World War II Spending in the Electrical Machinery Industry Group

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Introduction

During World War II, the U.S. economy underwent monumental changes as it engaged in the war effort: from 1940 to 1945 over $300 billion was spent on national defense (for context, in 1940, U.S. nominal GDP was $103 billion), from 1940 to 1943 industrial production nearly doubled, and unemployment fell to below 2 percent. Furthermore, many constraints were placed on the economy—price controls, rationing of strategic materials, et cetera.

My task is in preparing a data set which will then be used to examine the effects of World War II production on the post-war U.S. economy.

Data

The contract data was obtained from the Civilian Production Administration, digitized, and cleaned by Professor Brunet. It contains 191,709 contracts with 32,631 unique product descriptions, the total value of which is 183 billion 1946 U.S. dollars.

For each contract, I was provided the following information: a brief description of the product, the name and location of the manufacturer, the procurement agency that placed the contract, and the contract number.

SIC

Standard Industrial Classification (SIC) system was established in 1937 to classify industries. Each business is represented by a four-digit SIC code with a general-to-specific structure: the first two digits identify the major industry sector; adding the third digit gives the industry group within the sector; adding the fourth, the industry within the group. For example, a company which primarily produced television sets in the 1940s would have been assigned the SIC code 3661, with 36 identifying the major group "Electrical Machinery", 366 the industry group "Communication Equipment", and 3661 the industry "Radios and related products".

The SIC system has been updated as the U.S. economic landscape changed and new industries, such as those in electronics and computers, emerged. In 1997 the SIC system was replaced by the six-digit North American Industry Classification System (NAICS).

The 1947 Census of Manufactures provides as an appendix descriptions of each industry in sectors 20-39 (i.e., manufacturing); furthermore, detailed statistics for each industry are published in Volume II of the 1947 Census of Manufactures. I used these descriptions to assign SIC codes to contracts in the data set.

3661 **Radios and related products** (*Radios, radio and television equipment—except radio tubes; radar and related detection apparatus; and phonographs*)
Establishments primarily engaged in manufacturing radio and television receiving and transmitting equipment, electrical and magnetic field detection apparatus, light and heat-emission detecting apparatus, object detection apparatus (radar), and other apparatus and products associated with radio equipment, including miscellaneous radio parts; phonographs and accessories (except records—Industry 3663); and public-address and music-distribution apparatus. Establishments primarily engaged in manufacturing radio-receiving and transmitting tubes are classified in Industry 3662.

Figure 1. Description of the "radios and related products" industry from the 1947 Census of Manufactures

Coding

To each unique product description, I assigned two-, three-, and four-digit SIC codes, and coded binary variables indicating whether it was an intermediate input or a final good, whether it was a war good or also had civilian uses, whether it was new or used, and whether it was subject to rationing or required rationed materials to produce. I also identified contracts which were not for products but rather for packing, assembling, or disassembling services.

String functions in Stata were used to subset contracts. For example, the line `strpos(Product, "RADIO")` isolates the contracts whose product descriptions contain the string "RADIO". Adding `& !strpos(Product, "CABLE")` discards contracts for radio cables, radio cable plugs, etc.

It was necessary to subset contracts in this way, because coding unique product descriptions individually would have been infeasible. However, product descriptions containing the same string were often assigned different SIC codes. For example, radio equipment was assigned 3661, but radio testing equipment and analyzers were assigned 3613 (electrical measuring instruments). Furthermore, abbreviations varied between descriptions and there were occasional spelling errors. Therefore, it was necessary to review each product description to ensure that it would be coded correctly.

```
/* vacuum tube */
local condition `empty' & ///
                (`str' "VACUUM") | `str' "ELECTRON")) & ///
                `str' "TUBE") & ///
                !(`str' "TEST") | `str' "ANALY") | `str' "VOLT") | `str' "RECT"))
`rs2' `condition'
`rs'3 = 366 if `condition'
`rs'4 = 3662 if `condition'
`rw0' `condition'
`rf0' `condition'
`rr1' `condition'
`rn0' `condition'
`rs1' `condition'
```

Figure 2. Sample Stata code

Results

I assigned SIC codes and descriptors to more than nine thousand contracts, thus accounting for nearly five percent of the data set. Over two-thirds of these contracts were classified under Electrical Machinery (SIC 36), and the remainder were classified under Paper, Machinery (except electrical), Instruments, Transportation Equipment, and Miscellaneous. The contracts I coded for communication equipment alone have a total value of nearly 8.8 billion USD.

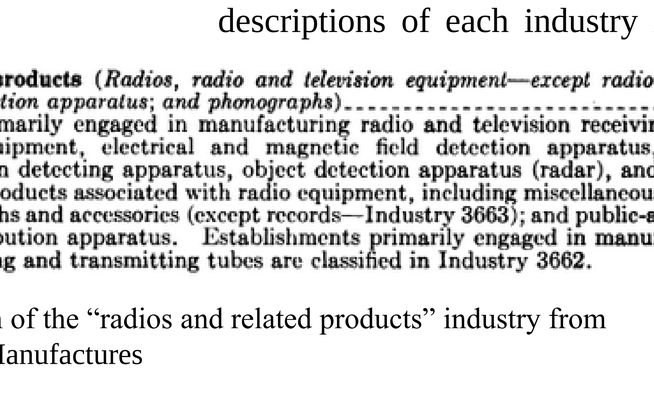

Figure 3. U.S. military spending by county

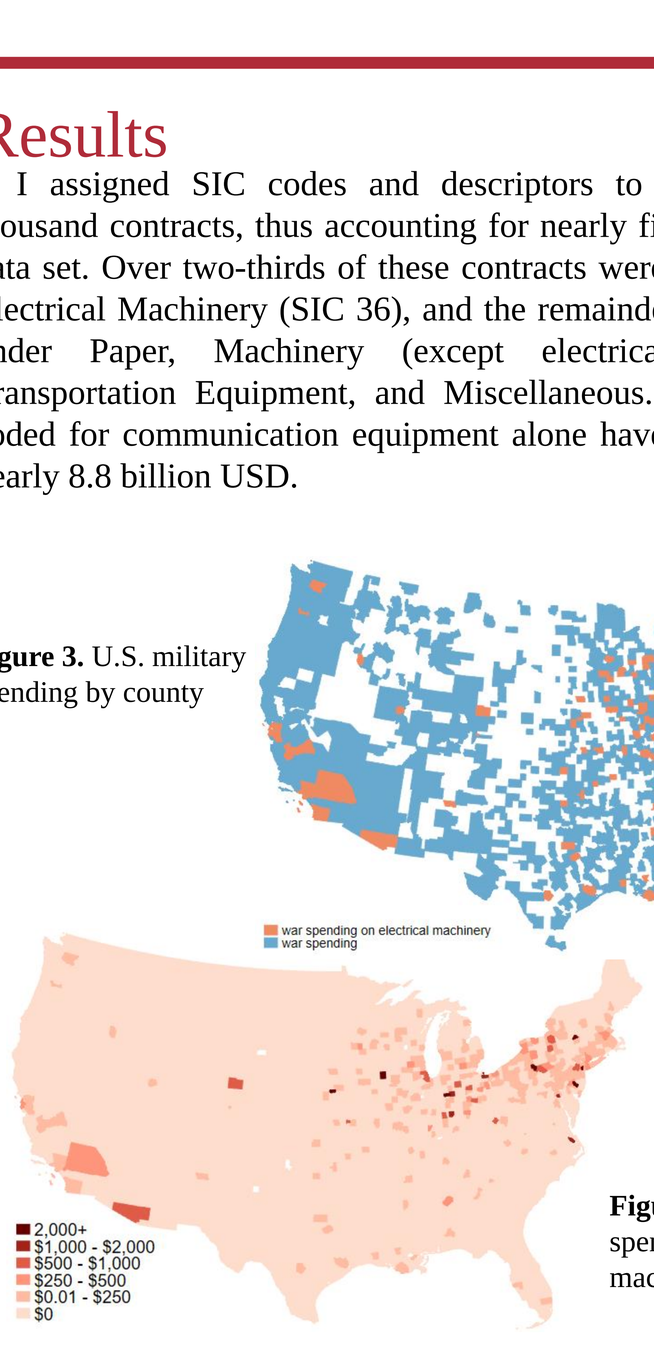

Figure 4. Per capita spending on electrical machinery by county

Analysis

Fishback and Cullen (2013) use county-level data to examine the effect of World War II military spending on retail sales per capita and other post-war economic outcomes, and determine that increased war spending contributed to greater population growth, but find no relationship between increased war spending and growth in per capita retail sales, home ownership rates, manufacturing value added, labor productivity, et cetera.

I compared the effects of generalized war spending to the effects of spending on electrical machinery and, more specifically, communication equipment. Given the connection between communication equipment and the high-tech electronics industry that emerged after the war, I considered whether counties that produced communication equipment during World War II would have had better economic outcomes post-war.

Table 1. Effects of communication equipment spending on manufacturing employment and manufacturing value added per capita

	(1) employed_mfg _1950_pc	(2) employed_mfg _1960_pc	(3) ihs_mfg_va _1947_pc	(4) ihs_mfg_va_ 1958_pc
ihs_comm_pc	0.00457	-0.000740	0.0255	0.0461
	(0.00451)	(0.00870)	(0.0256)	(0.0940)
employed_mfg_1940_pc	0.967***	0.847***	2.583***	1.980***
	(0.0205)	(0.0304)	(0.238)	(0.278)
frac_pop_rural_farm_1940	0.0182	0.0383**	-0.117***	-0.393***
	(0.0102)	(0.0140)	(0.0250)	(0.0489)
ihs_mfg_va_1939_pc			0.869***	1.361***
			(0.100)	(0.132)
_cons	0.0307***	0.0684***	0.118***	0.491***
	(0.00678)	(0.00997)	(0.0204)	(0.0406)
Number of observations	3091	3087	2494	2973
R-squared	0.894	0.789	0.814	0.658

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

There are a substantial number of counties with no communication equipment spending and/or no manufacturing value added, so I used the inverse hyperbolic sine transformation for these variables.

I included as controls the manufacturing employment rate and the fraction of the population living on rural farms in 1940.

I also controlled for state fixed effects, but the estimates are not shown in the table.

I found no statistically significant relationship between World War II spending on communication equipment and post-war manufacturing employment or manufacturing value added. Post-war manufacturing employment is very strongly predicted by pre-war manufacturing employment, and likewise for post-war manufacturing value added.