

Assessing the Effects of the WWII Bond Drives on Household Savings

Gillian Brunet*, Eric Hilt†, and Matthew Jaremski‡

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Abstract: Household saving increased dramatically during World War II, reaching more than 19 percent of GDP. We study the effects of the wartime bond drives conducted by the U.S. government on the level of household savings. The drives encouraged thrift and associated war bond subscriptions with patriotism. Yet as Friedman and Schwartz have noted, their main effect may have been to change the form in which savings were held, rather than to increase savings. We use county-level data and an instrument for participation in the bond drives to estimate the effect of the war bond promotion campaigns on total savings. We find that for every \$100 in E bond sales, bank deposit inflows fell by \$65. This suggests that while there was substantial substitution between E bonds and bank saving, E bond campaigns still increased net saving, resulting in about \$35 of additional saving for every \$100 in E bond purchases.

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*Assistant Professor of Economics, Smith College. Department of Economics, Wright Hall # 226, Northampton, MA 01063. Email: gbrunet@smith.edu. † Professor of Economics, Wellesley College. Department of Economics, 106 Central Street, Wellesley, MA 02481. Email: ehilt@wellesley.edu. ‡ F. Ross Peterson Professor of Economic History, Utah State University. Department of Economics and Finance, 3565 Old Main Hill, Logan, UT 84322. Email: matthew.jaremski@usu.edu.

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1 Introduction

The fiscal shock of World War II (WWII) was the largest of the twentieth century in the United States, and had far-reaching economic consequences. Among its many effects was a substantial increase in household savings. Personal saving nearly quadrupled as a percent of GDP between 1940 and 1942 and remained highly elevated through 1945. Though it lasted only four years, this period of dramatically increased saving shaped the social, economic, and political development of the United States in the remainder of the 1940s and in the 1950s.

Three major factors contributed to the substantial increase in savings during the war. First, household incomes rose significantly, as labor force participation, manufacturing employment, and agricultural commodities prices surged. Second, the conversion of manufacturing capacity to defense production restricted the availability of many consumer goods, limiting consumption spending. Finally, a major public policy initiative aimed at encouraging saving by promoting the purchase of war bonds began in May of 1941, and intensified as the U.S. entered the war.

Over the course of WWII, households purchased \$40 billion in war bonds, and the war bond program was regarded as a great success (Olney, 1971). Yet economists have long debated whether the efforts to promote war bond subscriptions actually had an impact on household savings. Some early studies of wartime survey data indicated that sales campaigns were generally effective (Katona, 1951, p. 79). Yet Friedman and Schwartz (1963, p. 559) were “inclined to be skeptical that the [wartime bond drives] had much effect on the amount of saving,” arguing that any effect they did have would have been on “the form in which savings were held—more in government securities rather than other assets.” Scholars in a variety of fields have studied the war bond campaigns (Samuel, 1997; Kimble, 2006; Sparrow, 2008, 2011), but their effects have never been analyzed empirically.

In this paper, we study household savings patterns in WWII and use county-level data to analyze the effects of the war bond campaigns. The marketing campaigns for the bond drives conducted during WWII urged support for the war and associated bond purchases with

patriotism. However, they also discouraged excessive spending and generally encouraged household saving, since one of the goals of the drives was to reduce inflationary pressures from consumer spending. If households responded to these messages by saving more, then the campaigns may have increased total savings, rather than simply reallocating savings into war bonds.

Most household savings accumulated in WWII were held either in war bonds or in bank deposits. In order to test for the effects of the war bond campaigns, we study the relationship between war bond purchases and inflows into bank accounts across counties, in a framework that controls for a variety of pre-WWII county characteristics, as well as per capita war production contracts in the county. If the bond campaigns had simply redirected savings out of bank accounts and into war bonds, then the two quantities should be negatively related. A coefficient of -1 would indicate complete substitution between the two forms of saving. However, a coefficient above -1 would suggest that the bond campaigns increased total saving, though a coefficient below 0 indicates at least some substitution between bond purchases and inflows into bank deposits.

Our OLS results find a positive association between the two quantities: in counties where war bond purchases were higher, inflows into bank deposits were also slightly higher, conditional on a variety of county characteristics that likely affected both. Yet this positive relationship could instead be explained by income or wealth: counties with higher incomes or greater wealth, something that we cannot observe directly, may have simply allocated more funds to both war bonds and bank deposits, since their total resources were greater. While the models already control for war spending, the previous value of deposits, and 1940 median incomes to help account for differences in income and wealth, it is still possible the models are missing some other facet. In this case the OLS estimate would be upward biased.

To address this possibility, we instrument for war bond purchases using county participation rates in the liberty bond drives of World War I (WWI). This instrument is likely related to social capital and other attributes of counties that led to higher participation in bond drives, and takes on very high values in counties such as those in central Iowa, which

had large numbers of local civil society organizations. Because the instrument is observed in 1918, it is plausibly unrelated to 1944 income or wealth.

Our 2SLS estimates using this instrument are very different from our OLS estimates: each \$100 in E bond purchases is associated with a \$65 reduction in deposit flows. This estimate indicates a substantial substitution effect—it implies that 65 percent of E bond purchases were financed with dollars that would have otherwise gone into bank deposits—but still falls short of complete substitution. This suggests that the war bond program did increase total saving—by about \$35 for each \$100 in E bond purchases.

In addition to the bond drives, a payroll deduction program was also used to promote war bonds. The program enlisted large employers to enable their work forces to deduct a share of their paychecks for bond purchases. It was thus aimed at capturing a portion of households' paychecks before they would have been deposited in bank accounts.

Although we cannot observe the local quantities of war bonds purchased through the payroll deduction program, we can use the fact that the program was implemented primarily among large employers—particularly manufacturing firms—to study its effects. Data from the 1940 census can be used to calculate the share of the labor force employed in manufacturing prior to the war. This is likely a good indicator for the share of the workforce that could have been enrolled in the payroll deduction program during the war.

We run the IV separately for low-manufacturing counties (in which participation in the payroll deduction program was likely quite low) and high-manufacturing counties (in which participation in the payroll deduction program was likely much higher). The results are quite different for the two sets of counties: in low-manufacturing counties, we estimate a coefficient of approximately -1, suggesting complete substitution between E bonds and bank deposit inflows. In high-manufacturing counties, however, we estimate that bank deposit inflows fell by only \$35 per \$100 in E bond purchases. While we must be cautious because we do not directly observe participation in payroll savings plans, the divergence between these estimates suggests that payroll savings plans were successful at promoting saving, while the bond drives largely shifted saving from bank accounts to E bonds.

Policymakers in the Treasury and Federal Reserve used the war bond program of WWII to raise revenues, promote support for the war effort, and discourage spending. It is well known that the program captured a substantial share of total personal income, but whether it actually increased savings, or merely shifted savings that would have occurred anyway into war bonds, has remained a source of academic controversy. The results of our analysis suggest that the bond campaigns conducted during the war increased total savings, as reflected in the sum of bank deposit inflows and war bond purchases. The surge in personal savings that occurred during the war can therefore be regarded as partly the outcome of a successful public policy program aimed at encouraging savings.

Many contemporary observers wrote about the bond drives during WWII and the following decade, and Friedman and Schwartz (1963) discuss the high wartime saving rate and hypothesize that WWII bond drives largely shifted saving into bonds from other savings vehicles. However, these early works of scholarship predate modern econometric analysis. Remarkably little modern economic research has addressed WWII saving. Fishback and Cullen (2013) comes closest to addressing our question, examining the association between WWII spending and the change in bank deposits between 1936 and 1944. More broadly, several scholars have written about significant economic distortions caused by the wartime economy (and associated policies), typically focused on either price controls (Higgs, 1992; Rockoff, 2012) or the effects of materials shortages (Gordon and Krenn, 2010; Field, 2022). Brunet (2024) discusses the macroeconomic effects of conversion, but in the context of distortions in the fiscal multiplier.

The question of whether war bond campaigns—and particularly the payroll savings plans—increased overall saving is closely related to the literature examining how retirement savings plans—also implemented through payroll deductions—influence total household saving. The modern public finance literature (Venti and Wise, 1990; Gale and Scholz, 1994; Poterba et al., 1995; Engen et al., 1996; Poterba et al., 1996; Gelber, 2011; Card and Ransom, 2011) debates this question and comes to a wide range of conclusions. Disagreement in this literature seems to be influenced by differences in data, specifically in the measurement of total household saving. We use only county-level data, a major limitation compared to the modern public

finance literature, but options for saving were also more limited during WWII, meaning saving may be easier to measure in our historical setting. We also examine a very different set of saving incentives within the far-from-normal economic environment of WWII. Nevertheless, the public finance literature does suggest the possibility that behavioral and framing effects may significantly influence household saving.

In Section 2 we present aggregate data on WWII saving and provide institutional details about wartime savings vehicles. Section 3 presents summary data and examines geographic patterns in WWII saving. Section 4 explores the effects of WWII bond drives by examining the influence of E bond purchases on additional bank deposits in 1944. Section 5 concludes.

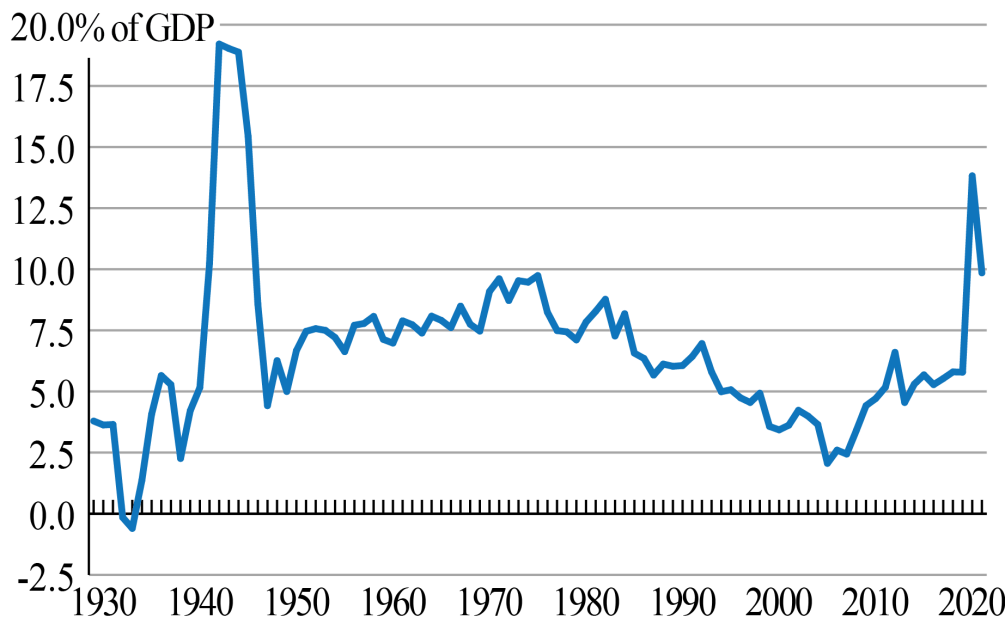
2 Aggregate Saving in WWII

Figure 1 shows how net household saving rose dramatically during WWII. Between 1940 and 1942, personal savings rose from 5.2 percent of GDP to 19.2 percent. After the war the household savings rate fell, though it remained above pre-war levels for a number of decades.

Bank deposit holdings and war bond purchases account for the majority (67 percent) of household savings accumulated during WWII. Increased currency (cash) holdings account for another 12 percent. The *Reports of the Comptroller of the Currency* (1939–1948) show that deposit holdings by individuals, partnerships, and non-financial corporations increased by almost \$60 billion between December 1941 and December 1945, equivalent to almost \$1 trillion in today’s dollars. Crucially, these estimates exclude interbank deposit holdings. This increase in deposit holdings accounts for about 35 percent of net private saving from 1941 to 1945. 64 percent of the increase in deposit holdings (\$38.4 billion) came from highly liquid demand deposits, while the remaining 36 percent of the increase (\$21.3 billion) was in time deposits. Similarly, U.S. government securities grew to \$63.6 billion in December 1945, a dramatic increase from just \$9.8 billion in December 1939.

This savings surge has been discussed by many scholars, but prior analyses were limited by lack of micro-level data. No prior study has been able to address whether the rise was

Figure 1: Personal Saving as a Share of GDP (United States)



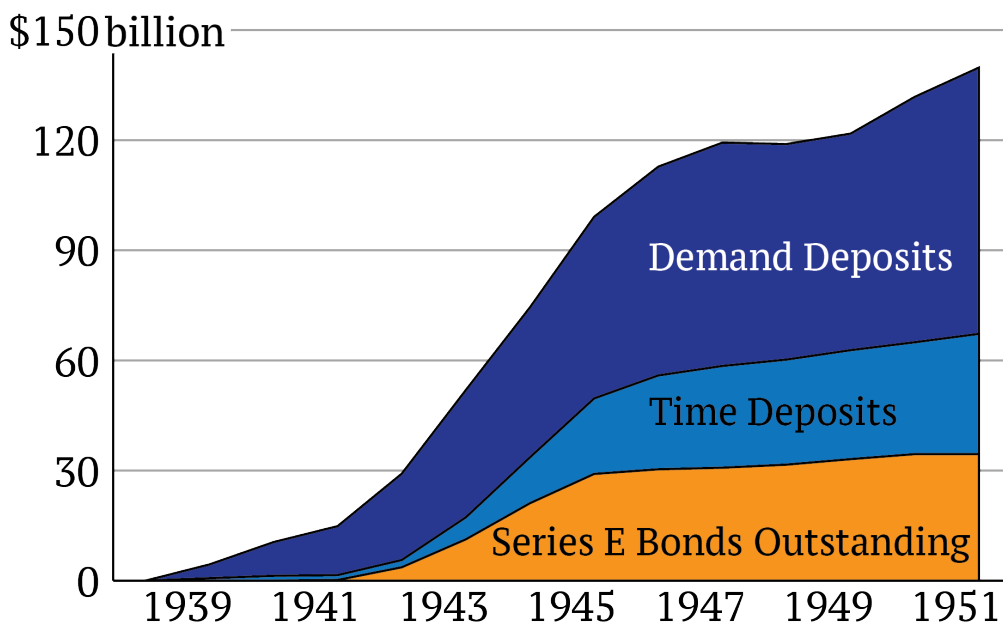
Source: FRED/Bureau of Economic Analysis

purely driven by the wartime economy or whether it was amplified by policies intended to encourage saving. The question of whether saving through E bonds was simply a substitute for traditional bank deposits or whether the war bond drives increased total saving has not previously been addressed empirically. The rest of this paper attempts to answer this question. We start by addressing the other central motives for wartime savings before discussing the details of the war bond drives.

2.1 Motives for Wartime Saving

There were several important motives for the high savings rate during WWII. First, many aspects of the war effort directly increased incomes. Both manufacturing and farm production expanded rapidly, increasing output and employment, even as almost 12 million Americans (mostly men) exited the civilian labor force by joining the Armed Forces. The result was dramatically expanded labor force participation—and a labor market so tight that the unemployment rate remained below 2 percent from September 1942 through December 1945. This

Figure 2: Growth in Asset Holdings During WWII



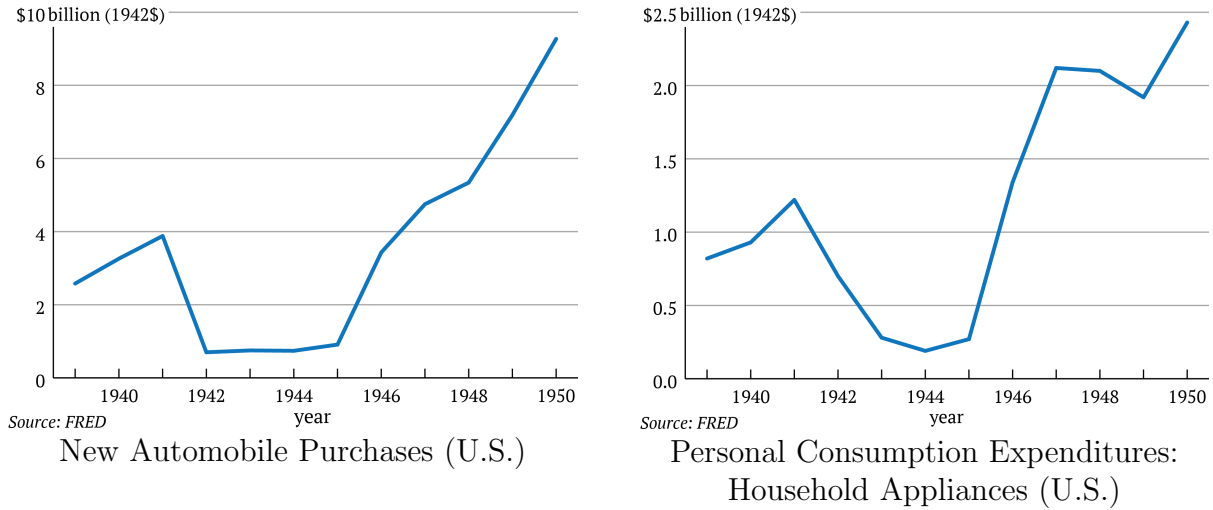
Source: *Monthly Treasury Bulletins, Reports of the Comptroller of the Currency*

direct expansion of economic activity increased income and thus promoted saving.

Second, the conversion of civilian manufacturing to war production helped war production take off faster than would otherwise have been possible. The war effort required immense resources—labor, materials, and industrial capacity—with relatively little advance notice. It was impossible to increase productive capacity fast enough to meet the demands of the war effort without constraining the civilian economy. The government rationed consumer goods to severely limit civilian manufacturing and free up resources for the war effort. In addition, the government strictly controlled the allocation of strategic materials. Metals (e.g. iron, steel, copper, and aluminum) and rubber were particularly scarce inputs, as they were necessary for nearly every type of war matériel (Gordon and Krenn, 2010; Field, 2023). Manufacturers could only buy these strategic inputs if they had a priority order, and only two categories of civilian manufacturing were eligible for these priority orders: farm equipment and replacement parts.

Some consumer goods—particularly durable goods—were thus not produced at all for the

Figure 3: Purchases of Household Durables During WWII



duration of the war. Household durables consumption dropped dramatically, as shown in Figure 3. Indeed, nearly all sales of household durables after early 1942 and before late 1945 reflect inventories at the time rationing orders went into effect in early 1942. For some consumer durables, production was prohibited outright during the war. For instance, American households could not buy new cars or household appliances at any price from 1942 through late 1945. Even when the government did not directly impose rationing, strict government control of strategic materials often made it impossible for producers to acquire inputs necessary for production.

Because of these restrictions on manufacturing, households could not respond to rising incomes by increasing their purchases of durables. Many households seem to have decided that the best substitute for buying cars and appliances during WWII was to wait and buy them after the war.¹

Finally, extensive and elaborate advertising campaigns urged Americans to buy war bonds as a patriotic duty and a way for every American to support the war effort. Purchases of government bonds helped finance the war effort, and large advertising campaigns encouraged

¹Under more normal circumstances, purchases of durable goods are an important component of consumer responses to fiscal stimulus (see Parker et al., 2013; Hausman, 2016, and many others).

everyone to participate. Pop stars wrote songs encouraging the purchase of war bonds, and posters advertised bonds to all segments of society. Children collected booklets of war savings stamps that, when filled, could be traded for war bonds, and many schools organized bond drives for their students. Workers purchased war bonds through payroll deductions, and soldiers purchased them while stationed overseas. War bond purchases were an important way in which all civilians could aid the war effort and support family and friends fighting overseas. Perhaps equally important, advertising campaigns tied war bonds to victory, suggesting that buying war bonds would help hasten the end of the war and return to ordinary peacetime life. In total, at least 85 million Americans (out of a total population slightly under 140 million) purchased \$185 billion in government securities between 1941 and 1946, of which \$54 billion were war bonds. Of the war bonds, \$34 billion were in series E bonds, which could only be purchased by individuals.²

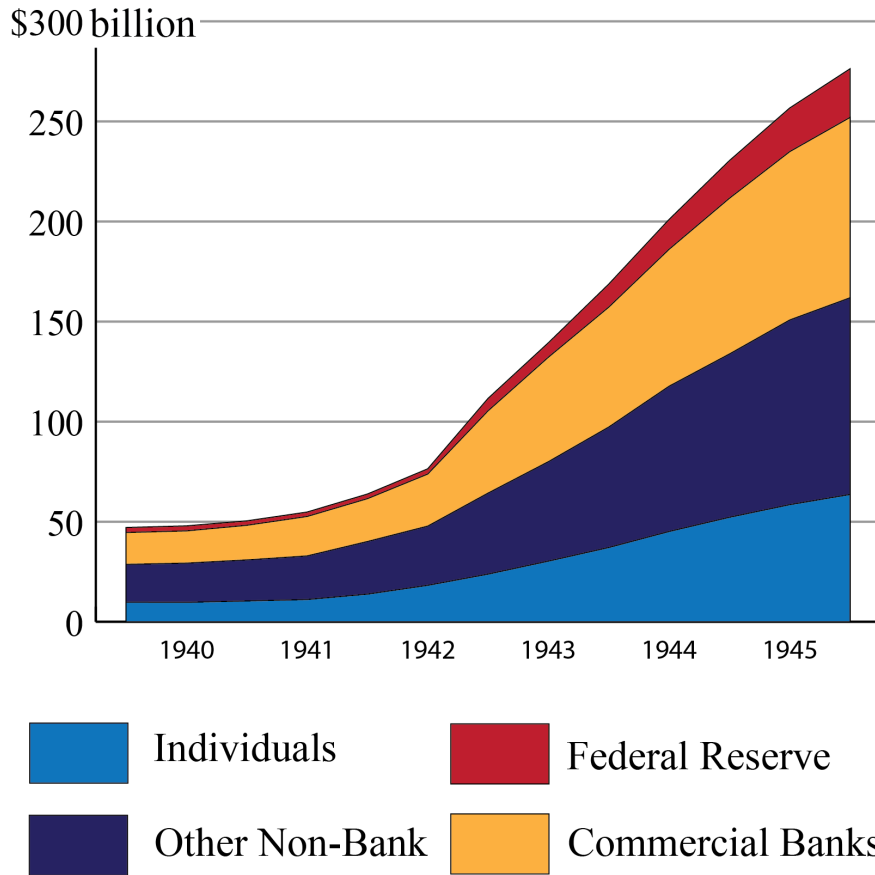
Figure 4 shows the growing ownership of U.S. government securities over WWII. Of the \$58.5 billion in government securities held by private individuals as of June 1945, \$29 billion were Series E bonds. Series E bonds are of particular interest both because they account for just over half of all government securities held by individuals at the end of WWII and because they could only be purchased by individuals. Other war bonds, discussed below, were available in larger denominations and could be purchased institutional investors (though not financial institutions accepting demand deposits). Thus while the data show that there were a total of \$42 billion in war bonds outstanding in June 1945, of which \$29 billion was series E bonds, the data do not indicate how much of the remaining \$13 billion in war bonds were held by individuals versus other types of investors.

2.2 Government Promotion of War Bond Sales

War bond sales to households were promoted through two mechanisms: bond drives and a payroll deduction program (called payroll savings plans) for war bond purchases. Approximately 53 percent of WWII E bond sales occurred during bond drives, while the remaining

²See *A History of the United States Savings Bonds Program* for details.

Figure 4: Ownership of Interest-Bearing Securities Issued or Guaranteed by the U.S. Government, 1939–1945 (par value)



Source: Monthly Treasury Bulletins

47 percent can be attributed to payroll savings plans (Murphy, 1950). However, the earlier start date of the payroll savings plan may have contributed to its larger share of total sales.

The payroll savings plans were first implemented in December 1941. Employees at individual firms were encouraged to put 10 percent of their income into E bonds through the Plans. Initially, 700,000 American workers participated, but participation data published in the *Monthly Treasury Bulletins* shows that number grew quickly.³ Participation in payroll savings plans exceeded 20 million by September 1942, peaking at 27.6 million in June

³Starting in August 1942, reported totals include participation in payroll savings plans by members of the Armed Forces. In that month, approximately 1 million members of the Armed Forces participated, along with 16.7 million workers in private firms and 1.7 million civilian government employees. Unfortunately, these detailed breakdowns of participation were not reported after early 1943.

1944. In April 1945, the last month for which participation data was reported, 25.1 million Americans were still participating. The public finance literature on salience and retirement savings choices (e.g. Dufflo et al., 2006) suggests that the payroll deduction program could have increased the salience of saving, potentially with spillovers to other savings vehicles.

Not every worker had the option to enroll in payroll savings plans. Instead, individual firms had to opt into the program before its workers were able to subscribe. Anecdotally, larger firms appear to have been particularly likely to participate. Wartime annual reports from Boeing, Chrysler, Douglas, International Harvester, and General Motors all discuss employee participation in payroll savings plans. At General Motors, 95 percent of employees were enrolled in the payroll savings plans in both 1943 and 1944. At International Harvester, the figure was 96 percent in 1943. These large firms report employee war bond purchases totaling approximately 10 percent of payrolls at the height of the war. Large firms were likely better equipped to handle the accounting and payroll details necessary to carry out such a program, compared to smaller firms and farms.

While the payroll savings plans ultimately reached a large number of workers, the Treasury felt that the sales of E bonds failed to capture a sufficient share of household incomes, and sought to better coordinate the sales efforts of the many state and local organizations marketing the bonds. Emulating the liberty bond campaigns of WWI, the Treasury orchestrated eight distinct bond drives in which sales goals were announced and intensive efforts to reach the goal prior to an end date were conducted. The first WWII bond drive (also called a “war loan”) ran from November to December 1942. The final WWII bond drive, called the “victory loan,” ran from October to December 1945.

While WWII bond drives were coordinated by the Treasury, they were implemented by local committees, assisted by local organizations. The bond drives were typically kicked off with rallies and parades, which were followed up by extensive door-to-door solicitations for subscriptions conducted by a volunteer sales staff. Posters and banners supporting the war effort and associating bond purchases with patriotism were distributed widely. Many of the drives had their own slogans, such as “They Give Their Lives—You Lend Your Money” (sec-



Figure 5: The Squander Bug

Cartoons of the Squander Bug, drawn by Theodore Geisel, were included in newspaper advertisement campaigns associated with the bond drives. Images are from “Spend, Sucker Spend: The Squander Bug Taunts,” *Minute Man*, 1 December 1943, pg. 10.

ond drive) or “Back the Attack” (third drive). Another important objective of the bond drives, however, was to discourage spending and encourage saving generally. The campaigns’ messages emphasized the importance of making sacrifices in support of the war effort, which meant giving up many “luxuries” and spending less (Olney, 1971). In support of this message, Theodore Geisel (Dr. Seuss) was asked to draw cartoons of a character named the Squander Bug, who spent frivolously and undermined his financial future by wasting money in the present. Cartoons featuring the Squander Bug were run in newspapers nationally in association with the bond drives.

Different types of securities were available to different classes of investors. War bonds (series E, F, and G) were sold by the Treasury beginning in May 1941. War bonds and Treasury savings notes (series C) were sold continuously throughout WWII. Treasury bills (3-months) were auctioned weekly. In addition, other Treasury bonds, called war loans, were sold by subscription during specific time windows for the drives. For example, the Second War Loan opened on April 12, 1943 and closed May 1, 1943. Total sales for the Second War Loan totaled \$18.5 billion, significantly exceeding the Treasury’s goal of \$13 billion and illustrating the high demand for private savings vehicles. Purchases of war bonds and Treasury savings notes during the time frame of each war loan were counted in the total subscriptions for each war loan, e.g. the \$18.5 billion subscription to the Second War Loan includes \$1.4 billion in

E bond purchases by individuals during the subscription window.

Series E bonds were purchased at 75 percent of maturity value, e.g. individuals paid \$18.75 up front for a \$25 E bond, etc. E bonds took 10 years to mature, implying a return of roughly 2.9 percent compounded semi-annually. The smallest denomination was \$25 (maturity value), while the largest denomination was \$1,000.⁴ E bonds could be redeemed early at a discounted value, and the evidence suggests that early redemption was not unusual. E bonds were registered to the individual purchaser and could not be traded. Individuals could purchase up to \$5,000 in maturity value (\$3,750 purchase value) of E bonds per calendar year.

Series F and G bonds could be purchased by corporations, trusts, and other non-financial institutional investors. Their structure was similar to that of E bonds, but had worse terms. They took 12 years to mature instead of 10 and accrued interest at a rate of roughly 2.5 percent per year instead of the higher 2.9 percent return on series E bonds. They were also available in larger denominations of \$5,000 and \$10,000. The vast majority of series F and G bonds sold were in denominations of \$1,000, \$5,000, and \$10,000. Like E bonds, F and G bonds were registered and could not be traded. Any individual entity could buy up to \$100,000 per year of F and G bonds (combined).

Financial institutions accepting demand deposits could not purchase war bonds, but instead purchased other government securities. Returns on treasury bonds varied with the market; interest rates on treasury bonds were generally about 1.5 percentage points lower than the interest rates on high-grade corporate bonds, but treasury bonds were partially tax exempt and could be “tendered in payment of taxes at earlier [pre-maturity] dates” (*Monthly Treasury Bulletin*, August 1943, p. 2).

To reach low income households, the government also sold savings stamps. Stamps came in smaller denominations, starting at just 10¢. The largest denomination of saving stamp was \$5. Unlike war bonds and unlike saving stamps from WWI, WWII saving stamps did not earn interest. Instead savings stamps were collected in booklets which, when filled, could

⁴E bonds were sold in a \$10 denomination after June 1944, but this denomination could only be purchased by members of the Armed Forces. Total sales of \$10 E bonds were much smaller than sales of any other denomination, even in FY 1945.

be redeemed for Series E war bonds. For example, a 25-cent booklet held 75 stamps; when full, the \$18.75 in saving stamps could be redeemed for a \$25 E bond. Even children were encouraged to buy savings stamps and redeem them for war bonds. In theory, savings stamps could be redeemed for Series E bonds, postal savings certificates, or cash. In practice, fewer than 0.1 percent of savings stamps were redeemed for postal savings certificates. 80-90 percent of savings stamps were converted into E bonds, while the remainder were redeemed for cash.

For understanding household saving, it is most useful to focus on Series E bonds. They could only be purchased by individuals—allowing E bond purchases to be added to other forms of saving—and they were the main government security purchased by all but the wealthiest households during WWII. Series E bonds were both the most widely marketed to consumers—making them the most salient—and had the highest interest rate of all government securities offered during the war—meaning they would have appealed to sophisticated investors so long as those investors included any U.S. government securities in their portfolios. The wealthiest investors largely bought both E bonds and other government securities. For very wealthy households E bonds would have been a fairly small share of their portfolios because of the annual purchase limits, but they would have been part of the mix.

While bank deposit holdings remain the majority of total savings, E Bond holdings represented a large portion of the total increase in household savings.⁵ As seen in Figure 2, the rise in E bonds was larger than that in time deposits and about half of that in demand deposits between 1941 and 1945. Interestingly, while total government securities outstanding peaked in February 1946, individual holdings of government securities did not diminish (in nominal terms) immediately after the war. Individual holdings of government securities peaked (for the period) at \$67.5 billion in November 1948 and only slowly receded thereafter, falling only to a low of \$65.7 billion in December 1949 before the outbreak of the Korean War in summer 1950.

These stable aggregates hide considerable churn in individual ownership of government

⁵Bank deposit holdings and war bond purchases account for the majority (67 percent) of household savings accumulated during WWII. Increased currency (cash) holdings account for another 12 percent.

securities, as will be discussed in later sections. The first Series E bonds reached maturity in May 1951. Yet by June 1945, 19 percent of all Series E bonds issued had been redeemed; by June 1950, 45 percent of all issued Series E bonds had been redeemed. Early redemption was quite common, but people continued to purchase more, keeping their outstanding total relatively consistent through 1951.

A narrow focus on E bonds, or even all government securities held by individuals, likely understates the role of government securities in wartime saving. Not only did commercial banks invest in government securities during the war, but other institutions such as insurance companies bought sizable quantities of government securities. Households may have directed some of their savings into insurance policies, indirectly supporting the purchase of more government securities.

3 Geographic Variation in Saving

To examine whether the war bond drives encouraged an expansion of total savings rather than just a switch from bank deposits to bonds, disaggregated data are necessary. Disaggregated data allow us to examine where the saving is actually going on and to make sure that changes in bank deposits are explicitly matched to changes in bonds in the same location. We therefore collect county-level data (the lowest level of aggregation we can obtain) on our key variables. Population data come from (Haines, 2010). 1944 E bond purchases and many other county-level variables are obtained from the 1947 *Consolidated City and County Data Books*. Bank deposit data was provided by Paul Rhode.

While wartime saving was a national phenomenon, the data show that there was substantial variation in savings across counties. Counties differed in both pre-war characteristics and wartime experiences. Table 1 shows county-level summary data for the relevant variables. All dollar amounts are shown in 1950 dollars, computed per capita (adults 21+).

In the median county, E bond purchases were \$128 per adult in 1944, the only year

of the war for which county-level bond purchases were collected.⁶ Deposit holdings also increased during the war. In the median county, per capita bank deposits (held by individuals, partnerships, and corporations) were \$395 at the end of 1941 and \$754 at the end of 1944, almost doubling over three years of war.

War spending is the sum of war production and war facilities spending. War production is constructed using digitized contract listings from the Civilian Production Administration, successor agency to the War Production Board, in 1946. These data are discussed in detail in Brunet (2024). War facilities spending is taken from the 1947 City & County Data Book.

In the median county, only 18 percent of the U.S. population lived in urban areas in 1940, although 56.5 percent of Americans lived in urban areas. County-level observations skew rural, away from cities and towards agricultural areas. Similarly, 7.1 percent of the 1940 labor force was employed in manufacturing in the median county. In contrast, fully 20 percent of the labor force was employed in manufacturing: manufacturing was concentrated in more populous counties. We define a county as “manufacturing-intensive” if at least 7 percent of its 1940 labor force was employed in manufacturing.⁷

Data on farm sales comes from the 1940 Census of Agriculture. 1939 crop sales were \$85 per capita in the median county. The median county was also 97.4 percent white in 1940, versus 89.8 percent of the U.S. population.

Because county-level E bond purchase data was collected only in 1944, we construct total (observable) 1944 saving as $1944 \text{ saving} = 1944 \text{ E bond purchases} + 1944 \text{ deposits} - 1943 \text{ deposits}$. Figure 6 shows total 1944 saving (calculated as the change in deposit holdings plus 1944 E bond purchases) by county.

Table 2 shows the relationship between various county characteristics and per capita saving

⁶Adults are defined as persons aged 21+ for consistency across changing census age bins. All prices are in 1950 dollars. Also note that in our regression analysis, we winsorize the top and bottom 1 percent of E bond purchases, deposits, and deposit flows to avoid distortions from extreme values.

⁷While we use a threshold of 7 percent, thresholds ranging from 7 to 15 percent produce virtually identical results. Just over 7 percent of the 1940 labor force was employed in manufacturing in the median county, while 15.4 percent of the labor force was employed in manufacturing at the 75th percentile. Using the share of 1940 labor force employed in manufacturing (i.e. the continuous variable) produces qualitatively similar results, though the coefficients are harder to interpret.

Table 1: County-Level Summary Data

	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 population (21+)	25,244	88,242	175	6,026	10,846	19,327	2,851,587
mfg employment rate 1940	10.4%	10.4%	0%	2.6%	6.6%	14.8%	60.4%
% population 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%
% change population, 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 purchases p.c., 1944	\$149	\$105	\$6	\$86	\$128	\$189	\$2,485
E bond purchases p.c., 1949	\$36	\$306	\$0	\$16	\$26	\$45	\$334
total war spending p.c.	\$1,233	\$4,417	\$0	\$0	\$423	\$851	\$134,600
Crops p.c. sold by farms, 1939	\$133	\$149	\$0.37	\$34	\$85	\$178	\$1,794

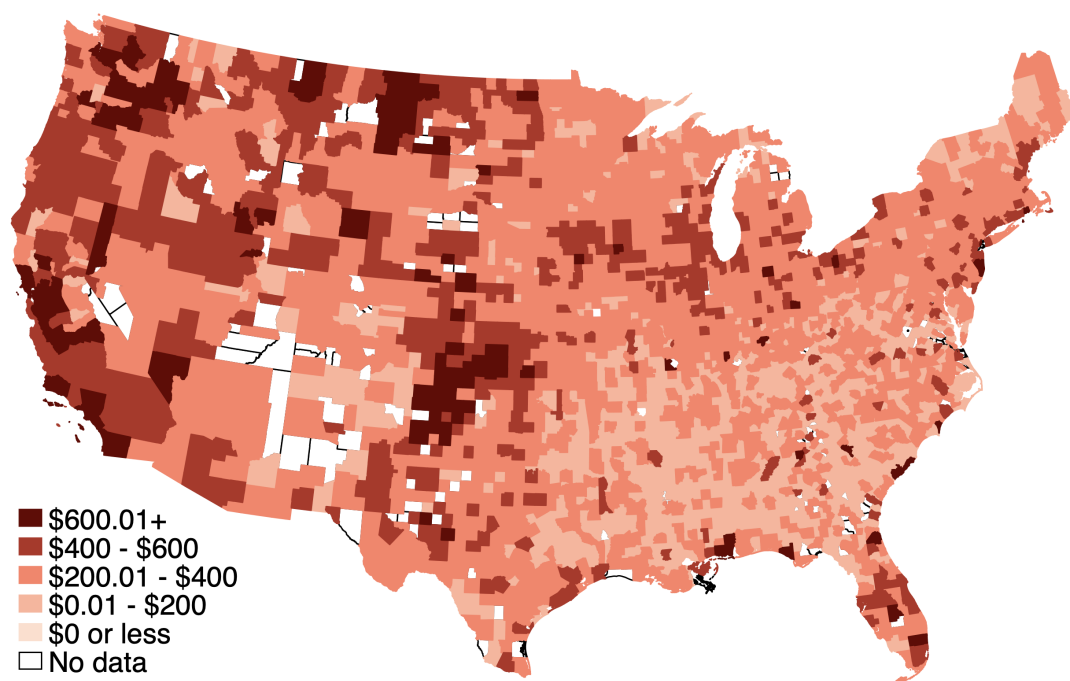
All dollar values shown in 1950 prices per (adult 21+) capita. Adult population is defined as population aged 21 and older. All dollar amounts are rounded to the nearest dollar. Data come from the Decennial Censuses, City and County Data Books, and Censuses of Agriculture. County-level bank deposit data 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+).

Table 2: Geographic Correlates of 1944 Saving
(\$ per adult capita)

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

Figure 6: Total 1944 Saving per Capita (Population Age 21+, 1950 \$)



Source: Authors' calculations using data from Civilian Production Administration and 1947 City & County Data Book

in 1944. In columns 1 and 2, the outcome variable is total 1944 saving, as computed above. In columns 3 and 4, the outcome variable is the change in bank deposits over 1944. In columns 5 and 6, the outcome is 1944 E bond purchases.

The results look remarkably similar—but not identical—across savings outcomes. Counties with more bank deposits at the end of 1943 saved slightly more in both bank accounts and E bonds in 1944. Similarly, counties with a larger share of white population in 1940 and counties with higher sales of farm crops in 1939 systematically saved more in both assets in 1944, while counties with higher shares of renter-occupied housing saved less in both. Counties receiving more WWII spending and counties with higher median wages in 1940 had significantly higher E bond purchases and higher total saving, but not larger increases in bank accounts. Manufacturing-intensive counties have slightly lower bank deposit flows and total 1944 saving than counties with less manufacturing, but the effects are only marginally significant when other controls are added.

4 How Did E Bond Campaigns Affect Bank Deposits?

Economists and policymakers in the mid-20th century were divided over whether the sale of E bonds—and the associated marketing campaigns for both the bond drives and the payroll savings plans—increased total saving or whether they simply shifted money out of other savings vehicles. We address this question by examining the relationship between E bond purchases and deposit flows in 1944.

Table 3 examines the relationship between 1944 E bond purchases and the 1944 change in bank deposit holdings. Column 1 examines this relationship without and finds that for each additional \$100 in E bond purchases in a county, bank deposits rose by \$7 over 1944. Of course, this estimate almost certainly suffers from upward bias: we expect both E bond purchases and deposit increases to be larger in wealthier counties (and counties benefiting more from the wartime boom).

Columns 2 through 4 add controls relating to pre-war income, wealth, and exposure to the wartime boom.⁸ The controls which reduce the estimated effect of E bond purchases on the accumulation of bank deposits are 1943 deposits, the value of farm crops sold in 1939 and the 1940 urbanization rate. Even so, each additional \$100 in E bond purchases is still associated with a \$7 increase in bank deposits, though this effect is not precisely estimated and is not statistically significant. Of course, even this estimate will still have an upward bias to the extent that we do not fully control for income, wealth, or other unobservable elements of the wartime economic expansion.

4.1 IV for measuring the effects of bond drives

The analysis presented above controls for a number of county characteristics associated with income, such as total war contracts and median wages. Yet there remains the possibility that higher incomes generated a positive correlation between E bond purchases and inflows into

⁸Note that because WWII caused a major agricultural boom, 1939 farm crop sales can be understood as a measure of exposure to wartime income growth—independent of war spending, which excludes military food purchases. The correlation between WWII spending and 1939 crop sales is -0.12.

Table 3: Influence of E Bond Purchases on Deposit Flows (\$ per adult capita)

	(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. 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

bank accounts. To address this concern, we instrument for E bond purchases in 1944 using participation rates for the liberty bonds of WWI.

During WWI, Treasury Secretary MacAdoo pioneered the concept of the bond drive in marketing what were called liberty bonds to the public. The bond drives of WWII were modeled after the liberty bond campaigns, and the local lessons learned from the conduct of the liberty bond drives were remembered by the organizers of the WWII drives. The participation rates in the liberty bond drives of 1918 (measured as per capita subscribers) were a function of local social capital, and were also influenced by the different marketing approaches adopted (Hilt and Rahn, 2022). Persistence in the levels of social capital across counties over time would lead the liberty bond participation rates to predict E bond purchases.

Because much of the of the variation in bond drive strategies occurred at the state level (with decisions made by state committees), we use region fixed effects instead of state fixed effects for our IV analysis. Note that using region fixed effects instead of state fixed effects does not substantially alter the effects reported in Table 3, just increases their statistical significance.

We present the first stage of our 2SLS estimation in Table 4. Liberty bond participation rates do indeed predict E bond subscriptions quite well. A 10 percent increase in the 1918 liberty bond drive participation rate is associated with a \$39 increase in 1944 E bond purchases. Adding a full complement of additional control variables reduces the size of the effect to a \$20 increase in 1944 E bond purchases per capita, but the relationship remains highly statistically significant.

IV results are shown in Table 5. The simplest form of the IV—including no controls except for region fixed effects—produces estimates similar to but larger than the OLS estimates: a \$100 increase in 1944 E bond purchases is associated with a \$30 increase in bank deposit flows, indicating substantial positive spillovers. However, once we add a control for 1943 deposits, the IV estimate becomes both negative and significant.

Once we include appropriate controls—including 1943 bank deposits—the coefficient on the instrumented E bond purchases becomes -0.652. This suggests that once we remove the

Table 4: First Stage: Predicting 1944 E Bond Purchases

	(1)	(2)	(3)	(4)
Liberty Loan participation rate	0.387*** (0.0352)	0.225*** (0.0389)	0.194*** (0.0418)	0.200*** (0.0412)
1943 deposits		0.106*** (0.00871)	0.0904*** (0.00826)	0.0712*** (0.00828)
manufacturing intensive		-0.00948*** (0.00343)	-0.0155*** (0.00320)	-0.00497 (0.00321)
WWII spending			0.00717*** (0.000901)	0.00778*** (0.001000)
% population white, 1940			0.0116 (0.0126)	0.0228* (0.0128)
pop growth 1930-1940			0.0330* (0.0174)	-0.0259 (0.0187)
% housing renter occupied, 1940			0.0330* (0.0174)	-0.0259 (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	0.417	0.550	0.602	0.664

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

Table 5: Liberty Bond IV for Effects of Bond Drives on 1944 Bank Deposit Flows

	(1)	(2)	(3)	(4)
1944 E bond purchases (instrumented)	0.294*** (0.0801)	-0.636*** (0.155)	-0.836*** (0.219)	-0.652*** (0.192)
1943 deposits		0.231*** (0.0216)	0.236*** (0.0252)	0.195*** (0.0187)
manufacturing intensive		-0.00976** (0.00465)	-0.0151*** (0.00580)	-0.00289 (0.00460)
WWII spending			0.00625*** (0.00189)	0.00569*** (0.00173)
% population white, 1940			0.0567*** (0.0149)	0.0775*** (0.0140)
pop growth 1930-1940			-0.000602** (0.000247)	-0.000362* (0.000217)
% housing renter occupied, 1940			0.0834*** (0.0248)	0.0245 (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)	120.7	33.4	21.5	23.5
Observations	1,390	1,390	1,390	1,389
R-squared	0.342	0.349	0.260	0.426

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

effects of income, wealth, and exposure to war production shocks, each \$100 in 1944 E bond purchases is associated with a \$65 decrease in bank deposit flows during 1944. Controlling for 1943 deposits dramatically alters the coefficient on the instrument, and has a much larger effect than any other individual control.

These estimates still suggest that E bond campaigns substantially increased overall saving: if bank deposit flows fall by \$65 in response to \$100 in E bond purchases in 1944, as suggested by the coefficient in column 4, overall saving increased by \$35. However, as economic theory would suggest, the IV results suggest substantial substitution between E bonds and bank deposits.

4.2 The effects of payroll savings plans

Some contemporary observers hypothesized that the payroll savings plans might have done more to promote overall saving than the bond drives. Because payroll savings plans were deducted from pay, participants never saw the dollars funneled into them—unlike the the dollars used to buy E bonds during bond drives.

The Treasury did not publish geographically disaggregated data on participation in payroll savings plans (and reconstructing it would require a large sample of individual income tax returns, which do not seem to have survived). Individual firms had to opt into participating in the payroll savings plans, after which their employees could sign up to have war bond purchases deducted from their pay. From anecdotal evidence (e.g annual reports), we know that large manufacturing firms were highly likely to participate in payroll savings plans. Manufacturing firms sometimes held internal competitions to boost employee participation in payroll savings programs, achieving employee participation rates as high as 96 percent.

To proxy for the effect of payroll savings plans, we divide the sample roughly in half, between counties with low manufacturing employment rates in 1940 and counties with high manufacturing employment rates in 1940 (using 7 percent of the 1940 labor force as the cutoff). We then reproduce the IV for each separate subsample. The first stage regressions

Table 6: First Stage: Non-Manufacturing-Intensive Counties Only

	(1)	(2)	(3)	(4)
Liberty Loan participation rate	0.321*** (0.0437)	0.154*** (0.0404)	0.125*** (0.0381)	0.148*** (0.0337)
1943 deposits		0.123*** (0.0127)	0.112*** (0.0122)	0.0837*** (0.0110)
WWII spending			0.0144*** (0.00216)	0.0177*** (0.00219)
% population white, 1940			0.0425*** (0.0150)	0.0583*** (0.0161)
pop growth 1930-1940			-0.000793*** (0.000205)	-0.000707*** (0.000169)
% housing renter occupied, 1940			0.0677*** (0.0235)	-0.00811 (0.0255)
median wage, 1940				0.0455*** (0.0123)
farm crops sold, 1939				0.190*** (0.0157)
% pop urban, 1940				-0.000375*** (0.000131)
Observations	713	713	713	713
R-squared	0.495	0.619	0.663	0.758

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

Table 7: First Stage: Manufacturing-Intensive Counties Only

	(1)	(2)	(3)	(4)
Liberty Loan participation rate	0.425*** (0.0535)	0.267*** (0.0634)	0.247*** (0.0673)	0.206*** (0.0774)
1943 deposits		0.0903*** (0.0119)	0.0704*** (0.0100)	0.0583*** (0.0107)
WWII spending			0.00701*** (0.000925)	0.00680*** (0.000972)
% population white, 1940			-0.0214 (0.0191)	-0.0254 (0.0187)
pop growth 1930-1940			0.000679** (0.000299)	0.000509* (0.000302)
% housing renter occupied, 1940			-0.0101 (0.0267)	-0.0502* (0.0271)
median wage, 1940				0.0349*** (0.0135)
farm crops sold, 1939				0.0885*** (0.0242)
% pop urban, 1940				9.80e-05 (0.000158)
Observations	677	677	677	676
R-squared	0.366	0.488	0.595	0.610

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

Table 8: Liberty Bond IV for Effects of Bond Drives on 1944 Bank Deposit Flows,
Non-Manufacturing-Intensive Counties Only

	(1)	(2)	(3)	(4)
1944 E bond purchases (instrumented)	0.332** (0.135)	-0.837** (0.357)	-1.144** (0.494)	-1.021*** (0.362)
1943 deposits		0.276*** (0.0518)	0.296*** (0.0635)	0.231*** (0.0382)
WWII spending			0.0140* (0.00814)	0.0158** (0.00710)
% population white, 1940			0.116*** (0.0368)	0.132*** (0.0350)
pop growth 1930-1940			-0.00130** (0.000538)	-0.00119*** (0.000384)
% housing renter occupied, 1940			0.135** (0.0587)	0.0194 (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)	53.9	14.5	10.7	19.2
Observations	713	713	713	713
R-squared	0.373	0.216	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

Table 9: Liberty Bond IV for Effects of Bond Drives on 1944 Bank Deposit Flows,
Manufacturing-Intensive Counties Only

	(1)	(2)	(3)	(4)
1944 E bond purchases (instrumented)	0.280*** (0.102)	-0.579*** (0.168)	-0.678*** (0.205)	-0.357* (0.215)
1943 deposits		0.209*** (0.0228)	0.202*** (0.0218)	0.172*** (0.0198)
WWII spending			0.00547*** (0.00174)	0.00375** (0.00160)
% population white, 1940			0.0113 (0.0167)	0.0484*** (0.0163)
pop growth 1930-1940			0.000738** (0.000330)	0.000807*** (0.000289)
% housing renter occupied, 1940			0.0455* (0.0253)	0.0211 (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)	62.9	17.8	13.5	7.1
Observations	677	677	677	676
R-squared	0.326	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

are shown in Tables 6 and 7.

IV results for low-manufacturing counties are shown in Table 8. When all controls are added, the coefficient on instrumented E bond purchases is approximately -1 for the subsample of counties with less manufacturing employment. Since participation in payroll savings plans was likely quite low for this set of counties, these coefficients can be interpreted as reflecting the effects of bond drives (only) on saving. The coefficient of -1 implies complete substitution: for these counties, all E bond purchases were financed by shifting money out saving in bank accounts, suggesting that bond drives had no net effect on saving (though they may have increased support for the war effort).

IV results for counties with higher manufacturing employment are shown in Table 9. In contrast to the results shown in Table 8, the coefficients on instrumented E bond purchases are significantly closer to zero. Indeed, when all controls are added, each \$100 of E bond purchases in these counties is associated with a reduction in deposit flows of only \$35, implying a \$65 increase in net saving per \$100 in E bond purchases.

While we cannot directly observe participation in payroll savings plans, the divergence of estimates over the two IV samples suggests that payroll savings plans may have been more effective at reducing consumption (a major goal of savings promotion during the war) and thus increasing aggregate saving, while bond drives largely shifted saving into war bonds from bank deposits.

5 Conclusion

Personal savings increased substantially during WWII, reaching more than 19 percent of GDP. This paper has investigated the determinants of this surge in savings, focusing on the role of the federal government's campaigns to promote the purchase of war bonds.

In an effort to control the inflationary pressures that would have resulted from the combination of rising incomes with the restricted availability of consumer goods during WWII, the federal government promoted the sale of war bonds to the public, through a payroll deduc-

tion program and a series of bond drives. This program was generally regarded as successful, with purchases capturing nearly 10 percent of personal after-tax income in 1944, and about \$40 billion in total sales during the war. Yet whether or not the program actually increased saving, or simply converted the form in which savings were held to war bonds, has been the subject of some controversy.

Using county-level data and an instrument for war bond participation, we find that \$100 in war bond purchases was associated with a decrease of flows into bank accounts of \$65. This suggests that while the majority of war bond purchases were financed by shifting savings out of bank accounts, the war bond campaigns still fulfilled their goal of increasing overall saving. The evidence also suggests that payroll savings plans may have been more effective at increasing total saving than the war bond campaigns.

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