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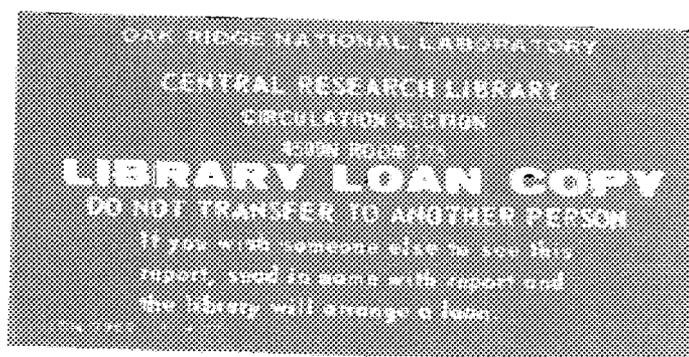
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**Arsenal of Democracy in the  
Face of Change: Four  
U.S. Mobilizations: A Macroeconomic  
Perspective Working Paper No. 5**

George Horwich



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**ARSENAL OF DEMOCRACY IN THE FACE OF CHANGE:  
FOUR U.S. MOBILIZATIONS: A MACROECONOMIC PERSPECTIVE  
WORKING PAPER NO. 5**

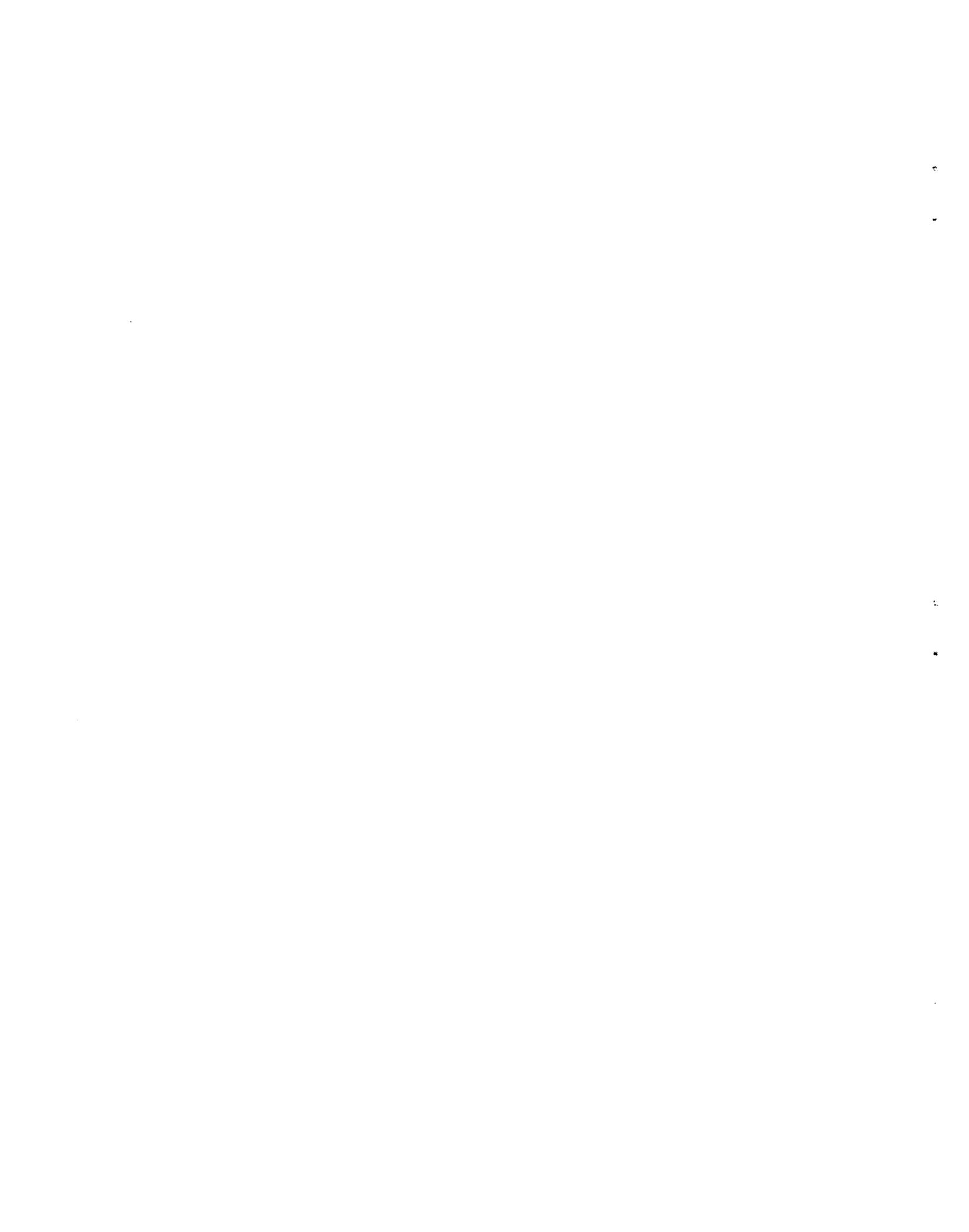
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## CONTENTS

LIST OF TABLES .....	ii
ABSTRACT .....	iii
I. INTRODUCTION .....	1
II. THE DEFENSE-EXPENDITURE/GNP RATIO .....	3
III. INCREMENTS IN GNP AND DEFENSE EXPENDITURES .....	7
IV. PERSONAL CONSUMPTION AND DOMESTIC INVESTMENT .....	11
V. THE MANPOWER RESPONSE .....	13
VI. DEMOBILIZATION .....	17
World War I .....	17
World War II .....	17
The Korean War .....	23
The Vietnam War .....	23
VII. FINANCING THE WARS .....	27
APPENDIX A .....	31
APPENDIX B .....	35

LIST OF TABLES

Table 1. Ratio (%) of U.S. federal government expenditures on national defense goods and services to GNP four 20th century U.S. mobilizations . . . . .	3
Table 2. Increments of real GNP and real national defense spending (G,[ND] in four U.S. mobilizations (billions of constant dollars) . . . . .	8
Table 3. Manpower changes in four U.S. mobilizations (thousands of persons) . . . . .	14
Table 4. Sources of total civilian and military employment in four U.S. mobilizations (millions of persons) . . . . .	16
Table 5. The World War I demobilization . . . . .	18
Table 6. The World War II demobilization . . . . .	20
Table 7. Real cash balances in World Wars I and II . . . . .	22
Table 8. The Korean War demobilization . . . . .	24
Table 9. The Vietnam War demobilization . . . . .	25
Table 10. Financing the wars: tax receipts vs defense expenditures (billions of current dollars) . . . . .	28

## ABSTRACT

Opinions on the magnitude of previous U.S. mobilizations vary. This study attempts to resolve these differences by examining U.S. government expenditures as a fraction of the GNP and the magnitude and sources of manpower during wartime.

The level of U.S. government national defense expenditures and the simultaneous deployment of manpower, both military and civilian, is taken to be the measure of mobilization. The paper examines the total magnitude of expenditures and manpower in each mobilization, the timing of its implementation and wind-down, and the ease with which the macroeconomy appeared to adapt to the war time conversion.

Taking as the bottom line measure of the magnitude of each war, the increment between the premobilization percentage of government expenditures on defense and the average percentage sustained during the mobilization years, then WW II is the largest mobilization at 36.3%. WW I is next at 9.6%, the Korean War is almost a third less at 6.6%, and Vietnam is a minuscule 1.2%. Premobilization military strength was low in both World Wars while for Korea and Vietnam, it was already relatively high. The additional manpower in each of the four mobilizations came from a reduction in prevailing levels of employment, an increase in the working-age population, and an increase in the rate of labor force participation.



## I. INTRODUCTION

This paper offers a descriptive economic overview and comparison of the four U.S. mobilizations of this century. Our measure of mobilization is the level of U.S. government national defense expenditures and the simultaneous national manpower total, both military and civilian. We focus on the total magnitude of expenditures and manpower in each mobilization, the timing of its implementation and wind-down, and the ease with which the macroeconomy appeared to adapt to the wartime conversion. We also look at the financial underpinnings of the mobilizations -- the degree to which resources were procured by federal taxes and borrowing. Our ultimate goal is to develop guidelines and principles of macroeconomic policy that will speed and facilitate any future mobilization.

In what follows, the GNP and expenditure series are expressed in constant prices of a year as near as possible to the war or mobilization in question. This procedure weights defense spending and other GNP components by the relative prices--the economic values--most reflective of the particular period. For WW I we use a 1929 constant-price series, the earliest such series available; for WW II, a 1947 price series; for the Korean War, 1954 prices; and the Vietnam War, 1972 prices.



## II. THE DEFENSE-EXPENDITURE/GNP RATIO

Table 1 indicates the percentage of GNP that U.S. federal government national defense expenditures were in each of the four twentieth century wars the United States participated in. Taking the ratio of annual expenditures to GNP, each expressed in the contemporaneous prices described above, we record the percentage prevailing before the mobilization began, the maximum percentage reached during the mobilization, the average percentage during the years of relatively full mobilization, and the increments between the premobilization percentage and the other two. The relevant years for each entry are also indicated.

Table 1. Ratio (%) of U.S. federal government expenditures on national defense goods and services to GNP four 20th century U.S. mobilizations

	<u>World War I</u> <u>April 1917-Nov. 1918</u>		<u>World War II</u> <u>Dec. 1941-Aug. 1945</u>		<u>Korean War</u> <u>June 1950-Mar. 1953</u>		<u>Vietnam War</u> <u>Undeclared</u>	
1. Pre-Mobilization	1916:	1.1	1939:	1.4	1950:	5.7	1965:	8.0
2. Maximum	1918:	17.4	1944:	42.8	1953:	13.5	1967:	9.8
3. Average <sup>a</sup>	1917-19:	10.7	1942-45:	37.7	1951-53:	12.3	1966-69:	9.2
4. Increment: 2-1		16.4		41.4		7.8		1.8
5. Increment: 3-1		9.6		36.3		6.6		1.2

<sup>a</sup>During years of relatively full mobilization.

Source: Appendix A, Tables A-1 through A-4.

By all measures, the mobilization of WW II was the largest. Government defense expenditures rose from 1.4% of the GNP in 1939 to a high of 42.8% in 1944 and averaged 37.7% over the wartime period, 1942-45. WW I brought the country to its second highest level of defense spending, 17.4 % of GNP in 1918. The defense budget was a mere 1.1% in 1916 and averaged only 10.7% during the mobilization years, in which we include 1919, the year following the war. The average reflected a relatively brief military involvement and a slow pace of both mobilization and demobilization. It was less than the average of the Korean War and only slightly greater than that of the Vietnam War, which in general were more limited engagements. The Korean War brought defense outlays to a maximum of 13.5% of GNP in 1953 and averaged 12.3% during 1951-53. The maximum for the Vietnam War was 9.8%, but that was only 1.8% above the premobilization percentage of 8.0. The average for the war years 1966-69 was 9.2%.

Unlike the world wars, the Korean and Vietnam mobilizations built upon relatively high level of prewar defense spending. After WW II, defense outlays did not fall below 5%, well above previous peacetime ratios. Similarly, after the Korean War the defense-spending/GNP ratio hovered around 10-11% for the rest of the 1950s and was no lower than 8% in the first half of the 1960s. The increment of spending at the height of the Vietnam War was thus only 1.8% of the GNP, while that of the Korean War, though higher at 7.8%, was nevertheless significantly below the average level of that period of 12.3%.

If we take as the bottom line measure of the magnitude of each war the increment between the premobilization percentage and the average percentage sustained during the mobilization years

*Arsenal of Democracy in the Face of Change: Four U.S.  
Mobilizations: A Macroeconomic Perspective,  
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(line 5 in Table 1), then WW II remains the most substantial mobilization at 36.3%. WW I is next at 9.6%, the Korean War is almost a third less at 6.6%, and Vietnam is a minuscule 1.2%.



### III. INCREMENTS IN GNP AND DEFENSE EXPENDITURES

Another measure of the economic burden of each mobilization is the degree to which additions to defense spending were accompanied by increments in the real GNP. On a first approximation, the greater the GNP growth, the less the need to curtail premobilization claims to GNP and the less the resistance to the wartime reallocation of resources. Table 2 presents the increments of real GNP and real national defense spending, G(ND), for each of the wars. The increments are taken first with respect to the level of the immediate premobilization year and then for successive years in which real defense spending continues to rise. As noted above, we use GNP and component series with constant prices as near as possible to each war.

In WWI the initial defense outlay in 1917 of \$2.6 billion occurred while real GNP fell \$0.7 billion -- a 1% decline. In 1918 expenditures rose \$9.3 billion accompanied by a \$6.3 billion increase in GNP. In 1917 GNP declined, probably as a result of monetary contraction as bank reserves drained into the pocket circulation.<sup>1</sup>

There was in any case insufficient slack in the economy to fully accommodate the mobilization effort. The compound annual growth rate of GNP over these two years was 4.1%.

By contrast, the expansion of total output in WW II was almost exactly equal to the huge increments in mobilization spending, though they were not generally synchronized. In 1940, 1941, and 1944 the additions to GNP were much greater than the increases in defense spending. The opposite was true in 1942 and 1943. Overall, a very elastic output growing from 1939 to 1944 at an average (compound) annual rate of 11.2%--a total of 70%--matched the wartime requirement.

*Arsenal of Democracy in the Face of Change: Four U.S. Mobilizations: A Macroeconomic Perspective, Working Paper No. 5*

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Table 2. Increments of real GNP and real national defense spending (G,[ND] in four U.S. mobilizations (billions of constant dollars)

World War I (1929 Prices)			Korean War (1954 Prices)		
	<u>ΔGNP</u>	<u>ΔG(ND)</u>		<u>ΔGNP</u>	<u>ΔG(ND)</u>
1917	-0.7	2.6	1951	23.7	18.2
1918	6.3	9.3	1952	11.7	12.3
			1953	15.5	3.1
Total	5.6	11.9	Total	50.9	33.6
%	100.0	212.5	%	100.0	66.0
Growth rate of GNP: 4.1%/yr.			Growth Rate of GNP: 5.1%/yr.		

World War II (1947 Prices)			Vietnam War (1972 Prices)		
	<u>ΔGNP</u>	<u>ΔG(ND)</u>		<u>ΔGNP</u>	<u>ΔG(ND)</u>
1940	14.1	1.9	1966	55.5	12.3
1941	26.6	16.3	1967	26.6	12.3
1942	25.4	46.9	1968	46.7	2.1
1943	25.3	34.9			
1944	19.3	12.7			
Total	110.7	112.7	Total	128.8	26.7
%	100.0	101.8	%	100.0	20.7
Growth Rate of GNP: 11.2%/yr.			Growth Rate of GNP: 4.4%/yr.		

Source: Appendix A, Tables A-1 through A-4.

The Korean and Vietnam Wars, drawing much less on the nation's resources, were again funded -- in terms of real resources -- totally out of increments in output. On average, the Korean War absorbed 66% of each year's growth increment while the Vietnam War took 20.7%. Only in one year, 1952, did the rise in GNP fail to exceed the spending increment -- and in that instance, not by much. During 1950-1953 the real economy grew at a comfortable rate of 5.1% per year, a total increase of 16%. In 1965-1968 the economy performed almost as well with growth at 4.4% per year, totaling 14%.<sup>2</sup>



#### IV. PERSONAL CONSUMPTION AND DOMESTIC INVESTMENT

Among other major components of GNP, the behavior of personal consumption expenditures and gross private domestic investment provides interesting contrasts. Only in WW I do total real consumption expenditures drop during the greater part of the mobilization period in both absolute amount and relative to GNP. Consumption fell by \$1.1 billion in 1917 and again by \$0.2 billion in 1918 (Table A-1, column 5). Throughout the much longer mobilization WW II, however, real consumption rose in every year but 1942, even while steadily declining as a fraction of GNP (Table A-2, columns 10, 11). In both the Korean and Vietnam wars, consumption rose in every year (Tables A-3 and A-4, columns 10 and 11). As a fraction of GNP, it fell during the Korean conflict but remained essentially steady during the Vietnam years.

Mobilization can doubtless proceed more smoothly in an economy that maintains and even increases its consumption level somewhat, even while undergoing an enormous economic conversion, such as that of WW II. Since the fruits of investment lie in the future, however, it can, and indeed does, appear to yield to the mobilization process without important negative consequences for either general economic welfare in the short run or the success of the wartime effort. Investment tends to be reduced by the uncertain state of both the war and postwar economies and by the crowding out of government materiel acquisitions and wartime borrowing. This is confirmed by both world wars. In 1918 investment fell by a third of its prewar (and postwar) level -- from 12% to 8% of the GNP (Table A-1, column 8). In 1942 and 1943, at 3% of GNP, investment was about a fifth of its trend level (Table A-2, column 13). Whether investment was much influenced by the Korean

and Vietnam episodes is less clear from the raw data. Investment, relative to GNP, was less during the Korean War than it was in the several years immediately before and after the war (Table A-3, column 13), though not markedly below a trend that was then generally around 15%. During the Vietnam War investment dipped from 17-18% of GNP to 15-16% for reasons that may have been unrelated to the war (Table A-4, column 13).

## V. THE MANPOWER RESPONSE

The changes occurring in both civilian and military employment in the four wars are summarized in Table 3. Once again, the largest response came during WW II. Between 1940 and 1944 civilian employment rose 6.4 million or 13.6%, 10.9 million joined the armed forces, and the sum of civilian and military employment rose 17.3 million or 36%. While 2.67 million were added to the armed forces in WW I, civilian employment rose only 1.4%, creating a rise in total employment of 8.5%.

Premobilization military strength was low in both world wars. During the Korean conflict, however, 1.9 million were added to a relatively large prewar total of 1.7 million; during the Vietnam war, a comparatively small number, 783,000, was added to a historically large prewar military of 2.7 million. The absolute increase in civilian employment in the Vietnam years, 6.8 million, exceeded even that of WW II, but in relative terms was much less at 9.6%.

Where did the additional manpower come from in each of the mobilizations? We identify three exhaustive sources: a reduction in prevailing levels of unemployment, an increase in the working-age population, and an increase in the rate of labor force participation. Table 4 summarizes the sources in each war.

In WW I, for example, the increase in total civilian and military employment was 3.2 million (2.7 million was military) of which 1.5 million or 47% was attributable to a reduction in labor unemployment, 0.9 million or 28% to an increase in working age population, and 0.9 million or 26% to an increase in the rate of labor force participation.

Table 3. Manpower changes in four U.S. mobilizations  
(thousands of persons)

	World War I		Korean War	
	Pre-Mob'n 1916	War Years 1917-18	Pre-Mob'n 1950	War Years 1951-5
Civilian employment	38,014	+526(1.4%)	58,918	+2,261(3.8%)
Armed Forces	181	+2,723	1,650	+1,895
<b>Total</b>	<b>38,195</b>	<b>+3,249(8.5%)</b>	<b>60,568</b>	<b>+4,156(6.9%)</b>

	World War I		Korean War	
	Pre-Mob'n 1916	War Years 1917-18	Pre-Mob'n 1950	War Years 1951-5
Civilian Employment	47,520	+6,440(13.6%)	71,088	+6,814(9.6%)
Armed Forces	540	+10,870	2,723	+783
<b>Total</b>	<b>48,060</b>	<b>+17,310(36.0%)</b>	<b>73,811</b>	<b>+7,597(10.3%)</b>

Source: Appendix B, Tables B-1 through B-4.

Table 4. Sources of total civilian and military employment in four U.S. mobilizations (millions of persons)

	WW I <sup>a</sup>	WW II <sup>a</sup>	Korean <sup>a</sup>	Vietnam <sup>a</sup>
Increase in total employment	3.2(100)	17.3(100)	4.2(100)	7.6(100)
military employment	2.7	10.9	1.9	0.8
Decrease in unemployment	1.5(46)	7.4(43)	1.5(35)	0.5(7)
Increase in population	0.9(28)	2.3(13)	2.3(55)	4.7(61)
Increase in labor force participation	0.9(26)	7.5(43)	0.4(10)	2.4(32)

<sup>a</sup>Percent share in parentheses

Source: Appendix B, Tables B-1 through B-4.

In all wars except Vietnam, a reduction in premobilization unemployment was a major source of the total manpower increment. The numbers were particularly impressive during WW II when 7.4 million, 43% of the additional civilian and military employment, was filled from the ranks of the unemployed. A much smaller absolute number (1.5 million), but an even higher percentage (47), was available in WW I in the lingering aftermath of the 1913-14 depression.

The increase in population was a minor source of manpower in WW II, but a major source in the Vietnam War and only slightly less in the Korean War. At 28% of the total manpower increment, it was not inconsequential in WW I. Increased labor force participation was most significant in WW II, for which it provided slightly more personnel than the reduction in unemployment. WW II was indeed the "patriotic" war. Women (see Table A-2, column 13), most of whom returned to households after the war, were largely responsible for the transfer from household to market employment.

## VI. DEMOBILIZATION

Each of the wars winds down at a different pace and with different consequences. We look at each in turn.

### World War I

The demobilization following WW I is summarized in Table 5. National defense expenditures fell by over \$5 billion in both 1919 and 1920, reducing the budget from \$12.6 billion to \$1.7 billion or, as a percentage of GNP, from 17.4 to 2.4. GNP itself declined by \$0.9 billion or 1.2% in 1920, the first year of the 1920-1921 downturn. In 1919 and 1920, 2.5 million personnel left the armed forces, while civilian employment rose by 0.6 million. As noted below the table, the 1.9 million reduction in net employment was balanced by a 1.6 million increase in unemployment, a 1.3 million increase in the working-age population, and a 1.5 million decrease in labor force participation. The increase in unemployment raised the unemployment rate from 1.4 to 5.2%, roughly what it had been in 1916 (see Table B-1). The decrease in labor force participation more than offset the 0.8 million increase in this source that had occurred in 1917 and 1918. The increase in working-age population was somewhat above the trend for a two-year period during 1914-1921 (see Table B-1, column 11).

### World War II

As shown in Table 6, WW II defense expenditures dropped \$18.4 billion in 1945 and then a massive \$77.1 billion in 1946. A further drop of \$7.8 billion in 1947 placed the ratio of defense spending to GNP at 0.05, a level it maintained more or less until the Korean War. Demobilization

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Table 5. The World War I demobilization

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	$\Delta$ GNP*	% $\Delta$	$\Delta$ G(ND)*	% $\Delta$	$\frac{G(ND)}{GNP}$	$\Delta$ E*	$\Delta$ CE*	$\Delta$ AF*	% $\Delta$	U(%)
1918	6.1	9.1	9.3	281.8	.1742	2.6	0.4	2.2	303.9	1.4
1919	0.8	1.1	-5.3	-42.1	.0973	-0.8	0.6	-1.4	-46.9	1.4
1920	-0.9	-1.2	-5.6	-76.7	.0239	-1.1	0.0	-1.1	-75.4	5.2

\*Billions of 1929 dollars

\*Millions of persons

1919 and 1920:  $\Delta$ E = -1.9,  $\Delta$ U = 1.6,  $\Delta$ population = 1.3,  $\Delta$ LFP = -1.5.

Symbols:

- E = total civilian and military employment (number of armed forces)
- CE = civilian employment
- AF = total number of armed forces
- U = number unemployed as % of civilian labor force
- LFP = labor force participation -- i.e., the size of the labor force.

Source: Appendix A, Table A-1 and Appendix B, Table B-1.

of the armed forces was almost as rapid as the curtailment of defense spending. Eight million personnel -- 70% of the 1945 strength -- were separated in 1946; another 1.9 million in 1947, bringing the forces approximately to their postwar equilibrium.

The winddown following WW II appears to have been more rapid than it was after WW I. National defense expenditures fell 80% in 1946, the first full year after the war, compared to a drop of 42% in 1919. But WW I ended late in 1918--November--while hostilities in 1945 ended in May and August. An accurate comparison would require the use of monthly or quarterly data. What is quite clear, however, is that the WW II demobilization in 1946 was the single largest one-year macroeconomic shock in U.S. history. Autonomous defense expenditures dropped precipitously by 28.4% of the GNP (Table 6, column 5). Eight million persons left the armed forces and, while 2.4 million civilian jobs were added, the difference, 5.6 million, left the labor force or joined the unemployment rolls. Perhaps a quarter to a third of the 65 million people in civilian employment or the military in 1945 changed jobs or returned to the household and nonprofit sector.

The real GNP in 1946 fell 11.1%, reflecting not the usual postwar recession and underutilization of resources, but rather a shift of resources to nonmarket nonmilitary activity. For in spite of the extraordinary magnitude of the adjustment, unemployment rose from an exceptionally low 1.9% to 3.9% of the labor force, a level compatible with long-run noninflationary equilibrium. Most remarkably, the reallocation occurred without a trace of centralized planning or coordination of industrial or market processes. The year 1946 was essentially one of price-directed market adjustment.

*Arsenal of Democracy in the Face of Change: Four U.S. Mobilizations: A Macroeconomic Perspective, Working Paper No. 5*

Table 6. The World War II demobilization

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	$\Delta$ GNP*	% $\Delta$	$\Delta$ G(ND)*	% $\Delta$	$\frac{G(ND)}{GNP}$	$\Delta$ E*	$\Delta$ CE*	$\Delta$ AF*	% $\Delta$	U(%)
1944	19.3	7.8	12.7	12.4	.428	1.9	-0.5	2.4	26.5	1.2
1945	-5.1	-1.9	-18.4	-16.0	.367	-1.1	-1.1	0.0	0.2	1.9
1946	-29.3	-11.1	-77.1	-79.9	.083	-5.6	2.4	-8.0	-69.8	3.9
1947	-1.6	-0.7	-7.8	-40.2	.050	0.7	2.6	-1.9	-53.4	3.9

\*Billions of 1947 dollars

\*Millions of persons

1945, 1946, and 1947:  $\Delta$ E = -6.0,  $\Delta$ U = 1.7,  $\Delta$ population = 1.7,  
 $\Delta$ LFP = -6.0

Symbols:

- E = total civilian and military employment (number of armed forces)
- CE = civilian employment
- AF = total number of armed forces
- U = number of unemployed as % of civilian labor force
- LFP = labor force participation - i.e., the size of the labor force.

Source: Appendix A, Table A-2 and Appendix B, Table B-2

Facilitating the adjustment, however, were stimulatory macroeconomic policies inherited from the war. Table 7 details the value of real cash balances (currency plus demand deposits) in the hands of the public in 1916-1919 and 1939-1947. Real balances fell in 1918 and rose only modestly in 1919. By contrast, between 1939 and 1945 real balances more than doubled. Although WW II price controls created an artificial downward bias in the recorded price level and thereby overstated the level of real balances, the increase in spendable purchasing power by 1945 is unmistakable.

The broader significance of the WW II demobilization extends to mobilization itself. The ability of a decentralized market economy to be transformed on so colossal a scale in so short a time can also be harnessed in the mobilization process. To do so, of course, requires the establishing of defense goals and priorities, a task many times more complicated than simply uncorking suppressed consumer preferences. At the same time, a mobilization that blends with, rather than opposes, the market has enormous advantages: it uses the awesome power of relative prices to signal new preferences, to continuously process and communicate information on conditions of cost and production throughout the economy, and to induce widespread mobility of both labor and capital.

The further lesson of 1946 is the importance of providing enabling monetary and fiscal policies at the macro level. These should entail not only a temporary easing of the money supply, but some constellation of taxes and subsidies to place funding in the appropriate hands. There is no reason in principle why the demand conditions underlying the success of 1946--the sudden mass removal of purchasing power from the military and its emergence in civilian hands--cannot be enacted in reverse during mobilization.

*Arsenal of Democracy in the Face of Change: Four U.S. Mobilizations: A Macroeconomic Perspective, Working Paper No. 5*

Table 7. Real cash balances in World Wars I and II

	<u>World War I</u>			Index of M/P
	<u>M*</u>	<u>P*</u>	<u>M/P</u>	
1916	14.4	32.7	0.440	100
1917	16.9	38.4	0.440	100
1918	18.3	45.1	0.406	92
1919	21.4	51.8	0.413	94
	<u>World War II</u>			Index of M/P
	<u>M*</u>	<u>P*</u>	<u>M/P</u>	
1939	32.6	41.6	0.784	100
1940	38.8	47.3	0.820	105
1941	45.3	48.7	0.930	119
1942	53.4	52.1	1.025	131
1943	72.8	53.6	1.358	173
1944	83.3	55.7	1.496	191
1945	97.5	56.9	1.714	219
1946	106.8	59.4	1.798	229
1947	111.4	64.9	1.716	219

\*Currency plus demand deposits held by the public (excluding banks).

\*Consumer price index, 1967 = 100

Source: M -- M. Friedman and A. J. Schwartz, A Monetary History of the United States, 1867-1960, Table A-1, col. 17, pp. 708, 709, 715-718. Entries are June of each year. P -- U. S. Department of Commerce, Historical Statistics of the United States: Colonial Times to 1970, Part 1 (Washington, Superintendent of Documents, 1975), p. 211.

### **The Korean War**

The mobilization of WW I was the only one in this century following which the economy returned to prewar levels of defense spending and military strength. WW II left the nation with defense spending at 5% of GNP and armed forces of 1.5 million, compared to prewar levels of about 1% and 200-300 thousand, respectively. Defense outlays after the Korean War were in the range of 9-10% of GNP reached in 1955. Military strength was 3 million. While both parameters declined slightly over the next 10 years, they remained close to these levels.

With reference to Table 8, the demobilization was essentially completed by 1955 when defense spending fell by \$3 billion, having fallen \$9 billion in 1954. Although a further drop of \$1.2 billion occurred in 1956, that appears to be more a postwar policy measure than a winddown of wartime activity, as such. The year 1954 was, of course, one of recession to which the decline of defense spending probably contributed.

### **The Vietnam War**

The winddown from the Vietnam War was a deliberately gradual process that began, on the expenditure side, in 1969 and proceeded, relative to GNP, to levels below those that preceded the Vietnam buildup (Table 9). By the end of 1972 defense spending was down by one-fourth of its 1968 peak and equal, in constant dollars, to its 1965 level (Table A-4). As a percentage of GNP, however, it was 6.3% in 1972, much less than its peak of 9.8% in 1967 and the 8.0% that preceded the mobilization in 1965. The percentage continued to drop throughout the 1970s, hovering around the 5% level before turning up in 1980.

*Arsenal of Democracy in the Face of Change: Four U.S. Mobilizations: A Macroeconomic Perspective, Working Paper No. 5*

Table 8. The Korean War demobilization

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	$\Delta$ GNP*	% $\Delta$	$\Delta$ G(ND)*	% $\Delta$	$\frac{G(ND)}{GNP}$	$\Delta$ E*	$\Delta$ CE*	$\Delta$ AF*	% $\Delta$	U(%)
1953	15.5	4.4	3.1	6.6	.135	0.9	0.9	-0.0	-1.3	2.9
1954	-5.9	-1.6	-9.0	-18.1	.112	-1.3	-1.1	-0.2	-5.5	5.5
1955	29.6	8.2	-3.0	-7.3	.096	1.8	2.1	-0.3	-9.0	4.4
1956	8.2	2.1	-1.2	-3.2	.091	1.4	1.6	-0.2	-6.3	4.1

\*Billions of 1954 dollars

\*Millions of persons

1954 and 1955: DE = 0.5, DU = 1.1, Dpopulation = 1.2, DLFP = 0.3.

Symbols:

E = total civilian and military employment (number of armed forces)

CE = civilian employment

AF = total number of armed forces

U = number of unemployed as % of civilian labor force

LFP = labor force participation -- i.e., the size of the labor force.

Source: Appendix A, Table A-3 and Appendix B, Table B-3.

*Arsenal of Democracy in the Face of Change: Four U.S. Mobilizations: A Macroeconomic Perspective, Working Paper No. 5*

Table 9. The Vietnam War demobilization

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	$\Delta$ GNP*	% $\Delta$	$\Delta$ G(ND)*	% $\Delta$	$\frac{G(ND)}{GNP}$	$\Delta E^*$	$\Delta CE^*$	$\Delta AF^*$	% $\Delta$	U(%)
1967	26.6	2.7	12.3	14.2	.098	1.8	1.5	0.3	10.3	3.8
1968	46.7	4.6	2.1	2.1	.096	1.6	1.5	0.0	2.6	3.6
1969	29.5	2.8	-5.1	-5.0	.088	2.0	2.0	-0.0	-0.8	3.5
1970	-2.0	-0.2	-10.1	-10.5	.079	0.5	0.8	-0.3	-0.9	4.9
1971	36.8	3.4	-9.0	-10.5	.069	0.2	0.7	-0.5	-14.8	5.9
1972	63.5	5.7	-2.6	-3.4	.063	2.4	2.8	-0.4	-14.4	5.6

\*Billions of 1972 dollars

\*Millions of persons

1969, 1970, 1971, and 1972: DE = 5.0, DU = 2.1, Dpopulation = 7.2,  
DLFP = -0.1.

Symbols:

E = total civilian and military employment (number of armed forces)

CE = civilian employment

AF = total number of armed forces

U = number unemployed as % of civilian labor force

LFP = labor force participation -- i.e., the size of the labor force

Source: Appendix A, Table A-4 and Appendix B, Table B-4.

The first significant reduction in the armed forces occurred in 1970, a year after defense outlays began their decline. By the end of 1972 the armed forces had been reduced from 3.5 million at the peak in 1968 to 2.3 million. Further minor reductions followed after that.

A 2% decline in real GNP made 1970 a recession year. The drop in defense outlays, though only 1% of GNP, doubtless contributed to the recession. The simultaneous attempt of the monetary authorities to curb the mounting inflation of the late 1960s was at least of equal importance in reducing the economy.

As indicated in the table, 5 million jobs were generated during 1969 - 1972. Offsetting this increase were a rise in unemployment of 2.1 million, an increase in the working-age population of 7.2 million, and a decrease in labor force participation of 0.1 million.

## VII. FINANCING THE WARS

We conclude our survey with a brief sketch of how each of the mobilizations was financed. The information is summarized in Table 10.

We take as our measure of government spending the increments in national defense expenditures in current dollars in each of the mobilization/demobilization years in which the expenditures were rising<sup>3</sup>. For these same years we record the increase in total federal government receipts (primarily tax revenues), again in current dollars. It is, of course, impossible to isolate specific components of government receipts earmarked for defense, and so the change in the aggregate is entered as the best indicator of available funding from nonborrowing sources. And while premobilization expenditures can be redirected to wartime uses, we apply the funding requirement only to the expenditure increment. All data in Table 10 are for fiscal years ending June 30.

In WW I only \$4.4 billion out of the \$17.8 billion increment in government spending (see note 3) -- a 25% share -- was funded by tax revenues. In WW II 48% of the defense spending was financed by taxes. Seventy-seven percent of the Korean War outlays were tax financed, although the revenues ran ahead of expenditures in fiscal-year 1951 and lagged thereafter. In 1951, moreover, nondefense spending fell \$6.8 billion, leaving a net increment in total federal government expenditures of only \$3.0 billion -- well below the revenue increment. In the Vietnam War receipts rose significantly ahead of defense expenditures in all years except 1968. Overall, receipts exceeded

*Arsenal of Democracy in the Face of Change: Four U.S. Mobilizations: A Macroeconomic Perspective, Working Paper No. 5*

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Table 10. Financing the Wars: tax receipts vs defense expenditures (billions of current dollars)

World War I			Korean War		
	<u>▲Tax Receipts</u>	<u>▲G</u>	<u>▲Tax Receipts</u>	<u>▲G(ND)</u>	
1917	0.3	1.2	1951	12.2	9.8
1918	2.5	10.7	1952	14.6	22.5
1919	<u>1.5</u>	<u>5.8</u>	1953	<u>3.4</u>	<u>6.7</u>
Total	4.4	17.8	Total	30.2	39.0
▲Tax Receipts/▲G = 4.4/17.8 = 0.25			▲Tax Receipts/▲G(ND) = 30.2/39.0 = 0.77		
World War II			Vietnam		
	<u>▲Tax Receipts</u>	<u>▲G(ND)</u>	<u>▲Tax Receipts</u>	<u>▲G(ND)</u>	
1941	2.2	4.8	1966	14.0	7.5
1942	5.9	19.2	1967	18.0	13.3
1943	9.4	41.0	1968	4.2	10.5
1944	19.7	12.4	1969	33.9	0.6
1945	<u>1.4</u>	<u>3.8</u>		—	—
Total	38.6	81.2	Total	70.1	31.9
▲Tax Receipts/▲G(ND) = 38.6/81.2 = 70.1/31.9 = 0.48			▲Tax Receipts/▲G(ND) = 2.20		

Note: ▲ = "change in".

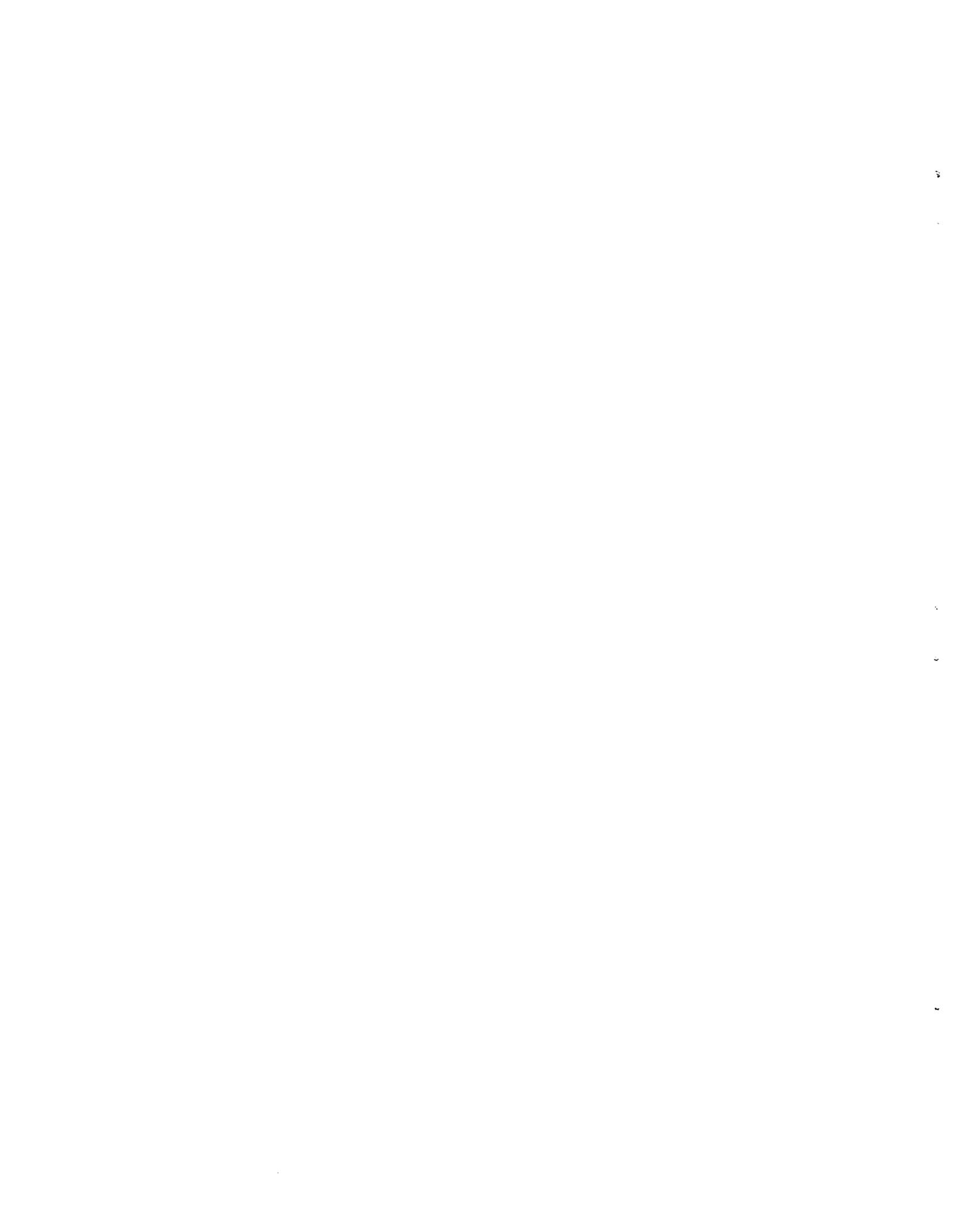
Note: All years are fiscal years ending June 30.

Source: World War I -- U.S. Department of Commerce, Bureau of the Census, Historical Statistics of the United States, Part 2, p.1104. For other wars -- Historical Tables. Budget of the United States Government. Fiscal Year 1990, U.S. Government Printing Office, 1989.

*Arsenal of Democracy in the Face of Change: Four U.S.  
Mobilizations: A Macroeconomic Perspective,  
Working Paper No. 5*

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defense expenditures by 120%, confirming the general impression that Vietnam did not entail a very significant mobilization.



**APPENDIX A**



## APPENDIX A

The following tables present the major U.S. GNP components for each of the major wars in this century, World Wars I and II, the Korean War, and the Vietnam War. As noted in the text, all series are expressed in constant prices of a year as near as possible to the war in question. GNP, a Laspeyres-type index,  $\Sigma q_t p_o / \Sigma q_o p_o$ , where  $t$  and  $o$  refer to current year and base-year magnitudes, respectively, weights all quantities by the prices  $p_o$  of the base year. Since military materiel has experienced significant relative price increases over the course of the century, a realistic assessment requires that we apply base-year price weights of a year as contemporaneous as possible with each war and its demobilization.

Prior to 1970, the portion of government expenditures allocated to defense or national security is reported by the Commerce Department only in current dollars. For World War I a constant-1929 price series on such outlays, constructed by Kuznets, is available in the volume cited by Kendrick. For the other wars we estimate constant-price national defense outlays by multiplying the constant-price series of total government purchases by the ratio of current-price national defense outlays to current-price total government purchases.

Table A-1. World War I - GNP and components  
(billions of 1929 dollars)

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)
	GNP (Commerce Dept.)	$\Delta$	GNP National Security Version	$\Delta$	National Security Outlays	$\Delta$	(3)/(2)		Consumption Expenditure		(5)/(1)		Gross Private Domestic Investment		(7)/(1)
1914	58.6		56.1		0.6		.0099		46.1		0.79		7.8		0.13
1915	60.4	1.8	57.8	1.7	0.5	-0.1	.0094		45.3		0.75		7.4		0.12
1916	68.9	8.5	66.8	9.0	0.7	0.2	.0107		49.4		0.71		9.0		0.13
1917	67.3	-1.6	66.1	-0.7	3.3	2.6	.0497		48.3		0.72		7.9		0.12
1918	73.4	6.1	72.4	6.3	12.6	9.3	.1742		48.1		0.66		6.2		0.08
1919	74.2	0.8	75.4	3.0	7.3	-5.3	.0973		50.2		0.68		7.9		0.11
1920	73.3	-0.9	72.7	-2.7	1.7	-5.6	.0239		52.7		0.72		8.4		0.12
1921	71.6	-1.7	69.4	-3.3	1.4	-0.3	.0198		56.1		0.78		7.6		0.11

Source: J. W. Kendrick, Productivity Trends in the United States (Princeton: Princeton Univ. Press, 1961), Appendix A, Table A-11a, p. 294.

Table A-2. World War II - GNP and components  
(Billions of dollars)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	
GNP 1947 Prices	$\Delta$ GNP	Total Government Expenditures Current Prices	National Defense Expenditures Current Prices	(4)/(3)	Total Government Expenditures 1947 Prices	G(ND) Expenditures 1947 Prices (5) x (6)	$\Delta$ G(ND)	G(ND)/GNP (7)/(1)	Consumption Expenditures 1947 Prices	(10)/(1)	Gross Private Domestic Investment 1947 Prices	(12)/(1)	
1938	145.9	5.5			9.6				109.8	.75	12.1	.08	
1939	157.5	11.6	5.2	1.3	.250	9.0	2.2	.0140	116.3	.74	16.8	.11	
1940	171.6	14.1	6.1	2.3	.377	11.0	4.1	1.9	.0239	122.5	.71	22.8	.13
1941	198.2	26.6	17.0	13.8	.812	25.1	20.4	16.3	.1029	130.9	.66	28.9	.15
1942	223.6	25.4	52.0	49.4	.950	70.8	67.3	46.9	.3010	128.1	.57	14.7	.07
1943	248.9	25.3	81.4	79.8	.980	104.3	102.2	34.9	.4106	131.4	.53	7.4	.03
1944	268.2	19.3	89.4	87.5	.979	117.4	114.9	12.7	.4284	135.9	.51	9.2	.03
1945	263.1	-5.1	74.8	73.7	.985	97.9	96.5	-18.4	.3668	145.2	.55	13.0	.05
1946	233.8	-29.3	19.2	16.4	.854	22.7	19.4	-77.1	.0830	162.4	.69	32.4	.14
1947	232.2	-1.6	13.6	10.0	.735	15.8	11.6	-7.8	.0500	165.0	.71	29.7	.13
1948	243.9	11.7	17.3	11.3	.653	20.8	13.6	2.0	.0558	168.0	.72	38.8	.17

Source: U.S. Department of Commerce, Survey of Current Business, various July (National Income Supplement) issues.

Table A-3. Korean War -- GNP and components  
(billions of dollars)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
GNP 1954 Prices	$\Delta$ GNP	Total Government Expenditures Current Prices	National Defense Expenditures Current Prices	(4)/(3)	Total Government Expenditures 1954 Prices	G(ND) Expenditures 1954 Prices (5) x (6)	$\Delta$ G(ND)	G(ND)/GNP (7)/(1)	Consumption Expenditures 1954 Prices	(10)/(1)	Gross Private Domestic Investment 1954 Prices	(12)/(1)
1949	292.7	21.1	13.9	.659	25.3	16.7		.0571	204.3	.70	38.5	.13
1950	318.1	25.4	19.1	.749	21.6	16.2	-0.5	.0509	216.8	.68	55.9	.18
1951	341.8	23.7	38.6	.876	39.3	34.4	18.2	.1006	218.5	.64	57.7	.17
1952	353.5	11.7	52.7	.877	53.3	46.7	12.3	.1321	224.2	.63	50.4	.14
1953	369.0	15.5	57.9	.846	58.8	49.8	3.1	.1350	235.1	.64	50.6	.14
1954	363.1	-5.9	48.4	.860	47.5	40.8	-9.0	.1124	238.0	.66	48.9	.13
1955	392.7	29.6	44.9	.869	43.5	37.8	-3.0	.0963	256.0	.65	62.5	.16
1956	400.9	8.2	46.4	.877	41.7	36.6	-1.2	.0913	263.7	.66	63.1	.16

Source: U.S. Department of Commerce, Survey of Current Business, various July (National Income Supplement) issues.

Table A-4. Vietnam War -- GNP and components  
(billions of dollars)

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	
GNP 1972 Prices	$\Delta$ GNP	Total Government Expenditures Current Prices	National Defense Expenditures Current Prices	(4)/(3)	Total Government Expenditures 1972 Prices	G(ND) Expenditures 1972 Prices (5) x (6)	$\Delta$ G(ND)	G(ND)/GNP (7)/(1)	Consumption Expenditures 1972 Prices	(10)/(1)	Gross Private Domestic Investment 1972 Prices	(12)/(1)	
1964	876.4	66.4	50.4	.759	100.2	76.1		.0868	528.0	.60	133.0	.15	
1965	929.3	52.9	68.7	51.0	.742	100.3	-1.6	.0802	557.5	.60	151.9	.18	
1966	984.8	55.5	80.4	62.0	.771	112.6	12.3	.0881	585.7	.59	163.0	.17	
1967	1,011.4	26.6	92.7	73.4	.792	125.1	12.3	.0981	602.7	.60	154.9	.15	
1968	1,058.1	46.7	100.1	79.1	.790	128.1	2.1	.0956	634.4	.60	161.6	.15	
1969	1,087.6	29.5	100.0	78.9	.789	121.8	-5.1	.0884	657.9	.60	171.4	.16	
1970	1,085.6	-2.0	98.8	76.8	.777	110.6	86.8	10.1	.0792	672.1	.62	158.5	.15
1971	1,122.4	36.8	99.8	74.1	.742	103.7	77.0	9.0	.0686	696.8	.62	173.9	.15
1972	1,185.9	63.5	105.8	77.4	.732	101.7	74.4	2.6	.0627	737.1	.62	195.0	.16

Source: U.S. Department of Commerce, Survey of Current Business, various July (National Income Supplement) issues.



**APPENDIX B**



## APPENDIX B

This appendix presents the manpower data, both civilian and military, for each of the four wars. Talking total "employment" to include both civilian and military personnel, we express the sources of employment by the following identity:

$$\Delta E = -\Delta U + \Delta \text{Pop} (E/\text{PoP})_{-1} + \Delta \text{LFP}$$

where E = total employment

U = total civilian unemployment

Pop = total working-age non-institutional population

LFP = total labor force participation

Verbally, the change in total employment in any period is equal to the negative of the change in civilian unemployment (a reduction in the number unemployed is entered as a positive amount), the change in the working-age population times the ratio of total employment to working-age population of the previous period, plus the change in the size of the labor force. The latter is measured as the residual after subtracting

$-\Delta U + \Delta \text{Pop} (E/\text{Pop})_{-1}$  from  $\Delta E$ . The term,  $\Delta \text{Pop} (E/\text{Pop})_{-1}$ ,

expresses the additional manpower available from increases in population on the premise that the employment/population ratio,  $E/Pop$ , of the previous period remains unchanged. Given also the change in unemployment, any further changes in employment can thus only be attributable to changes in labor force participation.

Table B-1. Sources of manpower, World War I  
(Thousands of persons 14 years old and older)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	<u>Civilian</u>	<u>Employed</u> <u>Armed Forces</u>	<u>Total</u>	$\Delta$	<u>%</u>	<u>Number</u>	$\Delta$	<u>Population<sup>a</sup></u>	$\Delta$	<u>Employment</u> <u>Population</u> <u>(9)/(8)</u>	$\Delta \left( \frac{E}{P} \right)$ <u>(9)/(10)</u>	<u>Residual</u> <u>(4)+(7)-(11)</u>
1913	37,004	157	37,161		4.3	1,671		67,770		.5483		
1914	36,281	163	36,444	-717	7.9	3,120	1,449	69,047	1,277	.5278	700	32
1915	36,223	174	36,397	-47	8.5	3,377	257	70,025	978	.5198	516	-306
1916	38,014	181	38,195	1,798	5.1	2,043	-1,334	71,092	1,067	.5373	555	-91
1917	38,175	719	38,894	699	4.6	1,848	-195	71,982	890	.5403	478	26
1918	38,540	2,904	41,444	2,550	1.4	536	-1,312	72,756	774	.5696	418	820
1919	39,150	1,543	40,693	-751	1.4	546	10	73,119	363	.5565	207	-948
1920	39,208	380	39,588	-1,105	5.2	2,132	1,586	75,036	1,917	.5276	1,067	-586
1921	37,061	362	37,423	-2,165	11.7	4,918	2,786	75,744	708	.4941	374	247
1922	39,637	276	39,913	2,490	6.7	2,859	-2,059	76,790	1,046	.5198	517	-86

<sup>a</sup>Non-institutional population 14 years old and older.

Source: U.S. Department of Commerce, Bureau of the Census, Historical Statistics of the United States: Colonial Times to 1970, Part 1 (Washington, Superintendent of Documents, 1975), p. 126.

Table B-2. Sources of manpower, World War II  
(Thousands of persons 14 years old and older except as noted)

	(1)	(2)		(3)	(4)	(5)			(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	<u>Civilian</u>	<u>Employed</u>	<u>Armed Forces</u>	<u>Total</u>	$\Delta$	<u>%</u>	<u>Number</u>	$\Delta$	<u>Unemployed</u>	$\Delta$	<u>Population<sup>a</sup></u>	$\Delta$	<u>Employment</u> <u>Population</u> <u>(3)/(8)</u>	$\Delta P \left( \frac{E}{P} \right)_{t-1}$ <u>(9)/(10)</u>	<u>Residual</u> <u>(4)+(7)-(11)</u>	<u>Female/</u> <u>Labor Force</u>
1938	44,142	340		44,482		19.1	10,390				97,986		.4540			
1939	45,738	370		46,108	1,626	17.2	9,480	-910			99,264	1,279	.4645	581	135	
1940	47,520	540		48,060	1,952	14.6	8,120	-1,360			100,321	1,057	.4791	491	101	.25
1941	50,350	1,620		51,970	3,910	9.9	5,560	-2,560			101,464	1,142	.5122	547	803	.25
1942	53,750	3,970		57,720	5,750	4.7	2,660	-2,900			102,687	1,223	.5621	626	2,224	.27
1943	54,470	9,020		63,490	5,770	1.9	1,070	-1,590			103,628	941	.6127	529	3,651	.29
1944	53,960	11,410		65,370	1,880	1.2	670	-400			104,659	1,032	.6246	632	848	.29
1945	52,820	11,430		64,250	-1,120	1.9	1,040	370			105,477	817	.6091	510	-1,260	.29
1946	55,250	3,450		58,700	-5,550	3.9	2,270	1,230			106,591	1,114	.5507	679	-4,999	.28
1947 <sup>b</sup>	57,812	1,590		59,402	702	3.9	2,356	86			107,592	1,001	.5521	551	237	.27
1947 <sup>b</sup>	57,039	1,590		58,629		3.9	2,311				103,418		.5669			
1948 <sup>b</sup>	58,344	1,459		59,803	1,173	3.8	2,276	-35			104,527	1,109	.5721	629	509	.28

<sup>a</sup>Non-institutional population 14 years old and older except as noted.

<sup>b</sup>Data are for persons 16 years old and older

Source: U.S. Department of Commerce, Bureau of the Census, Historical Statistics of the United States: Colonial Times to 1970, Part 1 (Washington, Superintendent of Documents, 1975), p. 126.

Table B.3. Sources of manpower, Korean War  
(Thousands of persons 14 years old and older)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	<u>Employed</u>				<u>Unemployed</u>					<u>Employment</u>	$\Delta P \left( \frac{E}{P} \right)$	<u>Residual</u>	<u>Female/</u>
	<u>Civilian</u>	<u>Armed Forces</u>	<u>Total</u>	$\Delta$	<u>%</u>	<u>Number</u>	$\Delta$	<u>Population<sup>a</sup></u>	$\Delta$	<u>Population</u>	$\left( \frac{E}{P} \right)$	$(4)+(7)-(11)$	<u>Labor Force</u>
1949	57,649	1,617	59,266		5.9	3,637		105,611		.5611			.28
1950	58,920	1,650	60,570	1,304	5.3	3,288	-349	106,645	1,034	.5680	580	375	.29
1951	59,962	3,100	63,062	2,492	3.3	2,055	-1,233	107,721	1,076	.5854	611	648	.29
1952	60,254	3,592	63,846	784	3.0	1,883	-172	108,823	1,102	.5867	645	-33	.29
1953	61,181	3,545	64,726	880	2.9	1,834	-49	110,601	1,778	.5852	1,043	-212	.29
1954	60,110	3,350	63,460	-1,266	5.5	3,532	1,698	111,671	1,070	.5683	626	-194	.29
1955	62,171	3,049	65,220	1,760	4.4	2,852	-680	112,732	1,061	.5785	603	477	.30
1956	63,802	2,857	66,659	1,439	4.1	2,750	-102						

<sup>a</sup>Non-institutional population 16 years old and older.

<sup>s</sup>Source: U.S. Department of Commerce, Bureau of the Census, Historical Statistics of the United States: Colonial Times to 1970, Part 1 (Washington, Superintendent of Documents, 1975), p. 126.

Table B-4. Sources of manpower, Vietnam War  
(Thousands of persons 16 years old and older)

	(1)	(2)		(3)	(4)	(5)	(6)		(7)	(8)	(9)	(10)	(11)	(12)	(13)
		<u>Employed</u>					<u>Unemployed</u>					<u>Employment</u>	$\frac{\Delta E}{E}$	<u>Residual</u>	<u>Female/</u>
	<u>Civilian</u>	<u>Armed Forces</u>	<u>Total</u>	$\Delta$	<u>%</u>	<u>Number</u>	$\Delta$	<u>Population*</u>	$\Delta$	<u>Population</u>	$\Delta$	$\frac{E}{P}$	$\frac{E}{P}$	$(4)+(7)-(11)$	<u>Labor Force</u>
												(9)/(10)	(9)/(10) <sub>t-1</sub>		
1964	69,305	2,739	72,044		5.2	3,786		124,485				.5787			.34
1965	71,088	2,723	73,811	1,767	4.5	3,366	-420	126,513	2,028			.5834	1,174	173	.34
1966	72,895	3,123	76,018	2,207	3.8	2,875	-491	128,058	1,545			.5936	901	815	.35
1967	74,372	3,446	77,818	1,800	3.8	2,975	100	129,874	1,816			.5992	1,078	822	.35
1968	75,920	3,535	79,455	1,637	3.6	2,817	-158	132,028	2,154			.6018	1,291	188	.36
1969	77,902	3,506	81,408	1,953	3.5	2,832	15	134,335	2,307			.6060	1,388	580	.36
1970	78,678	3,188	81,866	458	4.9	4,093	1,261	137,085	2,750			.5972	1,666	53	.37
1971	79,367	2,715	82,082	216	5.9	5,016	923	140,216	3,131			.5854	1,870	-731	
1972	82,153	2,323	84,476	2,394	5.6	4,882	-134	144,126	3,910			.5861	2,289	-29	

\*Non-institutional population 16 years old and older.

Source: U.S. Department of Commerce, Bureau of the Census, Historical Statistics of the United States: Colonial Times to 1970, Part 1 (Washington, Superintendent of Documents, 1975), p. 126. Data for 1970 and later are from appropriate tables in Economic Report of the President, various issues.

ENDNOTES

1. See M. Friedman and A. Schwartz, A Monetary History of the United States (Princeton: Princeton University Press, 1963), pp. 218-220.
2. Robert Barro finds that national defense expenditures, themselves a causal influence acting on GNP, exert a greater impact on GNP in wartime than in other periods. Specifically, he finds a correlation between the magnitude of the impact and U.S. combat fatalities as a fraction of U.S. population. His findings indicate a positive relationship between civilian work effort and the combat fatality ratio. See Robert J. Barro, "Output Effects of Government Purchases," Journal of Political Economy, Dec. 1986, pp. 1086-1121. Barro's measure of the size of each war, taken as the ratio of government national defense expenditures to GNP, differs from ours (Table 1) since he uses a 1972 constant-price series for all wars in this century and the last. This procedure, in our opinion, applies inappropriate weights to military expenditures in all periods other than 1972 and surrounding years.
3. An exception is World War I, in which we take the increment in total federal government outlays as a proxy (which is, in fact, quite close) for the defense increment. We do this because estimates of defense spending consistent with our calendar-year series were not available for fiscal years, the only basis on which reliable tax revenue data in World War I are published.

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