THE IMPACTS OF NATIONAL SECURITY EXPENDITURE UPON THE STABILITY AND GROWTH OF THE AMERICAN ECONOMY

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This paper evaluates the influence of national security expenditure from the twin standpoints of stability and growth. By "stability" we refer primarily to the absence of major short-run movements in output and employment, and, to a less extent, prices. By "growth" we mean both the realized and potential long-run rates of increase in real gross national product.

Framework of the analysis

Gross national product serves as a focal point of analysis because it measures the realized aggregate of both government and private sector demands upon resources for production. So viewed, security spending is a major component of aggregate demand, accounting for about 10 percent of gross product currently and as much as 42 percent in 1944.[1] When the rate of security spending persists at a given absolute level, it induces a corresponding rate of output and employment from the defense sector, while through its income-generating effects it also contributes indirect support to investment and consumption as a whole. When security demand changes markedly, it exerts direct effects upon production and employment in the defense sector. Barring independent offsetting movements in investment and consumption, changes in security spending will also induce wider parallel movements in these private components of aggregate demand.

Largely under the stimulus of increased security spending, Government demand as a whole (including State and local) has risen to claim now almost 20 percent of gross national product at full employment. This fact has much significance both for stability and growth.

Government demand in general and security demand in particular are largely independent either of the level, or of changes in the level, of private consumption and investment. They are, so to speak, insulated from forces producing fluctuations in the private sector because most Government spending is determined by different considerations. Thus the level of security spending is governed by the climate of international politics and the state of the military art, and it changes

[1] All data for gross national product and its components, including national security expenditure, have been taken from U. S. Department of Commerce, National Income, 1954 edition (Washington: Government Printing Office, 1954); Survey of Current Business, various issues; Joint Economic Committee and Office of Statistical Standards, Bureau of the Budget, Historical and Descriptive Supplement to Economic Indicators (Washington: Government Printing Office, 1955 and 1957); and Council of Economic Advisers, Economic Indicators, various issues.

Annual equivalents of quarterly values for gross national product and its components are seasonally adjusted unless otherwise indicated.

with these forces. This is not to say that security demand is always stable; only that there is no obvious mechanism that compels it to move in disastrous parallel with swings in investment and consumption. As with most of total Government demand, there is a good chance that it will prove relatively stable in the midst of movements originating in the private sector, particular in the shorter term.

This relative stability of security spending tends to dampen swings in gross product and employment, in particular to check contractions emanating from the private sector by providing a continuing steady flow of income-generating expenditure. In more technical language, it reduces the variance of gross product because security spending is not closely correlated with investment and consumption and because it frequently shows more stability than these other major variables influencing gross product. Again, however, it must be cautioned that security demand itself can shift sharply for sustained periods. It may do so either at the "right" or the "wrong" time, depending upon the strength of forces operating upon expenditure in the private sector.

It will be noted from our review of 1939–57 that when security expenditure has significantly changed, gross product and its other major determinants have not consistently or promptly responded either in the same direction or degree. This is hardly surprising. On some occasions the reason may well be that firms have anticipated changes in security purchases well before they became recorded fact, given that much knowledge about shifts in procurement programs is necessarily disseminated in advance. Perhaps a more basic reason is that investment and consumption also reflect the independent strength or weakness of the private sector. They may move with security expenditure, as in late 1945 and mid-1953, or they may move against it, as in mid-1946 and early 1950. Accordingly, it is particularly difficult to isolate the actual impacts of security spending from a context in which the independent strength or weakness of investment and consumption is often so obscure. This is only another way of saying that the aggregate demand for gross national product is determined by a composite of interacting variables whose behavior is not yet fully known. It follows that it is necessary to guard against simple cause-and-effect reasoning. While at times swings in security spending have proved decisive, they are not the sole factor producing changes in investment and consumption.

It should also be pointed out that security spending is not the only component of total government demand. At times sinces 1939 it has dominated shifts in government demand, while at others its movements have been offset or complemented by swings in the other categories of government purchases. In 1944 security purchases accounted for 91.8 percent of all government demand, as against 43.7 percent in 1948 and 52.9 percent in 1956.

Because security spending is commingled with other government demands and with demands from the private sector, it is particularly difficult to determine how much product it has absorbed by displacing these other forms of demand. If there is serious unemployment and idle productive capacity, as prevailed between 1939 and mid-1942, security spending probably involves no significant diversion of resources from other productive uses. Indeed, it may well contribute

to higher levels of investment and consumption at such times. In fact we cannot even be finally certain that resources would have been fully employed at all times during the long boom from mid-1942 through mid-1957 if security spending had fallen well below the rates actually established. In some years it may have increased investment and consumption demand, rather than displaced it, and at the same time it may have displaced potential increases in the other types of government demand.

Furthermore, as we show later, security expenditures undoubtedly have contributed valuable side benefits to private enterprise, increasing private product by fostering efficiency, investment, and growth through promoting the development of new products and technologies. On this count as well it would be a serious mistake to consider security expenditure a complete economic loss, granted that it is costly and does divert productive resources from other potential uses.

With this approach in mind, we shall consider next the influence of security spending upon the economy since 1939. This section begins with a few facts regarding the trend of such spending to date. There follows a review of six intervening and mostly short-term movements in gross product, where their ranges, lengths, and turning points are compared with the behavior of security spending.

Impacts of National Security Expenditure Upon Stability, 1939–57

The trend of security expenditure

Between 1939 and 1956, security expenditure rose from $1.3 billion to $42.4 billion annually, or almost 32 to 1. If the intervening extreme years of the period are ignored, this implies a compound rate of growth of about 20 percent per year. Since the rate of security spending has varied sharply with shifts in international tensions, and to a lesser degree with developments in weapons technology, this 20 percent rate of increase cannot safely be projected into the future.

The trend in the cost of national security is indicated by table 1. Between 1939 and 1944, the share of national production claimed by security spending rose from a negligible 1.4 percent to almost 42 percent. By 1956 it had fallen to a modest 10.2 percent, about equal to the 1946 share and exceeding only the low levels of 1947–50. The drop in the defense share from 1944 to 1956, which was interrupted by the Korean war, reflects increased real national output and reduced levels of security spending. On a per capita basis, national security in 1939 cost each American $9.92; by 1944 it had soared to a peak of $640.19, dropping back to $252.12 in 1956.

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TABLE 1.—*The changing cost of national security expenditure, 1939–56*

[Current dollars]

Year [1]	National security expenditure				Per capita disposable personal income
	Total (billions) [2]	Percent of gross national product	Percent of all Government purchases [3]	Per capita cost of national security	
1939	$1.3	1.4	9.7	$9.92	$538
1944	88.6	41.9	91.8	640.19	1,060
1953	51.5	14.2	61.0	322.61	1,568
1956	42.4	10.2	52.8	252.12	1,708

[1] The data per national security expenditures begin with 1939. The years 1944 and 1953 were peaks for such expenditure in the intervening period.

[2] Includes outlays for military service, international security and foreign relations, atomic energy, merchant marine, defense production and economic stabilization, and civil defense. Figures represent Federal purchases for national security as included in gross national product accounts.

[3] Federal, State, and local combined.

Source: U. S. Department of Commerce.

Considering the period as a whole, the big increases in security spending came during 1941–44 and 1951–53, when the Nation was at war. Each surge involved considerable price and wage inflation, for which the increased money supply invoked mainly by deficit financing of war expenditure was a major cause. Some qualification must be made for 1950–51, however, when speculative borrowing for inventory expansion, financed by easy credit, touched off a price-wage inflation well before defense spending got fully underway.

Although the absolute cost of national security remains very high today and is rising, the burden of these costs is much less than it was at the wartime peaks of 1944 and 1953. During 1954 and 1955 it fell about 20 percent below 1953, but it turned upward again in 1956, rising to an equivalent annual rate of $46.3 billion in the second quarter of 1957. For a population of 170.4 million, this represents a per capita cost of $271.71. If we make the heroic assumption that all security expenditure could be completely abolished with no change in gross national product and with no offsetting increases in the other components of government demand, we could say roughly that per capita disposable personal income (after taxes) in 1957 could then be increased from $1,757 per annum to $2,028, or by 15.4 percent. In a crude way this measure indicates the average amount of income each citizen must forgo as the price of national security in 1957. However, calculations of this type assume no decline of national product if security expenditure were wholly abolished.

How does the cost of national security compare with other countries? According to the comparative national income accounts prepared by the OEEC for 1954, the shares of gross national product assigned to defense expenditure were 8.5 percent for the United Kingdom, 7.3 percent for France, and 11.4 percent for the United States. Although the data are not strictly comparable, defense expenditure in the Soviet Union in 1948 (the latest available year) were 8.2 percent of gross national product.[2] Although the relative share is considerably larger for the United States, it must also be remembered that

[2] Data for United Kingdom and France from Organization for European Economic Cooperation, OEEC Statistical Bulletins, General Statistics, No. 2 (Paris, April 1956); for the Soviet Union from Abram Bergson and Hans Heymann, Jr., Soviet National Income and Product, 1940–48 (New York: Columbia University Press, 1954), table 6, p. 25.

per capita income levels here are double or more what they are in these other nations.

Wartime expansion, 1939–45

There can hardly be any doubt that the enormous increase of security expenditure that began in the last quarter of 1940 finally ended the long depression of the thirties, propelling the economy into boom times by mid-1942 and compelling continued high-pressure expansion until almost the end of the war. Once these expenditures started to take hold, they induced large increases in private investment, drawing up consumption demand through the accompanying rise of personal incomes. Here is the clearest case on record to show security spending in particular, and government spending in general, in the decisive role of a stimulator to economic expansion. For later movements in the postwar years, however, the evidence is considerably more mixed regarding the causal importance of these expenditures.

The wartime experience is important in two other respects. Relatively effective price and wage controls, coupled to a rapid increase in money supply primarily occasioned by deficit financing, compelled a large accumulation of idle cash held by business firms and the public. Restrictions upon production of investment and consumers' goods, which also promoted the growth of cash balances, built up an impressive backlog of postponed demands. Undoubtedly, the wartime legacies of increased cash holdings and deferred demand together provided powerful support for total demand in the reconversion period that followed the end of the war.

Reconversion, 1945–47

Beginning with the third quarter of 1945, security spending began a steep 2-year drop from a peak annual rate of $90.8 billion in early 1945 to $11.7 billion in later 1947, a decline of 87.1 percent. Total government purchases also fell sharply until mid-1947, although their contraction was checked somewhat by offsetting gains in nonsecurity spending. By the final quarter of 1947 total government purchases were running at a $30 billion annual rate, two-thirds below their peak in 1945.

Despite official predictions of heavy postwar unemployment with the inevitable collapse of security spending, unemployment rose only slightly, reaching a maximum for the reconversion years of 2.7 million persons in February 1946, or 4.9 percent of the civilian labor force. Thereafter unemployment dropped sharply.

The twin inheritance of large cash balances and unsatisfied investment and consumer demands, aided further by continuing easy credit, carried the economy through reconversion with a minimum of difficulty from the side of demand, although the transition was accompanied by considerable inflation. Private gross investment expanded over fourfold between 1945 and 1947, while even inventories gave no real trouble after a brief and modest liquidation in the closing months of 1945. Despite a small drop in disposable personal income in the last half of 1945, consumption expenditure rose rapidly in 1946 and 1947. This increase was strongly augmented by a rapid drop in the abnormally high personal savings rate of wartime. With this unusually strong support from business and consumer demand, gross national product fell only slightly in 1946, rising sharply again in

1947. This recovery, which began in the spring of 1946, has particular interest because it set in against a continuing rapid decline in security spending.

The first postwar recession, 1949–50

Measured by volume and rate of unemployment, this recession began in January 1949, and ended after the first quarter of 1950. However, industrial production had stopped rising in the last half of 1948, fell through the first three quarters of 1949, then started upward again in the first quarter of 1950. Gross domestic investment reached its peak in the third quarter of 1948, declined through the next 5 quarters, and then turned up strongly in the first quarter of 1950, surpassing its previous peak with the second quarter of 1950. Helped along by consumption and government demand, gross national product continued to increase in the last half of 1948, thereafter dropping moderately through all quarters of 1949. By the first quarter of 1950 it had overtaken its previous peak attained in the final quarter of 1948.

Security spending ended its lengthy postwar contraction when it reached its low in the third quarter of 1947 with an annual rate of $11.7 billion. Thereafter it rose throughout the next 7 quarters, reaching a peak annual rate of $20.5 billion in the second quarter of 1949, well after the recession had started. During the last 2 quarters of 1949 and the first 1 in 1950, security spending fell off 17.1 percent from its 1949 peak, turning up again thereafter. Total government demand reached its postwar low at $27.7 billion in the second quarter of 1947, after which it rose strongly to a $44.4 billion peak annual rate in the second quarter of 1949. Thereafter it held steady in the rest of 1949, dropping slightly during the first half of 1950.

This recession was brief and also shallow. It lasted for 15 months and the decline in gross product from the preceding peak to its lower turning point was only 3.2 percent. By contrast, the start of the downturn in security expenditure lagged 2 quarters behind the peak for gross product in 1948, while it dropped 17.1 percent from its second quarter high in 1949 to its low point in the first quarter of 1950. More important, both security spending and total government demand continued to increase strongly during the first half of 1949, while the downturn in gross product was already in progress. After leveling off in the last half, both categories of government purchases dropped sharply during the first half of 1950, although the lower turning point in gross product had been reached 6 months earlier and was followed by a sharp upturn in the first 2 quarters of 1950. Thus it is difficult to establish any direct causal connection between movements either in security spending or total government demand and the upper and lower turning points of the recession itself.

This conclusion is reinforced by scatter diagram tests. Plotting of absolute quarterly values (for annual rates) for gross product against total government demand in 1948–50 shows no close relationship, either on a current basis or with government demand lagged one quarter. No improvement in fit was obtained by plotting inventory accumulation against net changes in security spending, either with current values or with a one-quarter lag for security spending.

Two further points should be made about this recession. First, the continuing high absolute levels of security spending and total government demand, despite certain intervening movements, may well

have contributed some support to aggregate demand, providing a floor for the recession. However, the onset and pace of the following recovery suggests that demands in the private sector had considerable independent force. Second, consumption showed remarkable strength throughout the recession. Helped by contracyclical stabilizers such as the personal-income tax and unemployment compensation, disposable personal income declined only slightly. Even more, consumers drastically cut personal savings, from a peak annaual rate of $12.6 billion in the third quarter of 1948 to a level of only $3.2 billion at the end of 1949. Thus consumption in calendar 1949 actually rose $3 billion over the preceding year, despite the recession in employment and production.

We conclude that security spending probably had more influence in checking the depth of recession than in determining either its turning points or its length.

The Korean War, 1950–53

Significantly, economic expansion had gotten well underway approximately 6 months before the outbreak of the Korean War without additional stimulus from either increased security spending or total Government purchases. During the last half of 1950, gross product continued to rise rapidly, helped along by a sharp increase in prices. An easy money policy was in force and credit advances to businessmen and consumers expanded rapidly, drawing up prices and wages in their train. Large jumps occurred in private investment, centering in inventories and producers' durable equipment. In the final quarter, net expansion of inventories soared to a $14.7 billion seasonally adjusted annual rate, stimulated by rising prices and expected increases in procurement contracts. Rapid inventory accumulation continued over the first three quarters of 1951. Price inflation reached its peak in March.

For the first three quarters of 1950, national security expenditure showed surprisingly little change, while total Government purchases actually fell slightly. With the fourth quarter, security spending jumped $4.3 billion, or 24.2 percent. Thus began an almost unbroken rise through the second quarter of 1953, carrying this spending from its 1950 low of $17 billion to a postwar peak of $53.3 billion, an increase of more than three-fold. The buildup of defense spending proceeded most rapidly between the fourth quarter of 1950 and that for 1951, after which the rate of increase fell off markedly. Total Government demand moved in similar fashion.

Undoubtedly this lengthy series of increasing injections of security expenditure worked strongly to push the economy upwards at boom levels for nearly 3 years. It did so directly by increasingly powerful impacts upon aggregate demand and indirectly by promoting expansion of the money supply through deficit financing. Yet it must be remembered that the lower turning point of the first postwar recession occurred in the fourth quarter of 1949, with recovery continuing strongly for 9 months before significant increases in security spending had set in and 6 months before war had actually broken out. Evidently independent forces were already effectively at work in the private sector of the economy, although rising military budgets soon accelerated the rate of advance.

Two other facts should be noted about the Korean war boom. First, direct controls were neither as extensive nor as effective as in World War II. Thus there was much less carryover of suppressed inflation and postponed demand when hostilities ended. Second, military claims on gross national product never approached the deep 42 percent cut achieved in 1944. At their second quarter peak of 1953, they absorbed slightly less than 15 percent of total output. This, too, meant much less diversion of private civilian demand, hence much less postponed claims for the period following.

The second postwar recession, 1953–54

The Korean armistice was executed July 27, 1953, whereupon expenditures on national security began a lengthy contraction lasting over 18 months. From their peak annual rate of $53.3 billion in the second quarter of 1953, they fell steadily to $40.1 billion in the last quarter of 1954, a drop of almost 25 percent. Total Government demand declined over the same period, though at a much slower rate, dropping from an annual rate of $85.5 billion in the second quarter of 1953 to $74.2 billion at the end of 1954, or by 13.2 percent. The $13.2 billion decline in security spending during this period was partially offset by a substantial increase in purchases by State and local governments.

In timing, the onset of this recession in the third quarter of 1953 corresponds closely with the downturns in security spending and total Government demand, while, as scatter tests indicate, there was also a clear association between the downward course of both types of Government purchases and that for the economy as a whole, lasting through the last half of 1953. Gross national product dropped $9.9 billion between the second and fourth quarters, or by 2.7 percent. Thereafter it remained level for the first three quarters of 1954. Investment in business inventories contracted sharply in the third quarter of 1953, turning strongly negative in the fourth. Inventory liquidation continued until the fourth quarter of 1954, although substantial renewed accumulation did not occur until the beginning of 1955. The relationship between the behavior of inventories and of security spending was direct and rather close. Some connection is also evident between gross domestic business investment and security spending during the last half of 1953, but not thereafter.

The connection between security spending and overall economic activity is much less clear for 1954. The former continued to contract at a rate of about $2.3 billion each quarter, while gross product held level for the first three quarters, turning up very strongly in the last and even more sharply at the beginning of 1955. Clearly, the recession was over with the end of 1954.

Thus this recession shows a marked asymmetry in behavior. Its downward and initial phase of decline corresponds well with the drop in security spending and in total Government demand, and it is reasonable to attribute an important causal role to the contraction of security spending here. By contrast, the subsequent upturn and sustained recovery exhibit no direct connection with security spending or Government demand. This suggests that, as in 1949–50, recovery was invoked by the strength of forces initiating in the private sector of the economy. The evidence for this is quite conclusive. Gross private domestic investment experienced sharp increases in the second

and fourth quarters of 1954 and again in the first quarter of 1955, largely under the influence of the construction boom which set in with the second quarter of 1954 and the cessation of inventory liquidation at the end of the year. Consumption also offered powerful support to aggregate demand. Throughout the recession, it fell absolutely only once—in the last quarter of 1953, when the drop was negligible. Consumption rose throughout 1954 on an average of $2.7 billion per quarter (annual rates). The favorable behavior of consumption reflected three influences: The support afforded to disposable personal income by the contracyclical stabilizers; an increased propensity to consume rather than to save income; and easy credit for consumption loans.

What, then, can be said about the impacts of security expenditure upon the recession as a whole? First, the timing and rate of its decline were the main reason for the initial 6 months' drop in total economic activity. This suggests that sudden sharp changes in government purchases can invoke broader effects in the same direction. Second, while the drop in security spending was severe, it reached bottom at $40 billion, propping up total government demand at a minimum of about $75 billion, or 21 percent of gross product in 1954. We may view the fluctuations in both classes of government spending as falling within a band whose outer limits in these times have consistently represented a large component of total demand. The relative stability of government demand and its relatively high proportion of aggregate demand means that the government sector has put a firm floor under the whole economy. On this interpretation government demand very probably checked the depth of the contraction, in this way shortening the length of the recession while also keeping it relatively shallow. Put differently, the underlying strength of government demand probably contributed to the resiliency and vitality of forces operating upon aggregate demand from the private sector of the economy. However, sudden sharp changes within the Government sector can invoke corresponding movements in the whole economy, notwithstanding government's overall contribution to stability.

The investment boom, 1955–57

The upsurge in production in the closing quarter of 1954 continued even more strongly throughout 1955. During this time security spending ran steadily at about a $41 billion annual rate. Total government demand jumped $2 billion in the first quarter, staying at $76 billion for the next 2 quarters, then rising moderately in the last. Despite the strong tide of expansion, which lifted gross national product from $367.1 billion (annual rate) in the last quarter of 1954 to $401.9 billion in the last quarter of 1955 (up 9.5 percent), relatively little stimulus came from the Government sector other than the continuing broad basis of support afforded by the stability of security spending and total government purchases.

What actually occurred was an impressive boom in private investment, aided by a strong collateral rise in consumption. Between the closing quarters of 1954 and 1955, gross private domestic investment soared from an annual rate of $51.5 billion to one of $65.1 billion, or by 26.4 percent. This growth rested upon large increases in producers' plant and equipment, business inventories, and new construction.

During 1956, the expansion continued. Gross product rose an additional $24.1 billion between the final quarters of 1955 and 1956, or at the somewhat slower rate of 6 percent. Moreover, part of this increase reflected rising prices, which started upward after mid-1955. Gross private domestic investment stopped rising for the first three quarters of 1956, jumping upward again in the last. Producers' plant and equipment continued to record large gains, while inventory accumulation moved irregularly and new construction stayed level. Security spending held constant for the first half, but started upward in the last, reflecting, in good part, rising prices for hardware and materials. Total government demand rose slowly but steadily throughout the year. During the first half of 1957, both components of government demand moved upward strongly once more. By contrast gross investment dropped, reflecting declines in construction and inventory accumulation, although plant and equipment held steady.

The turn upward and subsequent marked increase in production and employment that began with the final quarter of 1954 appear to have little direct connection with the behavior of security spending and total government demand until the end of 1955. However, it must be noted again that the stability of the Government sector at this time probably contributed indirectly to the buoyancy of demands originating in the private sector. From mid-1956 to mid-1957, the resumed rise in security purchases doubtless helped to prolong the boom at a time when gross private investment had stopped increasing. Total government purchases had the same broad effect, in somewhat larger degree.

Impacts of National Security Expenditure Upon Economic Growth, 1939–57

The impacts of security spending upon long-term expansion in the economy pose two main problems. First, what is the connection between such spending and the realized rate of growth since 1939? This question requires evaluation of the issue whether security spending has primarily supported and supplemented or has mainly displaced private demand. Second, have security expenditures for research and development had any significant influence upon technology, investment, and economic efficiency within the sphere of private enterprise? This problem deals mainly with the contribution of government-sponsored research and development programs to the reservoir of economically usable inventions, hence to the productivity and potential growth of the economy.

Security expenditure and realized growth, 1939–57

Suppose there had been no increase in security spending after 1939: would private investment have recovered sufficiently to have carried expansion forward either at the rate actually realized or perhaps at an even faster rate? Or suppose that security spending had remained at the $11 billion annual rate to which it had declined by late 1947 instead of quadrupling thereafter: would subsequent growth have achieved or exceeded the rate actually realized?

These questions go to the issue of whether security spending merely displaced an equivalent or perhaps even greater amount of private

spending, particularly investment, or instead mainly supplemented such spending and thereby stimulated higher levels of production and demand than otherwise would have occurred. Admittedly, no final and conclusive answer can be devised, for it is impossible to determine how investment, consumption, and other categories of government demand would have behaved if security spending had not reached the levels it actually did. Nonetheless, some speculation is in order.

If we appeal to the past, we can say that the history of the American economy does contain periods of rapid and sustained expansion without benefit of substantial expenditure on national security. However, we would then have to recognize also that depressions have followed these past expansions, reflecting the instability of private investment. Even more, we have to confront the deep and protracted depression of the thirties, which, prior to the advent of the war-induced boom, seemed to have no visible end.

The development of a point of view regarding the role of security spending in overall growth after 1939 depends directly upon how one regards the strength of the inducement to private investment, since the hypothetical reduction of the actual levels of security spending implies a large potential increase in absolute savings. Either private investment would have absorbed fully these additional savings or the economy would have faced either continued depression or eventual deflationary collapse. Followers of what Fellner calls the Keynes-Hansen pessimism and the Schumpeterian pessimism point to alleged weaknesses in the inducement to invest, which suggests that security spending actually supported a higher rate of growth.[3] On the Keynes-Hansen reasoning, capital tends to accumulate more rapidly than population and natural resources, which lowers the rate of return on new investment and weakens the inducement to invest. By contrast, the Schumpeter argument points to the rise of the modern ideology of security and of greater income equality, suggesting that it gradually takes the profits out of innovation while also making innovations themselves more difficult to introduce.

Neither of these views is unassailable, either in reasoning or in supporting evidence. However, this is not the place to consider them in detail. It need only be said that the ultimate question they imply is still moot and probably will remain so.

Even if one does not adopt either of these pessimistic views, there is a persuasive argument for the contention that during 1939–57 security spending promoted a higher realized rate of growth than otherwise would have occurred. First, it can hardly be denied that the lengthy series of increasing injections of military demand beginning in late 1940 ended the protracted depression of investment and production prevailing throughout the thirties. While the banking and international monetary system undoubtedly compelled extreme liquidation with its attendant general mood of deep pessimism in that decade, the rapid rise of security spending was the decisive force invoking revival and prosperity within the context of given monetary institutions. Accordingly, it follows that security spending hastened and intensified recovery, making a higher growth rate possible at least in the forties.

[3] William Fellner, Full Use or Underutilization: Appraisal of Long-Run Factors Other Than Defense, American Economic Review, Papers and Proceedings, XLIV: 2 (May 1954), pp. 424, 428–431. For an evaluation of the stagnation hypothesis, see also George H. Hildebrand, Defense Expenditures and the Problem of Deflation, ibid., pp. 419–420.

Second, the normal experience of the American economy in the more remote past has included the boom-depression sequence. Yet no depression intervened during the long boom after 1942, while the three downturns that did occur (1945–46, 1949–50, and 1953–54) proved remarkably mild both in depth and duration. It is reasonable to conclude that the continuing high absolute levels of government demand, of which security spending has been at all times an important and often dominant part, has at certain times offset weaknesses in the private sector and at others has contributed to the buoyancy of private demands. If so, then the realized rate of growth since 1942 has been higher than what would have been attained with much lower levels of security spending and of total government demand.

Finally, the research and development programs supported by security spending had led to a large group of fundamental inventions, as we show in the next section. This new body of technology has permitted economies in existing types of production, while at the same time opening up a whole range of new products and even new industries. This has meant increased private investment and consumption, leading in turn to more rapid expansion in the private sphere itself. Here again, therefore, the rate of overall growth has been promoted by security spending.

The contribution of security expenditure to research and technology

Writing in 1952, S. Colum Gilfillan, a lifelong student of technological change, declared:

> The most striking change that has come over invention, a change that is universally overlooked * * * is that invention has latterly come to be chiefly pursued by the Federal Government and sometimes other noncommercial organizations, so that patenting is now a rare motivation, having force perhaps for 15 percent of all invention. * * * Invention has followed the path of science, except that fundamental civil inventions, the most valuable of all, are still nobody's baby.[4]

Testifying in 1955 before the Subcommittee on Economic Stabilization of the Joint Committee on the Economic Report, Dr. A. V. Astin, Director of the National Bureau of Standards, stated that "the great majority" of the current developments in scientific research and its practical applications could be credited to war and defense expenditures.[5] Looking at the rise of war-borne technologies, Dr. Vannevar Bush has observed that—

> What is new is an accelerated pace in the application of new techniques in industry. And this is part of a very important general movement, namely the planned application of scientific results in an economic manner for the increase of man's physical well-being.[6]

Clearly, the needs of modern warfare have brought about a close union of government, research, and business enterprise—a union centered upon the planned application of science to the creation of

[4] S. Colum Gilfillan, The Prediction of Technological Change, Review of Economics and Statistics, XXXIV : 4 (November 1952), p. 374.
[5] Automation and Technological Change, hearings before the Subcommittee on Economic Stabilization of the Joint Committee on the Economic Report, 84th Cong., 1st sess., p. 584.
[6] Ibid., pp. 613–615.

practical new technologies, promoted in large part by government funds, and laden with major implications for the American economy.[7]

Atomic energy is the best known of the new technologies, and, of course, is now the classic illustration of this new alliance. Here popular interest has centered upon atomic power, although the allied production of radioactive substances is finding important new uses in food preservation, agronomy, medicine, and industrial chemistry.[8] Two other war-inspired technologies, automation and electronics, had their inception in problems of fire control, missile guidance, and production of precision parts.[9] In all these instances the knowledge provided by theoretical science has been translated into practical technologies largely by the support of military funds. Similar impetus has been given the rapidly developing technology of synthetic chemistry, with its new plastics, fibers, ceramic materials, and metal alloys.

Dollar measurement of the contribution of security spending to research and development is particularly treacherous, mainly because it is impossible to draw a precise distinction between expenditure on research and development as such and on testing, procurement, and modification of military end products. Moreover, it is necessary arbitrarily to exclude or include common overhead costs borne by the Department of Defense, and these are substantial. To illustrate, the National Science Foundation, using a restrictive definition, estimated that the Department would spend $1.6 billion on research and development in fiscal 1956–57, but found that with the inclusion of certain allied costs the figure would rise to almost $5.2 billion.[10]

Proceeding from the conservative estimates developed by the Foundation, it will be found that research and development expenditure by the Department of Defense was only $26.4 million in fiscal 1940. With the inclusion of outlays by the Manhattan Engineer District (Atomic Energy Commission from 1947) beginning in fiscal 1943, total research and development spending in the national security category soared to $1,372 million by 1945, or 86 percent of all Federal expenditure for research and development purposes. A sharp drop occurred through fiscal 1947, followed by rapid expansion again during the Korean war. For fiscal 1957 total outlay was projected at $2,145 million. In recent years, major increases have centered in missile development and atomic research. Together, the Department of Defense and the AEC now account for about 85 percent of all Federal research and development expenditure.[11] Research outlays by private industry are now running at about $3 billion. If the indirect expenditures of the Department of Defense are included, total govern-

[7] For a thoughtful analysis of the long-run possibilities in these developments, see The Scientific-Industrial Revolution, a study published in 1957 by the investment house of Model, Rowland & Stone, 120 Broadway, New York, N. Y.

[8] Dr. W. F. Libby, member of the Atomic Energy Commission, recently reported to a UNESCO conference in Paris that radioisotopes were currently saving American industry about $406 million a year and might reach $1 billion a year by 1963. W. F. Libby, The Economic Aspects of Radioisotope Utilization, release dated September 17, 1957.

[9] According to Dr. Astin, ENIAC, the first all-electric digital computer, was connected with the formulation of bombing and firing tables in World War II. Automation drew powerful impetus from the Army's Rockford ordnance plant, which was conceived in 1941 for production of complicated metal parts in a fully automated process. Automation hearings, op. cit., pp. 569, 587.

[10] National Science Foundation, Federal Funds for Science, V: The Federal Research and Development Budget, fiscal years 1955, 1956, and 1957 (Washington: Government Printing Office, 1956), p. 19.

[11] Ibid., pp. 46–47.

ment and private outlays in 1957 may well reach $9 billion, with government accounting for about two-thirds.[12]

There is no precise way to measure what the dollar impacts of national security spending on research and development have been and will be for the economy, granted that they have already become important and promise even more for the future. That they are fostering continued growth is undeniable. From the side of investment in the private sector, four main effects can be discerned. First, the emergence of the new technologies is invoking investment in new industries. Electronics is the foremost example here. Second, these technologies are enabling existing industries to develop a new range of equipment, instruments, and materials, replacing, improving or extending old types of production. Computing machines, control devices, and synthetic chemicals well illustrate this case, where private investment is induced to create new or modify old plant and equipment. Third, the tools and materials forthcoming from the new technologies are making possible economies of production in other industries, calling forth new investment to finance cost-saving innovations and increased output. Automatic equipment and controls for the factory and on the railroads, and computers and recordkeeping equipment in the office, all exhibit this effect. Finally, looking some distance ahead we can expect considerable indirect investment induced, for example, by changes in the location of industry made possible by the new technologies.

To date, the impacts upon investment have probably been relatively small, save, perhaps, for the current investment boom. A similar verdict is indicated for consumption, where expansion of existing demands becomes possible with lower costs and improved quality, and an array of new demands emerges with the appearance of new products.

It would be a mistake to credit the whole of these advances to military support for research and development, or to conclude that security spending is the only means to continue their promotion. The primary role of theoretical science and the collateral contributions of private research must also be recognized. What can be said, however, is that security spending has made, and is continuing to make, a large contribution to a technological development of great pending importance to the private-enterprise sector and to the economy as a whole. Military expenditure is not all dead loss, by any means. While it can be argued that some of these advances might well have emerged from private sources without benefit of any government support, it seems equally clear that the risks and large costs of initial experimentation and development in some of these fields did make government aid essential to their successful exploitation. Atomic energy and radioactive products are a strong case in point. Furthermore, it seems equally obvious that the urgencies of modern warfare, whether hot or cold, when backed by ample funds, have proved decisive in invoking the close union between systematic research and its practical application, setting off the revolutionary chain of technical advances recorded since the early forties. In consequence, the potential rate of growth in the economy may well be even higher in the next two decades.

[12] Executive Offices of the President, Economic Report of the President, transmitted to the Congress, January 27, 1957 (Washington: Government Printing Office, 1957), pp. 59, 60.

Security Expenditure, Stability, and Growth in the Future

Security expenditure as a tool for fiscal policy

Assuming, with the Employment Act of 1946, that fiscal policy is to serve as an instrument for maintaining short-run stability and long-run growth of employment and production, how does security spending fit these purposes?

It must be conceded at the outset that security spending is a discretionary type of demand of relatively large size, dependent upon appropriations from Congress and recommendations and decisions by the executive branch. It does not significantly change automatically when national income increases or decreases. By contrast, contracyclical stablizers, such as the personal income tax and unemployment compensation, do automatically tend to increase or decrease disposable personal income in a way that dampens swings in national income. Instead, security spending today is determined by decisions taken by government authorities a year or more in the past. At times, such spending may hold steady when the economy is either expanding or contracting, while at other times it may change, either contracyclically or perversely, with business swings. When security spending moves contracyclically, it helps to dampen business movements; when it moves perversely, it intensifies them. Thus it can be either a stabilizer or destabilizer for the economic system. Moreover, the stabilizing or unstabilizing role of security spending is now largely determined by forces independent of the level of business activity, which narrows the scope for discretionary action.

Two forces, basically, control decisions about security spending. The principal one is the state of international tensions, while the development of weapons technology comes second. Neither factor has a close or direct connection with the level of employment and production. About the only influence business activity has upon security spending is to impose a rather indefinite ceiling with full employment and inflation in peacetime. Even here, the independent rationale for a given policy of national security imposes certain rigidities in security purchases, rigidities that recently have forced up security outlays, feeding the inflation.

This fact has important implications for fiscal policy as a tool for promoting economic stability and growth. First, shifts in security spending are likely to be erratic relative to business fluctuations. They may well prove unstabilizing at times, feeding booms or contractions rather than helping to offset them. Second, if security expenditure were to be used to reduce swings in business activity, it would pose a serious prediction problem because of its discretionary nature. The future course of the business swing must be foreseen in time, decisions to spend and appropriations must then be shaped accordingly and in time, and the desired impacts to follow must arrive in time to help offset the developing course of economic change. Here, successful results are threatened by the possibility of erroneous prediction, which would make the change in security spending unstabilizing, by the lengthy lag between the initial decision and its later effects, and by the inherent rigidity of most security requirements. Actually, most of these handicaps confront any discretionary policy of public spending, such as public works, but the inherent rigidity of defense

expenditure presents an added handicap not present in a public-works program.

These considerations provide a strong case for allowing security spending to be governed mainly by the requirements of America's world strategy, rather than atempting to use it also as a device for deliberately promoting stability and growth. For the latter purposes, security spending must compete with other, more flexible, discretionary tools, such as public-works spending, changes in taxes, and monetary policy. The scale of public works can be more readily adjusted to business conditions, while the works themselves are more likely to provide genuine public benefits then would military expenditures not independently justified by strategic requirements. For slumps, tax reductions clearly add to public benefits, because they permit the public itself to buy more goods and services of its own choosing. Accordingly, an efficiently administered security program would be guided by its primary and exclusive purpose; national defense in an uncertain and rapidly changing world.

Impacts of a major cut in security expenditure

If the requirements of national security were to drop greatly with an outbreak of major disarmament and international peace, what problems would be posed for economic stability and growth?

For the short run, a serious deflationary situation would confront the entire economy, with particularly severe impacts upon communities heavily committed to the production of armament. If, as seems reasonable, we assume a multiplier of 2.5, then even a $10 billion cut in security spending would imply a decline of $25 billion in gross national product, barring offsetting increases in private investment, consumption, or other components of Government demand. Since national product must increase about $15 billion a year at constant prices to maintain full employment with a growing labor force, a defense cut of this scale would require extensive Government actions to support aggregate demand. Unlike 1945, there would be no large-scale carryover of postponed investment and consumption demand to fill the gap occasioned by the drop in security spending. Undoubtedly, the problem would require prompt tax reductions to avoid excessive budget surpluses and to stimulate private spending, along with the stimulus of easy money and, probably, programs for increased Government spending.

Even if the initial transition to a much lower level of security spending were successfully made, there is little doubt that the problems of stabilization and continued growth would become more difficult thereafter. The reason is that the economy would then be more vulnerable to fluctuations in private investment than at any time since the twenties. Since private investment has proved very volatile historically, the risk of recurrence of major business cycles necessarily increases with the loss of a considerable part of the supporting strength now afforded by Government demand. If, to some extent, the savings from reduced defense outlays could partly be used to provide additional Government works and services now necessarily deferred with the continuing high costs of national security, then the stability problem would become less acute for this, perhaps, fanciful future world. Since the savings on defense would not likely be absorbed

fully in this way, fiscal-monetary management would have to be particularly sagacious as well as fortunate if it is to maintain stability.

Clearly, too, the outlook for continued growth in such circumstances would depend more heavily upon the long-run strength of the inducement to private investment. From the Keynes-Hansen or Schumpeter points of view, the prospects are not encouraging, barring a substantial permanent rise in Government spending. Even short of these types of pessimism, there is always the risk that the flow of labor-saving capital improvements of recent years may not continue forever. Against this possibility is the high promise of the new technologies, which justifies some optimism about the prospects for a sustained high level of private investment and growth for some years to come. Any final view must necessarily be speculative, although it is certain that the tasks of fiscal and monetary management with a greatly reduced level of security spending would be harder, rather than easier, than they are now.

Conclusions

This lengthy review of experience since 1939 suggests several inferences about the impacts of national-security expenditure upon the economy, in the past and in the future. These are summarized under the headings of stability and growth.

Stability

1. When major contractions in security spending can be foreseen, as at the end of wars, they are likely to induce a downward turning point in total production, as occurred in the third quarters of 1945 and 1953. The impact is transmitted mainly through inventories and, to a lesser extent, through new construction.

2. The timing of turning points into recovery bears no close connection with upturns in security spending, although anticipations of such upturns can occur, as in mid-1950. Slow but steady expansion occurred for seven quarters beginning in 1939 before a marked advance of security spending was recorded. Recovery set in strongly in the second quarter of 1946 while security spending was still sharply contracting. Recovery started again in the first quarter of 1950, while security spending failed to advance until the fourth.

3. A sharp and sustained contraction in security spending, when foreseen, will induce a collateral fall in general activity, with the length of this collateral drop dependent upon the independent strength or weakness of demands in the private sector. In 1946 these demands were unusually strong, and the general downturn lasted only 9 months, beginning with the third quarter of 1945. In 1953–54 the parallel movements lasted for only 6 months; after 1953 gross product leveled off for three quarters and then rose strongly, while security spending continued to contract throughout 1954.

4. A sharp and sustained increase in security spending can induce general expansion, although the latter can also occur independently. The stimulating effect of increased security spending is shown for 1940–44; from the last quarter of 1950 through the second quarter of 1953; and, to a lesser extent, during the last half of 1956 and first one of 1957. By contrast, general recovery proceeded for 9 months in 1950 without direct support from increasing security spending;

the same was true for 18 months beginning with the fourth quarter of 1954.

5. The rise of total government demand, strongly helped by increased security spending, to a probably enduring level of 20 percent of gross national product has contributed considerably to the stability of aggregate demand. The reason is that government demand is sheltered from contractions emanating from the private sector. This does much to explain the brevity and shallowness of the three postwar contractions and the absence of a major depression since 1941. Government demand also contributed to the buoyancy of private demands in the postwar years.

6. By promoting full employment and exhibiting rigidity in its claims upon total physical product, security spending has contributed to inflationary movements of wages and prices at certain times. This is true of 1941–45, 1950–53, and to some extent of the current inflation of 1955–57. However, all of the inflationary movements since 1939, including that during 1945–48, have also involved a rapid increase of money supply and some associated increase in money velocity.

7. Security spending is determined primarily by international tensions and the state of the military art. Thus it is both inflexible relative to general economic movements and at the same time susceptible to sudden changes that might well prove unstabilizing for the economy. As a discretionary tool for promoting stability, it has much less to commend it than public-works programs, tax changes, and monetary policy. If, by reason of major disarmament, security spending could be greatly reduced in a short period, it could provoke a severe deflation problem. Barring an offsetting increase in other types of government demand over the longer run, a major cut in security spending would make the tasks of fiscal and montary management considerably more difficult than they are even now, granted that the savings would be welcome from other points of view.

Growth

1. Judgments about the effects of security spending upon the long-run rate of growth in the economy since 1939 depend, basically, upon a choice of speculative views regarding the strength or weakness of the inducement to private investment. The issue of progress versus stagnation is unresolved and probably will remain so. While no definitive answer to this issue can be supplied, there is a persuasive argument that security spending did raise the realized rate of growth since 1939. First, the rapid increase of military demand from late 1940 very probably hastened the end of the great depression. Second, the sustaining force of security spending and government demand probably did much to keep the postwar contractions brief and shallow, while it is noteworthy that no major depression has appeared since 1941. Finally, military spending for research and development undoubtedly fostered the growth of new technologies and products, aiding private investment and consumption and promising much more for the future.

2. There has been a close connection between mililtary expenditures for research and development and the emergence of automation, electronics, synthetics, atomic energy, and radioactive substances. These discoveries have created new industries and have brought about

new products and methods in old ones, provoking an unprecedented current interest in systematic research. On this count alone, security spending has not been a complete economic loss. However, there are alternatives to security spending as a means for the Government to promote research, and the contributions of theoretical science and of private industry to these developments should not be overlooked. Nonetheless, the defense program and the urgencies of modern warfare have played a decisive role in promoting the revolution of production technology since 1940. The effect may well be an increase in the potential rate of growth of the economy in the future, and at the same time an increase in the rate actually achieved.

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