Income and WWII Contract Spending

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This Draft: February 15, 2019

Abstract Using a simple fixed effects specification a detailed, underutilized, state level panel of personal income from the BEA I find that state level WWII military contract spending has a complex effect on both contemporary and postwar state level personal income. I find that wartime manufacturing income grows faster in states that receive military contract spending. However, after the war interest dividend and rental income grows more slowly in states that received military contracts. Nonmanufacturing earnings also grow more slowly after the war, though this effect is likely driven by region specific effects. I also find that wartime investment contract spending permanently increases the growth of manufacturing earnings and wartime military infrastructure contract spending permanently increases government payrolls.

Keywords: World War II, Fiscal Policy.

JEL Classification Numbers: N42 E62, H56.

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1   Introduction

In this paper I show that military contract spending–the private provision of military production, investment and infrastructure–during WWII has a complex effect on personal income at the state level in the period 1941-1957. Private, nonfarm, earnings grow more quickly during the war from military contracts. This faster growth in private income is driven primarily by faster growth in manufacturing income with nonfarm proprietor income also showing faster wartime growth. After the war, however, contract spending causes slower growth in private earnings. This largely stems from slower growth in interest, dividend and rental income[1] as well as slower growth in nonmanufacturing nonfarm earnings. State level corporate retained profits are unaffected by war spending.

I make use of a high quality and detailed panel of state level income from the Bureau of Economic Analysis (BEA) that has heretofore been overlooked[2]. This publicly available panel details not only total state level income but also ownership income, total earnings and wages and salary data by major industry classifications, as well as farm income. This panel covers 1929-1957 and is not only useful for an analysis of the effects of the shock of WWII itself, but also provides the basis for a useful test for historical endogeneity, which is likely during the global turmoil of the 30s and 40s.

Following Jaworski(2017) and Bossie(2019) I employ an empirical specification that makes use of the state level panel to produce a time series estimate of the state level effect of WWII spending on state level income from 1939-1957. This "shock" approach treats the war a single shock to state level economies. This is particularly useful for studying a fiscal policy shock as distortionary as the shock of WWII. WWII absorbed 42% (Rockoff, 1998) of output and carried with it a massive monetary shock. As well, the war was a massive centralization of economic activity which saw the imposition of high tax levels price and wage controls and massive labor market disruptions. The distortionary qualities of the wartime fiscal shock

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[1]For ease of exposition "interest dividend and rental income" will be refereed to as "capital income".
[2]BEA panel SA7H and SA5H

and the corresponding significant crowding out of private economic activity has meant that economists are generally more interested in the effect of the war on the postwar boom. This shock empirical approach allows me to trace not only to contemporary effect of the war on personal income but also the effect of the war into the postwar period, where the "pent-up" private demand for goods and services could manifest itself. Following Nakamura and Steinsson (NS, 2014), Jaworski (2017) and Bossie (2019) I use a simple fixed effects specification that controls for both state unobservables and for national policy changes. However, unlike a traditional fixed effects estimate, I use this framework to trace out a time series of the state level effect of war spending for the entire period we have BEA income data for. This makes it possible to discuss the contemporary and long run effects of the war. Because we also have data for the immediate pre-war period (1929-1939) this specification also allows me to establish that the war can be reasonably thought of as an exogenous shock to state level personal income and earnings.

The detail and quality of the BEA income panel allows me to make number of empirical claims about the economic effects of WWII on the wartime and postwar economy. First, is the substantial effect of the war on the private economy. The per dollar relative state level effect of the war on manufacturing earnings is small, but given how large a shock the war was the absolute effects are large. A hypothetical state with average manufacturing earnings receiving an average amount of total wartime contract spending would see manufacturing income higher by 21.9% in 1943 as a result of the war. However, from 1949 to 1957, we see a statistically significant decline in nonmanufacturing earnings of 5% of a hypothetical average state's nonmanufacturing earnings. Since the nonmanufacturing sector is larger than manufacturing, this slower growth in nonmanufacturing income is comparable in levels to the positive wartime effect of the war on manufacturing earnings. This suggests that the relative wartime positive increase in manufacturing is offset by a longer term relative slower growth in nonmanufacturing industries.

The decline in nonmanufacturing income is complex. Ancillary evidence suggests that

this decline is the result of two, overlapping factors. First, the effect of war spending on total nonmanufacturing income is being driven by the idiosyncratic response of specific census divisions to the wartime contract shock. In particular, the New England, Middle Atlantic and Mountain divisions are driving the response of specific nonmanufacturing industries such as finance insurance and real estate (FIRE) and transportation and communication industries. In contrast, the wartime response of manufacturing to total contract spending is universal. Further, the decline in earnings from specific nonmanufacturing sectors—transportation and communication and retail and wholesale—is an indirect response to war spending. a simple test for an interaction effect between total income and contract spending bears this out. Wartime manufacturing shows no interaction effect between total income and contract spending and thus is linked directly to contract spending, as one would expect. However, the decline in transportation and communication and retail and wholesale earnings sectors show a strong interaction effect between income and contract spending, suggesting the response of these sectors is being driven by the relative decline in state level income after the war. While this introduces uncertainty about the point estimates of the postwar response of nonmanufacturing to contract spending, it offers useful insight into the complicated dynamics of the postwar response to war spending.

The second empirical fact of interest is that there is a substantial postwar decrease in capital income after the war as a result of contract spending. Contract spending causes statistically significant lower capital income growth starting in 1945. A hypothetical state with average capital income growth receiving an average amount of wartime contracts would see capital income 15.5% lower by 1957 as a result of total war contract spending. Of interest, this decline in savings income is isolated to this specific category of household income. State level corporate retained earnings and farm proporietor incomes are unaffected by wartime contracts. Nonfarm proprietors see a temporary increase in income during the war. Further, evidence from corporate balancepoint to the fact that this decline in capital income is not being driven by dividend payments. This suggests that the effect on capital income is from

interest and rental sources.

Third, I show that there is little relationship between farm earnings and military contract spending. Fishback and Cullen (FC, 2013) and Burnet (2016) argue that the relationship between farm earnings and contact spending is important at the state level. However, I generally find that the relationship between WWII contract sending and farm income is statistically zero. Where it is not statistically zero the relationship is economically weak. This is likely both because the war was a direct shock to industrialized economies, particularity those that center around manufacturing, but also because farm incomes were a relatively small part of most state's economies. While an interesting result on its own, this result also suggests that it is not useful to use agricultural economic activity as a control variable as the above papers do. The point those paper make that state level fixed effects are not an adequate control on their own is important. I offer evidence that there are heterogeneous trends among states that bias estimates of the effect of war contracts on total income. With this in mind, I emphasize the importance of including total income as a control variable in estimates of the individual components of income.

Finally, we can also break down total contract spending into several specific expenditure categories which offers some useful insights. Two results stand out in this regard. We see a permanent positive increase in manufacturing income resulting from contract spending to increase industrial capacity. Contracts for the building of military infrastructure such as airfields, depots, hospitals and research facilities produce a large and permanent increase in government, civilian, payrolls. These two results together are interesting in light of the findings of Ramey (2012). Ramey shows a relatively large multiplier for military spending of between 0.8 and 1.5. However, Ramey finds a ambiguous (negative) inter-temporal effect of military spending shocks on private economic activity similar to the effect found in this paper. Further, she establishes that an observed positive employment effect of military spending is driven by government direct hiring. The strong positive and permanent effect of military contracts from private investment and military infrastructure spending suggests that

military spending during WWII was most effective in increasing income when it was direct spending on expanding productive capacity in military industries and in the expansion of military infrastructure that must be staffed by government employees. This is in contrast to temporary positive effect on manufacturing income followed by a negative postwar negative effect on nonmanufacturing income from supply contracts.

The finding of a large permanent effect of state level of military industrial contracts on manufacturing income also contradicts the finding of Jaworski (2017) which finds no effect of contracts for structures investment on manufacturing income in a county level comparison of the effect of military contracts on manufacturing income in the southern US. As the southern census region does not operate as an outlier in my findings of a large positive per dollar effect of industrial contracts on manufacturing income there is a clear difference in the state level findings of this paper and county level findings in Jaworski.

In total, this suggests that unpacking the fiscal policy event of WWII is a complicated matter. The approach here can be thought of as "wide" and not "deep" and serves a useful function in tracing out a narrative of state level relative effects of the war on local economies. Numerous follow up studies suggests themselves from such an analysis.

2   Historical Background

There are a number of excellent resources on the evolution of the US economy during WWII such as Rogoff (1998; 2012), Vatter (1985), Gordon (1974), and Edelstien (2001). I refer the reader to those sources for a more in depth economic history of the war. The purpose of this historical background is to offer a national perspective on changes in the components of income during and after the war. It should be acknowledged right away that this discussion of income and the empirical results below deal only with nominal income changes. Inflation was a serious problem during the war and price and wage controls also add significant distortions to nominal estimates of output and income. Given this environment

trying to estimate real estimates–even if state level price level data were available–leads one down a rabbit hole of alternative deflators as official price deflators are notoriously unreliable during the war (Rockoff, 1984). To circumvent this complexity, there has been no attempt to adjust values to changes in inflation. However, the discussion of income below and the framing of the empirical results is geared towards establishing the relative magnitude of the effect of the war on the components of income, without the benefit of a credible price deflator. Further, it is still possible to discuss distributional effects—key understanding the decline in measured inequality during the 1940s—of war spending on different types of income and earning without adjusting for inflation.

Figure 1 shows per capita components of income from 1940-1957. The national story of total nominal per capita income growth is one of high nominal growth rates, averaging 8% per year. Growth of personal income from 1940 to 1945 averages 14.8% per year. This is almost exactly the same rate as private nonfarm earning (65.8% of total income)[3] growth of 14.5% per year from 1940 to 1945. Between WWII and the Korean war income growth is on average much slower at 2.9% per year. After 1950 nominal income growth is faster at 4.9% per year on average.

Farm earnings also grow rapidly during the war, growing at 20.2% on average from 1940-1945. However, farm earnings remains a relatively small share of total income, peaking as a share of total income during the war at 9.0% of income in 1942. Farm earnings absorb a slightly larger share of income immediately after the war. However, after peaking at 9.3% of income in 1948 farm earning's share of per capita total income decreases steadily through 1957. This is both a relative and absolute decline in per capita farm income. National farm income is $135.10 per capita in 1948 and falls to $78.05 by 1957. Also of note is the fact that farm proprietorship income makes up roughly 80% or more of farm earnings, with the remainder paid out as wages and salaries. At it's peak, farm proprietor income absorbs 85.5% of total farm earnings in 1943.

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[3]For brevity's sake I will refer to nonfarm private earning as private earnings.

Direct government income predictably grows during the war growing on average 25% between 1940 and 1945. Government earnings–primarily wage and salary earnings—decline in per capita terms after the war through 1947 and then begins to increase again. To put government earnings in perspective with total government purchases of final goods and services during the war: direct government earnings are a little over 62% of government spending in 1938, this proportion falls to 27% in 1942. Government earnings as a share of government spending bounces back to 55.6% in 1946 but this proportion declines through the rest of the sample to 43.4% by 1957[4].

Figure 2a shows manufacturing and nonmanfacturing private earnings for 1929-1957. Nonmanufacturing private earnings comprises a little less than 34% of total income before 1940 and this proportion is little changed after the war. Manufacturing earnings, on the other hand, is just below 19% of income on average before 1940. The share of income coming from manufacturing earnings reach a peak of 29.2% in 1943, surpassing the share of of all nonmanufacturing private earnings. The share of total income from manufacturing earnings is 23.5% for the interwar period (1946-1950) and on average 25.5% from 1950 to 1957.

Figure 2b shows details for the sectors that make up nonmanufacturing private earnings. Retail sales make up on average just under 40% of private nonmanufacturing earnings during the war and through 1950. After 1950, this share falls a little. Construction, mining, FIRE industries all make up less than 10% of nonmanufacturing private earnings, though construction increases to 12% of nonmanufacturing earnings on average after 1950. Transportation and utility earnings make up roughly 17-18% of nonmanfuacturing earngins on average over the whole period and services make up around 22% of nonmanfuacturing earnings through the whole period. The reader will also notice the increase in the level of construction earnings during the war. The evolution of construction income is of interest, as construction income responds in some instances to wartime contract spending. Construction income grows by

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[4]Total Government Spending data from BEA Table 1.1.5

over 50% in 1941 and 1942, during the height of production expansion. Construction income then falls significantly during the later half of the war. Postwar growth rates in construction income are also strong, with growth of over 43% from 1945 to 1946 and above 20% in the subsequent two years.

Figure 3a shows the evolution of private wages and salaries as well as private ownership income[5]. It is important to note here that capital income is measured separately from earnings data, and so it is only possible to compare ownership and wage and salary income at the aggregate and not industry level. Private ownership income grows more slowly than private wages and salaries during the war. Wages and salaries grow by 16% from 1940 to 1945, ownership income grows by 10.4% on average during the war. This is largely slower growth of capital income as private nonfarm proprietors income increases slightly faster than wages and salaries at 17.8% per year during the war. After the war, ownership income grows slightly more quickly than private wages and salaries through 1957. Ownership income grows at an average rate of 6.5% per year and private wages and salaries grow at 4.3% from 1946-1957.

For some additional perspective Figure 3b shows the share of total personal income going to employees and owners. Throughout the 1930s and 1940s there is a redistribution of the share of income from owners to employees. This redistribution is one aspect of what is well known in the inequality literature as the Great Compression (Goldin and Margo, 1992, for example). In 1929 owners take 31.7% of total income while employees take 57.6%. At the trough of the Depression in 1934 owners take 28.7% and employees take 60.1%. This share redistribution accompanies a decline in the level of total nominal income of 39% percent from 1929 to 1934. At the peak of the war in 1944 owners take 21.5% of total income while employees receive 66.6%. These shares shift a small amount after the war and by 1957 owners receive 23.7% and employees receive 64.3% of income. As Figure 3b also shows, this decline in the share of income is being driven by capital income. There is a gradual

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[5]What I am calling private ownership income consists of interest and dividend income (capital income) as well as nonfarm proprietors income.

decline in the share of total income coming from capital income from 1929 to 1940 of almost 5 percentage points. From 1940 to 1944, the decline in the share of total income going to capital accelerates, falling over 6.5 percentage points.

3   Empirical Results

3.1   Total Personal Income

The basic empirical model and military contract data used to study the effect of WWII military contract spending on the income (and the components of income below) is the same as that used to study the response the effect of WWII on county level southern industrial development in Jaworski (2017) and the effect of military contract spending on state level bank balance sheets in Bossie (2019). It is useful and instructive to start from estimates of the effect of contract spending on total income. However, these estimates should be viewed with caution. It is likely that the effect of contact spending on total income is overstated, as the fixed effects specification used to examine the effect of the war on total personal income does not contain a mechanism to control for differential trends across states. The next section, which looks at the components of income, uses total personal income as a control for these unobserved differential trends.

The bias in the results from not controlling for different trends across states is one of magnitude. Generally speaking, controlling for different trends across states produce a smaller effect of the war on the components of income. So, while the results of war contract spending on total personal income are biased, we know the direction of the bias.

The basic empirical specification is as such:

$$INCOME_{it} = \beta_0 + s_i + y_t + \delta_{1t}(y_t * WWII_i) + \delta_{2t}(y_t * KOREA_i) + \beta_1(X_{it}) + \epsilon_{it} \quad (1)$$

All variables are population adjusted and in logs[6]. $INCOME_{it}$ is total income and this specification includes a dummy variable each for state (s_i) and year (y_t). These control for time invariant individual state characteristics as well as policy changes across years. This paper, as with the other two papers mentioned, can be seen as employing a variation of the methodology used in NS (2012) to calculate state level "open economy" or "relative" fiscal policy multipliers. The effect of interest is δ_{1t} which captures the effect of $WWII_i$ contract spending interacted with an time dummy. The contract spending variable, $WWII_i$ is a single observation of total contract spending per state. $WWII_i$ includes military contracts of \$50,000 or more for the period June 1940 - September 1945 (Haines, 2010). There is also data on military contract spending for some subcategories of contract spending. Total war contract spending can be broken down into four subcategories and so it makes sense to explore the differences in the effect of plant and equipment spending, heavy equipment and non-heavy equipment supply contracts, and military facilities spending. These subcategories should be thought of as contracts for investment spending, production of durable and nondurable goods, and government military infrastructure respectively. One challenge of the data is that the wartime contract spending variable is time invariant. Normally, when estimating an interaction effect it is common practice to also include the "main effect" as well as the interaction effect in the estimate of a total effect. However, the time invariance of $WWII_i$ makes it pointless to include it individually as time invariant state level variation is absorbed by s_i. This does not pose a problem for our estimate because the effect of the contract spending variable is captured adequately by the interaction with the time dummy. The concern of this paper is the change in the components of income for 1940 to 1957 relative to 1939 attributable to war spending and the interaction effects captures this when we drop the 1939 year dummy. As well, since the state fixed effects already absorbs the variance time invariante war spending variable it does not provide any new information to the regression. Given that the individual effect of $WWII_i$ is neither material to the question of interest

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[6]It should be noted that it is occasionally necessary to add one to a variable to make log transformations tractable. When this is necessary it will be noted in the text.

nor useful in controlling for variation in our regression, not including the individual effect is costless. X_{it} are a selection of control variables taken from the BEA income data, detailed below.

There are two main issues when thinking about the effect of the war on the two very different (war and postwar) subperiods. First, the operating assumption is that the single observation per state is a reasonable proxy for annual wartime spending. If that assumption does not hold then estimates are likely to be biased. However, comparing the single observation of total contract spending to data from preliminary estimates of annual contract spending as well as annual "war industry" payrolls suggest that the single observation of total spending is a reasonable proxy for annual spending during the war. Appendix A shows comparisons between the single observation per state and annual contemporary wartime spending for 1940-1945 and shows that the single observation per state produces comparable estimates to annual series. This is particularly true for the more complete war industry payrolls series. As well, Appendix A establishes that estimates for the full 1939-1957 period also hold when the full period is divided up into a war (1939-1945) and a postwar (1946-1957) periods.

It should be pointed out that while there is readily available data for all variables for the District of Columbia it has been dropped from the analysis. The effects of war spending on income and the components of income are systematically different when DC is included. The fact that DC can obviously be regarded as a special case given that it is both not a state and the seat of the Federal Government means it is reasonable to drop DC as an outlier.

There are two main sources of potential endogeneity that have been well discussed in the literature (Jaworski, 2017; FC, (2013); Bossie, (2019); Rhode Snyder and Strumpf (RSS, 2017)). The first is potential endogeneity from the political process of spending allotments. As with all types of fiscal spending, political considerations potentially plays a role in the distribution of military contract spending. The second source of endogeneity comes from the fact that the contract spending shock was largely a shock to manufacturing, urban,

economies and thus war spending is endogenous to the existing industrial structure of a given state.

Political considerations did not seem to play a strong role in the allocation of military contracts. Koisenstien (2004) argues that military control of production removed, to a significant extent, the role of politics in deciding where military counteracts would be sourced. RSS (2017) confirm this empirically. However, both authors find that industrial structure was a major determinant of contract spending. This is perhaps obvious. Speed of production was the overarching concern of military planners and so production was centered largely where production capacity already existed. The main role of the state fixed effects is in controlling for the existing industrial structure of states in 1939. This is, of course, likely to be a imperfect device. Appendix B is dedicated to establishing that, given the fixed effects specification used here, the shock of the war can be reasonably assumed to be an exogenous shock to total personal income. This claim is based on a test for "historical endogeneity". Simply, the regression in Equation 1 is run backwards on the period 1929 to 1939, with the 1939 year dummy excluded (and without the Korean War variable). This allows us to measure the correlation of income variables from before the war with the WWII contract spending shock. In general, as Appendix B establishes, correlation between the 1930s and WWII contract spending is not of much of a concern. However a potential issue that state level fixed effects does not address stems from the fact that states with different industrial compositions are also likely to experience different post-1939 trends. This issue is relatively easy to solve for the components of income below by including total personal income as a proxy for unobserable trends across states. However, it is not possible to use the panel of total personal income to control for these state level trends when total personal income is the dependent variable.

Figure 4 shows the response of total personal income to war contract spending with a series off different control variables. Without any controls, income grows more slowly per dollar of contract spending by a trough of 16.8 cents in 1948. There is a small recovery, but

the level of slower growth is essentially flat through 1957.

Controlling for various subcomponents of income is a useful exercise in establishing the sectors driving the negative effect of total war contracts on total personal income. The effect on income seems to operate through two main channels. The negative effect of the war on income is temporary when controlling for nonfarm private earnings. Importantly, controlling for manufacturing income, the primary site of the direct contract spending shock does not mitigate the observed effect on total income. Instead, it is nonmanufacturing private nonfarm earnings that explain the decline in total private income. About half of the effect of contract spending on total income is absorbed by nonmanufacturing earnings. By 1948 the effect of contract spending on income is only 7.7 cents per dollar when controlling for nonmanufacturing earnings.

Ownership income is also clearly driving a large portion of the variation in total income. Controlling for capital, farm proprietor, and nonfarm proprietor income reduces the effect of total contract spending on income to zero. Farm earnings[7] and government income are included for completeness and to establish that neither farm income nor government income show a strong relationship with contract spending.

It is worth looking at the effect of controlling for ownership income in more detail. Figure 5 shows the change in income controlling for different forms of ownership income. Capital income is largely driving the results for all ownership income. As with overall farm earnings, farm ownership income accounts for little of total income variation. It is important to note that the effect of contract spending on overall income is temporary when controlling for capital and nonfarm proprietorship income.

It is also important to note that when controlling for the three types of ownership income individually, income still shows a negative, temporary effect of contract spending on income. This seems to be an artifact of the log transformation when combining farm owenship income with nonfarm ownership income[8]. It is, then, difficult to claim that all of the variation in

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[7]One has been added to farm earnings to make the log transformation tractable.
[8]One has been added to farm proprietor income to make the log transformation tractable.

the response of income to contract spending is due to a relatively slower growth in income for state level owners. However, income from capital income clearly play a large role in explaining the observed slower growth in income from wartime contract spending. In sum, this suggests, as with nonmanufacturing private income, the war produced a permanent postwar negative effect of contract spending on capital income.

3.2 The Components of Income

The effect of contract spending on total income suggests that the war primarily manifested itself as a shock to nonmanufacturing earnings and a shock to capital and rental income income. The more credible regressions in this section that control for disparate trends among states below also bear this out. However, there are some important details emerge when looking at the components of income individually. For instance, there is a strong, positive effect of the war on manufacturing income that does not manifest itself in the effect of contract spending on total income. As well, a strong negative effect of contract spending on state and local government spending appears when local government spending is a dependent variable.

Here we adopt essentially the same specification used for total income to look at the components of income. However, I now use total personal income as a control variable.

$$Y_{it} = \beta_0 + s_i + y_t + \delta_{1t}(y_t * WWII_i) + \delta_{2t}(y_t * KOREA_i) + \beta_1 * INCOME_{it} + \epsilon_{it} \quad (2)$$

Here, the regression show the effect of contract spending ($WWII_i$) on the components of income (Y_{it}) controlling for total income ($INCOME_{it}$). Where the regressions in 1 are useful in showing how we explain the variation in income using the components of income here we want to look at the components of income directly. One shortcoming of our fixed effects specification is that it does not control for variations or trends over time. This necessitates

controlling for time varying unobservables, $INCOME_{it}$ being the best available, generic, control for unobservables over time.

I refer the interested reader to Appendix C which discusses the use of income as a control variable. As discussed above, states that received war spending are systematically different in industrial structure and so it is reasonable to assume there is bias in those estimates due to disparate trends between industrialized and non-industrialized states. The pattern of response without income as a control suggests this. Appendix C, follows the empirical strategy used in Allegretto, Dube and Reich (2011) to deal with unobserable heterogeneity at the state level and I show that a major unobserable confounder are census division specific time effects. Bossie (2019) which uses this same basic empirical framework saw no evidence, outside of a few specific secondary cases, that regional differences mattered to the response of bank balance sheets to the wartime contract spending shock. However, regional difference do matter for measuring the effect of war spending on personal income. The decision made to use income as a control instead of census division and time specific dummies stems from that fact that it is assumed that income controls for a broader range of unobseravbles than just a time trend.

The problem with including total income as a control for the components of income is that it may be absorbing an indirect effect of war spending on our variables of interest. To take a simple example, if both soldiers abroad and workers at a brewery consume beer from a local brewery an observed increase in manufacturing income will be from both the increase in military orders for beer and also increased orders of beer from local bars and grocery stores when brewery workers consume more beer out of their increased income. This indirect effect where the fiscal policy shock operates through an increase in private income is central to the notion of the multiplier. Appendix C offers some simple tests of the interaction effect between income and war spending. There is an ambiguous indirect effect of war spending on nonmanufacturing income through total income. However, a negative indirect effect is very clear for transportation and utilities as well as retail and wholesale trade. As well, the

indirect effect of war spending through income on farm income is fairly strong and positive, though negative for farm wage income. Income does not play an important indirect role in other sectors. This adds ambiguity to the estimates of postwar nonmanufacturing income

3.2.1 Nonfarm Earnings

As discussed above, contract spending has a strong effect on earnings from nonfarm private sources. The shock of the war manifests itself in two different ways. During the war, manufacturing earnings increases by a peak of 4.6 cents per dollar of contract spending during the war. However, after the war, states that received wartime contracts experience slower growth of 4.1 cents per dollar of contract spending in nonmanufacturing earnings, this is spread widely across nonmanufacturing sectors, though the clearest effect is in slower growth in transportation and communication earnings. As well, ownership income grows more slowly, by 4.0 cents per dollar of contract spending by 1957 in states that receive war spending.

Figure 6 shows the effect of total war spending on total nonfarm private income, manufacturing income and nonmanufacturing income. The effect of war spending on total earnings and on wages and salaries alone are both included to show that the effect is primarily driven by the response of wages in salaries to contract spending. This is to be expected since wages and salaries are on average 84.5% of private earnings. Contract spending had a positive relative effect on manufacturing income during the war with a peak effect of 4.6 cents per dollar of war spending in 1943. For a hypothetical state with an average manufacturing income of $246.40 this is the equivalent of an extra $57.10 in per capita manufacturing income relative to 1939. War spending "explains" essentially one third of total manufacturing income growth from 1939-1943 for a hypothetical average state receiving an average amount of war contract spending. In terms of relative multipliers, the multiplier is not strong in per dollar terms, but it is large in absolute terms given the size of the military contract spending shock, which is on average $1233.69 per state.

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However, this faster growth in manufacturing income is temporary, dissipating by 1949. After the war, there is a negative effect of war spending on the growth of nonmanufacturing nonfarm income. By 1957 nonfarm manufacturing grows 4.1 cents slower per dollar of WWII military spending. Total nonmanufacturing income grew on average by $637.46 from 1939 to 1957 and an average level of war contract spending would result in nonmanufacturing spending growth $48.91, lower. The growth effect of the temporary wartime manufacturing increase in income is essentially offset by lower postwar income growth in nonmanufacturing. The effect on nonmanufacturing is also apparently permanent as opposed to the temporary faster wartime growth in manufacturing output.

Figure 7 shows the response of the various nonmanufacturing sectors to wartime contract spending[9]. The take away from Figure 7 is that there is no specific sector of nonmanufacturing earnings driving the slower growth in total nonmanufacturing income resulting from contract spending. Roughly speaking, for the postwar period the total effect of the individual sectors is about 80% of the total effect shown in Figure 6. Generally, sectors show a sharp decline somewhere between 1947 and 1949. However, it should be pointed out that construction shows a small positive effect of 0.6 per dollar of war spending. This small effect is actually quite large relative to the size of the construction industry. State level construction earnings increases on average $27.93 from 1939 to 1943. The total average effect of war spending is to increase construction income by $7.21. However, construction income also sees a sharp shift to relatively slower growth in per capita in 1949.

Ownership income also shows a significant negative effect. Figure 8 shows the effect of wartime contract spending on nonfarm ownership income. Starting in 1946 there is a statistically significant slower growth in total nonfarm ownership income as a result of the war. State level capital ownership income growth slows by 0.8 cents per dollar of war spending in 1946 to 4.0 cent per dollar of WWII spending in 1957. This effect is driven primarily by a decline in capital income. Dividend, interest and rental income grows 0.4 cents slower

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[9]Construction and mine earnings have both had one added to them to make the log transformation tractable.

per dollar of war spending in 1945. By 1957 capital income is 3.4 cents lower per dollar of spending. A hypothetical state with an average level of capital income would see capital income grow by $184.39 from 1939 to 1957. Had this average state seen an average level of wartime contract spending capital income would have grown by $42.08 slower. Capital income growth would be about 23% lower for such a state by 1957. Nonfarm proprietor income actually grows faster during the war in response to contract spending by a peak of 0.4 cents per dollar of war spending. This effect however only translates to an increase in income for nonfarm proprietors of 4% in a hypothetical state with average farm proprietor income receiving an average amount of war spending.

3.2.2 Corporate Income

FC (2013) speculate that their observed lack of an effect on retail sales stems from the fact that because most of war spending went to large corporations wartime income was redistributed nationally through these corporations. This "national corporation effect" would then result in observed effect of contract spending personal income an effect at the state level. The role of corporations is of interest here because the observed slower growth in capital income suggests that, taken in light of FC's hypothesis, corporate income may be playing a role in the observed decline in personal income from capital income, particularly dividend income.

This section offers a test of the national corporation hypothesis. A useful way of thinking about this problem is to point out that it is plausible that the relative effect of the war on state level total output (GDP, or equivalently Gross Domestic Income) could be zero or even positive while the effect on state level personal income could be negative, as observed. In a simplified sense the difference between GDP and personal income is corporate net income and taxes. While we do not have a state level panel of corporate income consistent with the BEA estimates of personal income, the Internal Revenue Service (IRS) recorded state level corporate net income, taxes and dividend payments for 1939-1951 in their Statistics of

Income Part II. While, again, these estimates cannot be combined with the personal income data to get state level GDP/GDI estimates, it is useful to look at the IRS data to explore the response of corporate income to contract spending. There are two things we can test. First, we can look to see if we see if corporate net profits and retained earnings show a divergent pattern from personal income. A positive effect of contract spending on corporate retained earnings would suggests the response of personal income did not capture the overall effect on output of contract spending. We can also directly test to see if dividend payments are playing a role in the overall response of capital income to contract spending.

In short, the observed decline in personal income due to war spending is not being driven by a relative redistribution towards corporations at the state level. As Figure 9 shows, the response of per capita retained earnings are statistically zero through the whole period. There is some effect of war spending on total net earnings, but the effect is small. Corporate post-tax net earnings grow more slowly by 2 cents per dollar of war spending in 1946 and 1947, but these years are the only years for which the effect is statistically significant. Important to the discussion here, to the extent there is an effect of war spending on corporate net income the effect is negative, in line with the effect of war spending on personal income. The negative effect on corporate net earnings is also in line with the negative effect to the components of income: roughly 20% of retained earnings for an state with average amount of corporate retained profits receiving an average amount of contract spending in 1946. There is also, statistically speaking, no difference in dividend payments driven by war spending. This suggests the effect of the war on capital income is not being driven by lower dividend payments to state households.

Of secondary interest is that war spending is associated with higher corporate tax payments during the war. This is because firms that received war spending contacts were more likely to pay excess profits taxes at the state level (not shown). It is worth pointing out, again, that this tax effect on corporate earings does does not result in a difference in retained earnings or dividend payments.

3.2.3 Farm and Government Income

Total farm and government income do not play a large role in explaining the overall effect of WWII contract spending on income. However, there are a few things about the effect of war spending on farm and government income that are worth discussing, particularly because they point to avenues of inquiry that are not well served by the empirical framework of this paper.

Figure 10 shows that there was a very small effect on the growth of farm wages due to war spending. There also appears to be a long run negative effect on farm proprietor's income. This would be consistent with the aggregate behavior of farm income. Nationally, farm income began to shrink in per capita terms after 1952, this effect may have been slightly faster in states that experience more war spending. However this effect is only statistically significant a decade after the war and so any causality of slower farm ownership income growth and the war is tentative at best. Generally speaking, the effect of war contract spending on farm earnings shown in Figure 10 reinforces the idea that farm income plays little role in explaining multiplier effects of the war.

The relationship of military contract spending and government payroll spending is also instructive for researchers interested in the war. The statistically zero response of total federal payroll spending and military spending suggests that direct Federal spending on (primarily) personnel and contract spending are largely orthogonal to each other. It is also obvious that a separate analysis of the effect of federal payroll spending on local incomes is warranted.

Somewhat striking is that state and local payroll spending is lower in response to war spending. State and local government spending grows 0.7 cents more slowly per dollar of total contract spending. As with other effects the per dollar multiplier is small, but the total effect is relatively large. State and local payrolls are on average $78.65 by 1957. The effect of an average amount of war spending implies state and local government payrolls would be $9.46 or 12% smaller.

As with nonmanufacturing income, I refer the interested reader to Appendix C which looks at the indirect effect of contract spending through income on farm earnings. This indirect effect is positive, suggesting that as incomes increase during the war farm ownership income also increases. However, the effect on farming with income included as a control variable shows the overall effect of war spending is less negative relative to regressions without income as a control. As with the role of indirect effects on nonmanufacturing, it is unclear what the net effect is–if any–of using income as a control variable is in biasing our results of warpsending on farm income. Nonetheless, the issue of indirect effects—again, central to our notion of the multiplier—is one of interest generally, but also in the context of pinning down the postwar effect of contract spending.

3.3   The Subcomponents of Military Spending.

As data is available on the different types of military contract spending that make up total contract spending it is useful to highlight the heterogeneity in the response of income to different types of military contract spending. Figure 12 shows the effects of the subcatagories of military spending on income. As with the effects of total war spending on income without controls, these estimates are likely biased in that the effects are overstated, but Figure 12 offers a useful picture of what types of spending are driving the response of income to total spending and how the difference types of spending behave generally[10]. Heavy equipment spending, (65% of total spending) shows a very similar pattern to total spending. Nonequipment supply contracts (23% of the total) shows a similar pattern to total spending, but the effect per dollar of spending is significantly larger. Nonequipment supply contracts produce an effect roughly four times larger than total war spending.

Of particular interest here is the behavior of income in response to industrial spending and military facilities spending. These types of spending are distinct from supply contracts which make up the bulk of contract spending. Industrial contracts (8% of total) are investment

[10]Heavy equipment contracts and plant and equipment (industrial) contracts have had one added to them to make log transformation tractable.

spending contracts for plants and equipment. Facilities spending (5% of total spending) is contract spending for military facilities spending such a supply depots, military bases, airfields and hospitals. From Figure 12 one can see that industrial contracts have a very large relative negative effect on income. The peak negative effect of industrial spending is -0.88 cents per dollar of spending. Facilities spending, however, shows a statistically zero effect on total income. Facilities contracts are unique among the types of contract spending because facilities contracts are for "nonproductive" military infrastructure and income behaves very differently in response to these contracts than contract spending on production or expanding production.

We can now turn to the unbiased estimates of the effects the subcomponents of war spending have on the components of income using total income to control for different trends among states. Figure 13 shows the response of selected components of income to industrial contract spending. Most striking is the effect of industrial spending on manufacturing income. Unlike total spending, industrial spending is associated with a permanent increase in per capita manufacturing income. This make sense, since industrial spending is spending on the expansion of manufacturing capacity. The effect is relatively large with a wartime peak of 32 cents per dollar of war spending in 1943. This translates to a roughly 10% faster growth in a state with average manufacturing earnings that received an average amount of plant and equipment spending. Industrial contract spending also has a long term effect on manufacturing income. By 1957 manufacturing income grows faster by 36 cents per dollar of wartime investment contract spending. Manufacturing incomes would be 14.6% higher in 1957 in an average state with average manufacturing earnings receiving an average wartime industrial spending.

Also of interest is that industrial spending is associated with significant large wartime increase in nonmanufacturing income. However, while it is not statistically significant, the postwar estimates suggest a similar postwar slower growth in nonmanufacturing income on average. Finally, the positive effect of industrial contract spending on construction income

is consistent with the time line of the war. The early part of the war was focused on expanding productive capacity in war industries (Koistinen, 2004). The response of construction earnings to industrial spending peaks in 1942/43 and diminishes afterwards.

Figure 14 shows the effect of military facilities contract spending on selected types of income. The effect of state level military infrastructure spending clearly has a strong and permanent effect on within state federal government income. Total federal payrolls shows a very strong positive response to facilities spending. Total federal payroll spending is 49.4 cents higher per dollar of facilities spending in 1944. This is, perhaps, unsurprising, since military facilities would necessarily have to be staffed. What is of particular interest here is that this increase in federal payroll spending is dominated by civilian payroll spending.

Facilities spending also has a similar effect on construction spending as industrial spending though this effect is slightly weaker. Finally, after the war, facilities spending is associated with higher earnings in the FIRE sector. The connection between civilian payrolls and finance earnings is unclear, however.

4   Discussion

It is worth summarizing the effect of the war on personal income. This effect is difficult to unpack and some questions remain outstanding. The war itself is increasingly well established as an exogenous shock to state level economies. However, while controlling for time and year fixed effects is useful in controlling for state characteristics as of 1939 and for both common trends and common policy shocks across states it is unreasonable to assume that states with war spending experience wartime and postwar trends similar to those of states who did not receive war spending. A useful stylized fact of the war is that it was primarily a shock to urban economies. The fact that urban and rural states were likely to experience different trends from 1939-1957 is underscored by the fact that, while private industrial income increased robustly during this period. National per capita farm income, while growing

robustly during the war is lower in 1957 than it was in 1945. Under these conditions, estimates of the components of income are more reliable than estimates of total income since total income can be used to control for the unobserved disparate trends among war and nonwar states. Under this specification there is a fairly large, positive effect of war spending on manufacturing. This gives way to a large, negative, postwar relative effect of war spending on state level income. This decline is largely driven by slower growth in two components of income: nonmanufacturing earnings and capital income (dividends, interest and rent).

During the war manufacturing income grows more quickly in response to war spending. Taken in total, a hypothetical state with an average level of manufacturing that received an average amount of total war spending would see its manufacturing income roughly 21% higher at the effects peak in 1943. This translates to an effect of roughly 5% of average state level total income in 1943. However, this effect is temporary and dissipates by 1949. The relatively large total effect of contract spending on manufacturing is expected reinforces the idea that the war was a shock to industry and industrial states. The fact that this wartime shock does not show much of a direct effect on farm income reinforces this point.

After 1948, per capita nonmanufacturing earnings begins to grow relatively more slowly. The slower growth in nonmanufacturing earnings is similar in magnitude to the increase in manufacturing income at it's peak. However, because these measured effects are nominal, this negative effect on nonmanufacturing income translates to roughly 2.6% of average state level total income after 1952. This effect appears permanent and relatively stable after 1952. It should be acknowledged the cause of the postwar decline in nonmanufacturing is unclear. The slower growth of total nonmanufacturing earnings is robust, but the response of individual nonmanufacturing sectors is not. There is evidence to suggest that the decline is broad based. However, more compelling evidence suggest that transportation and communication and wholesale and retail trade specifically are driving the decline. There is also evidence to suggest that the response of different nonmanufacturing sectors has a strong geographic component. On net, it is clear wartime contract spending slows down the relative growth of

nonmanufacturing earnings after the war. However, the precise magnitude and mechanism for this slower growth remains an outstanding question.

The war also produces a parallel effect on capital income. The observed decline in income to savers has important implications for the study of inequality during this period. In 1929 the top 1% of income earners received 23.9% of total income. By 1939 the share of top earners was 16.18%. Between 1940 and 1945 the share the top 1% captured fell a further 4 percentage points to 12.52%. This slower growth of savings and savings income as a result of war spending almost certainly played a role. New Deal financial repression and labor reforms probably set the stage for the decline in inequality and the decline in savings income. However, it is important to point out the channel for the response of capital income is unclear. I find in this paper that local dividend payments are not affected by contract spending. Bossie (2019) finds that the large decline in local bank savings comes mostly from a slower growth in demand deposits. Demand deposits do not pay interest, however, so the decline in bank balance sheets observed in that paper do not correspond to the decline in local capital income observed in this paper.

It is important to stress that this effect on savers is entirely localized on capital income. Relative across state corporate profits are essentially unaffected by war spending and farm owner's income is also unaffected. As well, proprietor's earning shows a modest relative wartime increase in response to contract spending and no statistical relative difference after the war. Unpacking the effect of the war on capital income is an obvious area for further research.

Earnings also show an economically and statistically significant response to contract spending. There remains however, one large loose end in this analysis. The negative effect of contract spending on state and local government spending. This result should be taken together with long run negative effect of total contract spending on nonmanufacturing earnings. Here we are likely at the limits of what we can get form a state level analysis. The open question that remains is whether the postwar development of the suburbs are playing

an important role in the results above. There is no reason to a priori assume less contract spending in a state means more suburban development. However, the inverse of the relative state level effects are consistent with this hypothesis. Implied by the direct effects of contract spending on nonmanufacturing earnings and state and local government payrolls is that they growth faster in states without war contracts. State and local government spending likely increased along with the suburbanization of rural areas. As well, it is plausible that non-manufacturing industries—much of which serve local markets and/or are nontradable—grew up along side suburban development. This is speculative, but analysis at the metropolitan statistical area (MSA) level would offer a perspective distinct from that of state and county level analysis. Of course, in terms of available data—and likely available data—MSAs are likely to suffer from the worst of both state level and county level analysis.

Finally, the war does offer some insights into the heterogeneous effects of different types of fiscal policy spending. While, again, the effect of these subcatagories of war spending on income are likely to be unique to the particulars of the Second World War they still suggest an important, general, point about how it is not adequate to simply discuss "fiscal policy shocks". There are two main points here. First, different types of fiscal policy shocks will have different effects. This is an obvious point, but one that the war is particularly useful in calling attention to. Even within the narrow category of "military spending" we see significant differences in the response of income to *types* of military spending. Supply contracts have a strong temporary effect on manufacturing. Investment contracts and military facilities contracts on the other hand have a permanent effect on manufacturing and government payrolls respectively. The second point is related to the first. As Ramey (2012) cautions, the intertemporal evolution of economies in response to government spending shocks should also be approached with caution. Researchers should be careful when trying to measure interempesal multipliers to distinguish between the private economy effects of government spending and the serial correlation of government spending itself. The effect of facilities and industrial contracts on state level economies observed in this paper are clearly tied

directly to the establishment of the military-industrial complex during the war. The large and permanent effect of the war on manufacturing income and government employment most likely stem from the fact that both types of economic activity are dependent on sustained government payments for goods and labor. The pattern of response, which shows a clear postwar wane and then a Korean War waxing reinforces this point. This effect is different than the desired "multiplier" effect in which government spending causes an increase in private output/income above the increase in government spending. Military spending—and military spending in the US in the 20th century in particular—is likely to produce multipliers that are driven by sustained government spending and not an increase in private economic activity.

References

Allegretto, Sylvia A, Arindrajit Dube, and Michael Reich (2011) "Do minimum wages really reduce teen employment? Accounting for heterogeneity and selectivity in state panel data," *Industrial Relations: A Journal of Economy and Society*, Vol. 50, pp. 205–240.

Bossie, Andrew (2019) "Fiscal and Monetary Interactions in the US During the 1940s," *Cliometrica (Forthcoming)*.

Brunet, Gillian (2016) "Stimulus on the Home Front: the State-Level Effects of WWII Spending."

Edelstein, Michael (2000) "War and the American Economy in the Twentieth Century," *The Cambridge Economic History of the United States*, Vol. 3, pp. 329–406.

Fishback, Price and Joseph A. Cullen (2013) "Second World War Spending and Local Economic Activity in US Counties, 193958," *The Economic History Review*, Vol. 66.

Goldin, Claudia and Robert A Margo (1992) "The great compression: The wage structure in the United States at mid-century," *The Quarterly Journal of Economics*, Vol. 107, pp. 1–34.

Gordon, Robert Aaron (1974) *Economic instability and growth*: Harper & Row.

Haines, Michael R., Inter university Consortium for Political, and Social Research (2010) "Historical, Demographic, Economic, and Social Data: The United States, 1790-2002,"Technical report, Inter-university Consortium for Political and Social Research.

Internal Revenue Serivce (Various Years) *Statstics of Income II*: Internal Revenue Serivce.

Jaworski, Taylor (2016) "World War II and the Industrialization of the American South," *Working Paper*.

Nakamura, Emi and Jon Steinsson (2014) "Fiscal stimulus in a monetary union: Evidence from US regions," *The American Economic Review*, Vol. 104, pp. 753–792.

Ramey, Valerie A (2012a) "Government spending and private activity,"Technical report, National Bureau of Economic Research.

——— (2012b) "Government spending and private activity,"Technical report, National Bureau of Economic Research.

Rhode, Paul W, James M Snyder Jr, and Koleman Strumpf (2017) "The Arsenal of Democracy: Production and Politics During WWII,"Technical report, National Bureau of Economic Research.

Rockoff, Hugh (1984) *Drastic measures: A history of wage and price controls in the United States*: Cambridge University Press.

———— (1998) "The United States: from ploughshares to swords," *The economics of World War II: Six great powers in international comparison*, p. 81.

———— (2012) *America's economic way of war: war and the US economy from the Spanish-American War to the Persian Gulf War*: Cambridge University Press.
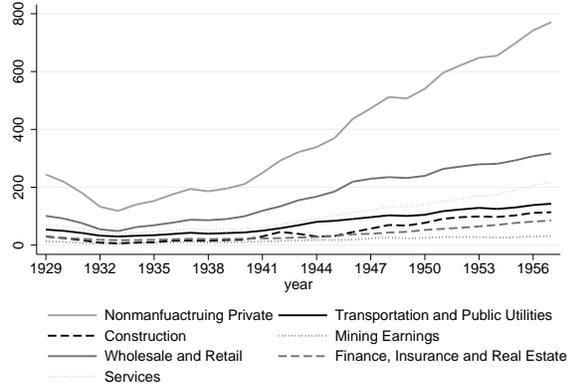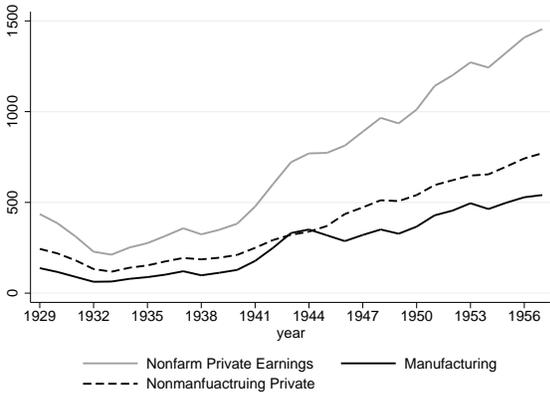
Vatter, Harold G (1985) *The US Economy in World War II*: New York: Columbia University Press.
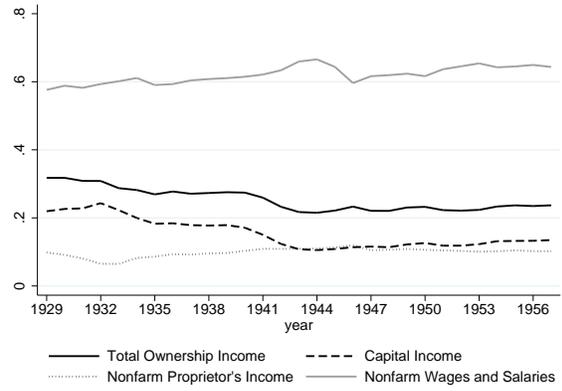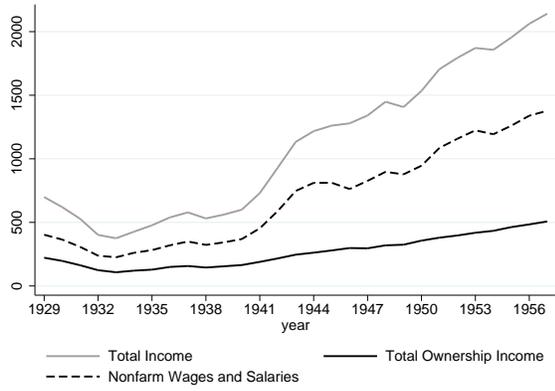
5   Figures and Tables
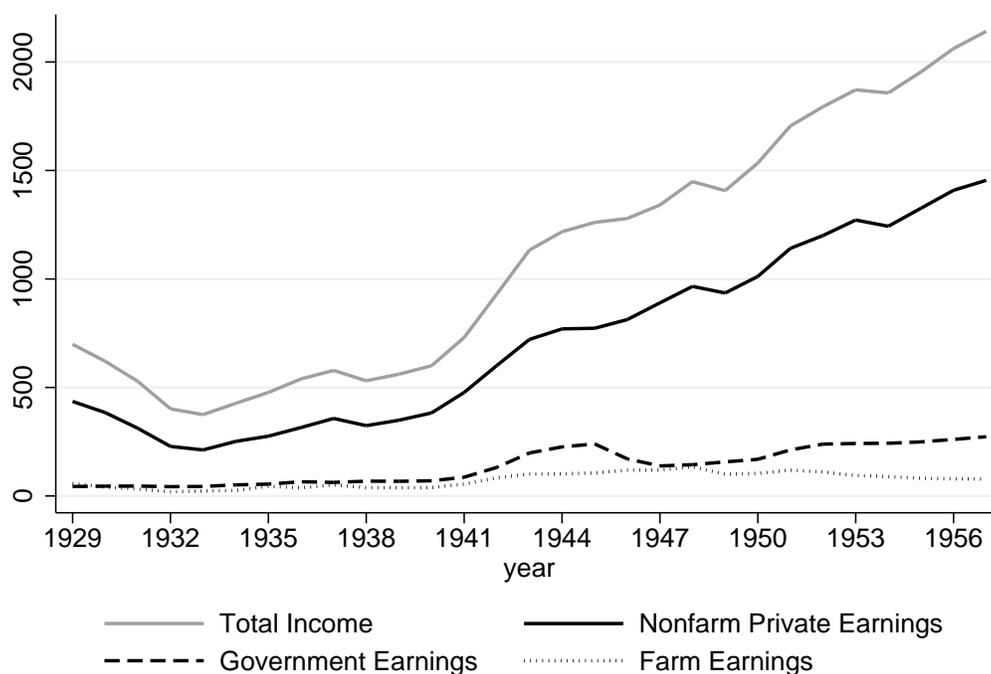
Figure 1: Total Income, Nonfarm Private, Farm and Government Earnings.

(a) Private Earnings

(b) Nonmanufacturing Earnings

Source: BEA panel SA7H and SA5H

Figure 2: The Components of Private Nonfarm Earnings 1929-1957

(a) Ownership and Wage and Salary Income   (b) Ownership Income Percent of Total Income

Source: BEA panel SA7H and SA5H

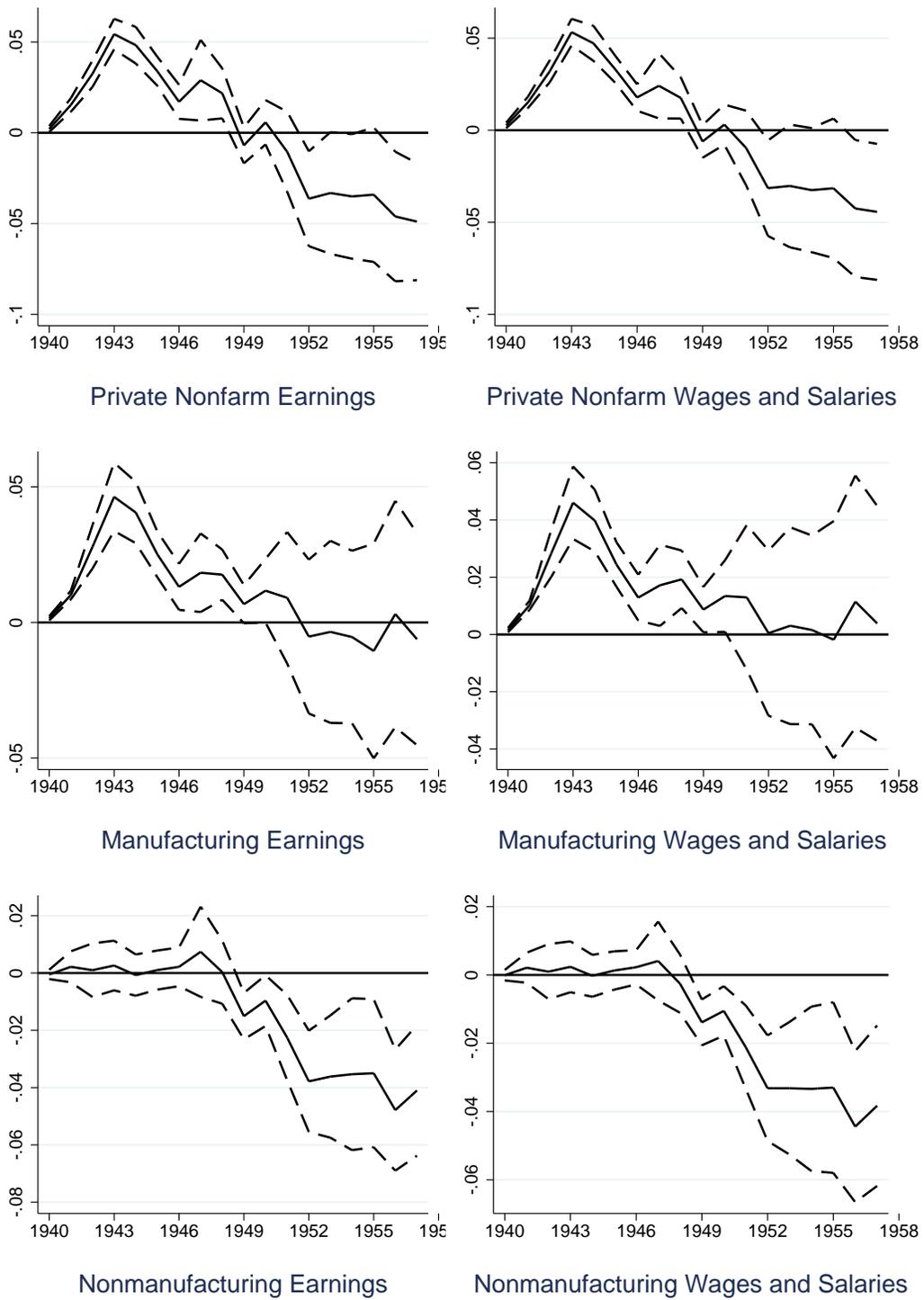Figure 3: Ownership Income 1929-1957
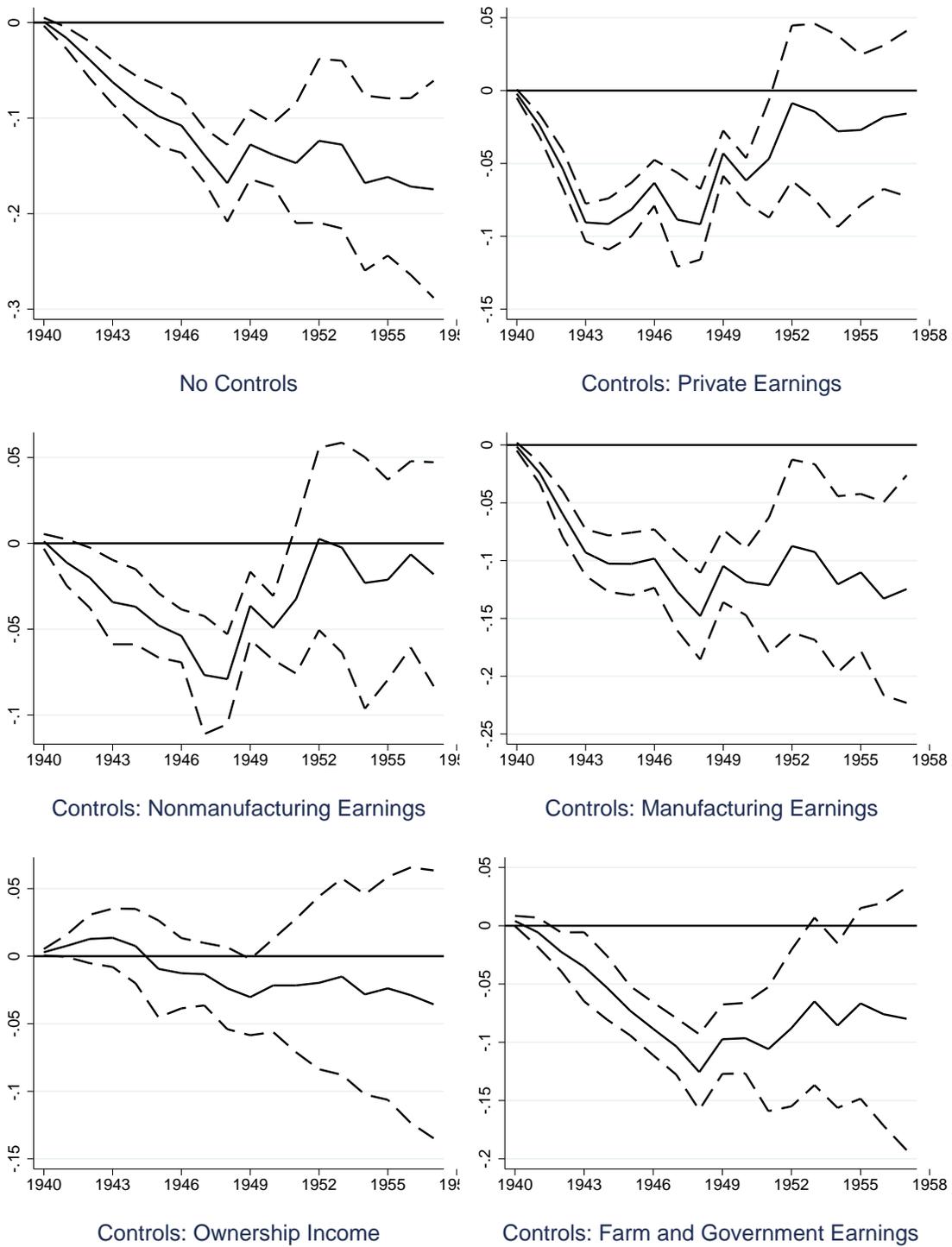
Graphs show the estimated dollar response to $1 of war spending per capita.

Dashed lines are 95% confidence intervals.

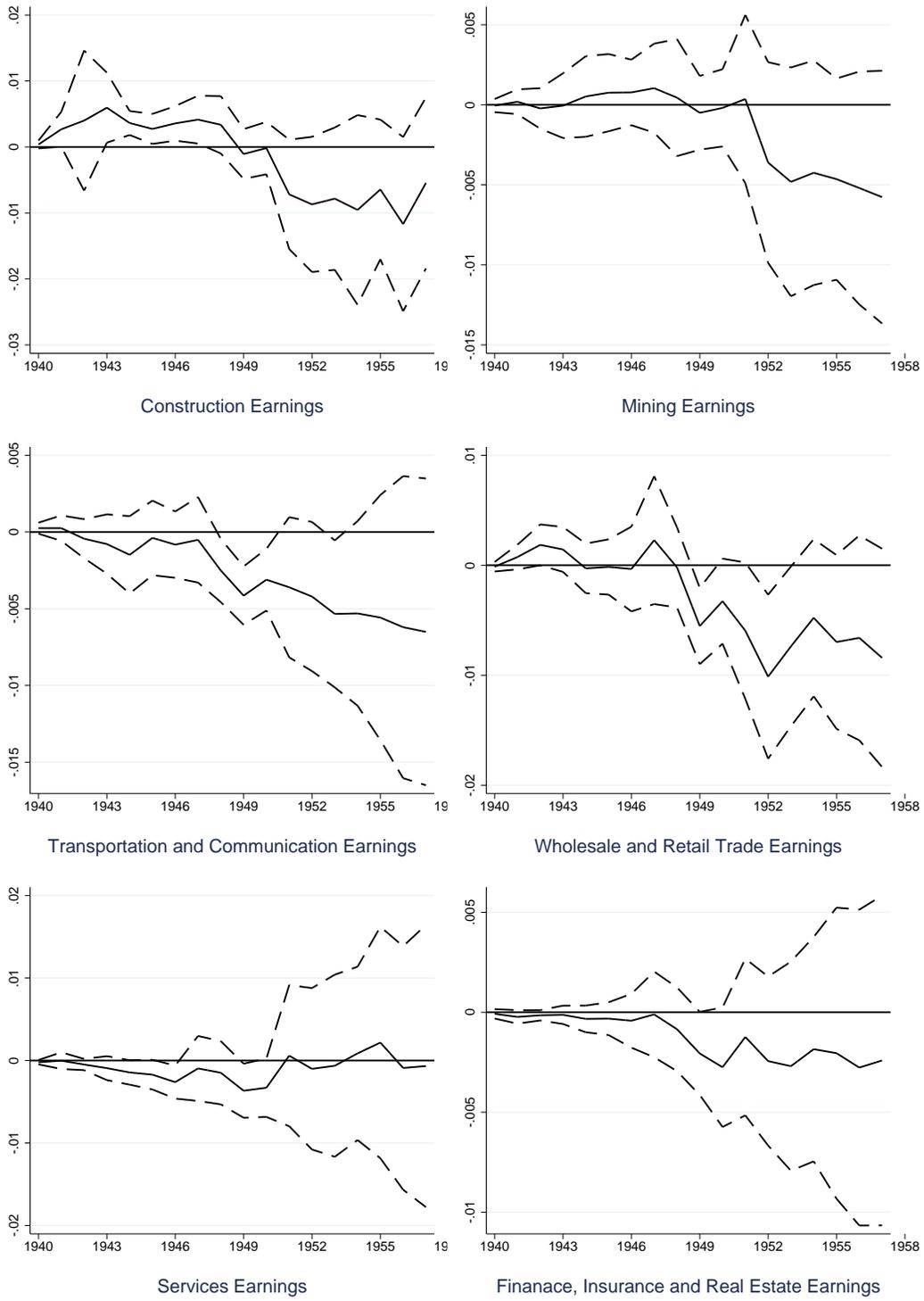Figure 4: The Effect of WWII Contract Spending On Income With Various Control Variables
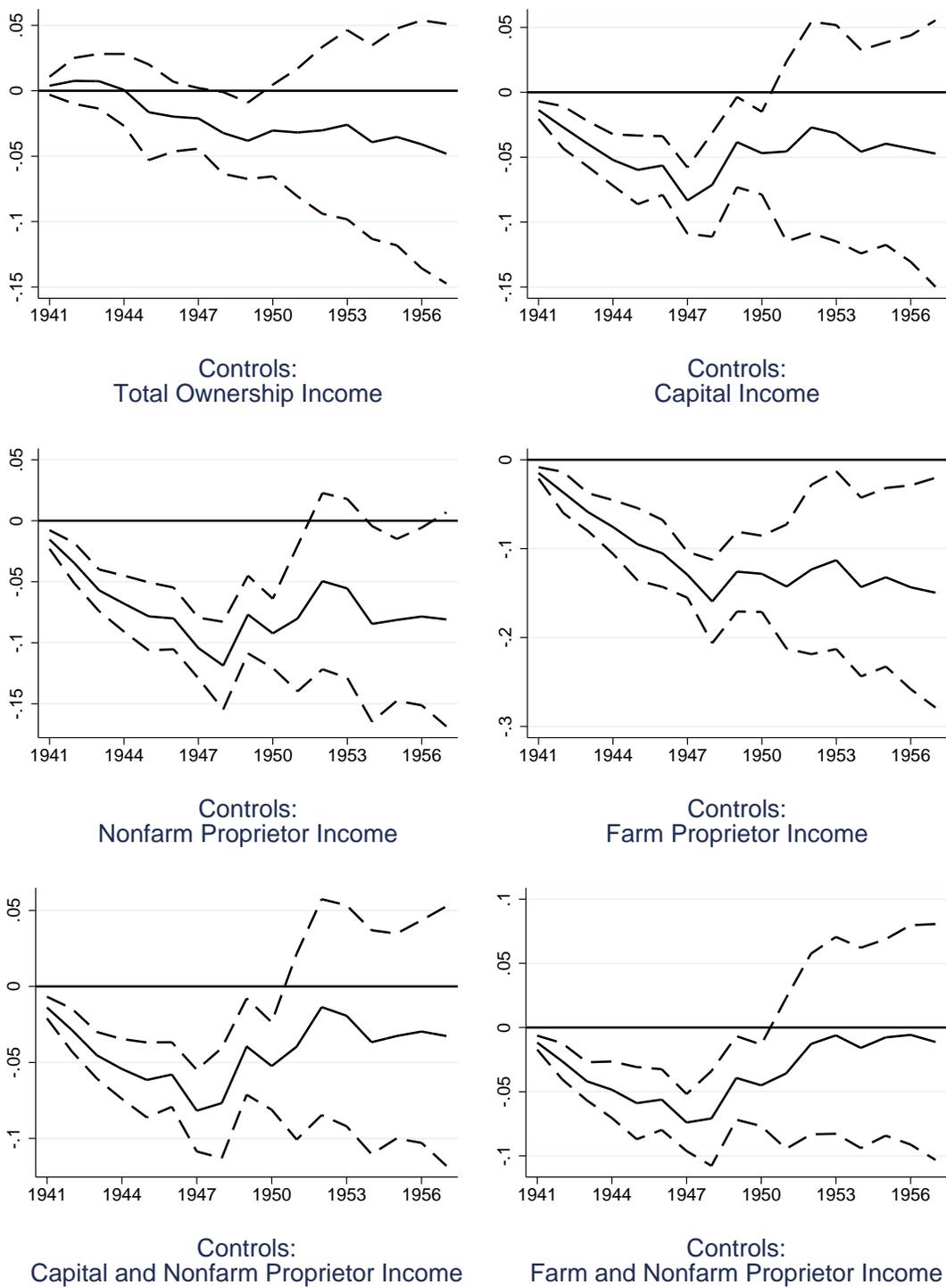
Graphs show the estimated dollar response to $1 of war spending per capita.

Dashed lines are 95% confidence intervals.

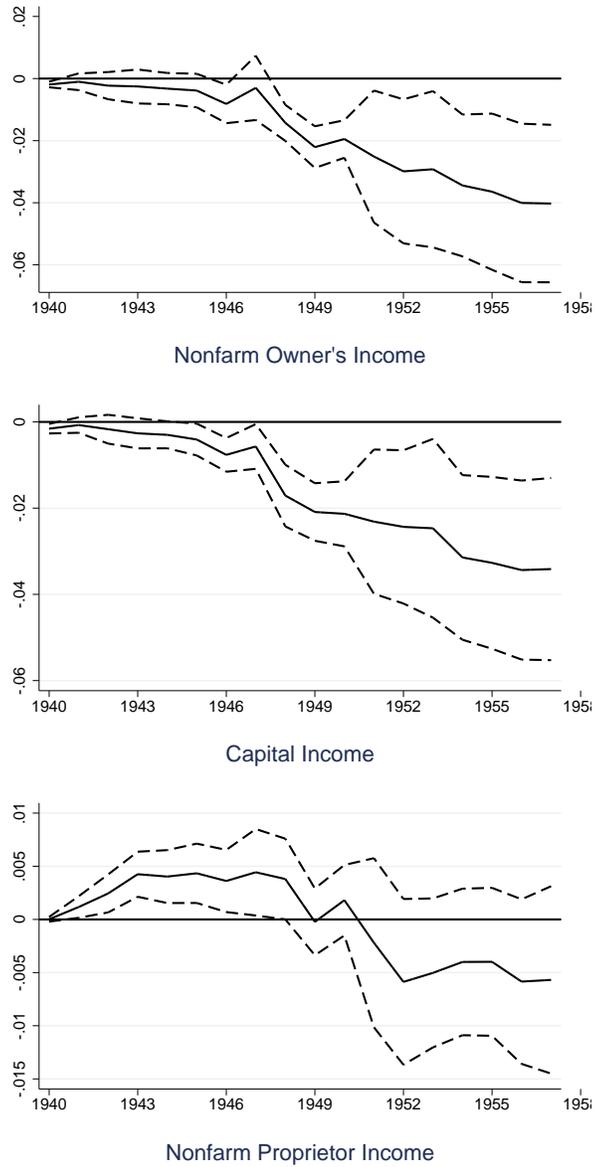Figure 5: The Effect of WWII Contract Spending On Income, Controlling for Various Types of Ownership Income

Graphs show the estimated dollar response to $1 of war spending per capita.

Dashed lines are 95% confidence intervals.

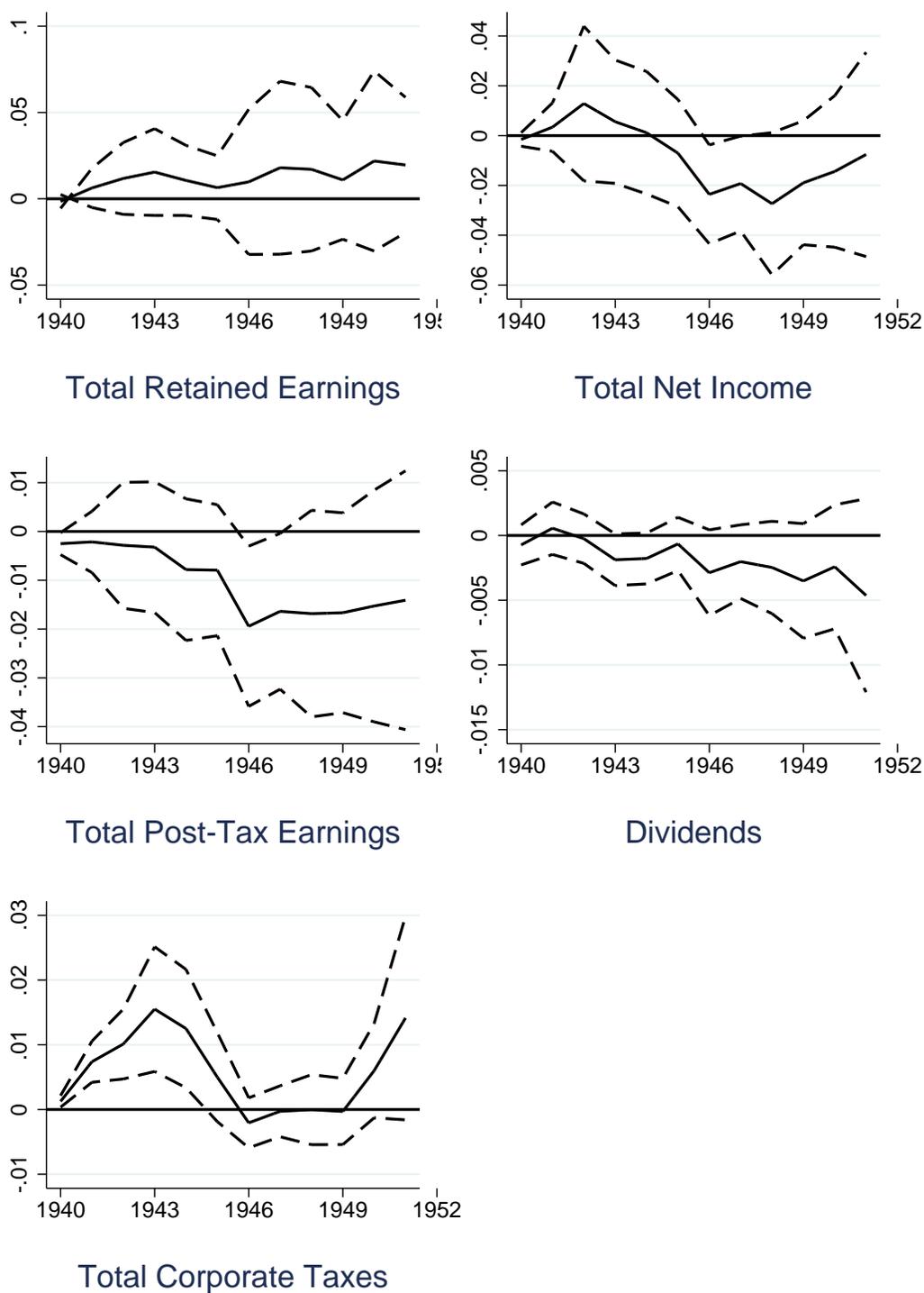Figure 6: The Effect of WWII Contract Spending On Private Nonfarm Income

Graphs show the estimated dollar response to $1 of war spending per capita.
Dashed lines are 95% confidence intervals.

Figure 7: The Effect of WWII Contract Spending On Private Nonfarm Income

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Nonfarm Owner's Income
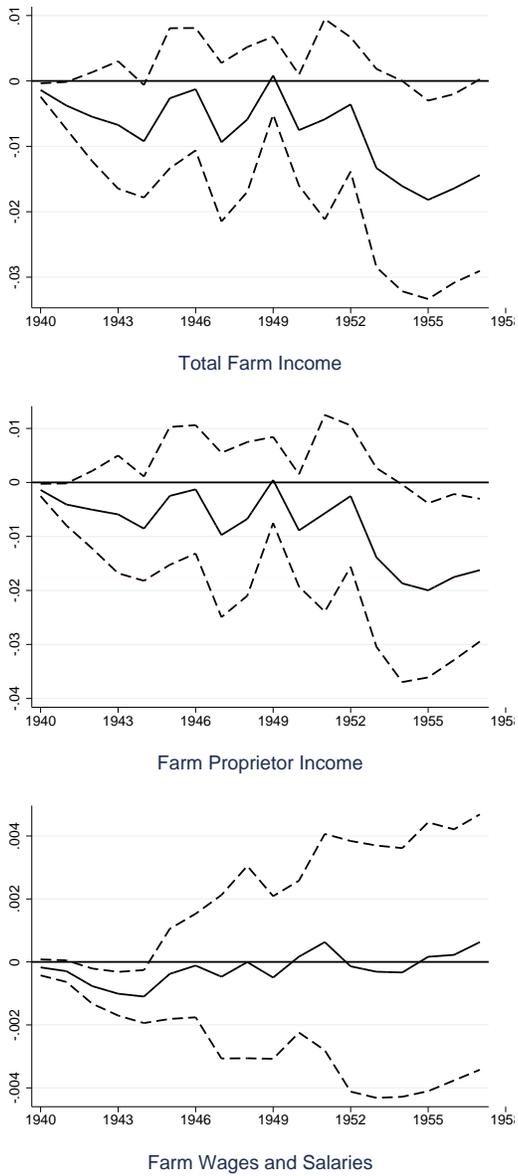

Capital Income

Nonfarm Proprietor Income

Graphs show the estimated dollar response to $1 of war spending per capita.
Dashed lines are 95% confidence intervals.

Figure 8: The Effect of WWII Contract Spending On Nonfarm Ownership Income

Total Retained Earnings

Total Net Income

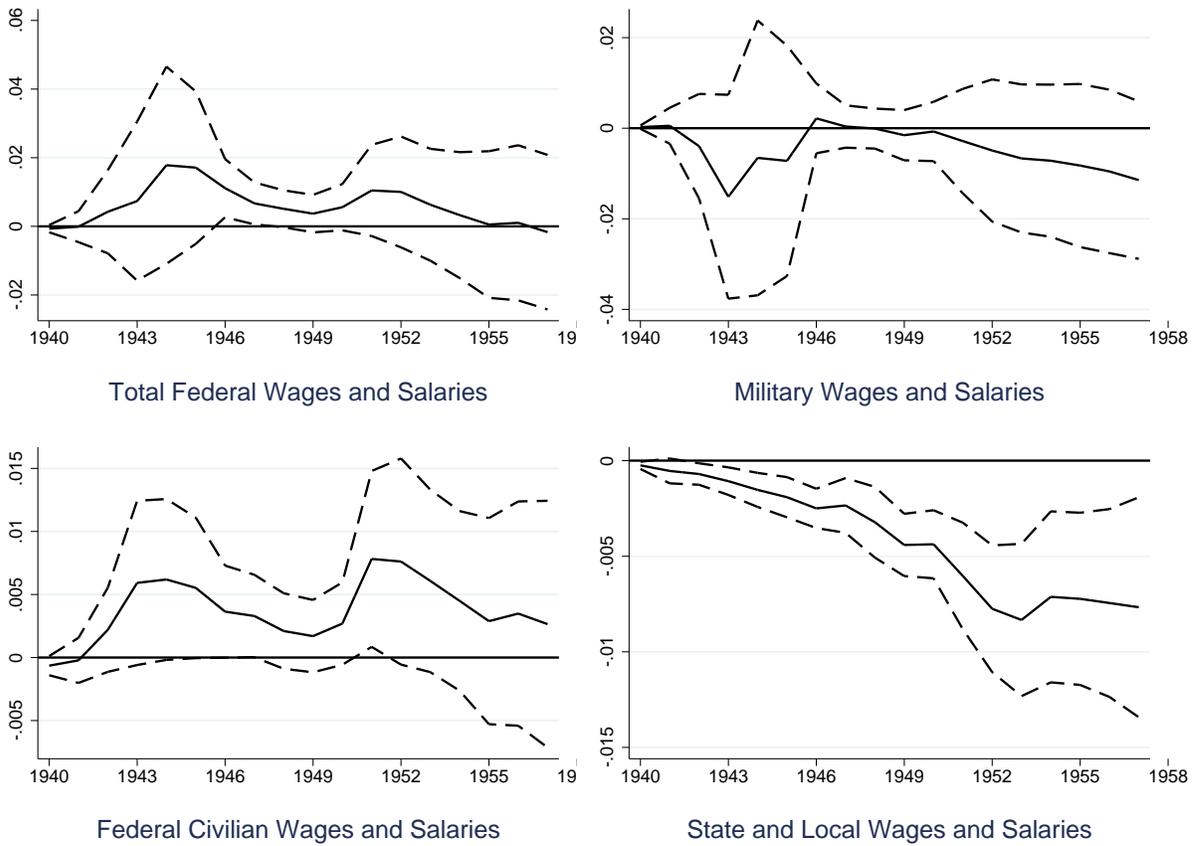**Total Post-Tax Earnings**

Dividends

Total Corporate Taxes

Graphs show the estimated dollar response to $1 of war spending per capita.

Dashed lines are 95% confidence intervals.

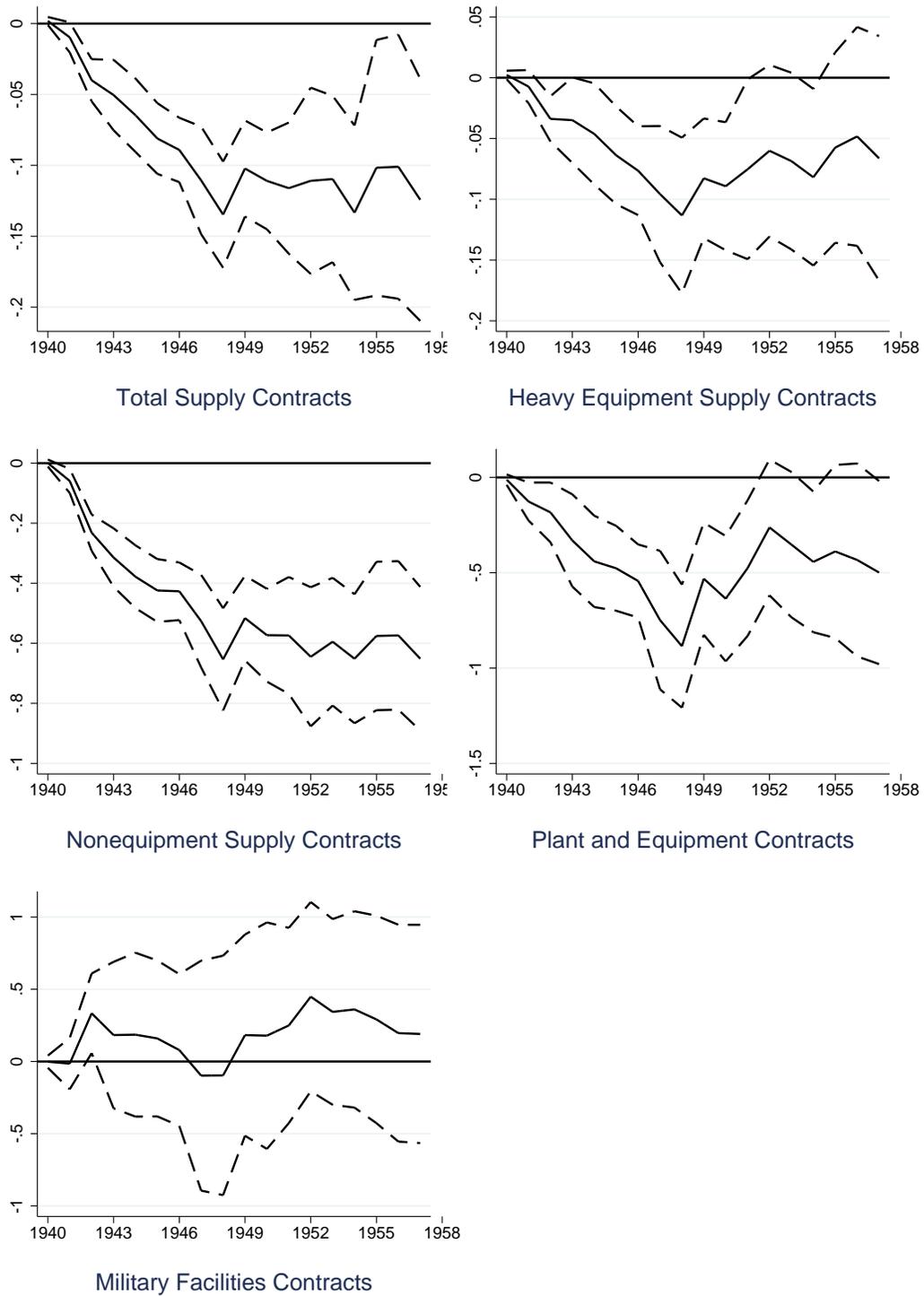Figure 9: The Effect of WWII Contract Spending on Corporate Income

Total Farm Income

Farm Proprietor Income

Farm Wages and Salaries

Graphs show the estimated dollar response to $1 of war spending per capita.
Dashed lines are 95% confidence intervals.

Figure 10: The Effect of WWII Contract Spending on Farm Income

Total Federal Wages and Salaries

Military Wages and Salaries

Federal Civilian Wages and Salaries

State and Local Wages and Salaries

Graphs show the estimated dollar response to \$1 of war spending per capita.
Dashed lines are 95% confidence intervals.

Figure 11: The Effect of WWII Contract Spending on Govenrmnet Payrolls

40

Total Supply Contracts

Heavy Equipment Supply Contracts

Nonequipment Supply Contracts

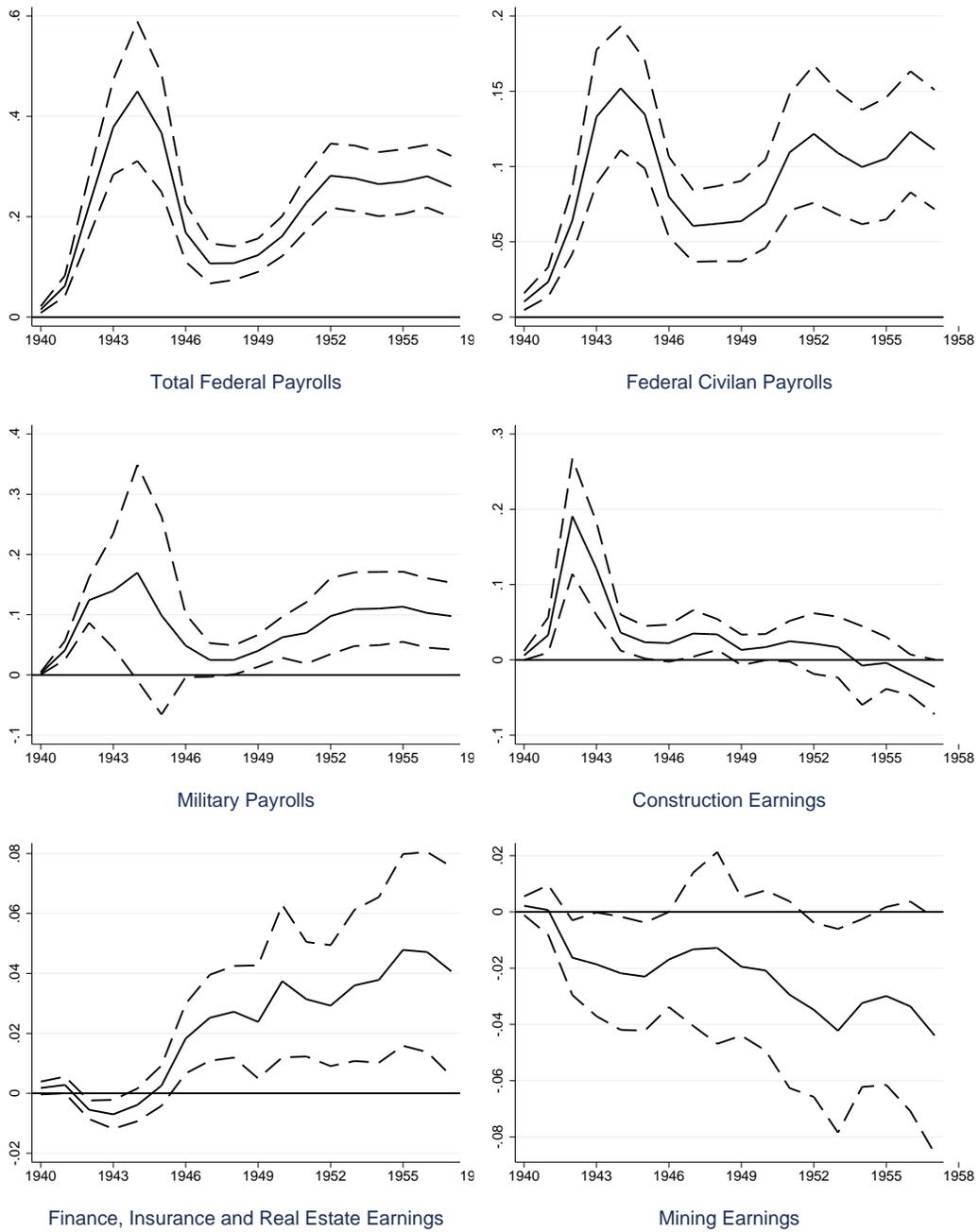Plant and Equipment Contracts

Military Facilities Contracts

Graphs show the estimated dollar response to $1 of war spending per capita.
Dashed lines are 95% confidence intervals.

Figure 12: The Effect of the Subcomponents of War Spending on Income

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Manufacturing Earnings

Nonmanufacturing Private Earnings

Construction Earnings

Graphs show the estimated dollar response to $1 of war spending per capita.
Dashed lines are 95% confidence intervals.

Figure 13: The Effect of Industrial Contract Spending on Selected Components of Income

Graphs show the estimated dollar response to $1 of war spending per capita.

Dashed lines are 95% confidence intervals.

Figure 14: The Effect of Military Facilities Contract Spending on Selected Components of Income