

NBER WORKING PAPER SERIES

DID BIG GOVERNMENT'S LARGESSE HELP THE LOCALS? THE IMPLICATIONS  
OF WWII SPENDING FOR LOCAL ECONOMIC ACTIVITY, 1939-1958

Joseph Cullen  
Price V. Fishback

Working Paper 12801  
<http://www.nber.org/papers/w12801>

NATIONAL BUREAU OF ECONOMIC RESEARCH  
1050 Massachusetts Avenue  
Cambridge, MA 02138  
December 2006

We would like to thank Todd Sorensen, Jennifer Yelle, Bill McNerney, Peter Vu, Doug Larue, Josh Easterlin, and Allison Johnson for their invaluable help in organizing and computerizing the data. We are grateful to Martin Feldstein and the National Bureau of Economic Research for financial support of this project and the National Science Foundation for grant support given to fund collection of the data from the New Deal project used in this paper. Any analysis and interpretations in the paper should not be seen as representing the views of those organizations. We received invaluable advice on earlier versions of this paper in presentations at the University of Arizona Economics Department, University of Wales at Swansea, Warwick University, and Oxford University and from the following people: Manuela Angelucci, Stephen Broadberry, Alphonso Flores-Lagunes, Robert Higgs, Kei Hirano, William Horrace, Shawn Kantor, Ronald Oaxaca, Paul Rhode, Todd Sorensen, Bisnupriya Gupta, Knick Harley, Jane Humphries, and John Wallis.

© 2006 by Joseph Cullen and Price V. Fishback. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission provided that full credit, including © notice, is given to the source.

Did Big Government's Largesse Help the Locals? The Implications of WWII Spending for Local Economic Activity, 1939-1958

Joseph Cullen and Price V. Fishback

NBER Working Paper No. 12801

December 2006

JEL No. H50,N32,N42,N92,R11

### **ABSTRACT**

We examine whether local economies that were the centers of federal spending on military mobilization experienced more rapid growth in consumer economic activity than other areas. We have combined information from a wide variety of sources into a data set that allows us to estimate a reduced-form relationship between retail sales per capita growth (1939-1948, 1939-1954, 1939-1958) and federal war spending per capita from 1940 through 1945. The results show that the World War II spending had virtually no effect on the growth rates in consumption that we examined. This contrasts with Fishback, Horrace, and Kantor's (2005) findings of about half a dollar increase in retail sales associated with a dollar of New Deal public works and relief spending. Several factors contributed to this relative lack of impact. World War II spending often required a conversion of plants designed for civilian good production into military factories and back again over the 9 year period. Substantially higher federal tax rates that were paid by the majority of households imposed much stronger fiscal drags on the benefits of the spending. Finally, less of the military spending was earmarked for wages and use of locally produced inputs, which reduced the direct stimulus to the local economy.

Joseph Cullen

Department of Economics

University of Arizona

Tucson, AZ 85721

[jcullen@email.arizona.edu](mailto:jcullen@email.arizona.edu)

Price V. Fishback

Department of Economics

University of Arizona

Tucson, AZ 85721

and NBER

[pfishback@eller.arizona.edu](mailto:pfishback@eller.arizona.edu)

## **Did Big Government's Largesse Help the Locals? The Implications of WWII Spending for Local Economic Activity, 1939-1958**

Joseph Cullen and Price Fishback

World War II brought us out of the Great Depression. At least that has been the standard account. It is thought that the unparalleled and huge federal spending on military mobilization eliminated unemployment, stimulated industry, and led to a resurgence in economic activity that set the United States on a path of 20-30 years of rapid economic growth. The conventional wisdom has been challenged by Robert Higgs (1992, 1999) who argues that the War was equivalent to a continuation of the Great Depression. When aggregate consumption figures are appropriately adjusted for the true cost of living, consumers were worse off during the war. Unemployment was eliminated by drafting or encouraging large numbers of working age men into the military, where many risked life and limb in highly uncomfortable positions. The War did raise the populace's expectations for a brighter future that led to rapid expansions in the private sector afterward. Further, there is no doubt that the allied victory prevented the tyranny of a western Europe controlled by Hitler and Mussolini and a militaristic regime under Japan in Asia. These results aided economic freedoms and growth and international trade in western Europe and Japan, although large swaths of the world's population were now subject to the mercy of Stalin's USSR regime.

To our knowledge, nearly all of the discussions of the War's economic impact in America have focused on macroeconomic aggregates before, during and after the war. There are few data points, and there are significant conceptual measurement issues associated with the transition to and from a command economy in which prices and allocations were largely determined by central planners and consumers could not

purchase many normal goods and only rationed amounts of others. We propose a different tactic for examining the role of war spending by looking at the tremendous variation in growth rates in consumer economic activity between 1939, just prior to the military buildup, and 1948, soon after the conversion back to the peace-time economy had been completed. To look at longer-term effects we also examine the growth rates in retail sales per capita from 1939 through 1954 and 1939 through 1958. Our goal is to examine whether local economies that were the centers of federal spending on military mobilization experienced more rapid growth in consumer economic activity than other areas. We cannot address the macroeconomic question of whether there was a uniform stimulus or slowing nation-wide, but we can answer the question of whether community leaders would have found it beneficial for consumers in their community to compete in the political arena for federal war spending.<sup>1</sup> We can also compare how the impact of the war spending at the local level compared with the peacetime expansion in emergency spending on public works and relief during the New Deal (Fishback, Horrace, and Kantor).

To that end, we have combined information from a wide variety of sources into a data set that allows us to estimate a reduced-form relationship between retail sales per capita growth (1939-1948, 1939-1954, 1939-1958) and federal war spending per capita from 1940 through 1945. We start by describing the military mobilization during World War II and showing the substantial variation in both war spending and retail sales growth across counties that is the source of our identification of the relationship. We then show how the reduced-form coefficient summarizes the combined effects of crowding out of

---

<sup>1</sup> Rhode, Snyder, and Strumpf (2002) have recently addressed the political economy of the distribution of war spending.

local production, drags on growth from the tax rates on additional income, the shares of inputs for war production bought locally, and the shares of consumer incomes spent on locally produced goods and services. We then estimate the coefficient with a variety of different control variables and perform a series of robustness tests of the results using different subsamples, instrumental variable estimation, and difference-in-difference analysis for retail sales per capita growth over the period 1939-1948 to show the procedures. The results for other time frames are virtually identical, so we report only those for retail sales from 1939-1948. The results show that the World War II spending had virtually no effect on the growth rates that we examined. This contrasts with Fishback, Horrace, and Kantor's (2005) findings of nearly a full standard deviation increase in retail sales associated with a standard deviation increase in public works and relief spending in the 1930s that translates into a half a dollar increase in retail sales in 1939 associated with a dollar of New Deal public works and relief spending during the 1930s.

The two sets of results both fit into findings for the impact of public works and expenditures because the literature generally finds a mixed set of effects..<sup>2</sup> In this case, however, we believe we can point to specific differences in the nature of the spending and tax regimes that help explain the difference in results. World War II spending often required a conversion of plants designed for civilian good production into military

---

<sup>2</sup> There also remains the possibility that the improvements in private productivity from the additions to civil infrastructure had no short-term effect on private incomes as it expanded production-possibilities without stimulating demands for the products. Recent empirical work investigating the impact of civil infrastructure on economic growth gives mixed support to the hypothesis that more infrastructure spending leads to substantial increases in economic growth. See Aschauer 1989; Costa, Ellson, and Martin 1987; Duffy-Deno and Eberts 1991; Hulten and Schwab 1991; Garcia-Mila and McGuire 1992; Munnell 1992; Gramlich 1994; Fernald 1999; and Pereira and Flores de Frutos 1999.

factories and back again over the 9 year period. This explicit replacement (or crowding out) of private production and investment was similar to the crowding out explicitly established in the AAA farm programs of the New Deal that Fishback, Horrace, and Kantor found had no positive effects on retail sales. Substantially higher federal tax rates that were paid by the majority of households imposed much stronger fiscal drags on the benefits of the spending. Finally, less of the military spending was earmarked for wages and use of locally produced inputs, which reduced the direct stimulus to the local economy.

### **WWII Economic Mobilization and the Allocation of War Spending**

The roots of economic mobilization of World War II lie in the failures of previous mobilization efforts during World War I. When the US entered World War I (WW I) in 1917 it did so without stockpiles of equipment or plans for creating them (Schubert 1994). Competition between branches of the military for war supplies resulted in price inflation and war profiteering. In addition, the inadequate distribution of the war's economic burdens resulted in congestion and inefficient use of resources. Inadequate knowledge of supply needs resulted in waste from overproduction of some war products and shortages of others. The end result was delayed procurement that negatively affected the war effort (Army and Board 1933, 1939). To avoid the shortcomings unveiled by the economic failures of WWI, a series of military boards were established to plan and coordinate military production in time of war. In the 1930s these boards established detailed Industrial Mobilization Plans (IMP), which partitioned productive capacity

between military agencies and laid out the military's role in commanding the economy in times of war(United States Joint Army and Navy Munitions Board, 1933).

World War II economic mobilization started gradually. At the outbreak of war in Europe in 1939, a modest Army build up was initiated with appropriations of about a half a billion dollars. The pace of preparation increased with the advent of German military successes in Europe in the spring of 1940. Cautiously, President Roosevelt reactivated the NDAC, a WWI civilian mobilization board, to assess the problem of mobilizing resources. However, prevailing attitudes of isolationism in the country resisted any move toward direct involvement in what was then viewed as a European war. Even so, federal military appropriations rose to \$8 billion in 1940 and again to \$26 billion in 1941. By the time of the attack on Pearl Harbor in Congress had spent more for Army procurement than it had for the Army and the Navy during all of World War I (Schubert 1994).

The attack on Pearl Harbor in December of 1941 and the subsequent entry of the US into the war led to emergency expansions of productive facilities. The President supplanted earlier civilian mobilization agencies with the War Production Board (WPB)in January 1942 to oversee the massive transition to a military economy. In theory, civilian agencies were responsible for transitioning the economy to war production and overseeing allocations of funds. Yet, most scholars agree that it was the military procurement agencies, not their civilian counterparts, that wielded the power of allocation during WWII. The military decided where contracts were allocated with little interference from the WPB. Although contract placement was a complicated process dependent on many factors that changed in importance over the course of the war, speed almost always overrode all other considerations. The military would contract with

whomever could produce the most quickly and reliably. In general, the firms who could accomplish this were large corporations. Price considerations frequently fell to the bottom of the list of priorities. It is important to note that economic problems in counties received virtually no systematic consideration in distributing funds, although political considerations still held some sway (Koistinen 2004, Smith 1959, Rhode, Snyder, and Strumph 2003; Higgs 2006, 91)

The conversion to a war economy between 1940 and 1942 was difficult. In many industries company executives were reluctant to convert facilities to military production because they did not want to lose consumer market share for civilian products to competitors who did not convert. Head of the WPB Donald Nelson noted that “...converting the automobile industry was, in a sense, destroying it--and its owners did not quite see fit to demolish this industrial colossus without knowing what would take its place” (Nelson 1946, 218). As the U.S. committed to the Lend-Lease program and then entered the war, the contract orders increased dramatically in size, limits on scarce inputs were imposed, and companies soon went ahead with the costly conversion processes (Koistinen 2004, 277). The technological complexity of new war materials required significant engineering and manufacturing expertise that eliminated many firms from competition for contracts. The sheer magnitude of the procurement effort and the necessity for speed led the army to contract with as few companies as possible and leave subcontracting up to the prime contractors. To expedite the process of procurement,



contracts were placed by negotiation rather than competitive bidding.<sup>3</sup> Firms with prior military contracts had a significant advantage in the process.

By 1942 consumers faced price controls and rationing of consumer goods as military objectives increasingly crowded out production for civilian consumption. By 1944 military spending accounted for forty-four percent of GDP, a level never reached before or since. The production of consumer durables, like washing machines and electric appliances were restricted or prohibited altogether (Koistinen 2004, 279). Steel, aluminum, rubber, and numerous other materials were primarily allocated to military production under the priority allocation system, increasing the difficulties for consumer product businesses, usually small, to operate. Although the majority of companies eventually found a place in the mobilization effort, approximately 43 percent of the nations 184,000 manufacturing firms could not be used directly or indirectly for war production and could not be spared critical materials for nonessential output at even curtailed rates (Koistinen 2004, 278-9). Donald Nelson (1946, 269), chair of the WPB, recognized this dichotomy. "I hope that a little repetition will serve to underscore my acknowledgment that business firms of sub-average size , more often than not, did get the dirty end of the stick....The difficulty was, we didn't quite know how to utilize the thousands and thousands of small firms which were beginning to be pinched because of the purchases of goods and raw materials by the large manufacturers."

The impact of the new munitions spending also had some positive productivity effects for the civilian production that would follow the conversion after the war. Those

---

<sup>3</sup> Between July 1, 1939 and June 30, 1940, 87 percent of the War Department procurement was place using competitive bidding. In the following year between July 1, 1940 and February 28, 1941, 74 percent of purchasing to the form of negotiated contracts (Higgs, 1993)

who could take advantage of plentiful war contracts and federal tax incentives for plant expansion had significantly improved their facilities at the war's end. Many repairs and improvements were made to facilities that had fallen into partial disrepair during the Depression. At the beginning of the war developing soldiers was a problem, but “the lack of industrial facilities constituted a greater barrier to mobilization. The Depression had created much idle but largely obsolete industrial capacity. With demand low, there had been no incentives to modernize. The government had to encourage industrial expansion before its armed forces were engaged.” (Schubert 1994 )” “To have delayed the construction of such facilities until the United States was actually involved in battle,” R. Elberton Smith observed in his book on industrial mobilization, “might have lost the war before it began.” (Schubert 1994, 14). As the war went on, improvements continued, but the extent to which they could be effectively converted for use under civilian production varied from industry to industry. Robert Higgs (2004) found that the bulk of the government investment was too specific to military production needs to be useful for consumer goods after the war.

After the official end of the war, the war industries rapidly demobilized. The day following the surrender of Japan on August 15, 1945, all controls over manpower were removed and ration restrictions on fuels were lifted. The remaining rationing orders (except for sugar) were lifted in succession by the end of 1945. On the producers’ side, the WPB eliminated most priority controls on input materials, over 2.5 million workers were released from war jobs, and almost one-third of the almost 300,000 outstanding war contracts had been canceled by the end of August (U. S. Bureau of Budget 1946, 492}. Many businesses then went about the process of converting back to production of

consumer goods. Despite predictions that the declines in war spending would lead to a major recession, the return to peace led to a rapid expansion in business investment, private employment, and private production (Higgs 1999).

### **The Geography of War Spending and Economic Activity**

War spending between 1940 and 1945 was divided into two broad categories: contract spending and facilities spending. Contract spending, which accounted for the bulk of all war spending, included the value of all supply contracts with value of \$50,000 or higher that were awarded by major procurement branches of the military to individual producers for the procurement of combat supplies such as planes, tanks, guns or ships, as well as incidental materials like clothing, medical supplies, and paper. The value of contracts reported reflects the net value of contracts with any contract cancellations or contract reductions having been subtracted. The bulk of the contract awards by value went to combat equipment such as flight planes, tanks and ships. By value approximately 65 percent of total contracts went to combat equipment.

Facilities spending, defined as funds used to build government financed military or industrial facilities, accounted for only 13 percent of total war spending in 1940-45.<sup>4</sup> Facilities and contract spending are highly correlated. Consequently, for this analysis all spending will be considered jointly under the term 'war spending.'

Spending for a particular contract was assigned to a county as having been spent there if the principle producing plant was located in the county. The contracting firms

---

<sup>4</sup> These were projects financed by the Army, Navy, Maritime Commission, Defense Plant Corporation, Reconstruction Finance Corporation, and British Empire governments with estimated value greater than \$25,000 were reported to the War Production Board. The value of each project represents an estimate of the final cost of the project. These included industrial facilities that produced war materials such as aircraft plants or shipyards and military installations such as air fields or cantonments.

were generally large players in industry who were generally reluctant to subcontract to smaller firms except for the least profitable parts of the contract. As a result, contract funds remained largely where the prime contract was allocated. As the demand for military products grew, production was expanded at first using existing facilities. Eventually, as military demand exceeded productive capacity, facilities also had to be expanded. Industry revealed a strong preference for expanding existing facilities rather than setting up a new plant in a new location; most of the time the military did not challenge their decision (Koistinen 2004).

Thus because of the concentration of contracts and the concentration of facilities expansion, production was concentrated in a relatively small number of firms and counties, especially early in the mobilization. As seen in the map of county level war spending in Figure 1, much of the war spending was highly concentrated in the heavily industrialized areas in the Northeast, along the Great Lakes, and the West Coast. Collectively, the top twenty counties account for almost 40 percent of total spending. At the top of the list are chiefly large industrial counties. Wayne County, Michigan, home of the Detroit automakers, accounts for 5.7 percent of the total. Los Angeles, California is number two with 4.9 percent and Cook County (Chicago), Illinois ranks third with 4.4 percent of total spending.

The spending per capita in Figure 2 is less concentrated. The mean squared error (ratio of the standard deviation to the mean) of total spending is 6.5, which is nearly double the 3.6 mean squared error for war spending per capita. Further, the per capita distribution in Figure 2 yields some different rankings. Sarpy County, Nebraska received the most spending per capita with approximately \$19,563 (1967\$) per 1940 resident per

year from 1940 to 1945. Located just south of Omaha, Sarpy had been home to the Army's Offutt Air Field since the early 1920s and in 1940 became the site of Glenn Martin's bomber assembly plant" Rhode, Snyder, and Strumpf (2002). At the bottom of the list, 43 percent of the 3065 counties in the US failed to receive even one dollar of war spending.

The central issue in the paper is the extent to which war spending stimulated local economic activity. The measure we use is the growth rate in retail sales per capita between 1939 and 1948. Fishback, Horrace, and Kantor (2005) used this measure in their examination of the impact of the New Deal on economic activity in the 1930s. County level measures of income are not available, and retail sales is very highly correlated with income and with consumption. In comparisons at the state level, where both are available, for example, retail sales and estimates of personal income have correlations above 0.87 for several years in the 1930s.

The war prevented the collection of a retail census on the usual schedule, so retail sales information was not collected again until 1948. A focus on the 1939 and 1948 retail sales measures is advantageous even if intermediary data were available. Retail sales data from the war period of 1940-1945 would likely mis-measure the true normal market value of consumption due to the distortions caused by price ceilings, rationing, and black market transactions. These problems have plagued the estimates of consumption expenditures as a measure of consumer welfare during the War Years (Higgs 1992). By 1948 price controls and rationing were one to two years in the past, and the industries had reconverted to peacetime production. Hence, our estimates of the impact of WWII spending on retail sales reflect not the immediate effect, but the medium run

consequences of war spending which occurred after the economy was allowed to readjust to civilian production.

Figure 3 shows the state growth rates in retail sales per capita plotted against war spending per capita. Retail sales per capita in 1967 dollars grew rapidly between 1939 and 1948. Most states experienced growth rates of above 65 percent with the lowest rates in Massachusetts at 36 percent. There appears to be a slight negative relationship between war spending and retail sales, which we will explore in much greater depth econometrically. Connecticut and Michigan had the greatest per capita war spending at over \$10,000 per person, but their growth rates in retail sales were in the lower part of the state distribution. Meanwhile, a number of farm-oriented states experienced high retail sales growth while receiving much less war spending.

Although there is substantial variation at the state level, the variation is even larger at the county level. The map in Figure 4 shows the range of growth rates in economic activity at the county level. As seen in the state scatter plots, the highest rates of retail sales growth per capita were found in the farm belt. Comparisons of Figures 1 and 2 and 4 show again that the highest concentrations of war spending were generally not associated with the highest growth rates in per capita retail sales. There are a variety of reasons why this negative relationship appears in simple correlations. For example, many of the high growth areas were areas with low levels of retail sales per capita as of 1939. Thus, the same dollar increase in retail sales per capita would generate higher growth rates for those counties than for counties with higher 1939 levels. We will control for prior levels and a variety of other factors in the econometric analysis.

### **Predicting the Effect of World War II Spending on Local Economies.**

The natural expectation is that the introduction of World War II contracts and facility spending during the War would have led to expansions in retail sales that would carry over through the war. In late 1940, the unemployment rate was still hovering around 10 percent, so it would appear that the war spending would help soak up that unemployment. Fishback, Horrace, and Kantor (2005) find that an additional dollar of New Deal public works and relief spending had led to an increase in retail sales of roughly 43 cents, and they suggest that this can be translated into an expansion of income of over 80 cents during the 1930s. There was a strong flypaper effect but no net multiplier effect. It is important to note, however, that the New Deal public works and relief spending were on roads, dams, and other public projects and were not meant to take the place of private production.. There was likely some crowding out of private employment, as found by Wallis and Benjamin (1989) and Neumann, Fishback and Kantor (2006), but this was more indirect.

The war contracts and facilities were likely to have a much stronger and direct crowding out effects because privately-owned plants that normally produced autos, clothing, and consumer goods were being converted to produce military equipment. Kuznets (1945) and Higgs (1992, 1999) document sharp declines in the production of many consumer goods associated with this conversion. In addition, there were the added costs of converting from consumer to military production at the beginning of the war and then the conversion back after the war had ended. We should not anticipate, however, that the crowding out would necessarily be one for one, because the plants converted likely were increasing total production, there were new facilities built, others were

expanded, and the conversion may have led to technological updates that raised productivity.

Our goal in the paper is to estimate a reduced-form coefficient that summarizes a series of effects of the change war spending on changes in retail sales at the county level. We believe it would be valuable to identify the individual effects on these multiple relationships, but data limitations force us to ask the much simpler question, what was the overall impact of World War II spending on consumption at the local level? As a political economy question, we are asking would it have been a good move for state and local community leaders to push strongly to try to obtain war spending to enhance the relative standing of their communities? .

Our construction of the underlying factors incorporated in the reduced-form coefficient builds on a series of identities inspired by a model of fiscal federalism suggested by Wallace Oates (1973, 22-29). It is based on a regional model in which citizens consume a mixture of goods produced inside and outside their counties and export and import goods from other counties. Since we are interested in showing the impact of an additional dollar of WWII spending on the growth rate of retail sales, we develop this discussion in terms of changes in the relevant variables. In the course of the section, we show that changes in all of the variables are influenced to some degree by changes in World War II spending, so the reduced-form impact of World War II spending is obtained through a series of algebraic substitutions. The ultimate goal of the substitutions is to end up with the change in retail sales as a function of the change in World War II spending and the reduced-form parameter, holding other factors constant. All monetary variables discussed below are assumed to be in per capita terms.



Increases in after-tax income cause increases in the demand for goods (retail sales), which lead to increases in the total revenue of retail sales, assuming an upward sloping or flat supply curve in the retail market. Thus, the relationship between changes in retail sales and changes in after-tax income can be expressed as

$$\Delta R_i = r (1 - t_f) (\Delta Y_i - \Delta T_{i\text{sl}}) \quad (1),$$

where  $i$  indexes the county,  $\Delta R_i$  is the change in retail sales,  $r$  is the share of disposable income devoted to retail sales,  $\Delta Y_i$  is the change in income,  $t_f$  is the federal income tax rate, and  $\Delta T_{i\text{sl}}$  is the change in lump-sum state and local taxation, which is assumed to be tax deductible for federal tax purposes.

The change in county  $i$ 's income can be written as the sum of the following changes:

$$\Delta Y_i = \Delta \text{PI}_i + \Delta X_i - \Delta M_i + \Delta W_i + \Delta \text{SL}_i \quad (2),$$

where  $\Delta \text{PI}_i$  is the change in private spending within the county on goods and services produced within the county,  $\Delta X_i$  is the change in private income from non-war production exported outside the county,  $\Delta M_i$  is the change in goods and services imported from outside the county,  $\Delta W_i$  is the change in War spending and  $\Delta \text{SL}_i$  is the change in state and local government spending.<sup>5</sup>

---

<sup>5</sup> For the purposes of this exercise, we are assuming that all other government spending has stayed constant.

The change in private spending on goods and services produced within county  $i$ ,  $\Delta PI_i$ , is influenced by changes in after-tax disposable income,

$$\Delta PI_i = \gamma (1 - t_f) (\Delta Y_i - \Delta T_{i sl}) \quad (3),$$

where  $\gamma$  reflects the share of after-tax income allocated to employing unemployed resources and purchasing local goods in county  $i$ . The change in goods imported from outside the county,  $\Delta M_i$ , is influenced by changes in disposable income and in war spending,

$$\Delta M_i = m (1 - t_f) (\Delta Y_i - \Delta T_{i sl}) + m_s \Delta SL_i + m_w \Delta W_i, \quad (4),$$

where  $m$  denotes the share of additional after-tax income that county residents used to purchase goods and services outside the county. Similarly,  $m_s$  and  $m_w$  are shares of state/local and War outlays, respectively, that government decision-makers devoted to purchases from outside the county.<sup>6</sup>

Private income from non-war goods sold outside the county,  $\Delta X_i$ , might also have been influenced by changes in  $W$  outlays, such that

$$\Delta X_i = \pi \Delta W_i \quad (5).$$

---

<sup>6</sup> Note that after substituting equation 2.4 into equation 2.2, the impact of an added dollar of New Deal spending on local income is  $(1 - m_n)$  and that of another dollar of state and local spending is  $(1 - m_s)$ . We do not include government spending in the private consumption of internal county production because it would lead to double counting. The sum  $m + \gamma$  would equal one if there were no saving.

The  $\pi$  parameter reflects the extent of crowding out or expansions in productivity associated with the war spending. If there were full one-for-one crowding out of private production,  $\pi = -1$ . If we add conversion costs,  $\pi$  could even be more negative than -1. These crowding out effects would be offset by productivity increases and expansions of facilities. A full offset would imply  $\pi = 0$ . It is more likely that the parameter is between 0 and -1.

An influx of federal spending can lead to responses by state and local governments, so we assume the functional relationship

$$\Delta SL_i = \theta \Delta W_i \quad (6).$$

Increased War spending might have led state and local governments to spend more on roads and infrastructure ( $\theta > 0$ ) to sustain the increased activity around the plants. On the other hand, cuts in unemployment would have reduced the extent to which the governments were required to provide public assistance ( $\theta < 0$ ). In either case, the effects on state and local spending were likely to be offset by changes in state and local taxation.. As a result, we specify

$$\Delta T_{i\text{sl}} = \delta \Delta SL_i \quad (7).$$

Substituting equation (2.6) into (2.7) yields

$$\Delta T_{i\text{sl}} = \delta \theta \Delta W_i \quad (8).$$

State and local governments faced significant state constitutional restrictions in their ability to run short run deficits. Even when the governments ran temporary deficits, however, the bulk of the bonds were sold in markets outside the local jurisdiction and thus repayment of the debt at market interest rates was likely to be expected. Thus, a close to balanced budget ( $\delta$  near or = 1) assumption, where increases in state and local spending are matched or nearly matched by increases in state and local taxation, is reasonable. To the extent that state and local governments had more leeway to run deficits and obtain subsidized interest rates,  $\delta$  might be assumed less than one.<sup>7</sup>

We can obtain a reduced-form equation with the change in retail sales as a function of the change in War spending by substituting from equations 3, 4, 5, 6, and 8 into the change in income equation (2). Equation 2 can then be rewritten as the change in income as a function of the change in war spending and all of the parameters. We then can substitute from the new version of equation 2 into the retail sales equation (1), which then yields:

$$\Delta R_i = r (1 - t_f) [1/(1 - (1 - t_f) (\gamma - m))] * [1 - m_n + \pi + (1 - m_s - \delta) \theta] \Delta W_i \quad (9).$$

Define  $\Pi$  to be the base multiplier, which is the first half of the term in equation (9):

---

<sup>7</sup> See Oates 1973. During the 1930s, all of the states ran very large surpluses if capital outlays are excluded from their budgets. The inclusion of capital outlays led to deficits in two-thirds of the states. The states appear to have taken repayment of their debts seriously because by 1937 all but four states ran surpluses (including capital outlays as spending), some of which were very large, and three of the remaining four were very close to a balanced budget (U.S. Bureau of the Census 1935, 8-17, 28-39; 1940, 7-16).

$$\Pi = (1 - t_f) / [(1 - (1 - t_f)(\gamma - m))]. \quad (10).$$

The base multiplier increases in value as the share of extra spending on purchases of unemployed local resources and local goods and services ( $\gamma$ ) produced inside the county rises and as the share of goods and services imported into the county ( $m$ ) falls. Higher federal taxes will reduce the size of the multiplier. Thus, the federal tax rates serve as drag on the benefits of expansion in the local economy and the income multiplier is reduced. Estimates of base multipliers for employment with more recent county-level data suggest values ranging from 1 to 2.5 (Vias and Mulligan 1997).<sup>8</sup>

Let  $\mu$  be the reduced-form relationship measuring the impact of an additional dollar of War spending in county  $i$  on retail sales. That is,

$$B = r \Pi [1 - m_w + \pi + (1 - m_s - \delta) \theta] = r \mu \quad (11).$$

The reduced form parameter  $\beta$  summarizes the various channels through which war spending influenced retail sales and  $\mu$  is the income multiplier after all influences are accounted for. To get a sense of what might be reasonable values to expect for  $\beta$  and  $\mu$ , Table 1 shows how different values of the key parameters would affect the impact of World War II spending on retail sales. Although the reduced-form parameter is composed of several underlying parameters, we can make educated guesses about some of their values, while others have very little impact on the predicted value of  $\beta$ .

---

<sup>8</sup> For discussions of the theoretical bases for these multipliers, see McGregor, et. al. (2000), Merrifield (1987), and the sources cited therein. The multipliers based on neoclassical principles have assumed that labor markets clear at the prevailing wage. We chose a quasi-Keynesian approach in part for simplicity and in part because of the strong price controls that prevented the existence of market clearing prices during the war years.

In general, we have a good sense of the following parameter values. Estimates from national data suggest a ratio of retail sales to personal income of roughly .53. If income elasticity for retail sales was one, we can reasonably assume that the  $r$  will remain the same for different income levels. Alternative income elasticities suggest that the range of the ratio for income levels 20 percent above or below the mean would be within the range of .5 to .6. If we find that an additional dollar of war spending raised retail sales by .53, it would suggest that income in the county rose by approximately one dollar, i.e. an income multiplier ( $\mu$ ) of 1. It is possible that the marginal  $r$  might differ from the average  $r$ . As  $r$  increases toward 1, so that each additional dollar of income goes to retail sales, the income multiplier converges to the retail sales coefficient. As  $r$  falls, the income multiplier from the retail sales coefficient rises.

In Table 1 we assume a nearly balanced state and local government budget,  $\delta = 0.9$ , and that the War spending had a net effect of increasing state and local spending ( $\theta = 0.1$ ). Changes in the state and local government crowding or matching parameter  $\theta$  have little effect on the reduced-form coefficient because state and local governments faced restrictions on deficit spending. If state and local governments had balanced budgets and focused their spending on goods and services produced inside the county,  $\delta = 1$  and  $m_s = 0$ , the estimated coefficient will reflect no flypaper or crowding-out effects. A reasonable assumption can be made that state and local governments focused their spending on local workers and goods and services, such that only 20 percent of state and local government spending went toward the purchase of goods and services from outside the county ( $m_s=0.2$ ). Changes in this assumption also tend to have very small effects on the final reduced-form parameter.

Everybody in the U.S. faced the same federal tax schedule, and taxation increased dramatically during the war, such that for the first time the majority of the public was paying income taxes. We are assuming that corporate income taxes are being paid in the counties where the plants were located, as well. The ratio of federal tax revenues collected to GDP was 0.10 in 1942, 0.23 in 1944 and 0.21 in 1946, so we choose a figure of 20 percent to reflect the extent of taxation. Lowering the tax rate to 10 percent compared to the baseline with half crowding out in Table 1 raises the retail sales coefficient from 0.13 to 0.16.

The anticipated retail sales coefficient ( $\beta$ ) is most strongly influenced by three parameters: the shares of income spent on local goods and services from outside the county ( $m$ ), the extent of crowding out or productivity enhancement of private activity ( $\pi$ ), and the extent to which the war spending was spent on inputs brought in from outside the county as opposed to wages, rents and other local services ( $m_w$ ). Table 1 shows the effects of different assumptions for these parameters. When the local/external spending split rises from 50/50 in the bottom half of the table to 75/25 in the top half, the base multiplier rises 1.67 fold. As a result the retail sales coefficient is magnified by the same ratio.

The extent of crowding out of local activity ( $\pi$ ) and the share of war plant expenditures purchased from outside the county ( $m_w$ ) serve to reduce the coefficient in a similar fashion. Both effects are magnified by the base multiplier. Given the structure of the relationship in equation 11, the same change in shares has the same effect in both cases. In the first line of Table 1, when the crowding out parameter  $\pi$  is -0.5 and the share of inputs from outside the county at the war plant ( $m_w$ ) is 0.3, the retail sales

coefficient is only 0.13. Increasing the absolute magnitude of the crowding out parameter ( $\pi$ ) from -0.5 to -0.7 in line 2 has the same effect as increasing the external share of inputs used for war spending ( $m_w$ ) from 0.3 to 0.5. Each reduces the reduced-form retail sales coefficient ( $\beta$ ) from 0.13 to -0.1. If the war had added production with no replacement or increased productivity from the war spending had offset the crowding out, the  $\pi$  parameter would be 0. In that case, the retail sales coefficient ( $\beta$ ) would be 0.49.

The results of this exercise suggest that even in the most optimistic scenario with no crowding out and reasonable estimates of the extent to which the population buys goods from outside the county and the war spending brings in inputs from outside, that we should expect no more than a 50 cent increase in retail sales per capita for a dollar increase in per capita war spending. Given the likelihood of significant crowding out of private production at the plants and of significant conversion costs to military production and back, we might expect no effect at all. The fiscal drag of the tax revenues collected on the expansion in income, the possibility of leakages in war spending when the plant brings in inputs from outside the county, and the possibility that war spending crowded out half of private production makes the possibility of a negative coefficient a real possibility.

### **Estimation Procedure**

We follow the lead of Fishback, Horrace, and Kantor (2005) in estimating a log-linear growth equation to estimate the impact of war spending on the change in retail sales between 1939 and 1948.



$$\ln(R_{i,48}) - \ln(R_{i,39}) = \beta_0 + \beta_1 \text{WAR}_{i,40-45} + \beta_2 \ln(R_{i,39}) + \beta_3 Z_{i,39} + \beta_4 S + \varepsilon_i \quad (12)$$

where  $\ln(R_{i,48})$  and  $\ln(R_{i,39})$  are per capita retail sales in 1948 and 1939,  $\text{WAR}_{i,40-45}$  is per capita war spending from 1940 through 1945,  $Z_{i,39}$  is a vector of structural correlates measured in 1939 that might have determined economic growth over the decade,  $S$  is a vector of state dummies, and  $\varepsilon_i$  is an unobservable error term.

As in the Fishback, Horrace, and Kantor paper (2005), the vector of structural correlates includes a large set of variables measuring the economic, demographic and geographic composition of each county. The reason for including a large set of control variable is to avoid problems stemming from omitted variables that would lead to biased coefficients and incorrect inference about the impact of war spending on local economies. For expositional ease, the vector of correlates is further subdivided into the following categories: prior levels of retail sales, economic trends, demographic, geographic, climatic effects and states fixed effects.

$$(Z_{i,39} S) = (\ln(R_{i,39}) \text{Econ}_{i,39} \text{Demo}_{i,39} \text{Geo}_{i,39} \text{Clim}_{i,39} S) \quad (13)$$

The model includes the lagged log level of retail sales per capita, as in most growth models to control for convergence and the mechanical relationship between growth rates and prior levels. To control for prior economic trends, the growth rate of retail sales from 1929 to 1939 is included. A series of demographic correlates control for differences in retail consumption patterns and income levels by age, race, ethnicity, education, gender,

urbanization, and ownership of radios. Geographic features influenced the natural resource base, access to transportation, potential agglomeration economies, and other factors (Diamond 1997; Gallop, Sachs, and Mellinger 1999). We include weather information to control for the impact of both regular weather and extremes in weather that might have influenced building projects. These features were interacted with the share of farming because weather likely had stronger effects on agricultural output. Finally, we incorporated state fixed effects to control for factors that were common to all counties within a state but varied across states, including state taxes, . The state dummies will capture unmeasured heterogeneity such as the extent of mobilization of the population into the armed forces, state taxation and revenue policies, retail laws, and differences in the cost of living across states.

Ordinary Least Squares estimates of the coefficients on war spending are shown in Table 2 for a series of specifications that add each set of correlates cumulatively. The simplest OLS specification,(1) shows the descriptive relationship between retail sales growth and war spending without any controls. As seen in the maps and scatter plots, there is a negative and statistically significant correlation between war spending and retail sales growth. A one standard deviation increase in war spending was associated with a reduction in the retail sales per capita growth rate of 0.19 standard deviations.<sup>9</sup> The coefficient implies that at the average level of retail sales per capita in the U.S. in 1939 of

---

<sup>9</sup> The standard deviation of county level war spending is \$807. The standard deviation of retail sales growth is 0.218. Using the war coefficient in specification (1), we have  $-5.13E-05 \times 807 = -0.041$  which is the effect of a one standard deviation change in war spending on retail sales growth. Dividing by the standard deviation of retail sales growth gives us the change in terms of the standard deviation,  $-0.041 \times 0.218 = -0.19$ .

\$533, a dollar increase in war spending per capita would have reduced retail sales per capita by less than one cent.<sup>10</sup> So the effect is relatively small.

Each subsequent specification in Table 2 retains the correlates of the previous specification while adding additional control variables. Although the coefficient remains statistically significant, the addition of more correlates causes the economic significance of the war spending to erode. The OLS coefficients in specification 7 are reported in Table 4.

### **Exploring Other Methodologies**

The results thus far suggest that a mixture of crowding out of private production, fiscal drag of taxation, leakages of military input spending, and/or consumption of goods produced external to the county contributed to war spending having virtually no effect on the local economies. We follow a series of procedures to examine the robustness of this findings including estimations on subsamples, estimation of a simple 0-1 treatment effect, and the inclusion of agricultural output. Although all of the narrative evidence suggests no reason to anticipate endogeneity caused by the military trying to spend more in regions with high unemployment, we explore an instrumental variable analysis using the 1930s war preparation plans as an instrument. We then estimate a difference in

---

<sup>10</sup> In specification (1), a \$1 increase in annual, per capita war spending in a county would reduce the difference between log retail sales in the later period and the log retail sales in the earlier period by 0.0000513. At the average level of retail sales per capita in the US in 1939 of \$533 (the log value is 6.2785) this translates into a \$.0273 decrease in retail sales for every war dollar spent in that county.

difference model, where we examine the change in retail spending growth from 1929-39 to 1939-1948.<sup>11</sup>

### *Subsamples*

One potential worry with this data set is that because of the tremendous variation in the amount of war spending between counties that outliers are driving the results. The impact of war spending per capita in specifications (8) through (11) in Table 3 show the results of checking the sample for outliers. After selecting a subsample from the full set of counties, each is estimated by OLS using the full set of correlates in specification (7).

Specification (8) eliminates counties which lie in the top 5% in terms of war spending per capita, an average of \$5028 per capita. These were the most industrialized counties in the country. In gross terms the top 5% of counties received 72 percent of the \$493 billion in contract war spending while accounting for only 26 percent of the population. Our goal in this specification is to compare the impact of the war spending in the counties which received nothing to those that received a moderate amount on the grounds that they are more alike.

Specification (9) considers only counties that received a strictly positive amount of war spending in case counties receiving no spending were too structurally different from those who received it.

Specification (10) still considers only counties with positive spending, but further eliminates counties in the tails of the positive spending distribution. Counties that are

---

<sup>11</sup>We have also performed the complete analyses in the paper by adding a squared term for war spending per capita and by using natural logs of war spending per capita after adding a dollar to all values to eliminate zeroes). The qualitative findings are unchanged.

below the 5<sup>th</sup> percentile or above the 95 percentile in the positive spending distribution are removed.

Specification (11) addresses the implicit assumption made by OLS concerning common support. Problems with common support occur when there are no “similar” observations to use as a counterfactual. We are concerned that counties that received war money were systematically different from those that did not receive money after controlling for observable characteristics. For comparison purposes we are looking for counties that are similar along many characteristics but one does not receive spending while the other does. To examine the common support a dummy variable was created for receiving a positive amount of war spending. A probit model was used to estimate the probability of treatment, i.e. receiving greater than \$0 of spending on the full set of correlates in specification (7) of the OLS regression. A histogram of treated and untreated counties by propensity score was used to determine a “thick region” of common support. Treated counties in this thick region have as counterfactuals untreated counties with similar observable characteristics. Counties with a propensity score outside of the thick region were eliminated. The model was then estimated using OLS with the continuous measure of war spending and all structural correlates.

The results in Table 3 for the different subsamples tell the same story as before. There is a very small negative effect of war spending in each subsample, although several estimates are now statistically insignificantly different from zero.

#### *Treatment Effects*

Another hypothesis may be that what really matters is not *how much* war money is spent in your county, but simply *if* a county receives any money at all. Since nearly

40% of the sample received no war spending, we can run regressions with a balanced number of treated and control counties. For specification (12), we replace war spending per capita in specification (7) with a dummy variable equal to one if a county received any level of spending. The resulting estimates should not be construed as causal since we don't believe that war contracts were randomly allocated, but rather counties were selected to be treated based on their ability to produce war materials quickly or efficiently. Thus the characteristics of counties receiving contracts and those which don't are likely to differ greatly in their characteristics. Still, regarding spending as a treatment is a useful exploration of the data. The resulting coefficient on the treatment dummy is still small, negative and insignificant, very much in line with the previous results.

### *Agricultural Production*

There were numerous reports of a sharp rise in agricultural production as American farmers grew foodstuff that were transported and sold to allies in war-torn lands. This rapid growth is highlighted in the county map for retail sales per capita growth in Figure 4. As seen in the other maps, these many farm counties did not receive much in the way of war spending. Specification (13) incorporates the growth in the value of farm output. While the growth in farm output has a positive coefficient, the impact of war spending per capita is negative, although smaller than in all of the other specifications.

### *Instrumental Variables*

Another possible criticism of the OLS results is the potential endogeneity of war spending and retail sales. The allocation of war spending was not random and might have been endogenous. In order to have a downward endogeneity bias, war funds would

have had to have been increasingly allocated to counties experiencing economic hardship. If military procurement plans took this into consideration, then the allocation of war funds to economically distressed counties could make it appear as though war spending impeded economic growth.

The argument for the negative bias is consistent with the following argument. The massive mobilization of the US economy caused labor shortages in areas with highly concentrated war spending by the middle of 1942. The shortages were exacerbated by the conscription of able-bodied workers. Meanwhile, civilian production by many smaller firms was squeezed by the lack of access to steel, aluminum, rubber and other necessary materials. In response to these economic disturbances, Critical Labor Areas and small business programs were developed to steer projects to smaller firms and areas with more unemployment. The narratives at the time suggest that the military, and not the War Production Board, dominated the allocation of the contracts, and that they paid little attention to these civilian-focused programs (Koistinen 2004). The programs generally had relatively few dollars to allocate but at the margin they might have influenced the distribution process in ways that cause some negative endogeneity bias.

On the other hand, the case for a positive bias due to endogeneity seems equally if not more plausible. From historical documents we know that large firms, businesses with established production records, and firms with manufacturing expertise had an advantage in acquiring contracts from military procurement agencies. Thus the most industrially capable and urbanized counties received the most war dollars. If we believe that economically capable counties also have a higher level of retail sale growth in the absence of contracts, then the allocation of war contracts to manufacturing counties

would lead to a positive bias of our estimates even if such spending had no real effect. If we believe growth is more or less independent of the economic capacity of the county then this type of endogeneity is not an issue.

In either case, the situation warrants further inspection. A natural recourse in this situation is to use instrumental variables. To use this procedure, appropriate instruments must be found that are strongly correlated with per capita war spending, holding the other correlates constant, and also uncorrelated with the error term of the growth equation. We find one such set of instruments in the Industrial Mobilization Plan (IMP) of the 1930s.

The first version of the IMP appeared in 1931. It was revised several times with the last revision in 1939. As part of the plan a survey was administered that determined the productive capacity of each firm. In case of war, the IMP plan assigned each plant a task to be performed for a specific branch of the military; during war other military branches were not to contract with that firm. The “more than ten thousand plants kept under allocation throughout the planning period represented the bulk, as well as the “cream” of American productive capacity.” (Smith 1959, 59). Although designed for an emergency like World War II, the plan was never formally implemented. However, there is plenty of evidence that “the selection of contractors for most items was guided if not determined by the facility surveys and allocation plans of the previous decade.” A 1943 sample study administered by the Army Industrial College in four major industrial cities found that 95 percent of contracts by value were awarded to facilities preselected under the allocation plan (Smith, 1959).

Given this institutional background, the number of facilities in a county allocated under the IMP seems to constitute an ideal instrument. The number of allocated facilities



in a county was clearly correlated with placement of contracts in the county. Given that allocations were made prior to the economic mobilization of the US economy facility, simultaneity bias is not a problem. The military planning process was designed to maximize readiness and thus was not oriented to potential unemployment in the 1940s.

To obtain counts we use the last published directory of facilities which was published January 1, 1938 well before any indication that the US would be entering what was a European conflict at the time. For each county the total number of facilities in the county allocated by the IMP was recorded. In addition, we count the number of facilities allocated to each procurement branch of the military.<sup>12</sup> In practice the vector of instrumental variables was a subset of the allocations to particular procurement agencies or boards. We used the allocations to procurement agencies rather than the total number of facilities in a county due to heterogenous affects of different kinds of allocations. For example, the procurement agency with the highest number of allocations in most counties was the Army Quartermaster Corp. Yet the types of facilities allocated to this agency, such as clothing manufacturers or paper suppliers, were unlike to secure the high value contracts that facilities allocated to the Aeronautical Board were likely to obtain. A subset of counts by agency were used rather than the full set of counts by procurement agency because many of the counts lacked explanatory power in the first stage of estimation.

---

<sup>12</sup> The sum of the number of facilities allocated to each procurement branch in a county is greater than or equal to the total number of allocated facilities in the county. This is because some facilities were shared, that is allocated to more than one branch of the military. In addition some facilities were of such importance that they were shared by all branches of the military. These "reserved" facilities were allocated to either the Army Navy Munitions Board (ANMB) or the Office of the Assistant Secretary of War (OASW). Other facilities of strategic importance were made part of a special plan which had a separate board to manage their use. We note whether a facility was earmarked as part of a special economic mobilization plan. For a list of procurement agencies and special economic mobilization plan. See Appendix Table 1 .

We re-estimate equation 12 using Two Stage Least Squares (2SLS) where the first-stage equation for war spending per capita contains all of the remaining right-hand side variables in equation 12 and the IMP counts.<sup>13</sup> The first-stage and second-stage results, along with the OLS results and summary statistics for all variables are reported in Table 4. Each of the IMP counts had statistically significant effects on war spending per capita after controlling for the remaining correlates. The F-statistic for the identifying instruments as a group is 4.51. We anticipated that the Army Quartermaster Allocations would have a negative effect because of the small size of their contracts, but we were surprised by the negative effects of the Steel Plan Allocations and the Office of the Assistant Secretary of War (OASW). Since these were both important and high value programs, we anticipated a positive coefficient. Although not all agency allocations are included in this regression, the negative signs on these instruments are still negative when all agency allocations are included. We have no explanation for this. A Hausman overidentification test did not reject the null hypothesis that the identifying instruments are uncorrelated with the errors from the growth equation.

This is the first estimation procedure that has led to a positive coefficient. However, the coefficient is not statistically significantly different from zero. Further, the economic significance is tiny because an additional dollar of war spending raised the level of retail sales by less than a cent and a one-standard deviation increase in war spending per capita raised the growth rate of retail sales per capita by 0.013 standard deviations.

---

<sup>13</sup> Before discovering the IMP plans, we explored the use of a number of instruments, ranging from the political variables used by Fishback, Hoxby, and Kantor (2005, 2006) to a series of variables used by Rhode, Snyder, and Strumpf (2002). In most cases they reduced the strength of the instruments, and in a number of cases their inclusion caused the Hansen test to reject the hypothesis that the specification was correct; thus there was a reasonable chance that the variables were correlated with the final equation error.

### *Differencing*

Our final robustness check involves estimating the differenced version of equation 12 with some adjustments that lead to equation 14.

$$[\ln(R_{i,48})-\ln(R_{i,39})] - [\ln(R_{i,39})-\ln(R_{i,29})] = \alpha_0 + \alpha_1 WAR_{i,40-45} - \alpha_2 NDPR_{i,33-39} \\ + \alpha_3 [\ln(R_{i,39}) - \ln(R_{i,29})] + \alpha_4 [X_{i39} - X_{i29}] + \alpha_5 [C_{39} - C_{29}] + \alpha_6 S + \eta_i \quad (14)$$

The equation was developed by using information collected by Fishback, Horrace, and Kantor (2005, 2006) for their studies of the New Deal at the county level. There are several adjustments made. First, we include New Deal spending on public works and relief programs, which was the vast majority of federal spending in the 1930s. We don't have specific war spending for the 1930s, but we don't believe this to be problematic because annual military spending in the 1930s was less than one-twenty-sixth of the spending in 1942 and one-seventieth of the levels around 1944 (U.S. Census Bureau 1975, 1120). Second, the differencing of the vector of correlates (Z in equation 12) between 1939 and 1929 drops the geographic variables because they do not vary over time and becomes the X vector of correlates in equation 14. Third, in differencing we might also expect the state correlates to difference out, but we include them to capture the changes in policy and cost of living that might have influenced the changing growth rates. Fourth, AAA farm program spending was a key feature of the New Deal. They continued and were reinforced in the 1940's (U.S. War Office of Budget, 1946). We

have AAA information by county for the 1930s but not for the 1940s. To control for the AAA spending in both decades, we use the shares of crop output devoted to crops that were part of the AAA program in 1929 and in 1939 as proxies for the extent of AAA activity.<sup>14</sup> Fifth, due to lack of information on retail sales growth per capita in the 1920s, we controlled for lagged growth in the X difference vector by using the difference in the growth rate of population between 1920-30 and 1930-1940<sup>15</sup>.

The differenced results are reported in Table 5. Again, we observe a negative and statistically significant effect of war spending that is very small in economic magnitude. We have explored using an instrumental variable analysis of the differenced equation but have been running into problems with finding instruments that are both strong in this setting and valid.

### **Longer Range Effects on Retail Sales**

There is always the possibility that the medium term effects we have measured understate the longer-range benefits of the military spending because by 1948 the factories only recently had been converted. To check this hypothesis, we have also run the same sequence of estimates for growth rates in retail sales per capita from 1939 through 1954 and again for retail sales per capita from 1939 through 1958. The basic results in Tables 6 and 7 are very similar to what we have reported for the 1939-1948 period. All the War spending coefficients show virtually no effect of the spending on the growth in retail sales per capita. All the coefficients are negative except in the 2SLS

---

<sup>14</sup> The "big five" crops that received subsidies via the AAA were wheat, cotton, corn, tobacco, and rice. Of these five we control for four of these: wheat, cotton, corn, and tobacco.

<sup>15</sup> The growth rate of the population seems to be a good proxy for retail sales growth. We found that substituting population growth for retail sale growth in the un-differenced model yielded almost exactly the same results.

estimation. There may be some omitted variables issues in these two cases associated with spending for war production during the Korean War and the very beginnings of the building of the interstate highway systems after the act was passed in 1956. However, these expenditures were much smaller than the War expenditures and we do not believe them to have enough influence to alter the findings by much.<sup>16</sup>

### **Conclusion**

Using a variety of specifications and methods of estimation the results show that the huge increases in World War II spending on contracts and facilities had virtually no effect on the growth in retail sales at the local level between 1939 and 1948. Nor did the spending have any longer range effects for retail sales growth rates over the periods 1939-1954 and 1939-1958. The results for World War II spending contrast sharply with Fishback, Horrace, and Kantor's (2005) findings for New Deal Public Works and Relief projects. They found that an additional dollar of public works and relief spending during the 1930s raised retail sales in 1939 by about 45 cents, and a one-standard deviation increase in public works and relief led to an increase in retail sales growth between 1929 and 1939 by 0.97 standard deviations.

Both studies estimated a reduced-form coefficient that simultaneously incorporates a series of effects. There are four key differences between the War spending and the New Deal public works and relief spending that likely led to this result. First, the war spending explicitly shifted whole plants to war contract production of military goods

---

<sup>16</sup> We have also performed the same sequence of estimations using the growth in manufacturing value added per capita for the periods 1939-1947 and 1939-1954 as the measures of economic activity. Again, the results are very similar to those found for retail sales per capita.

and subsequently reduced the production of consumer goods at those plants. Shortages of key materials contributed to this crowding out. In contrast, the New Deal public works and relief projects were designed to soak up unemployment to build works that had traditionally been built by governments. In this sense of crowding out, the New Deal AAA programs that took land out of production is more similar to the war spending. In fact, Fishback, Horrace, and Kantor (2005) found no positive effect of the AAA spending on retail sales spending.

Second, the war spending involved significant costs of conversion from civilian to war production and then back, a problem the New Deal did not experience. Third, any expansions in income and consumption from war spending were taxed at a much higher rate than similar expansions during the New Deal. During the war average federal tax rates increased sharply from an average of 7 percent to 22 percent. For the first time the majority of households were paying income taxes, compared with less than 7 percent of households during the 1930s. Fourth, it is likely that a significantly higher share of war spending went to inputs imported from outside the county. Whereas, 80 to 90 percent of public works and relief project spending went to earnings of workers, the shares of cost devoted to earnings, rent, and locally produced goods were likely lower for war spending. Our next step is to try to control for these import effects more effectively by developing spatial weights for war spending in other counties that would be based on distance and measures of the extent of production of key war inputs as of 1939.

The examination of per capita retail sales growth for the periods 1939-1948, 1939-1954, and 1939-1958 offered several advantages. We were able to look at the medium and longer term effects of the war spending by comparing consumer activity

before the mobilization and three years afterward with the populations that were in place at those time periods. However, there are a number of issues that we would like to address for which we have nearly finished computerizing the data.

One key issue is how the war spending influenced economic welfare and consumption during the mobilization. Higgs (1992) argues that the War was just a continuation of the Great Depression on several dimensions of economic welfare. When measured correctly, real consumption per person actually fell, and unemployment was largely replaced by induction into the discomforts and dangers in the military. If this is true, we might anticipate that the war spending would have influenced nontraditional measures like infant mortality. The rapid expansion in war spending might have been associated with higher infant mortality, although we might have seen improvements in infant mortality through the distribution of drugs like penicillin and maternal public health programs for the pregnant wives of soldiers. On another dimension, there is ample narrative evidence that the mobilization of resources for the war led to substantial internal migration over the course of the 1940s as some people were required to move long distances to meet labor shortages and many soldiers were moved about the country and the world and thus were more likely to return to another location after the war. In consequence, we plan to examine the impact of the war spending on migration patterns during the 1940s decade using methods like those developed for estimating net migration in Fishback, Horrace, and Kantor (2006).

Many argue that one of the keys to the post-war economic boom was the accumulation of savings by wage earners who had could not buy much due to the rationing and the lack of production of consumer durables. To some extent our use of the

growth rates through 1948, 1954, and 1958 already get at this issue. We plan to address the issue in an alternative fashion by examining the accumulation of deposits in banks during the War and also changes in the values of housing between 1940 and 1950.



## Data Appendix

### *War Spending.*

War spending figures come from the County Data Book of 1947 compiled by the Bureau of the Census and available in part 70 from the ICPSR in the datasets compiled and revised by Michael Haines (no date). War spending is broken into supply contracts and facilities projects. Supply contracts represented major war supply contracts awarded between June 1940 and September 1945 by the War Department, the Navy Department, the Maritime Commission, the Treasury Procurement Division, and foreign purchasing missions as reported to the War Production Board. A major war supply contract was a prime contract involving a sum of \$50,000 or more. The total value of contracts reflects the net value of contracts with any contract reductions and cancellations having been deducted. Contracts for combat equipment such as aircraft, ships, and ordnance were separately tabulated from other contracts. Supply contracts were assigned to counties if the location of the principle producing plants were located in the county. If it was not possible to assign a contract definitely to any county, then the contract was omitted. Contracts for foodstuffs and food processing were also omitted.

Facilities projects include any undertaking reported to the War Production Board between June 1940 and June 1945 for which a contract or project order was issued in excess of \$25,000. Projects financed by the Army, Navy, Maritime Commission, Defense Plant Corporation, Reconstruction Finance Corporation, and British Empire governments are included. The value of each project represents an estimate of the final cost of the project. Facilities spending was further broken down into industrial facilities spending and military facilities spending. Industrial facilities represent plants constructed to produce war materials such as shipyards, munitions factories, and aircraft plants. Military facilities represent cantonments, airports, and other military installations for which direct outlays were made by the armed forces. The value of any facilities which were constructed using private funds was excluded.

For the purposes of this study supply contracts (both combat supplies and other supplies) and facilities spending (both industrial and military facilities) were aggregated to construct total measure of war spending in a county between 1940 and 1945. Spending was adjusted to 1967 dollars to match other monetary measures in the study.

### *Industrial Mobilization Counts*

Facility allocations under the Industrial Mobilization Plan were found using the "Directory of Facilities, Allocated and Reserved" compiled by the Office of the Assistant Secretary of War's Planning Branch. This document, which was restricted at the time, was published several times during the 1930's. The data for this study are compiled from the version released January 1, 1938.

Almost 10,000 facilities are included in this publication. For each facility the following was recorded: location(city and state), the procuring agency it was assigned to, and finally whether it had a special designation. Some facilities were assigned to more than one procuring agency. Procurement agencies included the Navy Department, Army Quartermaster Corps, Army Ordnance Department, Army Air Corps, Army Corps of Engineers, Army Chemical Warfare Service, Army Signal Corps, Army Medical Department, and the Army Coast Artillery Corps. Special mobilization designations include the Steel Mobilization Plan, Machine Tool facility, Optical & Precision Instruments facility, Aeronautic facility, Army and Navy Munitions Board facility, and Offices of the Assistant Secretary of War facility.

For each city the total number of facilities were counted. In addition the total number of facilities allocated to each procuring agency was tabulated. The number of facilities with each special designation were also calculated. City counts were then aggregated to the county level. The final data shows the number of facilities in each county which were allocated to each procurement agency and designation.

Information on the correlates in 1940 and 1930 have been compiled by Price Fishback and Shawn Kantor from a wide range of sources. See the data appendices in Fishback, Horrace, and Kantor (2005, 2006) and the NBER working papers associated with those papers. See Price Fishback's website at the Department of Economics at the University of Arizona for access to the working papers and the portions of the data that have already been used in publications. Look under dataset from published research at <http://econ.arizona.edu/faculty/Fishback.aspx>. Population in 1948 was calculated via linear interpolation of populations from U.S. Population Census Information in 1940 and 1950 from Haines (ICPSR).

Fishback and Kantor had combined a number of counties and city districts in areas where the New Deal information was reported for the larger district. For this study additional counties were combined in cases where there were significant boundary changes in the 1940s. In Virginia this involved combining the following cities back into their counties: Bedford city into Bedford county, Chesapeake city into princess anne, Virginia beach city into princess anne, colonial heights into prince george, Covington city into Allegheny county; Fairfax city into Fairfax county, falls church city into Fairfax county, franklin city into southhampton county, Lexington city into rockbridge, manassas city into prince William county, poquosan city into york, salem city into Roanoke, Waynesboro city into augusta county, emporia city into Greensville county, galax city into carroll, norton city into wise county. In New Mexico, Los Alamos was created in 1949 out of Sandoval and Santa Fe counties, so we combined them into one. In North Dakota Washington County was eliminated and merged into Shannon County.

## References:

- Aschauer, David Alan, "Is Public Expenditure Productive?" Journal of Monetary Economics 23 (March 1989), 177-200.
- Bailey, Stephen J., and Stephen Connolly, "The Flypaper Effect: Identifying Areas for Further Research," Public Choice 95 (June 1998), 335-61.
- Barro, Robert J., and Xavier Sala-i-Martin, Economic Growth, second edition (Cambridge, MA: MIT Press, 2004).
- Costa, Jose da Silva, Richard W. Ellson, and Randolph C. Martin, "Public Capital, Regional Output, and Development: Some Empirical Evidence," Journal of Regional Science 27 (Aug. 1987), 419-37.
- Diamond, Jared, Guns, Germs, and Steel: The Fates of Human Societies (New York: W. W. Norton, 1997).
- Duffy-Deno, Kevin T., and Randall W. Eberts, "Public Infrastructure and Regional Economic Development: A Simultaneous Equations Approach," Journal of Urban Economics 30 (Nov. 1991), 329-43.
- Fernald, John G., "Roads to Prosperity? Assessing the Link between Public Capital and Productivity," American Economic Review 89 (June 1999), 619-38.
- Fishback, Price V. Fishback, William C. Horrace and Shawn Kantor. 2005. "Did New Deal Grant Programs Stimulate Local Economies? A Study of Federal Grants and Retail Sales During the Great Depression," Journal of Economic History 63 (March 2005):
- Fishback, Price V., Horrace, William C., and Kantor S. (2006). "Do Federal Programs Affect Internal Migration? The Impact of New Deal Expenditures on Mobility During the Great Depression," Explorations in Economic History 43 (April 2006): 179-222.
- Fishback, Price V., Shawn Kantor, and John Joseph Wallis, "Can the Three R's be Rehabilitated? A Comprehensive Analysis, Program by Program, County by County," Explorations in Economic History 40 (July 2003), 278-307.
- Gallop, John Luke, Jeffrey D. Sachs, and Andrew D. Mellinger, "Geography and Economic Development," in Boris Pleskovic and Joseph E. Stiglitz, eds., Annual World Bank Conference on Development Economics, 1998 (Washington, DC: World Bank, 1999), 127-78.
- Garcia-Mila, Theresa, and Therese J. McGuire, "The Contribution of Publicly Provided Inputs to States' Economies," Regional Science and Urban Economics, 22 (June 1992), 229-41.
- Gardner, John, and William Cohen, "Demographic Characteristics of the Population of the United States, 1930-1950: County-Level," ICPSR file 0020, 1992.
- Gramlich, Edward M., "Infrastructure Investment: A Review Essay," Journal of Economic Literature, 32 (Sept. 1994), 1176-96.
- \_\_\_\_\_, "Intergovernmental Grants: A Review of the Empirical Literature." In The Political Economy of Fiscal Federalism. Edited by Wallace E. Oates. Lexington, Massachusetts: Lexington Books, 1977.
- Greene, William H., Econometric Analysis, Fifth Edition (New York: Prentice Hall, 2003).

- Hahn, Jinyong, and Jerry Hausman, "A new specification test for the validity of instrumental variables," Econometrica 70 (Jan. 2002), 163-89.
- Haines, Michael. (no date). Historical, Demographic, Economic, and Social Data: The United States, 1790-2000. Computerized Data sets from the Inter-University Consortium for Political and Social Research (ICPSR). ICPSR No. 2896.
- Hausman, Jerry, "Specification and Estimation of Simultaneous Equations Models," In Zvi Griliches and Michael Intriligator, eds, Handbook of Econometrics (Amsterdam: North-Holland, 1983).
- Higgs, Robert. 1992. "Wartime Prosperity? A Reassessment of the US Economy in the 1940's," Journal of Economic History 52 (March): 41-60.
- Higgs, Robert. 1993. "Private Profit, Public Risk: Institutional Antecedents of the Modern Military Procurement System in the Rearmament Program of 1940-41." *Sinews of War: Essays on the Economic History of World War Industrial Mobilization Plan*. Edited by Geoffrey T. Mills and Hugh Rockoff. Ames, Iowa: Iowa State University Press, pp. 166-198.
- Higgs, Robert. 1999. "From Central Planning to Market, The American Transition, 1945-1947." Journal of Economic History 59 (September): 600-23.
- Higgs, Robert. 2004. "Wartime Socialization of Investment: A Reassessment of U. S. Capital Formation." Journal of Economic History 64 (June): 500-520.
- Higgs, Robert. 2006. *Depression, War, and Cold War: Studies in Political Economy*. Independent Institute.
- Hines, James R. Jr., and Richard H. Thaler, "The Flypaper Effect," Journal of Economic Perspectives 9 (Fall 1995), 217-26.
- Hulten, Charles R., and Robert M. Schwab, "Public Capital Formation and the Growth of Regional Manufacturing Industries," National Tax Journal 44 (Dec. 1991), 121-34.
- Inter-University Consortium for Political and Social Research, Historical, Demographic, Economic, and Social Data: The United States, 1790-1970, ICPSR Number 0003. The version has corrections by Michael Haines, Department of Economics, Colgate University, Hamilton, NY.
- Inter-University Consortium for Political and Social Research, United States Historical Election Returns, 1824-1968, ICPSR Number 0001.
- Koistinen, Paul A. C. 2004. *Arsenal Of World War II, The Political Economy Of American Warfare*. Lawrence, Kansas: University Press of Kansas.
- McGregor, Peter, Eric McVittie, J. Kim Swales, and Ya Ping Yin, "The Neoclassical Economic Base Multiplier," Journal of Regional Science 40 (Feb. 2000), 1-31.
- Melman, Seymour. 1985. *The Permanent War Economy: American Capitalism in Decline*. New York: Simon and Schuster.
- Merrifield, John, "A Neoclassical Anatomy of the Economic Base Multiplier," Journal of Regional Science 27 (May 1987), 283-94.
- Munnell, Alicia, "Infrastructure Investment and Economic Growth," Journal of Economic Perspectives 6 (Fall 1992), 189-98.
- Nelson, Donald Marr. 1946. *Arsenal Of Democracy, The Story Of American War Production*. New York: Harcourt, Brace and Company,
- Nordhaus, William and James Tobin. 1972. "Is Growth Obsolete?" in National Bureau of Economic Research volume on *Economic Growth* 96: 1-80.

- Novick, David, Melvin Anshen, and William Charles Truppner. 1949. *Wartime Production Control*. New York: Columbia University Press.
- Oates, Wallace, Fiscal Federalism (New York: Harcourt Brace Jovanovich, 1973).
- Pereira, Alfredo M., and Rafael Flores de Frutos, "Public Capital Accumulation and Private Sector Performance," Journal of Urban Economics 46 (September 1999), 300-22.
- Rappaport, Jordan, and Jeffrey D. Sachs, "The United States as a Coastal Nation," Journal of Economic Growth 8 (March 2003), 5-46.
- Rhode, Paul, James Snyder, and Koleman Strumpf. 2002. "The Great Arsenal of Democracy": The Political Economy of the County Level Allocation of World War Two Military Spending. Working Paper presented at the NBER Summer Institute.
- Schubert, Frank. 1994. *Mobilization: the United States Army in World War II*. Defense Dept., Army, Center of Military History.
- Smith, R. Elberton. 1959. *The Army and Economic Mobilization*. Washington, D.C. Center of Military History, U.S. Army. Washington, D.C.: Government Printing Office reprinted 1991.
- United States Bureau of Budget. 1946. *The United States at War: Development and Administration of the War Program by the Federal Government*. New York: Da Capo Press, Inc.,
- United States Bureau of the Census. (1975). *Historical Statistics of the United States: Colonial Times to 1970*. Part II. Washington, D.C.: Government Printing Office.
- U.S. Bureau of the Census, Historical Statistics of the United States: Colonial Times to 1970 (Washington, DC: GPO, 1975).
- U.S. Bureau of the Census, "Illiteracy in the United States, October 1947," Current Population
- U.S. Congress, Official Congressional Directory, for the 73<sup>rd</sup> Congress 1<sup>st</sup> session through 76<sup>th</sup> Congress (Washington, D.C.: GPO, various years).
- U.S. Bureau of the Census. Fifteenth Census of the United States, 1930, Population, Volume VI: Families. Washington, D.C.: Government Printing Office, 1933.
- U.S. Bureau of the Census, Sixteenth Census of the United States, 1940: Population, Internal Migration, 1935 to 1940 (Washington, DC: GPO, 1943).
- U.S. Department of Commerce, Bureau of Foreign and Domestic Commerce, Consumer Market Data Handbook. (Washington, D.C.: GPO, 1936).
- U.S. Department of Commerce, Bureau of Foreign and Domestic Commerce, Consumer Market Data Handbook. (Washington, D.C.: GPO, 1939).
- U.S. Department of Commerce, Bureau of Foreign and Domestic Commerce, General Consumer Market Statistics, Supplement 1 to the Market Data Handbook of the United States. (Washington, D.C.: GPO, 1932).
- U.S. Office of Government Reports, Statistical Section, Report No. 9, Volume 1, "Direct and Cooperative Loans and Expenditures of the Federal Government for Fiscal Years 1933 through 1939." Mimeo, 1940.
- U.S. Office of Government Reports, Statistical Section, Report No. 10, Volume 1, "County Reports of Estimated Federal Expenditures March 4 1933-June 30, 1939," Mimeo, 1940.

- United States Joint Army and Navy Munitions Board. 1933. *Industrial Mobilization Plan*. Washington DC: United States Government Printing Office. 1933
- United States Joint Army and Navy Munitions Board. 1938. *Industrial Mobilization Plan. Revision Of 1938*. Washington DC: United States Government Printing Office.
- United States Joint Army and Navy Munitions Board. 1939. *Industrial Mobilization Plan. Revision Of 1939. A Study Of Methods For The Effective And Equitable Utilization Of The Industrial Resouces Of The United States In Time Of War.*, Washington DC: United States Government Printing Office.
- Vias, Alexander and Gordon Mulligan. 1997. "Disaggregate Economic Base Multipliers in Small Communities." *Environment and Planning* 29 (June): 955-74.

**Table 1**

**Predicted Change in Retail Sales from an Additional Dollar of War Spending**

**Under Various Assumptions**

	Share population spends externally	Base Multiplier	Crowding Out/ Productivity	Share of War plant inputs imported	Income Multiplier	Change in Retail Sales from \$1 of New Deal spending
	$M$	$\Pi$	$\Pi$	$m_w$	$M$	$r\mu$
<b>EXTRA INCOME IS SPENT 75 % LOCALLY, 25 % EXTERNALLY</b>						
1	Baseline	0.25	1.33	-0.5	0.3	0.13
2	0.2 rise in crowding out	0.25	1.33	-0.7	0.3	-0.01
3	No crowding out	0.25	1.33	0	0.3	0.49
4	Baseline with 0.2 rise in war plant share of inputs imported	0.25	1.33	-0.5	0.5	-0.01
<b>EXTRA INCOME IS SPENT 50% LOCALLY, 50 % EXTERNALLY</b>						
5	Baseline	0.5	0.80	-0.5	0.3	0.08
6	0.2 rise in crowding out	0.5	0.80	-0.7	0.3	-0.01
7	No crowding out	0.5	0.80	0	0.3	0.29
8	Baseline with 0.2 rise in war plant share of inputs imported	0.5	0.80	-0.5	0.5	-0.01

Assumptions:

$r$  the ratio of retail sales to income is assumed 0.53.

$t_f$  the fed tax rate is 0.2.

$\theta$  the flypaper/crowding out effect on state and local spending is 0.1.

$\delta$  the ratio of state and local taxes to state and local spending is 0.9.

**Table 2**  
**Change in the Estimated Impact of War Spending on Retail Sales Growth, 1939-1948 As Correlates Are Added in a Cumulative Fashion**

Specification	Variables in Specification	War Spending Coefficient	P-Value	OSD Change	Dollar Change
1	War	-0.0000086	0.000	-0.190	-\$0.0045
2	(1) + Retail Sales 1939	-0.0000051	0.000	-0.113	-\$0.0027
3	(2) + Economic Correlates	-0.0000029	0.000	-0.064	-\$0.0016
4	(3) + Demographic Correlates	-0.0000013	0.016	-0.028	-\$0.0007
5	(4) + Geographic Correlates	-0.0000014	0.012	-0.030	-\$0.0007
6	(5) + Climatic Correlates	-0.0000011	0.027	-0.024	-\$0.0006
7	(6) + State Dummies	-0.0000010	0.096	-0.022	-\$0.0005

*Notes.* Results for specification 7 are reported for all variables except state dummies in Table 4.

**Table 3**  
**Exploratory Specifications**

Spec.	Description	War Spending Coefficient	P-Value	OSD Change	Dollar Change	N
8	No Spending Above 95 percentile	-0.00000544	0.117	-0.024	\$0.0028	2832
9	Positive Spending Only	-0.00000077	0.160	-0.027	\$0.0003	1766
10	5 <sup>th</sup> perc. < war < 95 <sup>th</sup> perc.	-0.00000281	0.234	-0.027	\$0.0015	1592
11	Common Support	-0.00000257	0.000	-0.062	\$0.0013	1258
12	Zero-One Treatment Effect	-0.00283333	0.023	-----	-----	3039
13	Ag Production	-0.00000105	0.098	-0.023	\$0.0005	3039

*Notes.* Uses specification 7 from Table 2.



Table 4: OLS and 2SLS ESTIMATES

Variable of Interest:	OLS		2SLS		Second Stage		Summary Statistics			
	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value	Mean	Std.Dev.	Min	Max
War Spending Per Capita	-9.78E-07	0.096			1.31E-06	0.600	1325	4844	0	144774
Instrumental Variables:										
Army Quartermaster Allocations			-10.9	0.001			2.003	15.95	0	504
Navy Allocations			64.0	0.029			0.275	2.926	0	139
Army Engineers Allocations			65.0	0.005			0.225	1.761	0	62
Tool Plan Allocations			70.1	0.001			0.095	0.879	0	28
OASW Allocations			-249.1	0.039			0.039	0.549	0	25
Areo Allocations			217.0	0.001			0.020	0.320	0	14
Steel Plan Allocations			-98.1	0.014			0.095	0.816	0	29
Exogenous Variables										
Log retail sales per capita	-0.0422	0.053	-225.16	0.001	-0.0389	0.078	6.1	0.58	3.23	7.55
% dwellings w/ radio, 1940	-0.0008	0.304	6.36	0.215	-0.0009	0.254	69.3	19.90	13.2	98.1
% retail sales growth, 1929-39	-0.0008	0.000	0.25	0.284	-0.0009	0.000	97.6	60.10	-30.58	1343.67
% employment in manufacturing, 1940	0.0013	0.214	44.28	0.000	0.0007	0.572	4.0	4.26	0	27.63
% of population female, 1940	0.0087	0.052	-12.73	0.560	0.0088	0.042	48.6	1.98	19.58	53.47
% of population black, 1940	-0.0012	0.002	1.11	0.285	-0.0012	0.001	10.6	17.84	0	85.52
% of population urban, 1940	-0.0010	0.000	3.14	0.007	-0.0011	0.000	22.8	24.50	0	100
% of population foreign born, 1940	0.0017	0.223	1.38	0.863	0.0017	0.224	3.7	4.62	0	28.69
% of population illiterate, 1940	-0.0010	0.606	-4.14	0.518	-0.0009	0.633	5.7	5.02	0.31	40.86
% of population in age categories, 1940										
10-19	0.0359	0.000	-61.91	0.037	0.0367	0.000	19.9	2.52	8.94	26.57
20-29	-0.0044	0.448	28.44	0.152	-0.0047	0.397	15.7	2.09	10.06	42.48
30-34	0.0332	0.018	-93.67	0.239	0.0346	0.013	7.1	0.88	3.92	12.74
35-44	0.0012	0.866	-24.73	0.278	0.0015	0.834	12.2	1.45	8.37	18.24
45-54	0.0111	0.095	27.47	0.115	0.0107	0.105	10.6	1.76	4.35	17.07
55-64	0.0201	0.005	-75.48	0.003	0.0212	0.003	7.8	1.77	1.39	13.7
65-up	0.0043	0.429	-8.77	0.683	0.0045	0.402	7.1	2.29	0	15.08
# rivers in county flowing through 11-20 counties	0.0103	0.091	73.05	0.214	0.0093	0.124	0.24	0.45	0	2
# rivers in county flowing through 21-50 counties	0.0065	0.469	41.54	0.144	0.0060	0.502	0.14	0.38	0	3
# rivers in county flowing through 50 counties	0.0241	0.013	91.41	0.345	0.0229	0.019	0.09	0.29	0	2

continued on next page

Table 4: *continued*

Variables	OLS		First Stage		Second Stage		Summary Statistics			
	Coef.	P-value	Coef.	P-value	Coef.	P-value	Mean	Std.Dev.	Min	Max
	2SLS									
Elevation range	3.64E-06	0.563	0.01	0.647	3.44E-06	0.580	1520	2360	11	14652
Max elevation	-7.88E-06	0.219	-0.03	0.345	-7.50E-06	0.238	2400	2963	11	14494
Number of bays	-1.31E-04	0.617	1.58	0.488	-1.50E-04	0.556	3.0	13.94	0	312
Number of lakes	-2.38E-05	0.628	-0.06	0.835	-2.23E-05	0.646	21.0	55.29	0	796
Number of beaches	-0.0017	0.037	0.3	0.966	-0.0018	0.029	0.5	3.15	0	64
Number of swamps	0.0005	0.131	-2.4	0.238	0.0005	0.104	2.4	8.07	0	136
Atlantic coast county	0.0352	0.056	216.62	0.089	0.0324	0.075	0.04	0.20	0	1
Pacific coast county	0.0082	0.738	107.15	0.704	0.0063	0.802	0.01	0.11	0	1
Gulf coast county	0.0190	0.458	125.57	0.468	0.0170	0.499	0.02	0.13	0	1
Great Lakes county	0.0003	0.980	-183.81	0.118	0.0015	0.906	0.03	0.16	0	1
Dustbowl	0.0752	0.022	114.63	0.159	0.0736	0.023	0.02	0.13	0	1
% of population farming	0.0073	0.000	-1.71	0.808	0.0073	0.000	46.2	21.61	0	100
Average monthly temperature, 1940-50	0.0011	0.567	17.39	0.062	0.0009	0.658	54.4	8.14	36.96	75.29
Average monthly precipitation, 1940-50	0.0041	0.727	-18.43	0.806	0.0044	0.703	3.2	1.12	0.37	6.26
Months of excess or severe drought, 1940-50	0.0026	0.009	1.13	0.813	0.0026	0.008	9.0	8.78	0	50
Months of excess or severe wetness, 1940-50	0.0014	0.128	1	0.833	0.0013	0.128	12.1	12.80	0	82.22
% of population farming X avg. temperature	-7.18E-05	0.020	-0.1	0.479	-0.0001	0.020	2546	1329	0	6029
% of population farming X avg. precipitation	-3.37E-04	0.228	1.29	0.304	-0.0004	0.197	150	98.10	0	480
% of population farming X months of drought	-4.87E-05	0.008	0	0.955	0.0000	0.007	430	522	0	3028
% of population farming X months of wetness	1.35E-05	0.434	-0.03	0.756	1.40E-005	0.411	572	693	0	4623
Constant	-0.8957	0.022	2865.58	0.211	-0.94	0.015				
State fixed effects	Included		Included		Included					
$R^2$	0.51		0.18		0.51					
$N$	3039		3039		3039					

Table 5: Differenced OLS Esitmates

Variables	OLS			
	Coeff	P-value	OSD	$\Delta$ \$
Variable of Interest:				
War Spending Per Capita (1940's)	-2.55E-06	0.001	-0.031	-\$0.0014
Exogenous Variables				
Public Relief Spending (1930's)	0.0001	0.399	0.012	
$\Delta$ Log retail sales per capita (1939 - 1929)	-1.2709	0.000	-0.795	
$\Delta$ % dwellings w/ radio, (1940 - 1930)	-4.89E-05	0.929	-0.001	
$\Delta$ % population growth, ((1930-40) - (1920-30))	-2.09E-05	0.298	-0.012	
$\Delta$ % employment in manufacturing, (1940 - 1930)	0.0058	0.007	0.030	
$\Delta$ % of population female, (1940 - 1930)	-0.0066	0.325	-0.016	
$\Delta$ % of population black, (1940 - 1930)	-0.0040	0.136	-0.016	
$\Delta$ % of population urban, (1940 - 1930)	0.0003	0.482	0.005	
$\Delta$ % of population foreign born, (1940 - 1930)	0.0025	0.260	0.014	
$\Delta$ % of population illiterate, (1940 - 1930)	0.0035	0.093	0.020	
$\Delta$ % of population in age categories, (1940 - 1930)				
10-19	0.0040	0.327	0.014	
20-29				
30-34	0.0015	0.885	0.003	
35-44	-0.0080	0.102	-0.023	
45-54	0.0031	0.547	0.008	
55-64	0.0137	0.028	0.033	
65-up	0.0129	0.043	0.027	
$\Delta$ % of population farming (1940 - 1930)	0.0185	0.000	0.260	
$\Delta$ Average monthly temperature, (1940's-1930's)	0.0091	0.418	0.009	
$\Delta$ Average monthly precipitation, (1940's-1930's)	-0.1169	0.000	-0.070	
$\Delta$ Months of excess or severe drought, (1940's-1930's)	0.0035	0.000	0.156	
$\Delta$ Months of excess or severe wetness, (1940's-1930's)	-0.0006	0.485	-0.020	
$\Delta$ % of population farming X avg. temperature	-0.0005	0.000	-0.380	
$\Delta$ % of population farming X avg. precipitation	0.0021	0.000	0.110	
$\Delta$ % of population farming X months of drought	-7.37E-05	0.000	-0.187	
$\Delta$ % of population farming X months of wetness	5.45E-05	0.001	0.096	
$\Delta$ % value of crops from cotton (1939 - 1929)	-0.0003	0.656	-0.007	
$\Delta$ % value of crops from corn (1939 - 1929)	-0.0014	0.012	-0.030	
$\Delta$ % value of crops from wheat (1939 - 1929)	-0.0017	0.013	-0.024	
$\Delta$ % value of crops from tobacco (1939 - 1929)	-0.0006	0.555	-0.006	
Constant	0.4064	0.000		
State fixed effects	Included			
$R^2$	0.85			
$N$	3035			

**Table 6****Change in the Estimated Impact of War Spending on Retail Sales Growth, 1939-1954 As Correlates Are Added in a Cumulative Fashion and Under Different Estimations**

Spec.	Variables in Specification	War Spending Coefficient	P-Value	OSD Change	Dollar Change	
1	War	-0.00001036	0.000	-0.178	-\$0.0055	
2	(1) + Retail Sales 1939	-0.00000383	0.000	-0.039	-\$0.0002	
3	(2) + Economic Correlates (3) + Demographic	-0.00000428	0.000	-0.074	-\$0.0023	
4	Correlates	-0.00000125	0.016	-0.028	-\$0.0007	
5	(4) + Geographic Correlates	-0.00000011	0.075	-0.02	-\$0.0006	
6	(5) + Climatic Correlates	-0.00000094	0.175	-0.016	-\$0.0005	
7	(6) + State Dummies	-0.00000072	0.404	-0.013	-\$0.0004	

Spec.	Alternative Estimations	War Spending Coefficient	P-Value	OSD Change	Dollar Change	N
8	No Spending Above 95 percentile	-0.00000367	0.358	-0.013	-\$0.0019	2832
9	Positive Spending Only	-0.00000069	0.390	-0.018	-\$0.0004	1766
10	Positive Spending, 5th < war < 95th	0.00000197	0.514	0.014	\$0.0011	1592
11	Common Support	-0.00000211	0.010	-0.038	-\$0.0011	1258
12	0-1 Treatment Effect	-0.00000072	0.404	----	-----	3039
13	Ag Production	-0.00000097	0.305	-0.017	-\$0.0005	3039
14	2SLS	0.00000481	0.142	0.082	\$0.0026	3039
15	Difference 1939-48 minus 1929-39	-0.00000375	0.010	-0.043	\$0.0020	3039

**Table 7**

**Change in the Estimated Impact of War Spending on Retail Sales Growth, 1939-1958 As Correlates Are Added in a Cumulative Fashion and Under Different Estimations**

Spec.	Variables in Specification	War Spending Coefficient	P-Value	OSD Change	Dollar Change	
1	War	-0.00001247	0.000	-0.197	-\$0.0066	
2	(1) + Retail Sales 1939	-0.00000258	0.000	-0.041	-\$0.0014	
3	(2) + Economic Correlates	-0.00002922	0.000	-0.077	-\$0.0156	
4	(3) + Demographic Correlates	-0.00000103	0.057	-0.016	-\$0.0005	
5	(4) + Geographic Correlates	-0.00000131	0.018	-0.021	-\$0.0007	
6	(5) + Climatic Correlates	-0.00000103	0.085	-0.016	-\$0.0005	
7	(6) + State Dummies	-0.00000047	0.503	-0.008	-\$0.0003	

Spec.	Alternative Estimations	War Spending Coefficient	P-Value	OSD Change	Dollar Change	N
8	No Spending Above 95 percentile	-0.00000456	0.232	-0.015	-\$0.0024	2832
9	Positive Spending Only	-0.00000094	0.178	-0.022	-\$0.0005	1766
10	5th < war < 95th	-0.00000178	0.561	-0.011	-\$0.0009	1592
11	Common Support	-0.00000200	0.007	-0.032	-\$0.0011	1258
12	0-1 Treatment Effect	-0.00000047	0.503	----	----	3039
13	Ag Production	-0.00000064	0.397	-0.01	-\$0.0003	3039
14	2SLS Difference 1939-48	0.00000467	0.107	0.074	\$0.0025	3039
15	minus 1929-39	-0.00000425	0.003	-0.046	-\$0.0023	3039

Figure 1: Total War Spending from 1940-1945

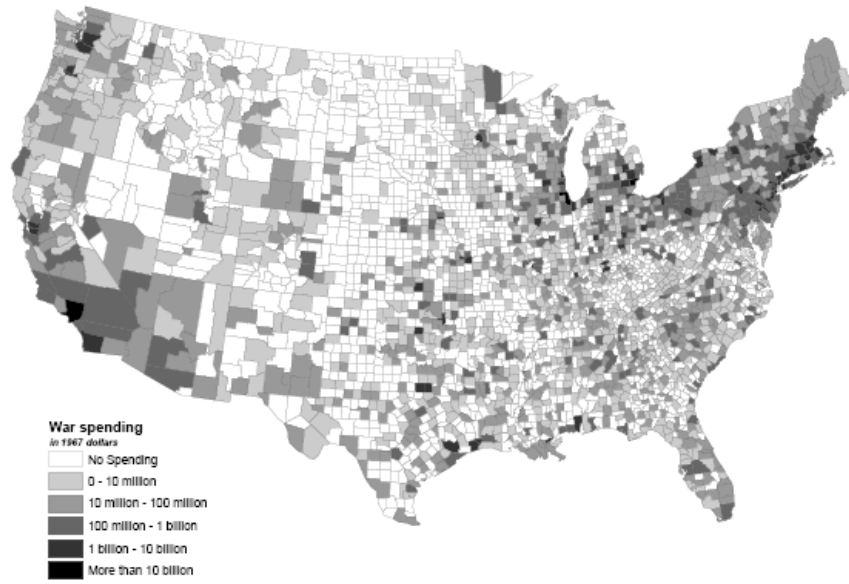


Figure 2: Total War Spending Per Capita from 1940-1945

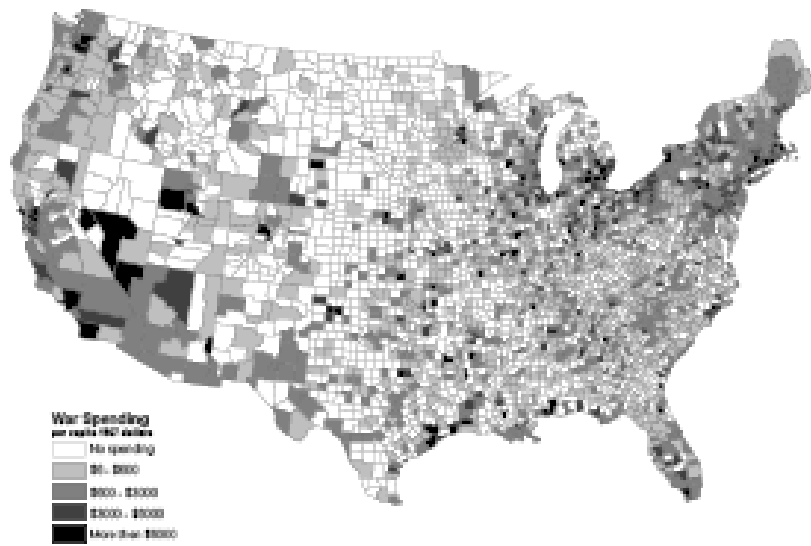


Figure 3

Scatter Plot of State Retail Sales Per Capita (1967\$) Growth Rate, 1939-1948  
and War Spending Per Capita, 1940-1945

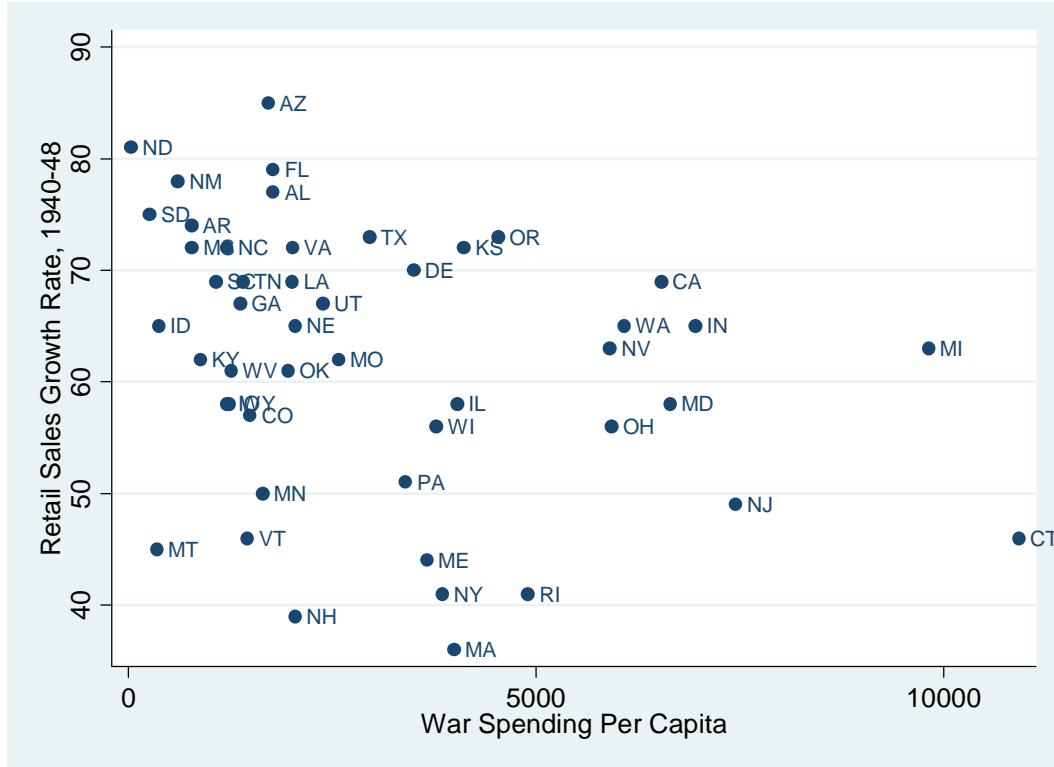


Figure 4: Per Capita Retail Sales Growth 1939-1948

