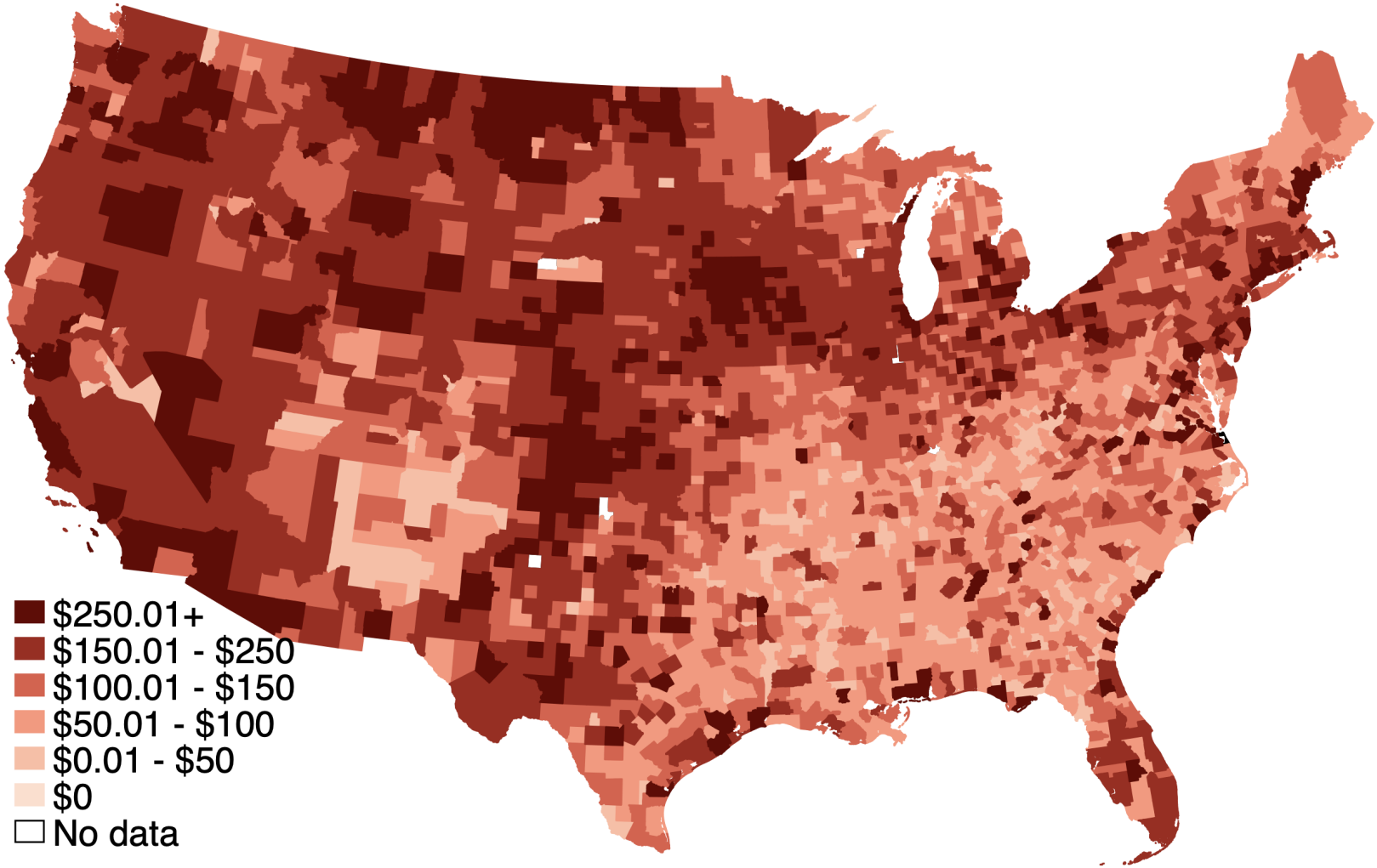
1. To help finance WWII
   - E-bond sales totaled $35 billion from May 1941 to December 1945, $\approx 12.5\%$ of US national defense spending
2. Encourage household saving to reduce inflationary pressure during the war
3. Sell the war to the public
   - Promotional tours and bond drives were used to bolster public support for the war effort

Two main sales mechanisms

Graph: monthly sales

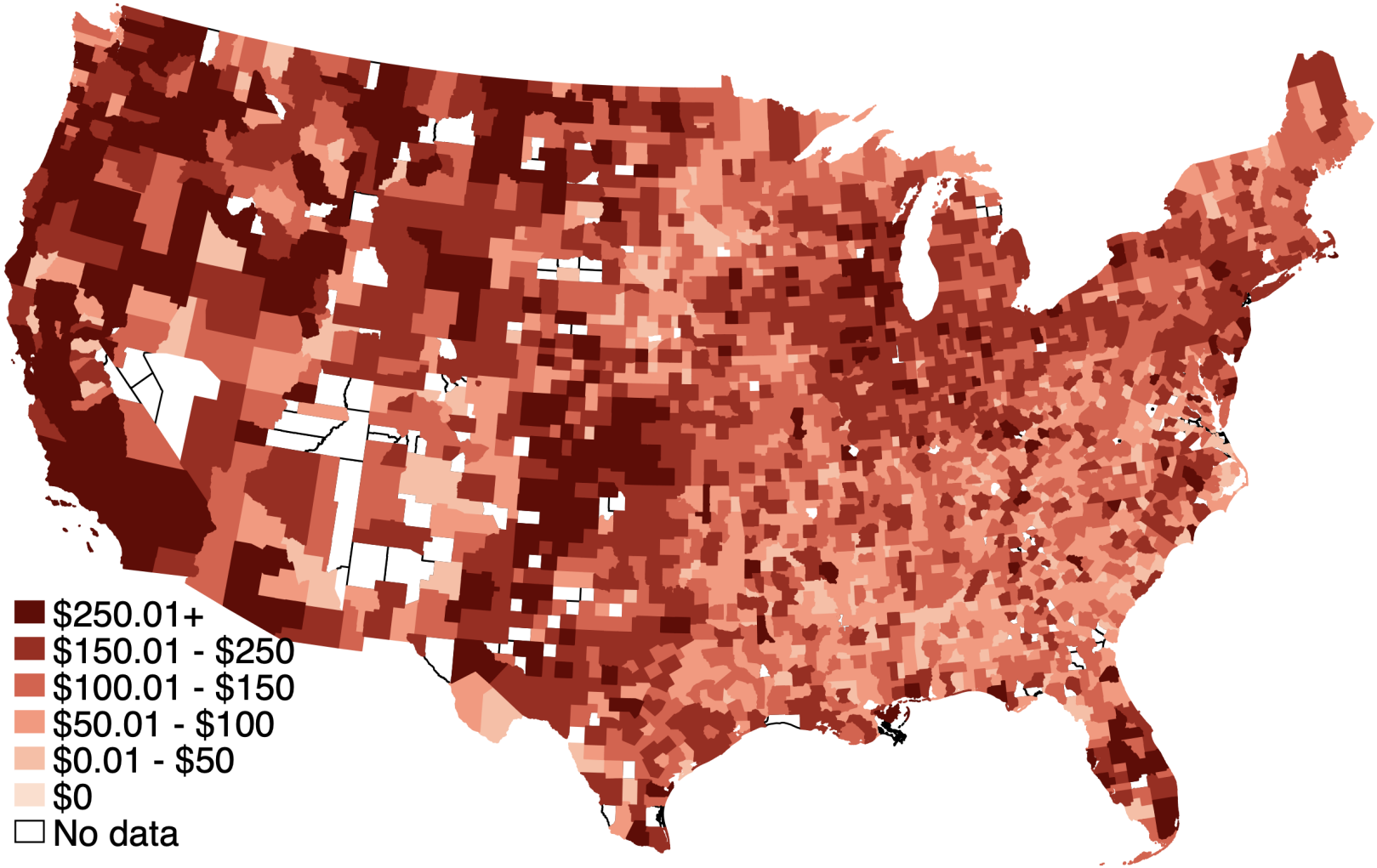
1. Payroll deduction programs
   - Accounted for $\approx$ 47% of E-bond sales
   - Employers could opt in, then employees at participating firms
   - Workers were encouraged to put 10% of their paychecks towards bond purchases
   - At the program's peak (June 1944), over half of all working Americans (civilian + military) participated, with average deductions slightly over 10% of pay
2. War bond drives
   - Accounted for $\approx$ 53% of E-bond sales
   - Organized locally
   - Variation in approaches, local organizers often returned to approaches used for WWI Liberty Bond drives

E Bond purchases per capita, 1944



Source: City & County Data Book, 1947

Deposit flows per capita, 1944



Sources: constructed using deposit data from Paul Rhode and population data from Michael Haines

E bond program was extraordinarily successful

- Widespread participation: $>$ 85 million Americans subscribed (total US population was 138 million in 1944, including children)
- E-bond sales exceeded policymakers' expectations for a voluntary program

But did E bond sales increase aggregate saving, or just shift savings from other assets?

Geographic correlates of 1944 saving

summary data

	Total 1944 Saving		Bank Deposit Flows		E Bond Purchases	
	(1)	(2)	(3)	(4)	(5)	(6)
1943 deposits	0.283***	0.246***	0.148***	0.140***	0.135***	0.106***
	(0.0146)	(0.0154)	(0.00958)	(0.00935)	(0.00927)	(0.0115)
manufacturing intensive	-0.00647	-0.00656	-0.00774*	-0.00104	0.00127	-0.00553
	(0.00711)	(0.00597)	(0.00410)	(0.00378)	(0.00434)	(0.00350)
WWII spending		0.00329**		-0.000715		0.00400***
		(0.00134)		(0.000688)		(0.00144)
% population white, 1940		0.0744***		0.0449***		0.0295**
		(0.0149)		(0.00994)		(0.0116)
pop growth 1930-1940 (%)		1.12e-06		0.000209*		-0.000208**
		(0.000180)		(0.000121)		(8.93e-05)
% housing renters, 1940		-0.0906**		-0.0528*		-0.0378*
		(0.0397)		(0.0302)		(0.0219)
median wage, 1940		0.0430***		-0.0197**		0.0628***
		(0.0136)		(0.00948)		(0.00917)
farm crops sold, 1939		0.193***		0.0848***		0.108***
		(0.0195)		(0.0157)		(0.0186)
% population urban, 1940		0.000182		0.000390***		-0.000209*
		(0.000170)		(0.000111)		(0.000108)
Observations	2,935	2,932	2,935	2,932	2,935	2,932
R-squared	0.673	0.710	0.515	0.541	0.576	0.655

All dollar values (deposits, war production) calculated per adult (21+) in 1950 dollars. Excludes counties with fewer than 1,000 adults. E bond purchases, 1943 deposits, and 1944 deposit flows are winsorized (top and bottom 1%). A county is considered manufacturing intensive if at least 7% of its 1940 labor force was employed in manufacturing. Standard errors clustered by state. State fixed effects included but not shown. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

III. How Did E Bond Campaigns Affect Bank Deposits?

Influence of E bond purchases on deposit flows, 1944

	(1)	(2)	(3)	(4)
E bond purchases (1944)	0.0668*	0.100**	0.0955*	0.0733
	(0.0371)	(0.0496)	(0.0486)	(0.0462)
1943 deposits	0.137***	0.138***	0.141***	0.132***
	(0.00979)	(0.00986)	(0.00991)	(0.00963)
manufacturing intensive		-0.00577	-0.00611*	-0.000631
		(0.00365)	(0.00360)	(0.00374)
WWII spending		-0.00134	-0.00136	-0.00101
		(0.000933)	(0.000942)	(0.000829)
% population white, 1940			0.0334***	0.0427***
			(0.0109)	(0.00981)
pop growth 1930-1940			0.000115	0.000224*
			(0.000135)	(0.000119)
% housing renter occupied, 1940			-0.0316	-0.0500
			(0.0279)	(0.0300)
median wage, 1940				-0.0243**
				(0.00909)
farm crops sold, 1939				0.0768***
				(0.0157)
% pop urban, 1940				0.000406***
				(0.000107)
Observations	2,935	2,935	2,935	2,932
R-squared	0.515	0.520	0.525	0.542

All dollar values (deposits, war production) calculated per adult (21+) in 1950 dollars. Excludes counties with fewer than 1,000 adults. E bond purchases, 1943 deposits, and 1944 deposit flows are winsorized (top and bottom 1%). A county is considered manufacturing intensive if at least 7% of its 1940 labor force was employed in manufacturing. Standard errors clustered by state. State fixed effects included but not shown. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

OLS results

- No controls (beyond state FEs): ↑ \$100 E bond purchases ⇒ ↑ \$7 bank deposits during 1944
  - Clearly upward biased: counties with higher income should see higher saving in both forms
- After adding controls: ↑ \$100 E bond purchases still ⇒ ↑ \$7 bank deposits during 1944
  - May still be biased upward

- Many reasons to think unobserved factors may be driving higher purchases of both assets, begging for an IV

IV approach

- Potential concern: controlling for observables doesn't fully capture income/wealth effects
- Our solution: use WWI Liberty Bond subscriptions as an IV
  - Identifying assumption: WWI bonds affected 1944 bank deposit flows only through WWII bond purchases
  - We believe this is plausible because WWI bond subscriptions reflected local marketing approaches reprised in WWII bond drives
  - Limitation: Liberty Bond data is available for only 1,390 US counties map

First stage: predicting 1944 E bond purchases

	(1)	(2)	(3)	(4)
Liberty Loan participation rate	0.221***	0.205***	0.194***	0.200***
	(0.0391)	(0.0391)	(0.0418)	(0.0412)
1943 deposits	0.105***	0.0934***	0.0904***	0.0712***
	(0.00876)	(0.00844)	(0.00826)	(0.00828)
manufacturing intensive		-0.0169***	-0.0155***	-0.00497
		(0.00324)	(0.00320)	(0.00321)
WWII spending		0.00700***	0.00717***	0.00778***
		(0.000915)	(0.000901)	(0.001000)
% population white, 1940			0.0116	0.0228*
			(0.0126)	(0.0128)
pop growth 1930-1940			0.0330*	-0.0259
			(0.0174)	(0.0187)
% housing renter occupied, 1940			0.0330*	-0.0259
			(0.0174)	(0.0187)
median wage, 1940				0.0452***
				(0.00899)
farm crops sold, 1939				0.169***
				(0.0139)
% pop urban, 1940				-0.000267**
				(0.000108)
Observations	1,390	1,390	1,390	1,389
R-squared	0.548	0.597	0.602	0.664

All dollar values (deposits, war production) calculated per adult (21+) in 1950 dollars. Excludes counties with fewer than 1,000 adults. E bond purchases, 1943 deposits, and 1944 deposit flows are winsorized (top and bottom 1%). A county is considered manufacturing intensive if at least 7% of its 1940 labor force was employed in manufacturing. Region fixed effects included but not shown. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

IV for bond drive participation

	(1)	(2)	(3)	(4)
1944 E bond purchases (instrumented)	-0.655***	-0.699***	-0.836***	-0.652***
	(0.161)	(0.177)	(0.219)	(0.192)
1943 deposits	0.232***	0.229***	0.236***	0.195***
	(0.0222)	(0.0219)	(0.0252)	(0.0187)
manufacturing intensive		-0.0157***	-0.0151***	-0.00289
		(0.00550)	(0.00580)	(0.00460)
WWII spending		0.00503***	0.00625***	0.00569***
		(0.00157)	(0.00189)	(0.00173)
% population white, 1940			0.0567***	0.0775***
			(0.0149)	(0.0140)
pop growth 1930-1940			-0.000602**	-0.000362*
			(0.000247)	(0.000217)
% housing renter occupied, 1940			0.0834***	0.0245
			(0.0248)	(0.0211)
median wage, 1940				-0.00356
				(0.0163)
farm crops sold, 1939				0.162***
				(0.0374)
% pop urban, 1940				0.000329**
				(0.000156)
Kleibergen-Paap F-Stat (First Stage)	31.9	27.5	21.5	23.5
Observations	1,390	1,390	1,390	1,389
R-squared	0.335	0.333	0.260	0.426

All dollar values (deposits, war production) calculated per adult (21+) in 1950 dollars. Excludes counties with fewer than 1,000 adults. E bond purchases, 1943 deposits, and 1944 deposit flows are winsorized (top and bottom 1%). A county is considered manufacturing intensive if at least 7% of its 1940 labor force was employed in manufacturing. Region fixed effects included but not shown.
*** p<0.01, ** p<0.05, * p<0.1

Interpreting IV results

- Once we control for 1943 deposits, IV estimates are strongly negative, indicating significant substitution between war bonds and saving via bank deposits
- For every additional \$100 per capita in E bond purchases, deposit flows decreased by \$65 per capita
- But $\hat{\beta} < -1$, i.e. still short of total substitution
- Suggests total saving increased by \$35 for every \$100 in E bond purchases, still a large positive effect on saving

Exploring the role of payroll savings plans

- Payroll savings plans deducted money from paychecks to buy war bonds, some contemporary observers believed they did more to reduce consumption because participants never saw the money
- Unfortunately the Treasury did not collect geographically disaggregated data on payroll savings plan participation
- But we know participation in payroll savings plans was concentrated in manufacturing
- Split the sample into counties with high and low 1940 manufacturing employment rates and run the IV separately for each subsample

IV: non-manufacturing-intensive counties only

	(1)	(2)	(3)	(4)
1944 E bond purchases (instrumented)	-0.837**	-0.872**	-1.144**	-1.021***
	(0.357)	(0.379)	(0.494)	(0.362)
1943 deposits	0.276***	0.279***	0.296***	0.231***
	(0.0518)	(0.0537)	(0.0635)	(0.0382)
WWII spending		0.00743	0.0140*	0.0158**
		(0.00617)	(0.00814)	(0.00710)
% population white, 1940			0.116***	0.132***
			(0.0368)	(0.0350)
pop growth 1930-1940			-0.00130**	-0.00119***
			(0.000538)	(0.000384)
% housing renter occupied, 1940			0.135**	0.0194
			(0.0587)	(0.0394)
median wage, 1940				0.0339
				(0.0278)
farm crops sold, 1939				0.234***
				(0.0716)
% pop urban, 1940				0.000536**
				(0.000262)
Kleibergen-Paap F-Stat (First Stage)	14.5	13.8	10.7	19.2
Observations	713	713	713	713
R-squared	0.216	0.200	0.046	0.278

All dollar values (deposits, war production) calculated per adult (21+) in 1950 dollars. E bond purchases, 1943 deposits, and 1944 deposit flows are winsorized (top and bottom 1%). A county is considered manufacturing intensive if at least 7% of its 1940 labor force was employed in manufacturing. Region fixed effects included but not shown. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

IV: manufacturing-intensive counties only

	(1)	(2)	(3)	(4)
1944 E bond purchases (instrumented)	-0.579***	-0.673***	-0.678***	-0.357*
	(0.168)	(0.211)	(0.205)	(0.215)
1943 deposits	0.209***	0.201***	0.202***	0.172***
	(0.0228)	(0.0220)	(0.0218)	(0.0198)
WWII spending		0.00554***	0.00547***	0.00375**
		(0.00181)	(0.00174)	(0.00160)
% population white, 1940			0.0113	0.0484***
			(0.0167)	(0.0163)
pop growth 1930-1940			0.000738**	0.000807***
			(0.000330)	(0.000289)
% housing renter occupied, 1940			0.0455*	0.0211
			(0.0253)	(0.0276)
median wage, 1940				-0.0238
				(0.0183)
farm crops sold, 1939				0.152***
				(0.0380)
% pop urban, 1940				0.000201
				(0.000178)
Kleibergen-Paap F-Stat (First Stage)	17.8	13.5	13.5	7.1
Observations	677	677	677	676
R-squared	0.419	0.419	0.427	0.574

All dollar values (deposits, war production) calculated per adult (21+) in 1950 dollars. E bond purchases, 1943 deposits, and 1944 deposit flows are winsorized (top and bottom 1%). A county is considered manufacturing intensive if at least 7% of its 1940 labor force was employed in manufacturing. Region fixed effects included but not shown. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Influence of payroll savings plans

- In counties with limited manufacturing employment, we see total substitution between E bond purchases and bank deposit flows, i.e. $\hat{\beta} = -1$
- But in manufacturing-intensive counties—where participation in payroll savings plans was likely much higher—we see less substitution than we did in the full sample ($\hat{\beta} = -0.36$)
- This suggests that E bond purchases via *bond drives* may have been fueled entirely by substitution from bank deposits, but that the payroll savings plans may have successfully induced households to increase their saving (reducing consumption)

Conclusions

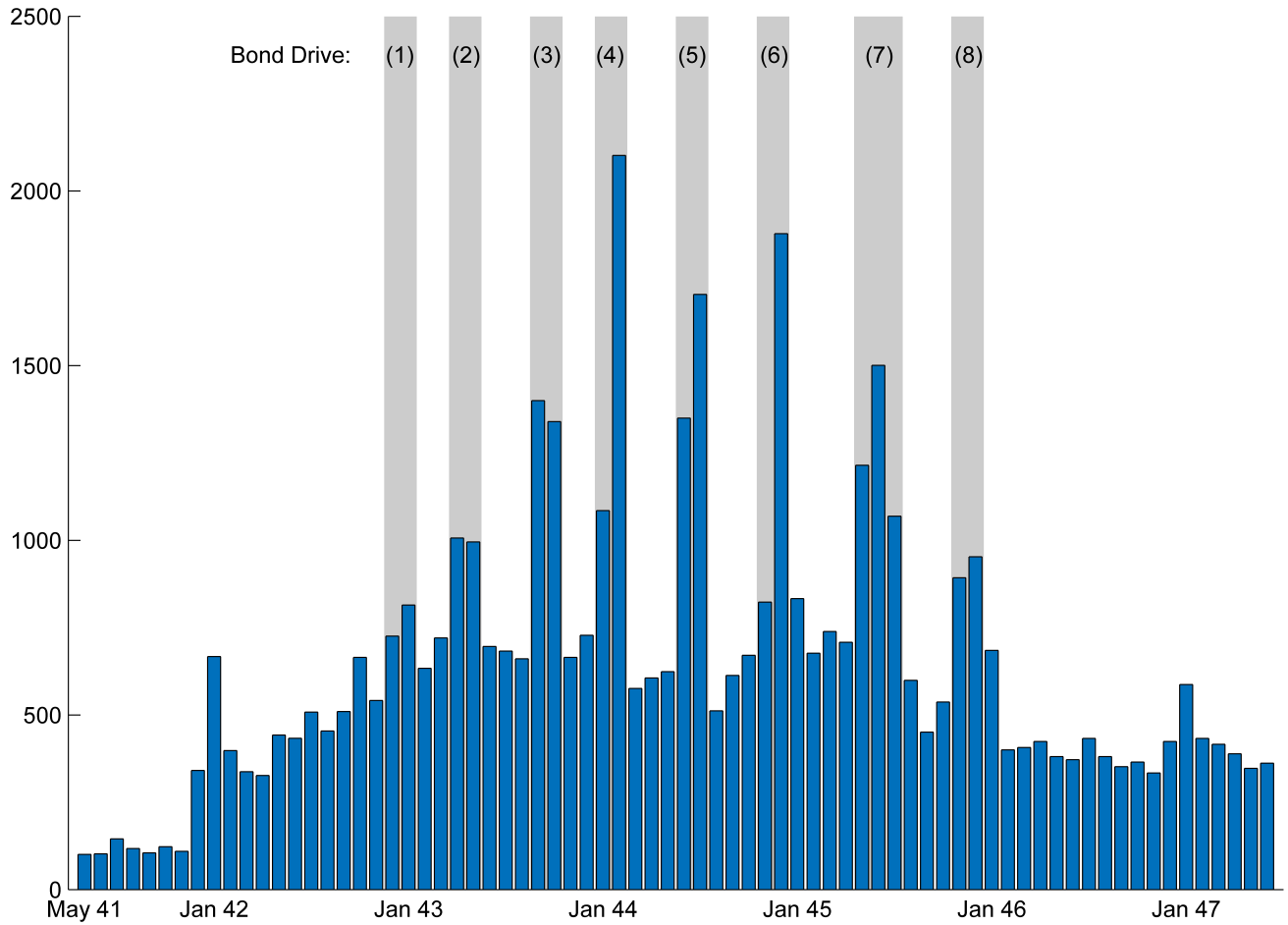
- For every additional \$100 per capita in E bond purchases in a county, deposit flows decreased by \$65 per capita
- But $\hat{\beta} = -0.65 < -1$, i.e. still short of total substitution
- Suggests total saving increased by \$35 for every \$100 in E bond purchases, still a large aggregate effect
- Payroll savings plans may have been more effective at boosting total saving
  - In counties with low manufacturing employment (low participation in payroll savings plans), total substitution between E bond purchases and bank deposit flows
  - But in counties with higher manufacturing employment (higher participation in payroll savings plans), we see less substitution: deposit flows decreased by only \$35 for each \$100 in E bond purchases

Thank you!

Backup Slides

Monthly E bond sales

back



Source: *Annual Reports of the Secretary of the Treasury*

Summary Data

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	mean	SD	minimum	25th percentile	median	75th percentile	maximum
total 1940 population	39,890	127,243	285	10,482	18,625	32,719	4,063,342
1940 adult pop (21+)	25,244	88,242	175	6,026	10,846	19,327	2,851,587
mfg emp rate 1940	10.4%	10.4%	0%	2.6%	6.6%	14.8%	60.4%
% pop white, 1940	88.1%	18.0%	14.2%	84.5%	97.4%	99.3%	100%
% pop urban, 1940	22.6%	24.4%	0%	0%	18.0%	38.2%	100%
% chg pop, 1930-1940	6.5%	19.1%	-47%	-2%	4.5%	12%	323.9%
deposits p.c., 1941	$469	$352	$13	$238	$395	$596	$5,036
deposits p.c., 1943	$685	$427	$17	$383	$617	$890	$5,270
deposits p.c., 1944	$833	$494	$20	$492	$754	$1,068	$5,513
deposits p.c., 1947	$918	$509	$15	$549	$856	$1,194	$6,253
deposits p.c., 1949	$856	$499	$46	$504	$799	$1,108	$8,453
deposit flow p.c., 1944	$147	$105	-$3	$90	$131	$185	$2,079
E bond sales p.c., 1944	$149	$105	$6	$86	$128	$189	$2,485
E bond sales p.c., 1949	$36	$306	$0	$16	$26	$45	$334
war spending p.c.	$1,233	$4,417	$0	$0	$423	$851	$134,600
crop sales p.c., 1939	$133	$149	$0.37	$34	$85	$178	$1,794

All dollar values shown in 1950 prices per (adult 21+) capita. Adult population is defined as population aged 21 and older. All dollar amounts are rounded to the nearest dollar. Data come from the Decennial Censuses, City and County Data Books, and Censuses of Agriculture. County-level bank deposit data for 1941 and 1943 provided by Paul Rhode. The manufacturing employment rate is the number of workers employed in manufacturing divided by the county labor force (age 14+).

Liberty bond participation rates, 1918

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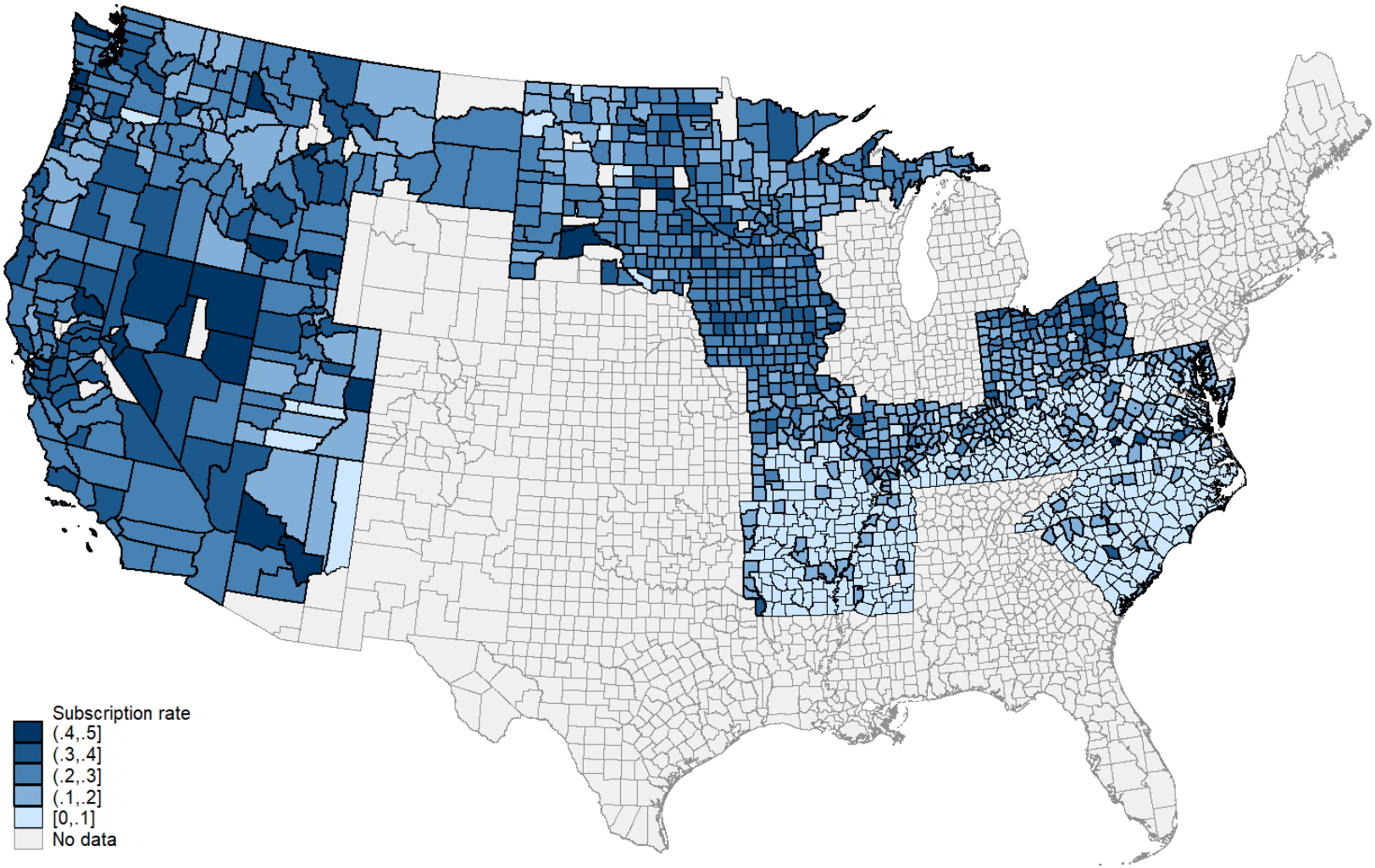

Source: Hilt et al.