

# The WWII Banking Curse

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**Abstract** It is generally assumed that the buildup of liquid assets in the U.S. during WWII played a large role in generating postwar economic activity. Contrary to this assumption, I establish that wartime contract spending slowed down the growth of bank balance sheets at the state level during the period 1940-1955. State level bank balance sheets are 10.8 cents smaller per \$1 of total military spending by 1949 and 5.8 cents smaller by 1955. This is driven by slower growth of deposits. The adjustment on the asset side is largely through reserves and Treasury holdings. Local lending also grows more slowly after the war, but this decrease is relatively small and temporary. This suggests that the local real economy was largely insulated from the slower growth in deposits by the wartime build up of paper assets. Historical evidence points to the fact that slower growth of deposits is likely driven by a relative decline in demand for deposits by large corporations in war industries.

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# 1 Introduction

Friedman and Schwartz describe the lack of monetary expansion after WWII as “[t]he foremost monetary puzzle of the immediate postwar period.” (Friedman and Schwartz (FS), 1963; pp. 577). The banking system had been flooded during the war by deposit liabilities and highly liquid assets such as reserves and treasury securities. What is more, the Fed’s commitment to maintain low interest rates to aid in war financing and the postwar maintenance of war debt meant that it would have been forced to accommodate any desired expansion of bank balance sheets. The banking system was thus primed to explode under the pressure of pent up demand following fifteen years of depression and war. Despite this, monetary growth after the war was muted.

This paper adds a piece to this “monetary puzzle” by finding that states that received military contracts during WWII experienced a slower growth of their banking systems from 1940 to 1955. One would expect that states that received the direct fiscal shock of the war would have had stronger growth in local savings. Contrary to this expectation, however, in the most general case, WWII military contract spending (the private provision of military goods and services) causes state level bank balance sheet to grow more slowly during and after the war. This effect translates to bank balance sheets that are smaller by 10.8 cents per dollar of contract spending by 1949 and 5.8 cents smaller per dollar by 1955. This decline in balance sheets is primarily a decline in demand deposits and a corresponding decline in reserves and treasury holdings. One could describe this as a war spending “banking curse” since state level commercial banking systems on average are made smaller by military contract spending.

Interestingly, this slower growth in deposits does not translate into a large effect on local economic activity financed through bank lending. War spending is associated with slower growth in lending temporarily during the 1948–1949 recession, but the slower growth in lending is small compared to decline in deposits and paper assets. This suggests that local economic activity financed by the banking system was not seriously affected by the relative

decline in deposits. That is, the local real economy was protected from this war spending banking “curse” because of the monetary shock of the war, which ballooned bank balance sheets with reserves and Treasury Bonds. The slower growth in deposits manifested itself on the asset side primarily as slower growth in paper holdings rather than slower growth in local lending. This also served to protect banks as well. There is also evidence from national bank earnings that the damage of this “curse” to the banking system was fairly limited. There is no effect on earnings, profits, and dividends, at least for national banks.

The historical evidence suggests that this slower growth of deposits associated with war spending is likely driven by the fact that large corporations accumulated securities at the expense of deposits. Most contract spending went to large corporations, with over two thirds of all contract spending during the war going to 100 firms. General Motors alone received almost 8% of war contracts<sup>1</sup>. These large corporations had access to national financial markets. The divestment of large corporations from the banking system can be thought of as a corollary to Fishback and Cullen (FC, 2013) who argue that their finding of no effect of war spending on retail sales after the war is explained by the fact that large corporations reduced local income as these firms redistributed profits nationally. Likewise, Robert Higgs (1999) demonstrates that, in the aggregate, much of the financing of the postwar investment boom was fueled by securities issues and the draw down of securities accumulated by large firms during the war outside the banking system.

The empirical strategy I use to measure the effect of contract spending on bank balance sheets is a variation on a simple fixed effects specification that controls for state and year fixed effects (Nakamura and Stiensson (NS), 2014; Jaworski, 2017). This fixed effects specification produces what NS refer to as an “open economy” or a “relative” effect of military spending on bank balance sheets. The year fixed effects control for changes in national policy. Most importantly year fixed effects controls for changes in national monetary policy, such as restrictions on types of credit, interest rate changes and reserve requirement changes. I use

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<sup>1</sup>Smaller War Plants Corporation (1946); Table 4

an approach similar to that used in Jaworski (2017) and treat the war as a single observation per state, or a “shock” to bank balance sheets, and then trace the effect of this shock from 1940-1955. This shock approach is particularly well suited to historical case studies such as the effect of WWII on state level savings during and after the war because it allows me to trace the effect of the event over time while retaining the benefit of a traditional fixed effects specification in controlling for unobservables. I present evidence that this shock approach produces estimates similar to specifications that have a more complete annual panel of wartime spending. As well, I establish that WWII contract spending can reasonably be thought of as an exogenous shock to state banking systems.

I approach the question of WWII multipliers through the lens of savings behavior, but find a similar phenomenon as other authors who look at the multiplier more directly. Brunet (2017) is a particularly useful example in finding that a dollar of WWII contract spending increases state level economic activity during the war by roughly \$0.25. NS (2014) find a multiplier of 1.4 with a similar panel of military contract data for a later period (1960–2017).<sup>2</sup> This paper adds to the mounting evidence that the nature of the spending—which relied on large corporations because they had the resources necessary to manage the global emergency—made it ill suited to produce large local multipliers.

The study of local savings behavior also offers an insight into the monetary history of the 1940s. The monetary shock of the war stemmed from a combination of a flood of Treasury bonds and an “arbitrarily low” policy interest rate which forced the Fed to print reserves to absorb excess Treasury issues. The build up of paper assets played a key role in muting the potential impact on the real economy of the slower growth of deposits that resulted from the fiscal shock of the war. An obvious counterfactual suggests itself in which, absent the wartime flood of Treasury bonds and reserves, the slower growth in liabilities in states that received war contract spending would have necessarily caused slower growth in local lending and thus slower local economic growth. This study of the wartime fiscal policy shock through

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<sup>2</sup>See Brunet (2017) for a useful review of multiplier estimates for WWII

the lens of savings points to the complexities of fiscal and monetary policy interactions.

## 2 Historical Background

### 2.1 The Macroeconomic Picture

This paper can be seen as an attempt to explore the monetary effects of the fiscal policy shock of the war on local wartime and postwar economic activity. Much has been written about the relationship of aggregate wartime savings and postwar aggregate economic activity, with most authors emphasizing the interplay between pent up demand and the large pool of savings accumulated by households and businesses. Robert Gordon (1974) offers a typical explanation:

While bank credit expanded, business firms remained in a healthy and relatively liquid position. The pent-up demand for consumer goods, the great demand for plant and equipment for replacement, modernization, and expansion, and the acute housing shortage, all backed by the great increase in the money supply and in the public's stock of liquid assets, created a set of expansionary forces that were largely independent of changes in short-term business expectations and other minor deflationary shocks. (pp 95)

In an aggregate sense, the role of the banking system during the war was to aid in the indirect monetary finance of the war<sup>3</sup>. In this role, the function of the commercial banking system was to absorb Treasury bonds. 30% of Treasury debt issued during the war was bought by the commercial banking system (Edelstein, 2001, Table 6.5). On the liabilities side, banks were a large source of the increase in the money supply during the war. The increase in deposits at commercial banks accounted for 76% of the increase in M2 from 1940 to 1946<sup>4</sup>.

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<sup>3</sup>The macroeconomic role of banking and the money supply during and after the war has received an extensive amount of attention elsewhere. For a more detailed macro view than I offer see: Chandler (1951), Edelstein (2001), FS (1963), Vatter (1985), Meltzer (2003), Rockoff (2012), and Campagna (1987).

<sup>4</sup>Historical Statistics of the United States, Millennial Edition, series Cj45 and Cj46

While I leave a more detailed discussion of the aggregate situation to other authors, the passivity of monetary policy—particularly from 1942-1951—is worth discussing here as it is important in establishing a key element of the monetary environment local banks were operating in. While the regression specification below takes care to control for national monetary policy changes, it is important to establish that the baseline monetary policy environment was one in which, essentially, the banking system was largely untethered from Fed control during the war and over most of the postwar period under consideration here. Given the passivity of monetary policy and the pent-up demand generated by the war, the lack of a positive effect of contract spending on bank balance sheets after the war is even more striking.

This explosion of liquid liabilities in the banking system had important implications for monetary policy at the time. Monetary policy before the war and the decades after the 1951 Accord was focused on managing the money supply directly through the management of reserves. From 1942 until 1951 policy shifted to maintaining a low target interest rates on Treasury Bonds to aid war financing during the war. After the war the peg was maintained to stabilize the large pool of Federal government debt both to aid the Treasury in debt management and to protect bond holders from capital losses.

The shift in policy objects meant that the while the Fed targeted treasury bond rates, it lost control over the amount of reserves in the banking system. In a simple model of reserve and deposit growth, the growth rate of deposits is dependent on the growth rate of reserves proportional to the simple money multiplier:

$$d = \frac{1}{\rho}r \quad (1)$$

Where  $d$  is the growth of deposits and  $r$  is the growth of total reserves and  $\rho$  is the portion of deposits required to be held as reserves. In a simple sense, before 1942 and particularly after 1951 (Wicker, 1974) the Fed tried to manage the growth of deposits buy picking a rate

for  $r$  and a level of  $\rho$  to produce a growth rate of deposits in line with a desired overall growth of the money supply and macroeconomic objectives. However, between 1942 and 1951 the move to targeting treasury rates meant that the Fed was obligated to purchase Treasury bonds whenever there was an excess supply of Treasury bonds in the banking system as such:

$$i = i^T + \gamma(\epsilon_S - \epsilon_D) - \gamma(\epsilon_{Fed}) \quad (2)$$

Where  $i$  is the market interest rate and  $i^T$  is the target rate. Since the interest rate responds inversely to demand shocks ( $\epsilon_D$ ) and positively to supply shocks ( $\epsilon_S$ ) the Fed is obligated to offset those shocks by purchases or sales of treasury bonds ( $\epsilon_{Fed}$ ) in order to keep the interest rate on target. Since the interest rate targets for treasuries<sup>5</sup> were intended as caps, the Fed primarily needed to respond to positive supply shocks and negative demand shocks.

The large Treasury build up during the war provided the banking system with a large inventory of liquid assets that could easily be exchanged for reserves. In their role as secondary reserves, Treasury bonds were held because they paid an interest rate as opposed to inter-bank demand deposits and other types of cash reserves. The interest rate cap further aided in the liquidity of Treasury bonds, by guaranteeing the price of these bonds and avoiding interest rate risk (Wicker, 1969; p. 455). However, if banks preferred to hold excess reserves or to make loans, it was a simple matter to sell Treasury Bonds in the national market for Treasury bonds. This national market for Treasury bonds had emerged out of WWI and had been made possible by the telegraph and telephone (Garbade, 2016). However, if the bank could not find a buyer at the target interest rate, the Fed was obliged to purchase

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<sup>5</sup>The target was officially 0.375% on 90 day Treasuries. The other interest rate caps evolved out of this. The Fed maintained caps on shorter term bonds until 1947 but continued the 2.5% cap on longer term (more than 5 years) until the 51 Accord. The Fed allowed rates on short term maturities to increase to facilitate a rebalancing of Fed holdings towards longer term bonds and bank holding towards shorter term bonds (FS, 1963; p562, 579-580).

those Treasury bonds by printing reserves. Within the banking system, then, an increase in the supply of bonds (decrease in demand) is equivalent to an increase in the demand for reserves<sup>6</sup>. That is, given Equation 2 a shock of  $\epsilon_S$  must be met by an equivalent change in Fed purchases of bonds and thus an increase in reserves of  $\epsilon_{Fed}$ . Given the simple money multiplier, an excess supply of Treasury bonds means:

$$d = \frac{1}{\rho}(r + \epsilon_{Fed}) \quad (3)$$

The Fed could try to target deposit growth with  $r$ , but deposit growth is also subject to the effects of shocks to the demand for Treasury bonds. By the end of the war Treasury holdings were half of bank assets<sup>7</sup>, representing an enormous potential to expand deposits and lending under interest rate targeting. One important mitigating factor would be the banking system's desire to hold excess reserves, but excess reserves were low during this period. It should also be clear from Equation 3 that the Fed could also raise reserve requirements to try to dampen deposits growth. The Fed tried this approach twice after 1947, though an increase in reserve requirements could and did induce an offsetting excess supply of Treasury bonds (Eichengreen and Garber (EG), 1991)

The Fed was quite aware of the lack of control it had over monetary aggregates due to its Treasury peg. In the 1945 Annual report, the Fed discussed at length the inflationary dangers inherent in the wartime monetary expansion, as well as the potential expansionary potential of the large pool of Treasuries held by the banking system:

One of these is the Reserve board's assurance to the Treasury that the rate of 7/8 percent on one-year certificates will be maintained, if necessary, through open market operations. This means in practice that the Federal Reserve stands ready to purchase short-term Government securities in the open market in order to prevent short-term interest rates from rising about the level the Government

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<sup>6</sup>For simplicity, this ignores the occasional infusion of new Treasury issues to support the war—which the Fed responded to robustly

<sup>7</sup>All Bank Statistics, 1959 Table A1

is now paying. ... This policy makes it possible, however, in the absence of effective restraints for commercial banks to sell short-term, lower-yield Government securities to the Reserve System and thus acquire reserves which, on the present basis of reserve requirements, can support a sixfold expansion of member bank credit. To the extent that commercial banks use these reserves, either for their own account or in loans to customers, for the purpose of purchasing longer-term higher-yield Government bonds or other securities, the money supply can thereby be increased on the volition of the banks irrespective of national monetary policy and without control such as exists in other principle countries. (Board of Governors (BoG), 1945 p 3-4)<sup>8</sup>

Meltzer (2003, Ch 4) emphasizes the passivity of the Federal Reserve between the wars and the way in which monetary policy was primarily driven by the concerns of the Treasury. The Treasury Department wanted to keep rates low to help manage the debt to GDP ratio. However, monetary policy was even more passive in the immediate postwar period than targeting Treasury rates would suggest. Even the low target rates were above the prevailing market rate on Treasury bonds. Thus, the monetary situation was so out of the Fed's hands that they found that they did not even have to print reserves to absorb an excess supply of bonds (FS, 1963, pp578–581).

FS attribute the fact that the postwar did not see a monetary expansion and inflation at the level one might expect to two main factors. First, and less importantly, the Federal government surpluses in the immediate postwar period reinforced the glut of private savings and further pushed market rates for Treasury bonds below support prices. More importantly, FS also attribute the desire of the public to hold onto liquid assets to the expectation of a postwar depression. They identify this as the main driving force of both the muted postwar aggregate demand and low interest rates. The liquidation of assets after the war would have both increased inflationary pressure through demand as well as increased interest rates on Treasury bonds to the point where the Fed would have had to actively support the price of Treasury bonds by expanding the monetary base.

Robert Higgs (1999) makes many of the same points that FS do, but his interpretation of the immediate postwar period differs in an important way. First, using polling data

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<sup>8</sup>Similar concerns are raised again in the 1947 Annual Report. (BoG, 1948 p. 7

Higgs argues that business owners and executives were in general optimistic about postwar prospects. Second, and more important to this paper, is that Higgs argues that much of the immediate postwar expansion took place outside of the banking system. After establishing the relatively passive postwar behavior of household savings, which he equates roughly with M2, Higgs continues:

In sum, the corporate investment boom of the postwar transition years received its financing from a combination of the proceeds of sales of previously acquired government bonds, increased current retained earnings (attributable, in part, to reduced corporate tax liabilities), and the proceeds of corporate securities offerings. (p 610)

As mentioned above, Eichengreen and Garber argue that the Fed became more active towards the end of the 1940s. However, before the 1951 Accord the only tool the Fed had at its disposal under the Treasury interest rate targeting regime were changes in reserve requirements. The Fed employed this tool twice, during the 1948-1949 recession and then again towards the end of 1950. The results of trying to employ this tool are unclear. The increase in reserves requirements during the 1948/49 recession is correlated with a decline in the money supply, but causality is not clear. At any rate, when the Fed attempted to raise reserves requirements again in the inflationary environment of late 1950, the increased reserve requirements lead to a sell off of Treasury bonds by banks which was accommodated by the Fed (EG, 1991 p. 195)

The move to using reserve requirements towards the end of the Treasury targeting period can be thought of as a manifestation of the Fed's increasing impatience with the interest rate targeting regime that had been in place since 1942 and as a prelude to the 1951 Accord. The desire for the Fed to move away from focusing on Treasury finance to economic stability was obviously driven by the inflationary environment of the late 40s but it was also likely aided by the fact that Treasury bonds had shrunk significantly in importance to banks, from 51% of assets in 1946 to just below 35% (All Bank Statistics 1959, Table A1) of assets in 1950 and so the Fed likely felt less obliged to maintain bond prices to protect bank balance sheets

(EG, 1991). The taciturn joint press release by the Fed and the Treasury on March 4th, 1951 indicated that Treasury debt management were still an object of the Fed policy, even if the Fed were no longer obliged to directly monetize the excess supply of bonds. However, if the Annual Reports of the Board of Governors are any indication, Treasury debt rapidly declines in importance through 1955. Only in the 1953 report does the Fed explicitly state government finance as a reason for easing credit (BoG, 1954a).

In many ways, production and investment for the Korean War was financed the same way WWII was financed. At the national level, however, instead of using deficit spending, the Federal Government financed the Korean War almost exclusively through taxes. Money creation played a small role as the Fed moved towards discount lending as their main instrument for adjusting reserves during the war. It is unclear, however, what the short term impact of the 1951 Accord was on the the banking system, though the impact seems modest ion the short term. Through the end of the period under consideration here. Longer term Treasury rates were about 50 basis points higher in 1955 than they were in the first quarter of 1951<sup>9</sup>. However, general short term business lending rates increased by 1.4 percentage points from 1951 to 1955<sup>10</sup>. As well, while there was a notable decrease in Treasury holdings by banks from 1950 to 1951 (from 34.7% in 1950 to 31.7% in 1951) Treasury holdings hovered around 30% through 1955. Reserves increased modestly as a share of assets during the Korean war, from 23.3% in 1950, to 25.3% in 1952, but reserves fell to 22.5% of assets by 1955 (All Bank Statistics, 1959 Table A1).

The effects on expectations of the 1951 Accord was likely significant, but it did not represent a major disruption in Treasury rates or the composition of bank balance sheets. However, it is my view that the post-1950 results presented below should be approached with some caution, even though the major, post-1950 monetary and fiscal policy changes have been controlled for in various ways. The full time period available has been employed because the question of whether the shock of WWII spending created a temporary or permanent effect

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<sup>9</sup>Banking an Monetary Statistics (1976; Table 12.12

<sup>10</sup>Ibid. Table 12.8

on balance sheets is of obvious interest. There is a clear temporary effect associated with the interest rate targeting regime (1942-1950), but the empirical and historical evidence is ambiguous on what the long term effect of the war was on bank balance sheets.

## 2.2 Demand Deposits

This section seeks to trace out a mechanism for the the observed decline in state level demand deposits. Using data from the IRS *Statistics of Income* (SOI)—which has balance sheet data for corporate tax filers—I extend and expand the series on corporate demand deposits from Raymond Goldsmith’s *A Study of Savings in the United States* to 1953. The SOI has data on corporate cash holding by asset class and SIC industry classification. This aggregate data shows that corporate deposits grew more slowly than noncorporate deposits, particularly after 1942. The data also shows that this slowdown in growth is being driven by large firms in war manufacturing industries, which experience negative growth in cash holdings from 1942 to 1946. Growth of all corporate deposits was somewhat faster in the postwar period, particularly in the 1950s, and growth in demand deposits held by individuals slowed down significantly. The behavior of cash holdings by large manufacturing corporations in war industries mirrors the empirical results below which shows a sharp decline in state level relative deposit growth after 1942 and some recovery in relative deposit growth towards the end of the 1940s and into the 1950s.

Figure 1a shows the behavior of corporate and noncorporate demand deposit holdings from 1926 to 1952. This figure is based on data from Goldsmith (1955, Table L-5) and the IRS SOI <sup>11</sup>. Goldsmith offers estimates of demand deposits held by corporations and noncorporations through 1949. I use the IRS SOI to extend the Goldsmith series ahead until 1953, the last year consistent data is available. Goldsmith’s estimates of corporate demand deposits are derived from the IRS SOI’s data on corporate balance sheets which includes cash holdings of corporations by industry. As is evident from Figure 1a, however, the IRS

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<sup>11</sup>IRS Statistics of Income Part II; 1938–1952 Table 6, 1953 Table 5

cash series is not exactly the same series as the Goldsmith demand deposit series. Goldsmith made adjustments to the SOI series—which only tracks “cash” holdings—for the years his series covers that I have not made to the raw IRS SOI series.

Cash holdings includes demand deposits, but also includes currency and time deposits. When making his adjustment to the SOI cash series to derive demand deposit holding by corporations Goldsmith estimates that currency and time deposits make up a small fraction of “cash”. As well, currency and time deposits holding by corporations grew very slowly over time. For instance, in 1926—the start date for Figure 1a— Goldsmith (1955, Table L-12) estimates that time deposits and currency make up 17% of corporate cash holdings, the remainder was held as demand deposits. By 1940 Goldsmith estimates only 12% of cashes holding was held in currency and time deposits. By 1949, the last date of Goldsmith’s estimates, 92.5% of corporate cash holdings was in demand deposits.

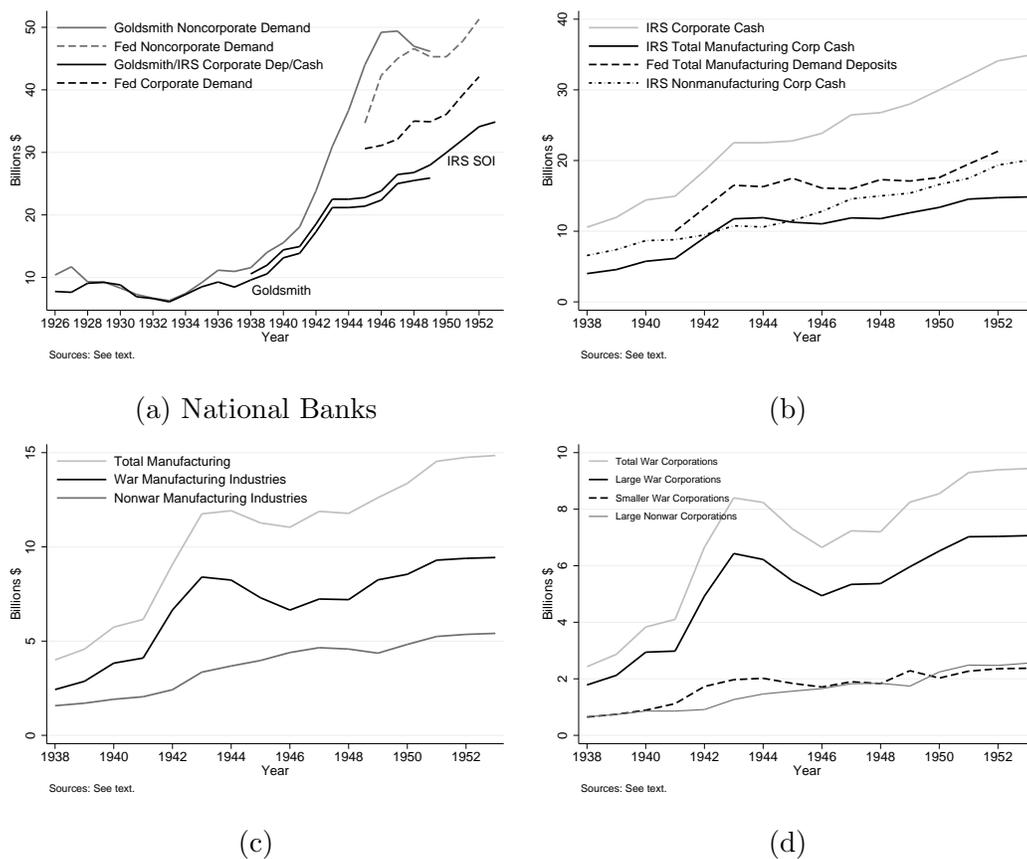


Figure 1: Demand Deposit and Cash Holdings of Selected Corporations 1938-1953

The broken solid line in Figure 1a shows both Goldsmith's estimates of demand deposits from 1926-1949 and an overlapping series of corporate cash derived from the SOI from 1938 to 1953. The Goldsmith and IRS series differ in two ways. Aside from the fact that the Goldsmith series is an estimate of demand deposit holdings and the IRS series measures cash holdings, Goldsmith adjusts cash and deposit holdings to account for the fact that not all corporations who filed tax returns with the IRS submitted balance sheets. I have not adjusted the IRS series to account for this because data on corporations filing with and without balance sheets is not available for individual assets classes, which form the basis of this discussion. As the reader can see, even without adjusting the IRS series, the difference between the Goldsmith and the IRS series is small and constant and the two series behave the same during the period they overlap (1938-1949). This is the basis for the assumption that the dynamics of cash holdings by corporations is driven by demand deposits.

Goldsmith also offers estimates of "non-corporate" demand deposit holders. This includes all noncorporate depositors except foreigners, state and local governments and Federal corporations. For comparison I have included—as dashed lines—separate estimates of corporate and noncorporate demand deposit holdings from a survey series conducted by the Federal Reserve from 1941 to 1952.<sup>12</sup> The Goldsmith and IRS series overestimate noncorporate deposits and underestimate corporate deposits relative to the Fed survey. There are numerous differences in the series; for instance the Fed survey does not track government deposit holdings though produces similar estimates of total demand deposit holdings to the Goldsmith and IRS series. It is not clear where government (state and local and Federal corporation deposits) that are accounted for by Goldsmith are included in the Fed estimates of demand deposits. However, for the period where they overlap (1944-1952) changes in both measures of demand deposits are very similar. Demand deposits increase by \$30.6 billion according to the Fed survey between 1945 and 1952 and cash holdings increase by \$26.8 in the IRS data.

Corporate and noncorporate demand deposit growth and levels are very similar before

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<sup>12</sup>Ownership of Deposits, Federal Reserve Bulletin June 1947 and May 1952. The Fed continued the survey after 1952 but changed the methodology which renders the results not comparable.

1937. After 1937, deposit growth picks up for both corporate and noncorporate holders, likely a result of pre-WWII gold inflows that serves as a monetary stimulus in the late 1930s (Romer, 1992). However, noncorporate and corporate growth in deposits is not systematically different until 1942 when corporate deposit growth essentially stops while noncorporate growth continues to increase rapidly until 1945. At roughly the same time as noncorporate deposit growth slows, or possibly reverses, (1946–1949) corporate deposit holdings begin to increase. Figure 1a suggests that after the 1948/49 recession deposit growth picked up for both corporate and noncorporate deposit holders.

Figure 1b shows total corporate cash and breaks that series down into manufacturing and nonmanufacturing industries. The lack of wartime growth in corporate cash holdings after 1943 is driven by relatively slow growth in cash holdings of nonmanufacturing corporations. However, these deposits continue to grow through the war. Manufacturing deposits, on the other hand, decline by 7.9% from 1944 to 1946. The Fed survey series (the dashed line) also shows a decline in demand deposit holdings of all manufacturing and mining businesses from 1943–1946 of 2.4%.

Figure 1c narrows the aggregate picture further and shows the breakdown of manufacturing corporations into war and nonwar manufacturing industries<sup>13</sup>. It should be evident from Figure 1c that war industries are driving the observed decline in manufacturing cash holding. While total manufacturing cash holdings falls by around \$0.8 billion, war industry cash holdings fall by \$1.8 billion from 1943–1946.

Finally, Figure 1d shows the distribution of war industry cash holdings by size of firms. The arbitrary cutoff for “large corporation” is set at total current assets of \$10 million or more to be consistent with Fed survey data of corporate balance sheets (discussed below). This asset level cutoff well represents other possible cutoff levels and captures the dynamics

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<sup>13</sup>Government agencies during the war used a fairly consistent definition of war industries based of SIC classifications. War industries are manufacturing industries that include petroleum, chemicals, rubber, steel and iron, nonferrous metals, machinery, electrical equipment, automobiles, and other transportation equipment. These industries also comprise “war industries” for the annual wartime wage and salary data for war industries discussed below.

of large corporations in war industries cash holdings clearly. Total annual cash holding for corporations with less than \$10 million in assets are also included. Cash holdings of nonwar manufacturing corporations with assets of \$10 million or more are also included for additional perspective.

It is clear from Figure 1d that war industry holdings of large corporations are driving the total war manufacturing series. Cash holdings of large corporations are both significantly larger and significantly more volatile than smaller firms and nonwar firms. There is also obviously correlation between large corporate cash holdings and total war industry cash holdings. Smaller corporations also show a slight decline in cash holdings, though the decline is smaller and more temporary. This decline largely reflects that fact that firms with assets between \$1 million and \$10 million show a similar pattern to the very largest firms. However, relative to very large firms, cash holdings of “midsize” firms are small. It should be repeated that the definition of “large corporation” used here is arbitrary and likely these midsize also had access to national financial markets to some extent.

On both the national and local level, the demand for deposits by large corporations falls in the second half of WWII. Large corporations most likely substituted away from local banking systems into national securities markets. During the war nonfinancial firms also absorbed some of the flood of government debt. The Fed also collected survey data on the balance sheets of corporations in war manufacturing industries with \$10 million dollars in assets or more<sup>14</sup> In 1940, currency and deposits made up 13.1% of large corporate balance sheets in war industries. Securities made up 2.9% of assets of these firms. By 1945 securities holdings made up 13.7% and currency and deposits shrank in relative importance slightly to 12%. After the war, when firms were able to invest more heavily in plant and equipment, both securities holding and cash holdings decline in relative importance to large war industries corporation’s balance sheets. For the second half of the 1940s, securities holdings hover around 9% of large corporate balance sheets in war industries and increase starting in 1949

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<sup>14</sup>Dirks, 1945; Warner, 1945; Warner and Koch, 1946; Schmidt, 1948; Stockwell, 1950; Stockwell, 1951; FRB, 1954. See Appendix F for a discussion of how these survey compare to each other.

though the first year of the Korean War. Cash holdings, on the other hand, continue a slow decline in importance to large corporations in war industries balance sheets slowly to 6.8% in 1952, the last year of the survey. Accounts receivables also increase in importance during the war, from 8.8% in 1940 to 13% in 1945, falling to around 11% after the war is over. Suggesting large firms also substituted away from cash holdings into direct credit to client firms and subsidiaries particularly during the two wars.

The aggregate data suggests that the slower growth in local deposits is a savings corollary to the FC hypothesis that large corporations drained economic activity away from localities receiving war spending. While individuals and many smaller business only had access to local financial markets and thus were “forced” to hold their savings in deposits, larger corporations that received war spending could simply purchase liquid assets—most obviously Treasury bonds—in national financial markets. The local effect of war spending on bank balance sheets then is explained by the fact that large corporations drained (in a relative sense) savings out of local banking systems.

In effect, smaller savers used their local banking systems as intermediaries for Treasury purchases. To the extent that corporate profits were saved, larger corporations could purchase Treasury bonds directly. As discussed above, the commercial banking system in a national sense was primarily used as a warehouse for Treasury purchases. This is reflected in the empirical results below, in which the slower growth in deposit in states that received war spending is met by slower growth in paper assets (Treasury holdings and reserves) and not lending. A discussion of lending is warranted, to emphasize the observed disconnect between slower deposit growth and lending.

## **2.3 Lending**

Bank lending was only a minor part of overall war finance, despite the V loan program that was designed to move firms away from relying on government advances and into private financing. What is more, bank credit generally is a small part of the financing for large

corporations. This explains at least some of the relative passivity of bank lending at the state level relative to the decline in deposits. This also justifies the assumption in the discussion of the empirical results below that the slower growth of liabilities is driving the slower growth in assets. Table 1, taken from Fuller (1945) lays out the basic relationship of large manufacturing firms and different sources of funds during the war. Fuller establishes that the growth in business finance during the war took place largely outside the banking system. As Fuller reports, the combination of advanced payments and tax accrual provided about 50% of working capital for the firms in the survey. Government direct financing accounted for another 10-15%. Bank lending remains at less than 8% of liabilities during the war, even after the introduction of V loans in 1942, which corresponds with a doubling of the share of war financing by banks from 3.2% in 1941 to 6.4% in 1943. Bank lending peaks at 7.9% of liabilities in 1944. Trade credit, which accounted for about 20% of wartime financing was another very important source of financing for firms. Much of this credit was the extension of credit from prime contractors to subcontractors (Jacoby and Sauliner (JS), 1947, pp. 181).

Table 1: Distribution of Liabilities of 388 Manufacturing Firms 1941-1945

Date	Bank loans		Government Direct Financing		Federal Income Tax Accrued		Other Taxes		Trade Credit		Other Liabilities	
	millions \$	% of total	millions \$	% of total	millions \$	% of total	millions \$	% of total	millions \$	% of total	millions \$	% of total
Dec-39	62	4.4%	25	1.8%	202	14.2%	172	12.1%	530	37.4%	427	30.1%
Dec-41	152	3.2%	527	11.1%	1,990	42.0%	305	6.4%	982	20.7%	781	16.5%
Dec-43	640	6.4%	1,449	14.5%	3,685	36.9%	451	4.5%	1,884	18.9%	1,873	18.8%
Dec-44	716	7.9%	1,266	13.9%	3,266	36.0%	460	5.1%	1,889	20.8%	1,484	16.3%
Jun-45	627	7.6%	1,067	12.9%	3,152	38.1%	486	5.9%	1,581	19.1%	1,363	16.5%

Source: Securities and Exchange Commission *Working Capital of 1228 Registered Corporations, December 5, 1945*. Quoted in Fuller (1945) Footnote 15, page 125.

Bank lending, while a small portion of overall direct war financing, was also the target of government programs. There were three programs that fell under the armed services loan guarantee scheme: V loans, VT loans and T loans. V loans were intended to finance war production and investment while VT and T loans were contract termination loan guarantees, meant to help firms smooth the transition from war contracts to private production. The

majority of loans were made under the V loan program and while the terms and purpose were somewhat different for VT and T loans they are not conceptually different programs. As a shorthand I refer to all of these as V loans. The V loan program, authorized under an executive order in 1942, established a procedure by which the branches of the military offered partial loan guarantees for loans made to firms engaged in war production. These loans were arranged with banks through the Federal Reserve System, which was tasked with doing all of the paperwork. The guaranteeing branch of the military would then earn a fee—a percent of the interest rate on the loan—corresponding to the portion of the loan being guaranteed. The average guarantee on a V loan was around 85%. Losses on these loans were very small, much smaller than what the military services earned in guarantee fees. The high guarantee percentage protected banks from losses almost completely as well. Burr and Sette (BS), 1950, pp. 56)

The V lending program is of particular interest because we have a detailed statistical breakdown of V loans. Table 2 offers estimates of V loans relative to other types of war lending and commercial and industrial loans more generally. It is important to point out that while total lending of commercial banks did grow overall during the war from 1941 to 1945 despite decreases in lending through 1944, commercial and industrial lending fell in absolute terms. This is largely due to the fact that growth of new credit by banks was largely for the purchase of securities. Table 2 shows that, for the most part, commercial and industrial lending was crowded out by war lending and that after 1942, the expansion of war lending was driven primarily by regulation V lending, at least through the height of the war.

Since large corporations received the bulk of war contracts, they also received the bulk of V loans. Corporations with over \$5 million in assets received two thirds of the \$10.8 billion in V lending. Petroleum, electrical machinery, and aircraft firms accounted for 78.6% of V lending to large firms, with just over 41% of total V loan lending to large firms going to the Petroleum industry alone(BS, 1950, Appendix Table 2).

However, much of these authorized loans went unused. At no point were more than one

Table 2: Commercial and Industrial Lending by All Commercial Banks 1941-1945

		Total Loans		War				Other Commercial and Industrial	
				Total War		Regulation V			
		millions \$	% total	millions \$	%total	millions \$	% total war	millions \$	% total
1941	Dec	21,258	100.0%	1,300	6.1%	0	0.0%	7,900	37.2%
1942	June	19,920	100.0%	2,250	11.3%	81	3.6%	6,600	33.1%
	Dec	18,903	100.0%	2,950	15.6%	804	27.3%	4,800	25.4%
1943	June	17,390	100.0%	3,250	18.7%	1,428	43.9%	3,650	21.0%
	Dec	18,841	100.0%	3,500	18.6%	1,914	54.7%	4,300	22.8%
1944	June	20,729	100.0%	3,150	15.2%	2,064	65.5%	4,250	20.5%
	Dec	21,352	100.0%	3,200	15.0%	1,736	54.3%	4,700	22.0%
1945	June	23,376	100.0%	3,000	12.8%	1,387	46.2%	4,500	19.3%

Source: Conkling, Gerald M. *Loans for War Purposes*, Federal Reserve Bulletin November 1945. Tables 1 and 4

third of the authorized loans to firms with \$5 million in assets or larger were outstanding. Smaller firms utilized V loans more extensively. Early in the war the ratio of loans authorized to loans outstanding for firms with less than \$5 million in assets was over 50% and was higher than that of large firms throughout the war (BS, 1950, Appendix Table 4).

One other important aspect of the V loan program that was likely to mute the local effect of war contracts on local banks was that many of the larger loans under the V loan program were participation loans that were backed by many different banks. Again, this is an aspect of national scope of large corporations. 68.9% of loans to firms with assets of \$5 million or more were participation loans. This is in contrast to overall V loans, 82.4% of which were from a single commercial banks (BS, 1950, Table 20).

One often cited example of V loans to General Motors is instructive. General Motors was extended a \$1 billion line of credit. About \$100 million of this loan was actually used. Almost 400 banks subscribed to this line of credit (BS, 1950, pp. 55). It goes without saying that it is unlikely these banks were all in Michigan, which had 446 banks total (All Bank Statistics, 1959).

Financing of the Korean War was not dramatically different than WWII financing. The Regulation V loan program was revived. However, as with WWII tax liabilities and advanced payments were significant sources of funds for firms, who also financed much of their wartime

investment with cash. A survey of 300 major corporations by the Fed gives us a picture of wartime funding for corporations generally. Cash on hand made up the bulk of funding for large corporations (31% in 1950), while outstanding tax liabilities comes in at a distant second as a proportion of financing (18.9%). Direct bank lending, as with WWII, remained a relatively small part of the financing of private business at 7.1% (Federal Reserve Bulletin, May 1951, pp. 483). Regulation V lending was revived in 1950 to aid in the financing of Korean War production. However, at its peak in 1952 the V loan program had just under a billion dollars in loans outstanding, (Federal Reserve Bulletin, June 1953, pp. 611), a tiny fraction of the overall war cost of around \$115 billion (Edelstein, 2001, Table 6.2). The V loan program as it was revived in the 1950 Defense Powers Act was essentially the same as the program enacted during WWII, and continued until 1960. However, since the Korean war marked only a 4.2% increase in defense spending's share of GDP as opposed to the 35.8% increase in spending to fight WWII (Daggett, 2010) one would expect war spending and the accompanying financing arrangements to have a smaller impact on the banking system.

While the Federal government was clearly successful in using V loans to increase the role of the commercial banking system in the direct finance of WWII, the banking system only played a small part in overall war financing for large firms both during WWII and the Korean War. The Fed's survey of large war industry corporations reinforces this point. In 1940 bank loans make up 1.4% of the liabilities of large corporations in war industries. This increases to a still modest 2.73% in 1944. In the postwar period bank lending accounted for an average 2.5% of liabilities for large war firms, reaching a peak of 3.21% in 1952. There is clearly a wartime pattern of increased reliance on bank loans, but this increase is small in both relation to the size of large war industry balance sheets and in relation to the overall size of wartime financing. The relatively low impact of these two wars on bank lending likely explains the very small impact of contract spending on state level lending discussed below.

### 3 Data and Methodology

My basic empirical strategy is to estimate the following model with year and state fixed effects. For each state (i) and each year (t) I estimate the following equation:

$$BANK_{it} = \beta_0 + s_i + y_t + \delta_1(y_t * WWII_i) + \beta_1 I_{it} + \beta_2 MAN_{it} + \delta_2(y_t * KOREA_i) + \epsilon_{it} \quad (4)$$

Where  $BANK_{it}$  is the natural log of the per capita banking variable of interest at time t (1940-1955) and in state i.  $WWII_i$  is the per capita military contract spending variable of interest and is the natural log of the single observation per state covering spending from June 1940 to September 1945. This spending variable is interacted with a dummy for year t ( $y_t$ ). In this specification  $\delta_1$  is the coefficient of interest and captures the interaction effect of the year dummy and the  $WWII_i$  variable.  $I_{it}$  is the natural log of per capita income in each state and each year.  $MAN_{it}$  is the log of per capita manufacturing income in each year for each state, and  $s_i$  is a dummy for each state. This fixed effects specification controls for national policy changes in each year and unobservable individual state characteristics (NS, 2014). It is occasionally necessary, to facilitate the log transformation, to add 1 to the variables. When this is necessary a note has been made in the text.

It should be pointed out that only the interaction effect of  $WWII_i$  and the time dummy are included in this regression.  $WWII_i$  is not included as an individual variable because it is time invariant and is absorbed by the state fixed effect. Not including  $WWII_i$  individually is not costly because the variation introduced by  $WWII_i$  is not year dependent and so is absorbed by the state fixed effect. As well, the coefficient for  $WWII_i$  has no intuitive interpretation given that we have a measure of the effect of  $WWII_i$  for each year with the interaction term. Given this, the individual  $WWII_i$  term does not add useful information. The results should be interpreted as the change in  $BANK_{it}$  relative to 1940, which was

dropped from the year dummies. The variable  $KOREA_i$  is similar to the WWII contract spending variable. It is a single observation per state of total contract spending for the Korean war (Fiscal Year 1951-1953).  $KOREA$  is added to the regression to control for the effect of the Korean War on the evolution of bank balance sheets after WWII. This data comes from “The Changing Patterns of Defense Procurement” a document prepared by the Office of the Secretary of Defense in 1962. This single observation per state is interacted with a time dummy and takes on the single value per state in each year 1951-1955 and is zero before 1951.

The various bank balance sheet series,  $BANK_{it}$ , come from the Federal Reserve Board of Governors “All Bank Statistics” available in the St. Louis Fed’s FRASER archive and contains balance sheet data for commercial banks in each state. Commercial banks include both state and nationally chartered commercial banks as well as mutual savings banks and unincorporated banks<sup>15</sup> “All Bank Statistics” covers the period from 1896 to 1955, though this paper is interested in only the period 1940 to 1955. Geographically, “All Bank Statistics” covers all states and territories as well as the District of Columbia. Due to limitations with the war spending data this paper uses the data from the continental 48 states. The annual totals for balance sheet elements are totals as of June 30th of each year.

War spending data,  $WWII_i$ , is taken from the Inter-University Consortium for Political and Social Research’s (ISCP) “Historical, Demographic, Economic, and Social Data: The United States, 1790-2002” study number 02896. Originally this data was compiled in the Census Bureau’s “1947 County Data book”. War spending includes total supply and facilities contracts of \$50,000 and above issued between June 1940 and September 1945. The data is recorded in the state in which the primary contract was awarded. Firms who were issued the prime contract were responsible for organizing subcontracting so that may lead to some leakage of spending out of each state. This issue is discussed in more detail below. Income and manufacturing data comes from the Bureau of Economic Analysis Table SA7H.

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<sup>15</sup>Unless I refer to charter type specifically, all types of banks are included in the generic terms “commercial banks” or “all banks”.

Finally, population data comes from the Census Bureau’s “Intercensal Estimates of the Total Resident Population of States” and includes armed forces residing in each state.

The war spending data can be broken down into five subcategories. There is, of course, total war spending. As well, contract spending is also divided into categories that capture investment spending (plant and equipment spending), large equipment supply contracts (such as ships and planes), non-equipment supply contracts, and military facilities spending, which includes the building of things such as bases and airfields.

To make it clear what variables are being used, what data we have for each basic subperiod (the WWII period, the postwar period and the Korean War period), and to give the reader a sense of the magnitudes of the variables Table 3 offers summary statistics for the war spending variables and the bank balance sheet variables. The variables are all adjusted for population.

Table 3: Summary Statistics for War Contract Variables and Selected Bank Balance Sheet Components.

	Obs #	1940-1945				1946-1950				1951-1955			
		Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
Total WWII Contracts	48	1242.54	972.81	16.87	4435.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heavy Equipment Contracts	48	733.80	841.55	0.35	3605.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plant and Equipment Contracts	48	135.10	152.62	0.22	1017.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nonequipment Contracts	48	269.82	236.32	7.92	1012.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Military Facilities Contracts	48	103.82	97.33	2.88	590.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Korean War Contracts (51-53)	48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	460.22	459.94	8.24	1923.69
Total Assets	768	625.29	469.00	91.34	3705.37	944.87	470.66	319.30	3514.74	1056.10	506.99	328.20	3702.68
Treasury Holdings	768	268.46	278.43	5.85	2169.21	451.64	250.82	123.96	1955.77	371.56	171.60	116.35	1144.01
Total Reserves	768	158.18	86.14	29.95	706.52	188.43	81.06	77.97	606.42	205.98	87.45	83.51	680.47
Total Loans	768	134.94	108.96	26.79	859.70	229.23	138.95	47.41	983.32	373.52	224.43	54.89	1717.53
Total Deposits	768	571.22	426.98	81.22	3402.97	874.56	420.37	297.03	3202.43	965.62	448.36	304.62	3301.80
Demand Deposits (Nonbank)	768	297.39	204.43	53.22	1451.07	511.02	217.22	225.18	1602.72	561.98	218.24	246.68	1519.43
Interbank Deposits	768	46.55	56.34	2.72	378.06	51.33	89.09	2.89	1164.46	51.39	56.85	3.42	382.15
Private Deposits	768	527.38	369.04	80.88	2674.85	850.23	404.05	290.42	2880.25	940.65	433.40	295.01	3213.21
Government Deposits	768	43.84	74.83	0.06	728.12	24.32	33.44	2.78	322.18	24.97	19.00	5.01	139.37

Source: See Text.

For ease of interpretation the elasticities of the regression results are presented as relative, open economy multiplier estimates that express the results in terms of the dollar effect of \$1 of war contract spending on banking variables<sup>16</sup>. 95% confidence intervals are also included. These are derived from standard errors calculated by clustering at the state level, primarily

<sup>16</sup>To make it clear, the annual estimates that make up the impulse responses series presented below are calculated as:  $Mult_t = \frac{WARSPEND}{BANK_t}(\delta_t)$ . Where  $\frac{WARSPEND}{BANK_t}$  is the ratio of the across state average of the war spending variable to the across state average of the banking variable in year t (1941-1955).

to control for serial correlation. The results can be thought of as similar to an “impulse response” found in the structural VAR literature. By analogy, the response being shown is the response of state level bank balance sheets to \$1 of war contract spending relative to 1940. 1940 is a particularly useful dummy to drop because the banking data is recorded as of June of each year and war contract data is recorded starting in June 1940. It should be pointed out that between 1940 and 1945 we are measuring the response of bank variables to total contract spending. For any year before 1945, only a portion of war contract spending has been spent. This can complicate the interpretation of the dollar for dollar value of these relative multipliers before 1945. However, given that these regressions are in log levels, the individual year estimates can be thought of as a cumulative effect of contract spending on bank variables relative to 1940. We would expect the cumulative effect of total war spending on bank variables for years before 1945 to reflect this partial effect. However, it must be admitted these multipliers are more difficult to interpret than annual war spending on annual bank variables. In practice, however, the relative multiplier effect of total war contract spending on assets is not any more different than the elasticity estimates of the effect of the annual wartime spending series on bank assets offered below.

All of the variables are current dollar. To communicate the real or relative magnitude of the effect of war spending on bank variables I also offer an alternative estimate of what I will call the “total effect” of war spending on state bank balance sheets. This total effect is measured as the percentage change in a given bank variable in a hypothetical state with an average amount of that bank variable and an average amount of contract spending, holding everything else constant. There are problems with this estimate. First, I am comparing the marginal effect of contract spending on bank variables with the average values. Second, the unconditional average of the banking variables already contains the effect of the contract spending shock and so in a sense we are counting the effect on balance sheets twice. This estimate is useful, however, in communicating the magnitude of the effect of war spending on bank balance sheets, which is important information not communicated by the multiplier

estimates.

This brings us to some possible objections to the empirical strategy above. A more conventional fixed effects specification would have a military contract spending variable that varies across the panel. That would allow for the estimation of average within state effects of contemporaneous military contract spending for the period under consideration. This empirical strategy is, *prima facie*, certainly more credible and it does create useful information. However, this empirical strategy would also flatten out the estimated effect into a single point estimate. Applying this technique to the 1940s means either confining oneself to estimating the effect of the war, the effect of contemporary contract spending on the postwar period, or accepting an estimate for the full period that does neither subperiod justice. Treating the war as a single shock—more akin to time series estimation strategies—allows one to trace the effect of the war through the whole war-postwar cycle. This holistic approach to the war allows one to explore the more complex questions about the role of the war in setting the stage for the postwar economy.

While the regression specification used here is a potentially powerful tool for exploring the war, there are a few potential issues that should be addressed. First, there is the issue of potential endogeneity of war spending that would be a concern for any fixed effects specification. This issue is left to the results section where it is explored extensively. Second is the issue of potential bias created by using the single observation, particularly the problems of using this single observation across the 1940-1945 period. I provide evidence that the single observation is a valid proxy for war spending in each year. Third, there are potential issues with the data itself. It is not obvious that state level contract data and balance sheet data capture state economic activity precisely. I argue below that state level data used here does do a reasonable job of capturing state level economic activity. Finally, there is the potential issue of outliers. Generally, individual state, census division, and Federal Reserve districts are not driving these results<sup>17</sup>. One important exception being Washington DC and as such

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<sup>17</sup>There are some potential exceptions to this general rule for Federal Reserve Districts. There is an extensive discussion of the role of Federal Reserve District in Appendix D

it has not been included in the analysis.

Some readers are likely to object to the inclusion of the years 1940-1945 given that my war spending variable is a single observation that covers total spending for all years. I justify including the war period (1940-1945) by arguing that the additional information generated is worth the small risk of possible bias in wartime estimates. The evolution of bank balance sheets during the war is of no small interest and including the pre-1946 observations does not affect the post 1946 estimates<sup>18</sup>. The probability of bias in wartime estimates is small because wartime spending was likely to be highly correlated across years. It not unreasonable to argue that the single 1940-1945 observation is an adequate proxy for average variation in spending across states in each year. Furthermore, referencing results relative to 1940 gives us a better picture of the real counterfactual of interest. That is, we are interested in what would have happened in the absence of WWII, as opposed to simply how deposits evolved after the war was over, which is the information we would have if I took 1945 as the base year.

Table 4: Correlation of total war contract spending with alternative measures of wartime total supply contract spending

	1940	1941	1942	1943	1944	1945
War Industry Payrolls	0.866	0.901	0.942	0.948	0.802	0.934
Cumulative Contract Spending	NA	NA	0.944	0.979	0.993	NA
Federal Military Payrolls	-0.043	-0.150	-0.241	-0.344	-0.303	-0.267

Sources: Statistics of War Production, various years; State and Regional Market Indicators 1939-1945; BEA series SA7H

There are two readily available sources of annual wartime data to compare to the single total wartime contract spending variable used in the empirical specification above. The BEA collected payroll data in industries considered “war industries” for 1939-1945<sup>19</sup> and

<sup>18</sup>See online appendix A for a discussion of this.

<sup>19</sup>See footnote 13 for a list of what constitutes “war industries”.

there are contemporary cumulative total supply contract spending estimates for each year 1942-1944<sup>20</sup>. Table 4 shows the correlation between the single observation of total supply contract spending (heavy equipment and nonequipment supply contracts), war industry payroll data for all years 1940-1945 and the cumulative contract spending for 1943-1944. The correlation between these three variables is very high, mostly above .9 with the exception of war industry payrolls in 1940 and 1944. One would expect the behavior of war payrolls to be somewhat different than contract spending strictly speaking since war industries did not produce exclusively for the war effort and payrolls capture only a portion of income from contract spending. That having been said, the strong correlation between our incomplete series of annual cumulative total supply contracts and the complete wartime payroll data establishes that the single observation per state of total contract spending is a reasonable proxy for spending in each year. Also shown is the correlation of Federal government military payrolls spending. The reader will note that the correlation between military payrolls and contract spending is very low. Military payrolls are included to make the point that military contract spending is a distinct form of military spending, both functionally and geographically. This lack of correlation is the rationale for not including military payroll spending as a control in the regression specification above as inclusion of military payroll spending does not affect the results below. Federal payroll spending during the war should be treated as a topic independent of spending on the private provision of military goods and infrastructure. As such, it is outside the scope of this paper.

Figure 2 offers further evidence that the single observation per state is a reasonable proxy for annual war spending. Figure 2 shows comparisons of the effect of total supply contract spending on assets for the period 1940 to 1945 with the effect of annual cumulative contract spending and war industry payrolls. The response of assets to total annual cumulative total supply contract spending is very similar to the response of assets to total supply contract spending during the war. The small difference between the responses is likely, at least in

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<sup>20</sup>I am extremely grateful to Paul Rhode for providing this data.

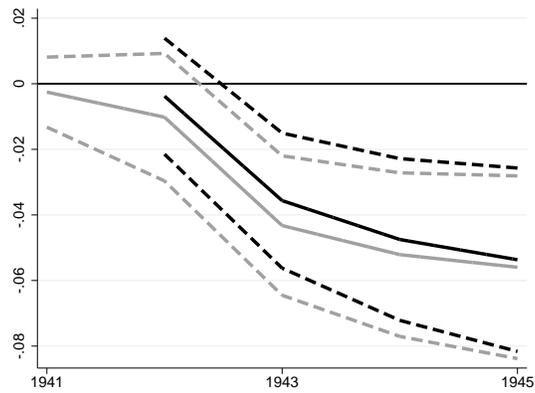
part, attributable to the fact that the estimates of the annual series are preliminary. Total assets also show a similar response to annual war industry payrolls as they do to cumulative total supply contracts. As with annual contracts, war payrolls produce a slightly smaller response. As stated above, this is also to be expected since war industries, even at the height of the war, did not produce exclusively for the war effort. Even if these war industries did produce exclusively for the war, payrolls represent a subset of income from war contracts. In a simple sense, what is missing from the wartime payroll data is profits. Those whose income derives from wages and salaries are likely to have a lower propensity to save than those whose income comes from profits and thus one would expect bank assets to respond less strongly. A less credulous reader will fixate on the fact that the single total contract variable systematically overstates the effect of the war on assets from both annual series. This potential bias, if it cannot be explained by measurement issues, is small, less than 1 percentage point (on average around 0.5 percentage points). This does not change the qualitative results of this paper significantly<sup>21</sup> It is also important to point out that the series converge to the estimates for the single observation of total supply contracts by 1945, suggesting that this potential bias evaporates by the end of the war, as one would expect.

There are some secondary potential issues with the geographical distribution of war spending and bank lending which may bias estimates of contract spending . For instance, a large portion of war spending was subcontracted. How much this biases the results is unclear. The SWPC compiled a study by the armed forces of 252 companies on the extent of subcontracting . About 50% of value added in war contracts was from the prime contracting firm itself <sup>22</sup> About 36% of the value added came from subcontractors while the other 15% came from materials purchases. Furthermore, a little more than half (56%) of the value added by subcontractors came from the subcontractors themselves. 13% of subcontracting sales were sub-subcontracted and about 31% of the value added came from “market” purchase of

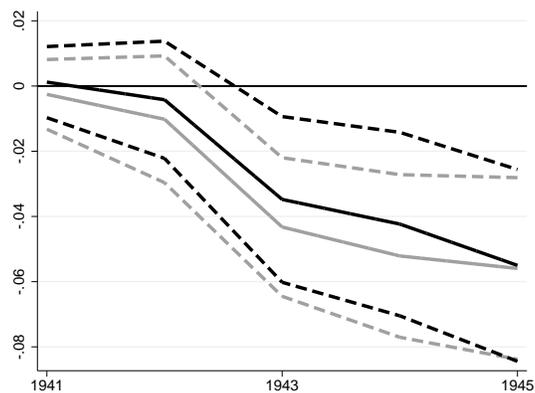
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<sup>21</sup>This difference in estimates is even smaller for other components of bank balance sheets.

<sup>22</sup>The “prime contractor” is the contractor of record in the war spending data set used in this paper. That is, the location (county/state) of the prime contractor is the location of record for the war spending data used here.



Cumulative Annual Total War Supply Contracts



War Industry Payrolls

Graphs show elasticity estimates.  
Dashed lines are 95% confidence intervals.

Figure 2: Comparison of the Response of Total Bank Assets to Various Alternative War Spending Series.

materials and supplies. However, it is not clear that this affects the geographic distribution of war spending very much. The issue of subcontracting is one of whether contract spending is a good proxy for total military related economic activity in each state and not whether intermediate goods were acquired through subcontracts or market mechanisms. NS establishes for the contract spending data they use (which starts in 1963) that contract spending is a reasonable proxy for within state military spending. As well, FC argue that contract spending is a reasonable proxy for economic activity during WWII.

Compounding the potential geographical problems with the distribution of war spending are some geographical issues with the distribution of bank lending. On the one hand the dispersion of the unit banking system in the United States and the limits on interstate branching lend credibility to the notion that the results above are capturing a pure within state effect on the banking system. However, as discussed above, it should be kept in mind that the fractured nature of the banking system meant that credit lines for large corporations were often subscribed to by a number of banks working in partnership.

It should also be noted that military facilities spending is less likely to suffer from these potential “spillover” problems. Military facilities spending was paid for directly by the various war agencies. There were none of the financial arrangements that were necessary for financing the private provision of military goods as the service branches paid for facilities contracts out of pocket. Facilities spending is also unlikely to be as subject to out of state leakage or “subcontractor bias” given that military facilities—military infrastructure such as bases and airfields—were necessarily built in the states where the contracts were assigned. However, given the fact that facilities spending is such a different kind of contract spending than spending on industrial supply or expanding industrial supply, it is not obvious what facilities spending tells us about the effects of other types of contract spending.

There is also the issue of potential outliers. States containing major reserve cities (New York, Illinois and California in particular) spring to mind as potential outliers. However, war spending does not seem to affect bank balance sheets in these states differently than other

states. However, Washington DC does appear to be somewhat of an outlier, particularly with respect to the responses of balance sheets after 1950. Regressions that include DC show a stronger “permanent” effect of war spending on the components of bank balance sheets than regression in which DC is excluded. It is not clear if DC should be treated as an outlier, but given that DC is both not a state and the seat of the Federal Government it seems justified to treat DC as a special case given the role it plays in the results. As such, it has not been included.

## 4 Results

I find that in the most general case, a dollar of military contract spending slows the growth of state level bank balance sheets by 10.8 cents by 1949 and 5.8 cents by 1955. This slower growth in bank balance sheets is driven primarily by private demand deposits, though there is also a smaller effect of war spending on interbank deposits. On the asset side, this decline manifests itself primarily as a decline in papers assets, namely Treasury bonds and reserves. There is some weak evidence to suggest lending also falls, but the decline in lending is only statistically significant for 1949-1950. The individual effect of wartime contract spending on total reserves and total Treasury holdings is statistically significant until 1950 and 1953 respectively.

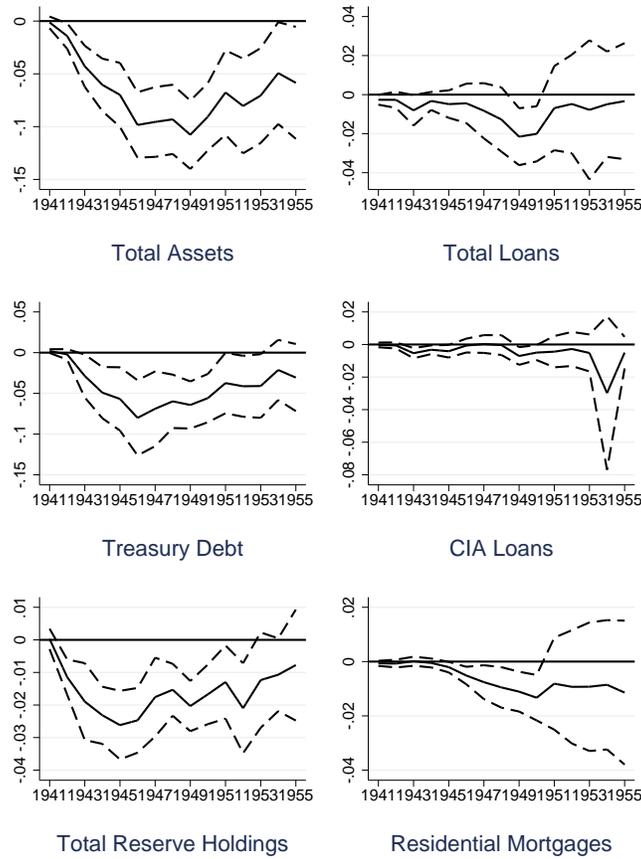
The credibility of these results from this “shock” empirical strategy rests on establishing that the war is in fact an exogenous shock. The estimates of the effect of war spending on both sides of the balance sheet are accompanied by a simple test for “historical endogeneity”. The response of total assets, total lending and total deposits can be seen as reasonably uncontaminated by the economic turmoil of the 1930s. However, there are potential issues of bias for some individual components of state level bank balance sheets, particularly paper assets such as reserves and Treasury bonds. Taken as a whole, however, the evidence suggests that the WWII is a plausibly exogenous shock to bank balance sheet.

The subcategories of spending also offer some insight. First, it is obvious that the response of bank balance sheets to total war spending is being driven by supply contracts, which make up the bulk of military contract spending. Non-equipment supply contracts produce a larger and more permanent effect than total spending. There is little we can say about plant and equipment spending but military facilities spending offers an interesting counter example. Military facilities spending, which—unlike the other types of spending—take place outside manufacturing industries, produces a large but temporary effect on total assets and a notable positive effect on business lending between the two wars. I go into more detail about the results below.

## 4.1 Total War Spending

Figure 3 shows the response of bank assets to a shock of war contract spending of \$1. As discussed above, total balance sheets grow more slowly in response to war spending: 10.8 cents by 1949 and 5.8 cents by 1955. Given that total war spending is \$1220.87 per capita on average this translates to an estimated per capita average slower growth of deposits of \$133.83 by 1949 and \$72.68 by 1955. To get a better sense of the magnitude of this effect, a hypothetical state with average assets who received an average amount of contract spending during the war would see balance sheets 14.5% smaller by 1949, but only 6.5% smaller by 1955.

I would also draw the reader's attention to the way the response evolves historically. There is a sharp wartime slowdown in assets growth from 1940-1944 and a second sharper slowdown from 1945 and 1946. There is somewhat of a leveling in the interwar period in which balance sheets do not change very much. The per dollar of contract spending decline relative to 1940 is 9.8 cents in 1946 and 9.1 cents in 1950. However, seemingly concurrently with the Korean War, the WWII effect on assets evaporates somewhat. The effect of WWII contract spending on bank assets is roughly half of its peak effect by 1955. One is tempted to divide the effect of the war between the large, temporary, pre-1950 effect and a smaller



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

Figure 3: Response of All Banks' Assets to Total WWII Spending

permanent effect that can be observed through 1955<sup>23</sup>. This makes sense as the Korean War—while a re-commitment of the US to its military industrial complex—marks a shift in both the type of military spending and geographical distribution of contract spending (Malecki and Stark, 1988, Table 3). While the long term effect is presented here because it is of interest, the explanation for the long term post-Korea behavior of bank balance sheets remains a question unresolved here.

This overall decline in commercial bank balance sheets does not translate into a large effect on bank-financed local economic activity. The decline in bank balance sheets manifests itself primarily through a draw-down of paper assets: Treasury bonds and reserves. Treasury bond holdings decline by 6.4 cents per dollar of total war spending by 1949 and decline by a statistically insignificant 3.1 cents by 1955. Reserves fall by 2 cents by 1949 and a statistically insignificant .8 cents by 1955<sup>24</sup>. The effect of military spending on lending is somewhat ambiguous: total lending shows a statically significant decline of 2.2 cents by 1949, 2 cents by 1950. The effect is otherwise statically insignificant. This decline in lending seems primarily driven by the decline in residential mortgage lending (1.3 cents by 1950). The decline in CIA loans is similar though smaller at .5 cents per dollar of total contract spending by 1950. It is somewhat difficult to interpret the lending response as the response is only statistically significant for 1949-1950 for total lending and CIA loans while the response of residential mortgages is significant only from 1945-1950. To put this decline in lending in perspective, a hypothetical state with average sized commercial banking system and receiving an average amount of total war spending would see its lending 6.9% lower on average from

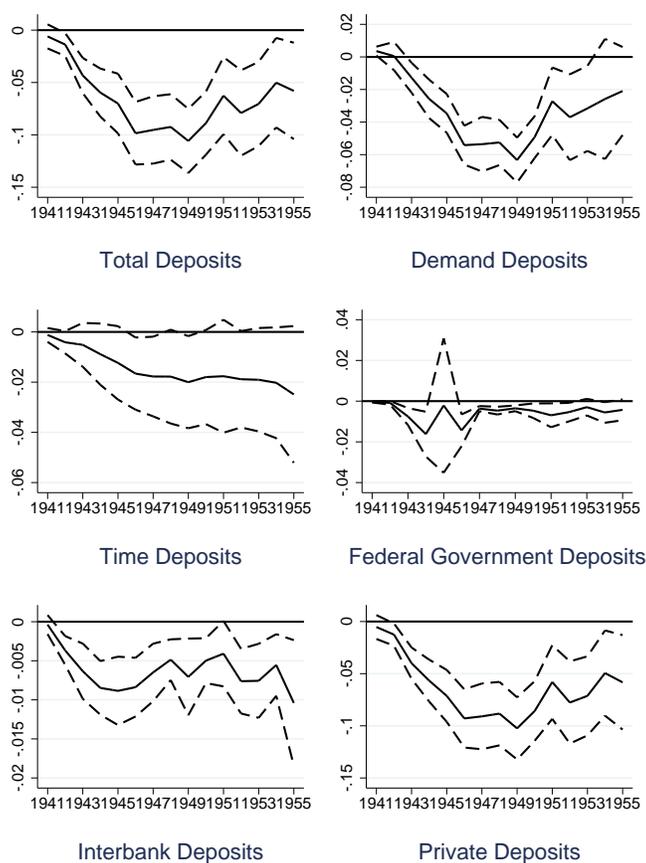
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<sup>23</sup>There is some question about whether there is a permanent effect. Dropping the San Francisco and Minneapolis Federal Reserve Districts reduce the post-1950 effect to something statistically zero. However, dropping the Chicago District increases the effect of war spending on total assets for the full period. Given the nature of this case study, using the full population of states, the 95% confidence intervals should be thought of as capturing this heterogeneity in the effect of the shock of the war on bank variables. See Appendix D for a more complete discussion of this issue.

<sup>24</sup>It is important to point out here that reserves are measured as a combination of three separate categories from All Bank Statistics: total currency and coin, cash items in the process of collection and bankers balances. The primary component driving the decline in total reserves are bankers' balances. Interbank deposits (discussed below) can be thought of as the liabilities compliment to bankers balances, though they are not exactly the same thing. See Appendix G for a more detailed discussion of the response of reserves.

1946-1950, with a peak effect of 10.5% lower lending in 1949.

About 80% of the decline in total assets is “explained” by the decline in Treasury bond and reserve holding in 1949. 20% of the decline in total assets is explained by the decline in total lending by 1949. To give a sense of how important these asset categories are to commercial banks, average total lending made up 27.5% of total assets in 1949. Total reserves on hand and total Treasury bonds held by banks were 20.5% and 53.8% of average total assets in 1949, respectively.



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

Figure 4: Response of All Banks’ Deposits to Total WWII Spending

Figure 4 shows the response of various types of deposits to \$1 of total military contract spending. The response on the liabilities side of the balance sheet is almost entirely a

response of privately held demand deposits<sup>25</sup> Privately held deposits decline in response to a \$1 increase in WWII contract spending by 10.2 cents by 1949 and by 5.8 cents by 1955. Demand deposits experience a decline of 6.2 cents by 1949 and 2 cents by 1955. Federal government deposits show a small response to war spending, as do interbank deposits<sup>26</sup>. The reduction in government deposits, aside from some volatility during the war, hovers around one cent for every dollar of war spending. Interbank deposits fall by less than one cent until 1955 when they fall by 1.2 cents. Time deposits show an ambiguously statistically significant response. The peak effect of war contract spending on time deposits is in 1949 at 2 cents per dollar of total war contract spending.

## 4.2 Historical Endogeneity

There are some outstanding issues of potential endogeneity that should be addressed. Following Jarwoski (2017) it is important to point out the identifying assumption here is that there would have been no difference in the evolution of bank balance sheets in the absence of the war. The state fixed effects play a large role in absorbing the variation from factors that would violate this assumption. Additionally, the inclusion of manufacturing income helps absorb time varying changes in manufacturing, the sector the contract spending shocks are centered on. Given that the spending shocks are generated by the Federal government, politics may have played a role in distribution of contracts. However, military control of production decisions seems to have insulated production decisions from political considerations. Both Jarwoski (pp. 1060) and FC (pp. 987) cite Koistinen (2004) when arguing that political decisions did not play a role in the distribution of contracts. Rhode et al (2017) explores this issue empirically and finds that political variables do not explain war spending, though industrial structure does.

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<sup>25</sup>It should be acknowledged this is a bit of a misnomer. Private deposits are really “Non-Federal deposits”. Private deposits are simply total deposits less Federal Government deposits. State and local government deposits are included in total deposits, but I do not have data on state and local deposits separately.

<sup>26</sup>Both Federal government deposits and interbank deposits have had 1 added to their population adjusted totals to make log transformation tractable.

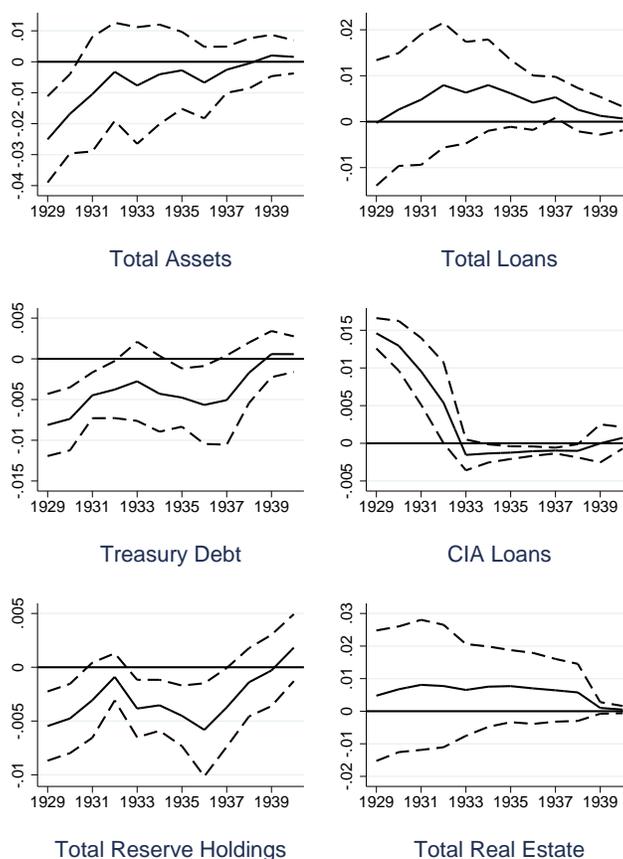
As FC point out, the overriding concern of war production was speed of production. As such, a more serious challenge to the claim that the war was an exogenous shock is the fact that contract spending was endogenous to the industrial structure of a given state. The heavy lifting done by the the fixed effects is in controlling for the industrial structure of a given state, which likely dictates the structure of the banking system of a given state. In addition, the manufacturing income variable helps control for potential changes in this structure over time.

It is possible that war spending is in part dependent on the industrial structure of the state, there is bias from historical factors leading up to the war. These can be divided up into two types. First, “Depression bias” may come from any structural changes induced by the depression that carried into the 1940s. One expects some correlation given that the war was a massive shock to manufacturing, and the extraordinary effect of the shock of the Depression on manufacturing is well documented. However, as shown below, this correlation between the Depression and WWII contract spending dissipates long before the 1940s. That this correlation is temporary and temporally distinct suggests that the Depression did not in some way set the banking system on a path that is erroneously attributable to the war.

A second type of historical bias is also possible. The war did not simply spring out of nowhere. There was ever increasing political instability throughout Europe and Asia in the 1930s. Instability in Europe meant an increase in gold flows into the US, particularly after 1936 (Romer, 1992). Military spending changes in the second half of the 30s were likely to be less important, but still contribute to potential historical bias. As entrance of the US into the war became increasingly inevitable military spending expanded both to supply allies and to put the US on a war footing. The effect of this military buildup before 1940 should not be overstated, however. It was not until 1939 that Roosevelt managed to get the Pittman Act passed that allowed businesses in the US to supply allies (Erlandson, 1997, pp. 269), and Roosevelt had a difficult time both organizationally and politically building up the military before the Pearl Harbor attack (Fesler, 1947pp. 13-15). The combined monetary and fiscal

“buildup bias”, tends to manifest itself in very limited ways in the data starting around 1936 or 1937 for some specific variables. However, as a general rule this buildup bias evaporates before 1939.

I offer a simple test for both types of historical bias. Using the specification in equation 3 (without the Korean War variable) I regress war spending backwards on the period 1929-1939, leaving 1940 as the omitted year dummy so that the results can be interpreted as relative to 1940, the beginning of the total war contract spending shock.<sup>27</sup> Figure 5 and Figure 6 show the results of this regression for all banks’ assets and liabilities, respectively.



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

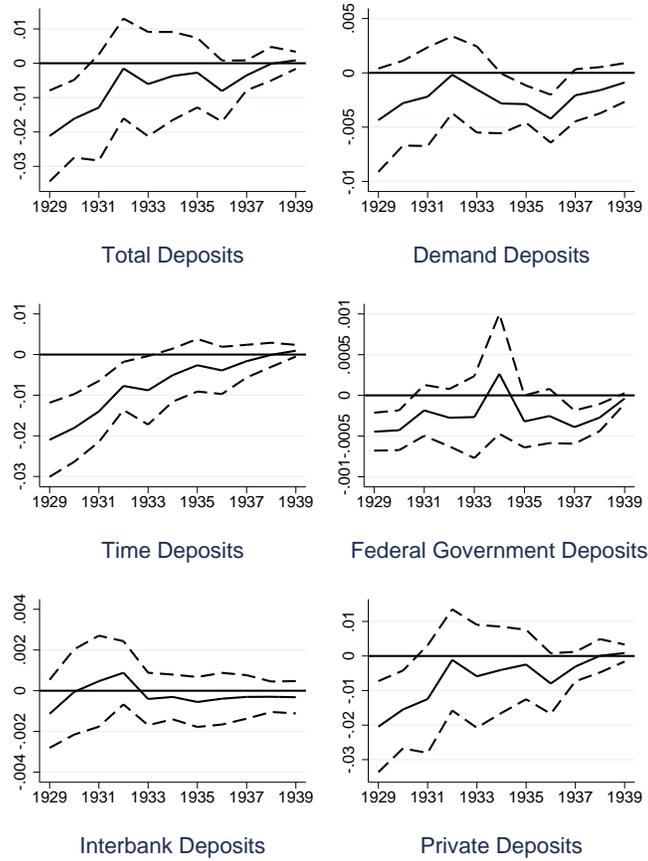
Figure 5: The Relationship of Assets 1929-1939 to WWII Contract Spending.

<sup>27</sup>Using 1941 as the base year provides similar, and in some ways stronger, conclusions.

Figure 5 illuminates the relationship of the war contract variable and the preceding decade. It should be acknowledged immediately that there is a significant amount of correlation between the shock of the Depression on bank balance sheets and total WWII contract spending. This is to be expected. As mentioned above, we are talking about two massive shocks to manufacturing within a 20 year period. The somewhat crude idea that WWII “ended the Great Depression” is implicitly predicated on the correlation between the Depression and wartime spending. The problem this presents for my analysis is that the shock of the Depression plays a potentially significant role in determining both the industrial makeup of states and—as is virtually universally agreed by economists—likely also played a role in determining the composition of the banking system. However, as both Figures 5 and 6 suggest, the relationship between the Depression and the war’s effect on bank balance sheets is obvious, but temporally distinct in most cases and thus not an issue for statistical inference, reserves and Treasury holdings being two important possible exceptions.

The estimates in both figures generally do not show coefficients statistically different than zero for most series after 1936. These zero estimates are also fairly precise. The exceptions to this zero correlation finding after 1936 are demand deposits, federal government deposits and total lending. However, these series also all converge towards zero by 1939. To the extent there is statistically significant correlation, the magnitude of the correlation is very small. The evidence for serious endogeneity issues for the effect of wartime contract spending on demand deposits, government spending and total lending is relatively weak, though it should be noted. Both show significant correlation for only one or two years between 1935 and 1937 and after each blip the series converges to a very tightly estimated zero bias.

While in a statistical sense the relationship between contract spending, Treasury bond holdings and reserve holdings dissipates by 1937, these two series deserve a discussion. While both series converge towards zero by 1939 it is clear that there is a strong relationship between reserve and Treasury holdings during the 1930s and war spending. This is likely a mix of both Depression and buildup bias. The persistence of this bias is perhaps cause for concern



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

Figure 6: The Relationship of Deposits 1929-1939 to WWII Contract Spending.

with reserve holdings as particularly concerning. The correlation between reserve and war spending is statistically zero by 1939, but on an upward trajectory. It should be noted, however that the estimates of the response of paper assets to WWII contract spending fits well into the overall narrative of the response of the other components of state bank balance sheets. So while there is some limited evidence to suggest historical endogeneity for paper assets, the estimates of bank balance sheets as a whole seem reasonably free from confounding factors from the decade before the war. This test of historical endogeneity is also helpful in giving us a rough estimate of how bad the bias is in our estimates. In this respect the potential bias is also mild. If I pick the year with the most severe correlation, 1936, as representative of the overall issue of endogeneity, that suggests that the estimates are overstated by less than one cent per dollar of war spending for both Treasury debt and reserve holdings. Even overstating the likely bias as such, the qualitative analysis is unchanged.

### 4.3 National Bank Earnings

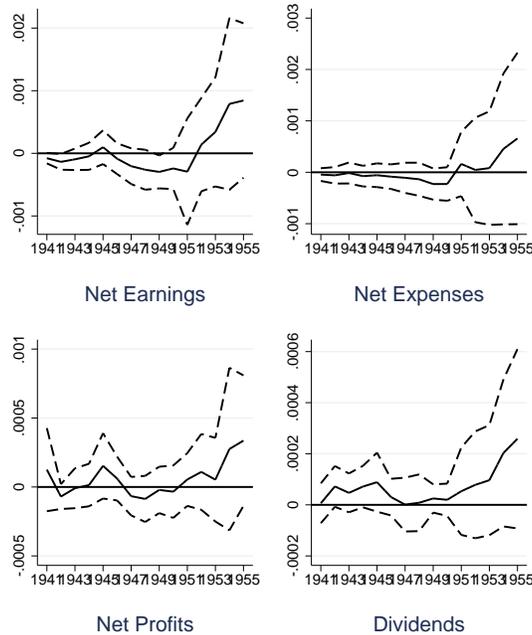
Figure 7 shows the effect of total war spending on earnings, expenses, profits and dividends of nationally chartered banks<sup>28</sup>. The evidence from nationally chartered banks demonstrates that there is not a strong effect of war on bank earnings and profits.<sup>29</sup> This makes a certain amount of sense since bank lending is, relatively speaking, unaffected. What is affected is the composition of lower interest assets (Treasury bonds and reserves) and low or no interest short term liabilities (primarily demand deposits). It is important to emphasize that these earnings results are not directly comparable to the balance sheet response of all banks. National banks saw a weaker balance sheet response—less than half the magnitude—than the response of all banks to war spending. This suggests that the effect on earnings and expenses is also likely to be smaller for national banks alone than for all banks. How-

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<sup>28</sup>All earnings data has had 1 added to their population adjusted totals to make log transformation tractable.

<sup>29</sup>The effect of war spending on banks by charter is relegated to Appendix B. Generally, the response of banks by charter is of secondary interest.

ever, this lack of response of national bank earnings—when considered alongside the muted effect of war spending on local lending—suggests the dramatic difference in balance sheet growth driven by war spending had a limited local economic impact. Unfortunately, data on earnings is only available beginning in 1940 and so the test of historical endogeneity above is not available for earnings data.



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

Figure 7: The Response of National Bank Earnings to WWII Contract Spending.

#### 4.4 Spending Subcategories

The effect of total contract spending on bank balance sheets masks a significant amount of heterogeneity in the response of balance sheets to the subcategories of spending. It is clear from Figure 8 that the response of bank balance sheets to war contract spending is driven by supply contracts. The response of total supply contracts, which includes heavy equipment and non-equipment supply contracts, mirrors that of total war spending. Importantly,

however, the effect of total supply contracts on total assets does not evaporate during the 1950s as it does for total contract spending. By 1949 total supply contracts produce slower growth in deposits by 9.9 cents as compared to 10.8 cents for total war spending. However, by 1955 assets still show a 9.8 cent slower growth in assets in response to total supply contracts compared to total contract spending's 5.8 cents per dollar of contract spending<sup>30</sup>. The response of balance sheets to heavy equipment spending<sup>31</sup> most closely resembles that of total spending. This makes sense, as heavy equipment contracts makes up 65% of total war spending. Non-equipment supply contract spending (22% of the total) produced an effect about four times as large as total spending, slowing the growth of assets by 47 cents per dollar of non-equipment supply contracts by 1949. The effect of non-equipment supply contracts is also "permanent" in the sense that the effect does not evaporate during the 1950s. By the 1955 deposits have still grown 47 cents slower. This leads to a large total effect relative to the size of non-equipment spending contracts. A hypothetical state with average assets, receiving an average amount of non-equipment supply contracts, would see total balance sheets 11.9% smaller by 1949 and 11.5% smaller by 1955.

Plant and equipment (5% of total contract spending) spending's effect on bank balance sheets is difficult to interpret and is only included for the sake of completeness. The series is of dubious statistical significance. Furthermore, these results are being driven by the 9th Federal Reserve district. Dropping that district renders the results statistically insignificant and reserves the sign of the effect after 1947. Evidence suggest that North and South Dakota, which are included in the 9th District, are driving the results<sup>32</sup>.

The correlation of balance sheets and supply contacts before the war is consistent with total contract spending (not show). There is clear correlation in the early 1930s. However, after 1932 this correlation is not statistically significant and the point estimate hovers closely

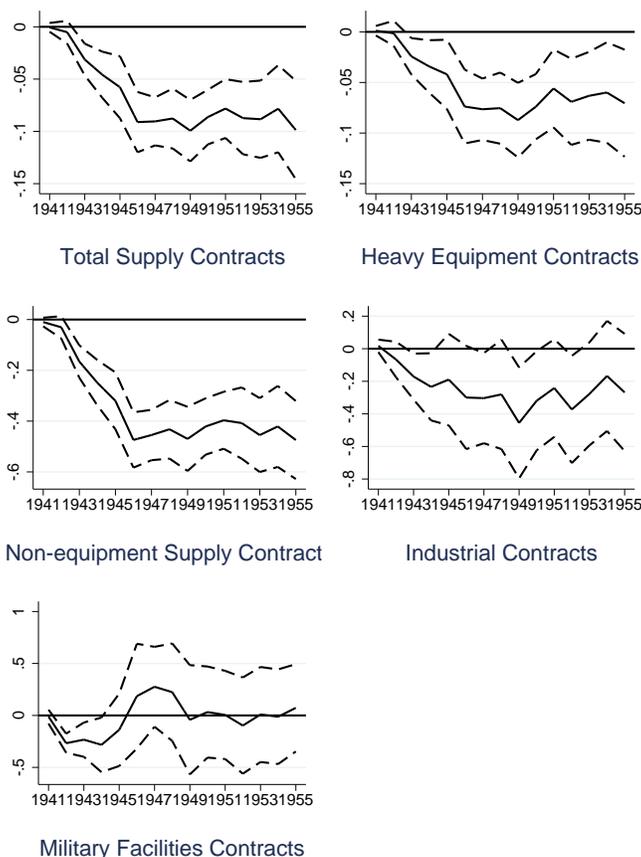
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<sup>30</sup>There is also less dispersion of estimates for supply contracts than for total contracts when excluding Federal Reserve Districts. Again, see Appendix D.

<sup>31</sup>Heavy equipment spending and plant and equipment spending have both had 1 added to their population adjusted totals to make log transformation tractable.

<sup>32</sup>Shown in Appendix D.

around zero. Industrial contracts and military facilities contracts show correlation with total assets in the middle of the decade (also not shown). However, by 1937 both series have converged to zero suggesting no real issue of historical bias for subcategories of spending.



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

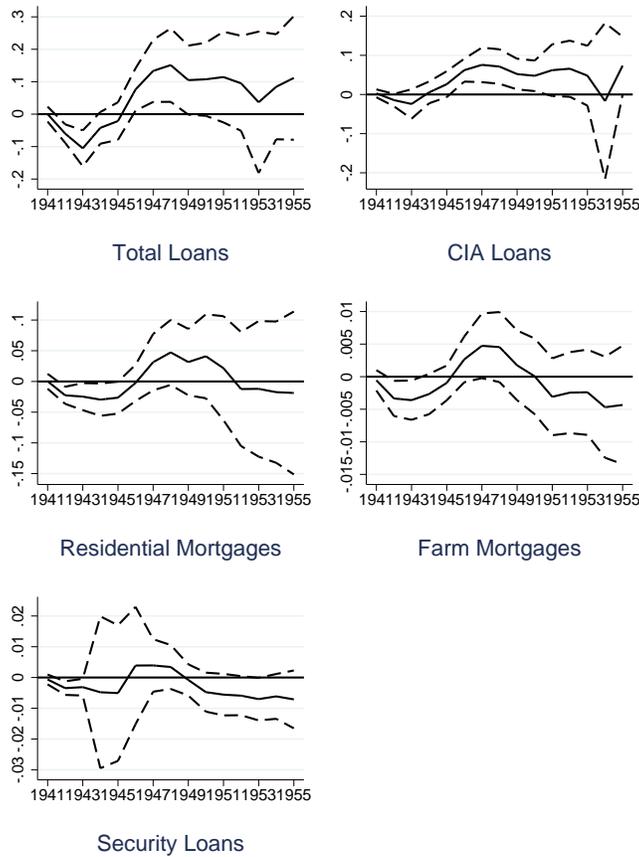
Figure 8: Response of All Banks' Total Assets to Contract Spending Subcategories

Facilities spending includes spending on military infrastructure such as airfields, bases, hospitals supply depots and housing for soldiers. As such, it is distinctly different than the other types of spending which are geared towards the private provision of military goods and services, either in producing those goods and services directly or expanding production capacity. Facilities spending was paid for directly by the Federal Government in their entirety (McGrane, 1946), unlike the other types of spending which relied on a matrix of public and

private financing. As well, facilities spending is different than other types of spending because these contracts do not generate production activity or expand productive capacity. Military facilities spending has only an effect on total bank balance sheets during the war. The effect is large, with a peak effect in 1944 of 28.2 cents slower deposit growth relative to 1940. However, because facilities spending is a small portion of total war spending, this translates into a relatively small total effect. A hypothetical state who received average facilities spending and had average balance sheet growth would only see its banks 3.7% smaller by 1944 (the year of peak effect) than a state that otherwise did not get facilities spending.

On the liabilities side, this temporary wartime effect of facility spending on bank balance sheets manifests itself similarly to total spending as a decline in private deposits and inter-bank deposits (not shown). Figure 9 shows the response of lending to war facilities spending. There is a temporary decline in the response of reserves and Treasury holdings in line with total war spending (not shown). However the behavior of lending is different for facilities spending than it is for total war spending. There is a temporary decline in lending growth during the war, evenly split among types of lending. After the war, there is a small positive effect of facilities spending on CIA lending. CIA lending growth is reduced by 2.4 cents per dollar of facilities spending by 1943. However, by 1949 CIA lending grows 5.2 cents more quickly in response to facilities spending, with a peak increase of 7.6 cents in 1947. To get a sense of the magnitude of this, for a hypothetical state with average facilities spending and average CIA loan growth, CIA lending would be 9% higher in 1947 than without facilities spending. This effect, however, is temporary and is no longer statistically significant after 1950.

The endogeneity test used in this paper is not available for some of lending categories because of a lack of data for these categories before 1940. For the lending categories we have pre-1940 data for there is some mid-decade correlation between lending and war spending (not shown). As with other series, this mid-decade correlation evaporates by 1937.



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

Figure 9: Response of All Bank lending to Military Facilities Contracts.

## 5 Discussion

In this paper I have shown that, controlling for individual state characteristics, WWII contract spending, and particularly wartime supply contracts, caused bank balance sheets to grow more slowly from 1940-1955. The relative effect of war contract spending on bank balance sheets was large. State level balance sheets grew 10.8 cents more slowly by 1949 a gap that decreases to 5.8 cents smaller by 1955 as a result of WWII contract spending. The response of bank balance sheets to war spending contracts is driven by war supply contracts.

When supply contracts are considered alone, the effect on balance sheets is similar to total contract spending, though permanent. Total supply contracts cause deposits to grow more slowly by 9.9 cents by 1949 and 9.8 cents by 1955.

Using data from the IRS I have also argued this decline in bank balance sheets was driven by a decline in the demand for demand deposits by large corporations in manufacturing industries most likely to receive contracts for military production. Data from Goldsmith (1955) and the IRS Survey of Income on corporate holding of cash makes it fairly clear that, while deposit growth among corporations generally slowed down in the middle of the war, deposits by large corporations in war industries shrank over the second half of the war, consistent with the empirical evidence for state level bank balance sheets. By the end of the 1940s deposit growth by both individuals and corporations were growing at roughly the same rate. This is also consistent with the empirical evidence that the effect of the war on bank balance sheets dissipates in the 1950s.

The finding that local deposit growth was slower in states that received war spending raises suggests more attention should be focused on the fiscal and monetary shock of the war. If we accept the “three Ts” of fiscal policy (timely, targeted and temporary) as best practice then the negative example of WWII as a fiscal policy shock offers some useful lessons for the future conduct of fiscal policy. For instance, the real economy impact of the 2008 financial crisis had a strong regional element. Likely any future crisis in the US will also have a strong regional element. The evidence from WWII suggests that the size and types of firms that receive future stimulus spending is an important consideration when designing a fiscal policy intervention targeted to resolve crises in specific states and regions.

Further, the “easy money” environment created by the war—a combination of a flood of reserves and secondary reserves and an “arbitrarily low” policy rate—is analogous to the post-2008 zero-lower bound and quantitative easing regime. The evidence for WWII suggests that the effect of this slower growth in liabilities on local economies was significantly muted because the negative shock of the war on bank liabilities was met by slower growth of paper

assets instead of slower growth in local lending.

The empirical evidence and aggregate historical evidence are both consistent with the hypothesis that corporate savings was redistributed out of state depository institutions and into national asset markets. I have pursued this line of inquiry because there is precedence for it in the literature (FC (1963), Higgs (1999), SWPC (1946)). There is also a fair amount of aggregate evidence to support the hypothesis. However, given the complexity of the period under question, the results of this paper suggest other possible lines of research. A decline in deposits is also consistent with other, overlapping and congruent hypotheses. For instance, tax policy likely played a role, as did simple “crowding out” of civilian production in muting the effect of contract spending on balance sheet growth. As well, the spatial development of the postwar period and the rise of the suburbs require more data be brought to bear on what remains an open question about the growth, development, and financial effect of the war. The suburbanization question in particular is ill suited to analysis at both the state and country level. Exploring the effects of contract spending on Metropolitan Statistical Areas is likely to prove fruitful in exploring the effects of the war on economic development and finance. For instance, while this study finds no evidence that the inter-spacial distribution of deposits, say towards reserve cities, played a role at the state level, a more granular study might find evidence that local deposits drained away towards reserve cities.

More generally, panel econometric techniques have breathed new life into the study of the economic effects of WWII. While the mid-century statistical revolution was in its early stages when the war broke out, a researcher with time and resources is likely to be able to find data to answer many of the open questions surrounding what has been an understudied moment in American economic history.

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