FEDERAL EXPENDITURES AND ECONOMIC GROWTH

CONTRIBUTION OF FEDERAL EXPENDITURES TO ECONOMIC GROWTH AND STABILITY [1]

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INTRODUCTION

It is, I believe, a sign of progress that in the past few years we have
become increasingly concerned with economic stability and particu-
larly with growth, rather than merely with full employment. (It is
interesting to note that the Employment Act of 1946 does not mention
the word "growth." The nearest it comes to it is in the expression
"maximum production.") As goals of economic policy, full employ-
ment, and growth are not incompatible, but neither are they identical.
An economy like ours growing at a sufficiently rapid rate (with the
usual qualifications regarding health, leisure, and so forth) will enjoy
full employment without worrying about it, but full employment may
or may not be used efficiently and will not necessarily result in growth.
Growth, with its emphasis on efficiency, good management, techno-
logical progress, and, may I add, hard work and thrift, fits much better
with our general attitudes and is the healthier objective of the two.
That growth as such is desirable seems to me obvious. With the
present international conflict it is also a condition of survival.

I shall mean by growth the rate of increase of the total output of
goods and services, measured by real national income or product (gross
or net) or some similar series. To achieve a growing national income
two basic conditions must be satisfied: (1) There must be a growing
demand for goods and services which the economy can produce; and
(2) there must also be a growth of productive capacity. These two
conditions are closely interrelated. The first without the second will
initially result in full employment, but eventually—in inflation. The
second without the first—in unemployment and idle capacity which
will undoubtedly inhibit the growth of capacity itself. While eco-
nomic stability is essentially concerned with the first condition, or
more correctly with the adjustment of demand to a given level of
capacity, and growth—with the second, it would be difficult, in an
economy like ours, to achieve either without the other.

Before proceeding further let me make clear that this paper is solely
concerned with Federal expenditures, and even with only certain kinds
of expenditures, not because I imagine that the change in the volume,

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timing, and composition of Federal expenditures is the only, or even the most important, key to the problem in hand, but simply because it is the subject of the present hearings. While the committee has been considering one aspect of Federal policies in its bearing on growth and stability at a time, we may hope that it will synthesize its findings someday.

ECONOMIC STABILITY

The first aspect of our problem, the adjustment of demand to productive capacity at a given point of time—that is, economic stabilization—is a field where it is easy to advise and difficult to act. Economic discussions of the last two decades have repeatedly emphasized that Federal expenditures should be curtailed during an inflation and expanded during a depression, thus preventing the development of either. This is good advice, so far as it goes. A mild inflation is not catastrophic and is unlikely to injure growth, but it is hard to keep an inflation mild. There is also another reason for curtailing Federal expenditures in prosperous and inflationary times. When productive capacity is fully utilized, any increase in Federal (or any other) expenditures must be matched by a more or less equal reduction elsewhere, achieved by taxation or inflation, and is, therefore, costly. During a depression, however, when labor and machinery are not fully utilized, an increase in Federal expenditures need not and should not be matched by a corresponding reduction elsewhere because labor, machinery, and materials do not have to be taken off other jobs. More than that. The additional stream of Federal (or other) expenditures will, in turn, give rise to secondary and subsequent streams and thus increase national income by an amount greater than the original expenditure (the so-called multiplier effect).

While our economy is seldom, if ever, in one of the extreme positions described here, and while there is quite a difference between the simplicity of a textbook demonstration and reality, the essence of the argument holds. The trouble is not with the argument itself, but with its practical implementation. If the early arrival of a depression could be foreseen, some Federal expenditures, such as those on highways, could be postponed. But the slack in non-Federal expenditures (private, State, and local) might not take place for years to come. How long are we to wait? Of course, if a depression does come, Federal expenditures should be increased. This is also not easy to do on short notice if the expenditures are to be socially useful, yet less difficult, it seems to me, than their postponement.

I find it most fortunate that the stabilization problem will be considered by a special panel, whose members, I trust, will be more ingenious in devising practical suggestions than I am. (The decision to consider Federal expenditures in isolation from other measures, such as taxation, is very restrictive in this connection.) Let me make the optimistic assumption that this problem has been solved in the sense that demand for goods and services will grow at an appropriate rate and proceed to the problem of growth of productive capacity.

THE GROWTH OF PRODUCTIVE CAPACITY

The growth of productive capacity is a most complex phenomenon, and any attempt to classify its ingredients in a simple (or perhaps

any other) fashion is unsatisfactory. No particular significance should be attached to the following list. It is merely used as a point of departure.

An increase in productive capacity depends on the following factors:

1. An increase in the labor force (more correctly, man-hours available).

2. An improvement in the health, education, and training of the labor force.

3. Development of knowledge, including technical knowledge, and its application.

4. Improved management and administration.

5. Accumulation of capital, and improvement in its quality.

6. More efficient utilization and discovery of new resources.

7. Changes in other economic factors, such as composition of output, industrial structure, competition, etc.

8. Changes in more general factors, such as attitudes toward work, efforts, invention, thrift, risk, and many others which are very important, perhaps more important than the strictly economic ones, but which I am hardly competent to discuss. It is not easy to change them by Federal expenditures, in any case.

There is no simple formula that could tell us which of these components of growth should be the particular concern of our Federal or of any national government. No two countries, nor any one country at different periods of time, would give the same answer. In this particular case, it seems best to me to follow our traditions and to modify them when reasons for a change are strong.

Let us start with capital formation. Whether we could profitably invest a larger fraction of our national income (or product) is a controversial subject among economists. Much, of course, depends on the concomitant growth of the labor force and on technological progress. Without these two, and particularly the latter, the output contributed by an extra dollar of capital will decline with time. I doubt if this has been the case in this country, and I believe that we could invest a higher fraction of our income, provided anti-inflationary measures were undertaken at the same time. From this it does not follow, however, that the Federal Government should participate in capital formation on a large scale, except in such fields as highways, where benefits are diffused; atomic energy, where returns are still uncertain; defense installations, which serve a special purpose; and other special fields. The bulk of our capital formation can be left in private hands, stimulated, if necessary, by tax, credit, and other policies. This has been our tradition, and I do not see good reasons for changing it at the present time.

Similarly, there is no need for Federal (or any governmental) interference with the growth of our labor force; that is, essentially with the birthrate—we are doing quite well here on our own—nor with the length of the workweek. I do not see that the Federal Government could or should try to change our managerial or administrative methods, except, perhaps, in its own backyard. The Federal Government does concern itself with questions of competition and monopoly, but this is hardly a field for Federal expenditures, as distinguished from other Federal actions, except, possibly, in the allocation of Govern-

ment contracts. With these exclusions, the fields where Federal expenditures can and should contribute to growth are:

1. Education and training.
2. Development of knowledge; i. e., research.
3. Public health.
4. Natural resources.

All these fields are important and deserve Federal attention. but I shall limit my remarks to the first 2, and particularly to education, both because of my ignorance of the last 2 and because our education and research suffer from serious deficiencies.

FEDERAL EXPENDITURES AND EDUCATION

The committee is undoubtedly familiar with the shortage of qualified teachers, the overcrowding, and the frequently unsatisfactory level of instruction in our public schools. I would like to discuss here another aspect of our educational system: the waste of ability and talent caused by the failure of a surprisingly large number of bright high-school graduates to attend college.

In an advanced industrial society like ours, positions of importance and responsibility in practically every field increasingly require a college education and, frequently, postgraduate training as well. When an able person who can benefit from such an education does not receive it, he hurts both himself and society. It is not always easy to identify good college material, but a high score on an intelligence test combined with a high performance in high school gives a strong promise of success. Yet, according to table I, taken from a study of the Commission on Human Resources and Advanced Training published in 1954, 38 percent of high-school graduates in the upper 20 percent of their graduating class and with an intelligence score of 145 or over (which is very high, indeed) do not even enter college.[2] For that matter, even a score of 125 is quite high—the average for college graduates is 121 [3]—yet, as table I shows, over 40 percent of this group, who are also in the upper 20 percent of the graduating class, do not go to college. In the words of Dael Wolfle, the Director of the Commission:

> Every year, over 150,000 pupils who could become average or better members of most of the specialized fields graduate from high school but do not enter college. Some of these able students will attain positions of high responsibility; they will contribute as much to society and derive as much personal satisfaction from their work as they would had they attended college. But many will not. Without college education, they have little or no opportunity to become teachers, scientists, doctors, lawyers, or social scientists. They may become businessmen, musicians, artists, journalists, or nurses, and some of them can become engineers while others can work in a variety of subprofessional fields. But, as a group, they can-

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[2] Dael Wolfle, America's Resources of Specialized Talent; the Report of the Commission on Human Resources and Advanced Training (New York, Harper & Bros., 1954), p. 174. This Commission was appointed by the Conference Board of Associated Research Councils under a grant from the Rockefeller Foundation.
[3] Ibid., p. 146.

not contribute to society as much without additional education as they could with it.[4]

TABLE I.—*Percentage of high school graduates who do not enter college, classified by intelligence and high school grades* [1]

AGCT score	Percent of all high-school graduates	High-school grades (percentile rank in graduating class)					
		1-20	21-40	41-60	61-80	81-100	Total
145 and above	2.1		59	52	44	38	40
135 to 144	5.4	70	63	57	50	43	46
125 to 134	12.0	74	67	60	53	46	52
115 to 124	19.2	76	70	63	56	49	58
105 to 114	22.8	79	72	65	58	52	65
95 to 104	19.2	81	74	68	61	54	71
85 to 94	12.0	84	77	70	64	57	78
75 to 84	5.4	88	81	74	67	60	84
Below 75	2.1	92	84	77	70	66	91
Total		83	74	65	56	47	65

[1] Ibid., p. 174.

The Commission concluded that—

The United States wastes much of its talent. College graduating classes could be twice as large as they currently are, and with no loss of quality. The potential supply gets drained off, in large or small amounts, all the way through the educational system. Practically all potentially good college students enter, and most of them finish high school, but after high school the loss is large. Fewer than half of the upper 25 percent of all high-school graduates ever earn college degrees; only 6 out of 10 of the top 5 percent do. Society fails to secure the full benefit of many of its brightest youth because they do not secure the education that would enable them to work at the levels for which they are potentially qualified.[5]

It is proper to inquire at this point whether the influx of all these bright young men and women into colleges would create an oversupply of college-trained personnel. Their admission to college need not necessarily give rise to a sharp increase in the fraction of our population going to college, unless this is regarded as desirable in itself. Every college teacher is aware that a distressingly large fraction of our present undergraduates are poor college material. Hence, a good deal of substitution of these poor students by better ones, rather than a net addition to them, could take place. Secondly, a rapidly growing economy needs talent and ability; in turn, a better utilization of these rare qualities promotes growth.

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[4] Ibid., p. 242.
[5] Ibid., p. 269.
Similar evidence was obtained by another study which tried to find the relation between the intelligence level and occupation. It was found that on the whole people of high intelligence are concentrated in the professional, managerial, and clerical occupations; persons of low intelligence do not usually rise to the top, but a large percentage of highly intelligent persons (with scores of 140–149) are found among skilled manual, semiskilled and even unskilled groups. See C. A. Anderson, J. C. Brown, and M. J. Bowman, Intelligence and Occupational Mobility, The Journal of Political Economy, vol. LX (June 1952), pp. 218–239. Their conclusion was that "Elimination of the less intelligent men from the topmost level appears more certain than the rise of brilliant men from low positions to high ones", p. 221.

These 40 or so percent of potentially excellent students do not go to college for two sets of reasons: one is financial, the other—more general. A study made by Ralph F. Berdie in Minnesota reveals that only one-half of the upper 10 percent of high-school graduates who did not intend to go to college said that they would go if funds were available.[6] The other half would not go because of lack of motivation, interest, or other reasons.

A system of Federal scholarships for college and post-graduate training would help those who do not go to college because of lack of funds, but no miracles should be expected from it. A large number, perhaps as many as two-thirds of potential recipients would go to college in any case, though some of them would be enabled to enter better schools and some parents would be relieved from a heavy burden. What worries me about a system of Federal scholarships, however, is their probable restriction to some specific fields, such as sciences and engineering where a shortage of trained personnel seems to exist. We certainly need able and well trained scientists and engineers, but we also need able doctors, lawyers, businessmen, teachers, and even economists. We should increase our supply of scientists and engineers by drawing into college those bright men and women who stay out of them, rather than by denuding other professions and occupations of their best personnel. The choice of study should be left to the individual, aided by advice from his relatives and teachers and not hampered by the promise of a scholarship in one field and its absence in another.

Federal scholarships could help solve but one aspect of the problem. They would not improve education in our schools, the need for which is great. To quote again from the Commission's report:

> Of these possible courses of action, probably the most important in the long run is to improve education at the elementary and secondary levels. In the intermediate run, early identification of talent plus efforts to improve motivation on the part of both the pupil and his parents appears to be the most promising direction of effort. And in the short run, intensive indoctrination plus financial assistance will have the earliest payoff.[7]

Such an improvement in our educational system will hardly be accomplished without Federal help. But before I press this point further, let us take a look at a few facts.

Taken as a fraction of total population, enrollment in all our schools and universities, taken together, has not changed much since 1930. In elementary and secondary schools this fraction was 23.2 percent in 1930 and 21.7 percent in 1956 (see appendix, tables AIII–AV); in universities the corresponding figures were 0.9 percent and 1.8 percent, and total enrollment on all levels was 24.1 percent in 1930 and 23.4 percent in 1956. The proportion of young people enrolled has been increasing, but the fraction of young people (ages 5–24) in the total population fell from 38.3 percent in 1930 to 31.7 percent in 1956. With the higher birth rates since World War II, the fraction of total population enrolled is beginning to rise.

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[6] Ralph F. Berdie, After High School, What? (Minneapolis, Minn., University of Minnesota Press, 1953). The reference is taken from Wolfle, op. cit., p. 165.
[7] Wolfle, op. cit., p. 244.

The fraction of our gross national product spent on education from all sources (Federal, State, local, and private) has risen from 3.49 percent in 1930 to 3.87 percent in 1954, after a slight dip in 1940 and 1950 to 3.16 and 3.07 percent, respectively. (See appendix, table AVI.) Expenditures on elementary and secondary education as fractions of gross national product have behaved in roughly the same manner, while expenditures on higher education have risen faster (from 0.69 percent in 1930 to 0.95 percent in 1954).

Thus neither the fraction of our population enrolled in school nor that of gross national product devoted to education has shown a marked change. Rough as these comparisons are, they leave one somewhat puzzled regarding the causes of our increasingly acute educational problem. Part of the latter can be explained by a rise in what is regarded as good education, but by far more important is the peculiar character of education: It is an industry deriving little benefit from technological progress, so that real productivity per person (teacher) engaged has not increased much, if at all, over the centuries. True, our teachers know more (I trust) than their ancestors, but the essential method of instruction has not changed considerably since the days of Socrates: A teacher working directly with a class of students without much help from mechanical devices was then and still is the typical method. An attempt to raise the teacher's productivity by increasing the size of class simply reduces the quality of instruction.

It is most ironical that while education contributes so much to economic growth—perhaps more than any other activity—it suffers from the success of its own efforts. In industries subject to particularly rapid technological progress productivity per worker rises and his income can be and is raised without difficulty. This brings pressure on less progressive industries. To keep their workers they also have to raise wages or reduce the quality of their personnel. Their output becomes more expensive and/or of lower quality. This is exactly what has been happening to education.

This is not a temporary situation. The more prosperous we become and the faster we grow the more expensive good education will become, unless some major technological revolution, such as mass use of television as an instrument of instruction, transforms the education industry. It is too early to tell whether such a change will be possible or desirable. As things stand, it is very unlikely that this country will have an educational system such as it deserves and badly needs and can certainly afford without Federal participation on a large scale.

Traditionally, education, particularly on the elementary and secondary level, has been regarded as a local affair. Although part of this tradition has already been broken by State educational grants to local governments, which are quite common, further departures from this or any other tradition require justification.

In ages past when a person was likely to be born, live, and die in the same community (if such times ever existed in this country) which was economically more or less self-sufficient, it was natural to think of education, particularly on the elementary and secondary level, in local terms. Whatever might have been the case in the past, the geographical mobility of our present population is remarkable: between 1953 and 1956 over 10 million persons per year changed their county of residence. (See appendix, table A–VII.) Subject to annual variation, the gen-

eral trend has been from the Northeast and South toward the West. Must the South—our poorest region—provide education for the more prosperous West?

That the economic interdependence of all regions of this country is very great requires no elaboration. A waste of ability and talent in any one region affects all the rest. The education and training of our highly mobile labor force is therefore a national problem.

One may still wonder whether a proper educational system could not be financed by local governments, with State support, particularly in periods of high prosperity and full employment. Whether a large increase of educational expenditures from these sources can be undertaken is a moot question. Financial ability is hard to judge. On the whole, our poorer States, which usually also have poorer schools, are making at least as great or even a greater educational effort than the richer ones. Thus in 1954 Mississippi spent 3.06 percent of her personal income on education; Arkansas and South Carolina 2.78 and 3.37 percent, respectively, as compared with 2.08 percent for New York, 1.80 and 2.01 percent for Connecticut and New Jersey. (The highest ratios were in the West: in New Mexico, 3.56; Wyoming, 3.44; and Idaho, 3.39 percent.) (See appendix, table A–IX.) That the State and local governments find it much more difficult to raise funds than the Federal Government does is well known. The fear of repelling customers in case of a sales tax, and wealthy individuals in case of an income tax, is an important factor. Perhaps the unwillingness to tax is as strong as inability. Be all this as it may, the fact remains that State and local governments have not met the problem. Nor is a radical improvement to be expected in the near future.

The emphasis placed in this paper on the waste of talent and ability caused by the failure of potentially bright college students to enroll should not give the impression that this is the only educational problem we face. Other problems will, I presume, be discussed by the special panel. Perhaps I may add here that it is highly desirable to raise the general level of our college instruction. Our education is becoming ever longer because so little is accomplished in 4 years of undergraduate training; a master's degree and even a doctorate are increasingly required. For that matter, postdoctoral training is becoming more common. But such a reform of college education cannot be undertaken without a major improvement in our elementary and, particularly, high-school instruction.

FEDERAL EXPENDITURES AND RESEARCH

Expenditures on research and development from all sources (governmental, commercial, and nonprofit) have increased markedly over recent years, rising from some $0.8 billion in 1941 to $4.6 billion in 1953, or as a fraction of gross national product from 0.6 to 1.3 percent. Between 1941 and 1957 Federal expenditures on research and development rose from $0.2 billion to $2.6 billion, though as a fraction of gross national product the latter figure corresponds to only some 0.6 percent. (See appendix, table A–X.) And of course the absolute figures should be corrected for changes in the price level.

That economic growth is based on technological progress and research in general is clear beyond doubt. It is tempting, therefore,

to argue that Federal expenditures on research should increase. I take this position, but with the following qualifications:

1. The social usefulness of research expenditures is limited by the supply of well-trained research workers, which in turn depends on our educational system. If the Federal Government increases its demand for them without helping to increase the supply, research workers will be simply shifted from non-Federal to Federal projects. In the short run this will accomplish certain specific objectives, particularly connected with national defense. Its long-run effects may be less desirable.

2. By far the largest part of Federal research expenditures—84 percent in 1956—is related to national security. (See appendix, table A–XI.) While some of the results of these expenditures will find peacetime uses, I cannot help wondering whether it is healthy in the long run that only 16 percent of them are directed to nondefense purposes.

3. Even more important is the estimate that over 90 percent of Federal research obligations are for applied research. (See appendix, table A–XII.) Granted that the distinction between basic and applied research is vague and that the estimate is not precise, it still remains true that the Federal Government is little concerned with basic research. It may even be impeding it by encouraging scientists to leave basic research where material gains, if any, are small and move to applied projects which can be easily financed. And yet basic research is the foundation on which all other research is built; its benefits are widely diffused and accrue to the whole society rather than to its direct sponsors and originators. It is difficult to find a field more worthy of Federal support.

APPENDIX

This statement was made by Alfred Marshall, the great English economist, near the turn of the century. While there is a vast difference between the present American conditions and those in the England of his time, his statement is still of interest.

> The laws which govern the birth of genius are inscrutable. It is probable that the percentage of children of the working classes who are endowed with natural abilities of the highest order is not so great as that of the children of people who have attained or have inherited a higher position in society. But since the manual labor classes are 4 or 5 times as numerous as all other classes put together, it is not unlikely that more than half of the best natural genius that is born into the country belongs to them; and of this a great part is fruitless from want of opportunity. There is no extravagance more prejudicial to the growth of national wealth than that wasteful negligence which allows genius that happens to be born of lowly parentage to expend itself in lowly work. No change would conduce so much to a rapid increase of material wealth as an improvement in our schools, and especially those of the middle grades, provided it be combined with an extensive system of scholarships, which will enable the clever son of a workingman to rise gradually from school to school till he

has the best theoretical and practical education which the age can give.

To the abilities of children of the wroking classes may be ascribed the greater part of the success of the free towns in the Middle Ages and of Scotland in recent times. Even within England itself there is a lesson of the same kind to be learned; progress is most rapid in those parts of the country in which the greatest proportion of the leaders of industry are the sons of workingmen. For instance, the beginning of the manufacturing era found social distinctions more closely marked and more firmly established in the south than in the north of England. In the south something of a spirit of caste has held back the workingmen and the sons of workingmen from rising to posts of command; and the old established families have been wanting in that elasticity and freshness of mind which no social advantages can supply, and which comes only from natural gifts. This spirit of caste, and this deficiency of new blood among the leaders of industry, have mutually sustained one another; and there are not a few towns in the south of England whose decadence within living memory can be traced in a great measure to this cause.[8]

TABLE A–I.—*Estimated distribution of college graduates classified by occupation of father*

Father's occupation	Distribution of 1,000 children	Percentage of each group graduating from college	Number and percentage among college graduates	
			Number	Percent
Professional and semiprofessional	65	43	28	22
Managerial	128	19	24	19
Sales, clerical, and service	158	15	24	19
Farm	162	6	10	8
Skilled, unskilled, factory, etc	487	8	39	31
Total	1,000		125	100

Source: The distribution of children was taken from Bureau of the Census report p. 20, No. 32, Dec. 4, 1950, Children and Youth: 1950, which gives the distribution of children under the age of 18 by occupation of the employed head of the household. The other figures are quite tentative Commission estimates. Dael Wolfle, America's Resources of Specialized Talent, p. 162.

TABLE A–II.—*Estimated educational attainment of boys and girls with AGCT scores of 130 or higher* [1]

	Both sexes	
	Annual number	Percent
In age group of 2,200,000	152,000	100.0
Finish high school	148,000	97.0
Enter college	80,000	53.0
Graduate from college	70,000	46.0
Receive doctor of philosophy degrees	2,600	1.7

[1] All numbers are rounded, and are based upon an age group of 2,200,000 approximately the current size; percentage figures are of all (boys and girls, or both) in age group and with AGCT scores of 130 or higher.

Source: Commission estimates.
Dael Wolfle, America's Resources of Specialized Talent, p. 183.

[8] Alfred Marshall, Principles of Economics (London, Macmillan & Co., 1890), 1st edition, pp. 270–271.

TABLE A–III.—*Population, labor force, and school enrollment*

Year (1)	Total continental population, including Armed Forces (2)	Labor force (including military) (3)	Total enrollment in schools (all levels) (4)	Enrollment in elementary and secondary education (5)	Enrollment in higher education (6)
1890	62,947,714	21,814,412	¹ 13,980,756	¹ 13,824,000	156,756
1900	76,085,794	27,323,055	17,198,841	16,961,249	237,592
1910	92,027,874	35,749,068	19,999,148	19,643,933	355,215
1920	105,827,858	41,016,851	24,061,778	23,463,898	597,880
1930	122,864,499	50,080,000	29,652,377	28,551,640	1,100,737
1940	131,788,208	56,030,000	29,751,203	28,257,000	1,494,203
1950	151,683,000	64,599,000	31,319,271	28,660,250	2,659,021
1952	157,028,000	66,426,000	32,856,348	30,554,464	2,301,884
1954	162,409,000	67,818,000	35,911,050	33,396,338	2,514,712
1955	165,248,000	69,538,000	¹ 37,811,547	¹ 35,090,618	2,720,929
1956	167,181,000	69,885,000	¹ 39,181,765	¹ 36,234,780	2,946,985

Year (7)	As percent of population			As percent of labor force			As percent of total enrollment	
	Total enrollment as percent of population (4÷2) (8)	Elementary and secondary enrollment as percent of population (5÷2) (9)	Enrollment in higher education as percent of population (6÷2) (10)	Total enrollment as percent of labor force (4÷3) (11)	Elementary and secondary as percent of labor force (5÷3) (12)	Enrollment in higher education as percent of labor force (6÷3) (13)	Elementary and secondary enrollment as percent of total enrollment (5÷4) (14)	Enrollment in higher education as percent of total enrollmet (6÷4) (15)
1890	22.21	21.96	0.25	64.09	63.37	0.72	98.88	1.11
1900	22.60	22.29	.31	62.95	62.08	.87	98.62	1.38
1910	21.73	21.35	.39	55.94	54.95	.99	98.22	1.78
1920	22.74	22.17	.56	58.66	57.21	1.46	97.52	2.48
1930	24.13	23.24	.90	59.21	57.01	2.20	96.29	3.71
1940	22.58	21.44	1.13	53.10	50.43	2.67	94.98	5.02
1950	20.65	18.89	1.75	48.48	44.37	4.12	91.51	8.49
1952	20.92	19.46	1.47	49.46	46.00	3.47	92.99	7.01
1954	22.11	20.56	1.55	52.95	49.24	3.71	93.00	7.00
1955	22.88	21.24	1.65	54.38	50.46	3.91	92.80	7.20
1956	23.44	21.67	1.76	56.09	51.87	4.22	92.48	7.52

¹ Denotes estimation on basis of subsequent (or preceding) proportions of private enrollment to total enrollment in elementary and secondary schools. Consequently, the total enrollment in elementary and secondary schools (and in all levels) is, in part, an estimation.

SOURCES FOR TABLE A–III

Col. 2: 1890 figure from Stat. Abst. 1956, p. 5, table No. 1; figures for 1900–1940 computed from Hist. Stat., p. 25, series B, 2, and 3; figures for 1950–56 from Stat. Abst., p. 5, table No. 2 (1956 figure is for December).

Col. 3: Figures for 1890–1930 are based on "gainful worker" concept. From 1940 on the labor force concept is used. Difference is mainly that former excluded new workers not yet employed for 1st time, whereas latter includes them. Figures for 1890–1920 from Hist. Stat., p. 64, series D, 32, and cover gainfully occupied as of age 16 and over. Figures for 1930–55 from Stat. Abst. 1956, p. 197, table No. 235 and include those gainfully occupied or in labor force (whichever is appropriate) of age 14 and over. Figure for 1956 (December) comes from Monthly Labor Review, April 1957, p. 506, table A–1.

Cols. 4, 5, and 6: Figure for 1890 enrollment in elementary and secondary schools is estimated on basis of 1890 enrollment of 12,723,000 in public elementary and secondary schools (Biennial Survey of Education, 1950–52, ch. I, p. 18, table No. 11) and distribution between public and private enrollment in elementary and secondary schools in 1900 (ibid., ch. I, p. 7, table No. 4). Figure for 1890 enrollment in higher education from Biennial Survey, 1950–52, ch. I, p. 41, table No. 34. Figures for 1900–1952 from Biennial Survey, 1950–54, ch. I, p. 7, table No. 4. Figures for 1954 from Biennial Survey, 1952–54, ch. I, p. 7, table No. 4. Figures for 1955 and 1956 enrollment in elementary and secondary schools are estimated on basis of 1955 and 1956 enrollment in public elementary and secondary schools (30,532,166 in 1955 and 31,527,695 in 1956) (Office of Education, supplement to circular No. 490, p. 1, table No. 1) and on basis of 1954 enrollment in private elementary and secondary schools (Biennial Survey, 1952–54, p. 7, table No. 4) as a proportion of total enrollment. Figures for 1955 and 1956 enrollment in higher education from Office of Education, Circular Series, No. 460 (p. 7) and No. 496 (p. 2).

TABLE A–IV.—*Total population and school-age population*

Year	Total continental United States population (including Armed Forces)	Population ages 5 to 24	Population ages 5 to 17	Population ages 18 to 24	Population of ages 5 to 24 as percent of total population (3÷2)	Population of ages 5 to 17 as percent of total population (4÷2)	Population of ages 17 to 24 as percent of total population (5÷2)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1900	76, 085, 794	31, 845, 462	21, 538, 024	10, 307, 438	41. 85	28. 31	13. 55
1910	92, 027, 874	36, 988, 359	24, 239, 948	12, 748, 411	40. 19	26. 34	13. 85
1920	105, 827, 858	40, 746, 789	27, 728, 788	13, 018, 001	38. 50	26. 20	12. 30
1930	122, 864, 499	47, 034, 979	31, 571, 322	15, 463, 657	38. 28	25. 70	12. 59
1940	131, 788, 208	46, 351, 915	29, 745, 246	16, 606, 669	35. 17	22. 57	12. 60
1950	151, 683, 000	46, 519, 445	30, 735, 025	15, 784, 420	30. 67	20. 26	10. 41
1955	165, 248, 000	52, 440, 000	37, 334, 000	15, 106, 000	31. 73	22. 59	9. 14

Col. 2: Figures for 1900–1950 from table A–III, col. 2.

Col. 3: Figures for 1900–1950 computed from 1950 Census, Special Report P–B1, p. 93, table No. 39. Figure for 1955 computed from Current Population Reports, Series P–25, No. 121, p. 1.

Col 4: Figure for 1900 computed from 1900 Census of Population, vol. II, pt. II, p. xxxvi, table XIV. Figure for 1910–50 computed from 1950 Census, Special Report P–B1, p. 95, table No. 43. Figure for 1955 computed from Current Population Reports, Series P–25, No. 121, p. 1.

Col. 5: Figure for 1900 computed from 1900 Census of Population vol. II, pt. II, p. xxxvi, table XVI. Figures for 1910–50 computed from 1950 Census, Special Report P–B1, p. 95, table No. 43. Figure for 1955 from Current Population Reports, Series P–25, No. 121, p. 1.

Cols. 6, 7, and 8: Computed from cols. 3 and 2, cols, 4 and 2, and cols. 5 and 2, respectively.

TABLE A–V.—*School-age population and educational enrollment*

Year	Population of ages 5 to 24	Total enrollment in education	Population of ages 5 to 17	Total enrollment in elementary and secondary schools	Population of ages 18 to 24	Total enrollment in higher education
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1900	31, 845, 462	17, 198, 841	21, 538, 024	16, 961, 249	10, 307, 438	237, 592
1910	36, 988, 359	19, 999, 148	24, 239, 948	19, 643, 933	12, 748, 411	355, 215
1920	40, 746, 789	24, 061, 778	27, 728, 788	23, 463, 898	13, 018, 001	597, 880
1930	47, 034, 979	29, 652, 377	31, 571, 322	28, 551, 640	15, 463, 657	1, 100, 737
1940	46, 351, 915	29, 751, 203	29, 745, 246	28, 257, 000	16, 606, 669	1, 494, 203
1950	46, 519, 445	31, 319, 271	30, 735, 025	28, 660, 250	15, 784, 420	2, 659, 021
1955	52, 440, 000	[1] 37, 811, 547	37, 334, 000	[1] 35, 090, 618	15, 106, 000	2, 720, 929

Year	Total enrollment in education as percent of population of ages 5 to 24 (3÷2)	Total enrollment in elementary and secondary schools as percent of population of ages 5 to 17 (5÷4)	Total enrollment in higher education as percent of population of ages 18 to 24 (7÷6)
(1)	(8)	(9)	(10)
1900	54. 01	78. 75	2. 31
1910	54. 07	81. 04	2. 79
1920	59. 05	84. 62	4. 59
1930	63. 04	90. 44	7. 12
1940	64. 19	95. 00	9. 00
1950	67. 33	93. 25	16. 85
1955	72. 10	93. 99	18. 01

[1] Denotes estimation. (See table A–III.)

Cols. 2, 4, and 6: See table A–IV, cols. 2, 3, and 4.

Cols. 3, 5, and 7: See table A–III, cols. 4, 5, and 6.

NOTE.—The enrollment data include total enrollment in the particular level of education under consideration and consequently are not limited solely to enrollments from the age group with which it is compared. Enrollments by age group do not exist for some years; hence, it seems better to retain a consistent measure for enrollment figures.

TABLE A–VI.—*Gross national product and educational expenditure*

[All figures in thousands of dollars]

Year	Gross national product (Department of Commerce)	Gross national product (Painter)	expenditure on education (including capital outlay) (5+6+7+8)	Expenditure on public elementary and secondary schools (including capital outlay)	Expenditure on private elementary and secondary schools (including capital outlay)	Expenditure on public higher education (including capital outlay)	Expenditure on private higher education (including capital outlay)	Total expenditure on elementary and secondary schools (including capital outlay) (5+6)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1900			[1] 287, 751	214, 965	[1] 27, 000	[1] 24, 463	[1] 21, 323	[1] 241, 965
1910			[1] 571, 688	426, 250	53, 542	[1] 49, 100	[1] 42, 796	[1] 479, 792
1920		86, 600, 000	[1] 1, 382, 658	1, 036, 151	[1] 130, 141	115, 597	100, 769	[1] 1, 166, 292
1930	91, 105, 000	88, 200, 000	3, 182, 316	2, 316, 790	233, 277	288, 909	343, 340	2, 550, 067
1940	100, 618, 000	97, 100, 000	3, 176, 804	2, 344, 049	227, 000	332, 592	273, 163	2, 571, 049
1950	285, 067, 000		8, 743, 885	5, 837, 643	782, 967	1, 174, 125	949, 150	6, 620, 610
1952	346, 095, 000		10, 696, 434	7, 344, 237	1, 027, 670	1, 313, 084	1, 011, 443	8, 371, 907
1954	360, 500, 000		13, 949, 876	9, 172, 129	1, 364, 079	1, 911, 750	1, 501, 918	10, 536, 208
1955	391, 700, 000							
1956	414, 700, 000							

Year	Total expenditure on higher education (including capital outlay) (7+8)	Total expenditure on public education (including capital outlay) (5+7)	Total expenditure on private education (including capital outlay) (6+8)	Total State and local expenditure on education (including capital outlay)	Total Federal expenditure on education (including capital outlay and grant to States)
	(10)	(11)	(12)	(13)	(14)
1900	45, 786	[1] 239, 428	[1] 48, 323	255, 000	
1910	91, 896	[1] 475, 350	[1] 96, 338	577, 000	
1920	216, 366	1, 151, 748	230, 910	1, 705, 000	
1930	632, 249	2, 605, 699	576, 617	2, 311, 000	
1940	605, 755	2, 676, 641	500, 163	2, 638, 000	174, 930
1950	2, 123, 275	7, 011, 768	1, 732, 117	7, 177, 000	3, 618, 900
1952	2, 324, 527	8, 657, 321	2, 039, 113	8, 318, 000	
1954	3, 413, 668	11, 083, 879	2, 865, 997	10, 557, 000	
1955				11, 907, 000	1, 561, 574

See footnote at end of tables.

TABLE A-VI.—*Gross national product and educational expenditure*—Continued

EDUCATIONAL EXPENDITURES AS PERCENT OF GROSS NATIONAL PRODUCT

[All figures in thousands of dollars]

Year	Total educational expenditure (4÷2)	Total expenditure on elementary and secondary education (9÷2)	Total expenditure on higher education (10÷2)	Total expenditure on public education (all levels) (11÷2)	Total expenditure on private education (all levels) (12÷2)	State and local government expenditure on education (13÷2)
(15)	(16)	(17)	(18)	(19)	(20)	(21)
1900						
1910						
1920						
1930	3.49	2.80	0.69	2.86	0.63	2.54
1940	3.16	2.56	.60	2.66	.50	2.62
1950	3.07	2.32	.74	2.46	.61	2.52
1952	3.09	2.42	.67	2.50	.59	2.40
1954	2 3.87	2.92	.95	3.07	.80	2.93
1955						3.04
1956						

1 Federal grants to States and local governments for education included in expenditures of col. 13 and ncluded in Federal figure in col. 14; then adding cols 13 and 14 involves double counting.

2 Denotes estimation due to the need to estimate expenditure on private elementary and secondary schools in 1954.

SOURCES FOR TABLE A-VI

Col. 2. Figures for 1930-52 from National Income, 1954, supplement, pp. 162-163, table No. 2. Figures for 1954 from Business Statistics, 1955, supplement, p. 3. Figures for 1955-56 from Survey of Current Business, July 1957, pp. 30-31, table No. 49.

Col. 3. Figures for entire column from Painter, Federal Reserve Bulletin, September 1945, p. 873.

Col. 5. Figures for 1900-1952 from Biennial Survey 1950-52, ch. 1, p. 18, table No. 11. Figure for 1954 from Trends in School Finance, p. 49, table No. 42.

Col. 6. Figures for 1910, 1930-52 from Statistical Abstract, 1956, p. 124, table No. 146. Figures for 1900, 1920, and 1954 estimated on basis of preceding (or subsequent) proportions of public and private expenditure of total elementary and secondary expenditure.

Col. 7. Figures for 1920-52 from Statistical Abstract, 1956, p. 124, table No. 146. Figures for 1900, 1910 estimated on basis of total expenditure on higher education given in same table. Figure for 1954 from Biennial Survey 1952-54, ch. 4, pt. II. pp. 106, 121, tables Nos. 5, 7.

Col. 8. Same as col. 7 for years 1900-1952. Figures for 1954 from Biennial Survey 1952-54, pp. 108, 122, tables Nos. 5, 7.

Col. 13. 1900, 1910, 1920, 1930 figures are actually for years 1902, 1913, 1922, 1932, respectively. All figures come from Historical Statistics on State and Local Government Finance 1902-53, p. 17, table I, except for 1954 and 1955 figures, which come from Summary of Government Finances in 1955, p. 26, table No. 8.

Col. 14. 1955 figure from Federal Funds for Education, 1954-55, 1955-56, p. 24, table No. 7. 1950 figure from Federal Funds for Education, 1950-51, 1951-52, p. 5, table No. 2. 1940 figure from Federal Funds for Education, 1938-39, 1939-40, p. 27, table No. 5, with $21,358,000 added for expenditure not attributable to any given State—that figure being the one for 1942.

TABLE A-VII.—*Average annual number of migrants, by region of residence at beginning and end of year: April 1953 to March 1956*

Region of residence at end of year	Region of residence at beginning of year				Total migrants into a county of—
	Northeast	North Central	South	West	
Northeast	1,424,000	71,000	270,000	57,000	1,822,000
North Central	105,000	2,051,000	487,000	186,000	2,829,000
South	198,000	342,000	2,726,000	271,000	3,538,000
West	115,000	238,000	334,000	1,558,000	2,245,000
Total migrants from a county in	1,842,000	2,702,000	3,817,000	2,072,000	10,434,000

Source: Current Population Reports; series P-20, No. 73, p. 18, table No. 11.

From the above information we can compute average annual net migration of each region by subtracting the appropriate column sum from the appropriate row sum.

TABLE A-VIII.—*Average annual net migration, by regions, 1953-56*

Region:	Net migration
Northeast	—20,000
North Central	127,000
South	—279,000
West	173,000

Source: Calculated from table A-VII.

TABLE A–IX.—*Current expenditure on public elementary and secondary schools and personal income, 1954, by States*

[All in thousands of dollars except col. No. 5]

State	Expenditure (current) on public elementary and secondary schools, 1954	Personal income, 1954	Expenditure on schools as percent of personal income, 1954	Current expenditure per pupil in average daily attendance in public secondary and elementary schools, 1954 United States average= $264.76
(1)	(2)	(3)	(4)	(5)
Northeast:				
Connecticut	$92,755	$5,156,000	1.80	$296.80
Maine	30,872	1,304,000	2.37	199.33
Massachusetts	189,814	9,448,000	2.01	298.39
New Hampshire	19,025	894,000	2.13	256.38
New Jersey	233,639	11,619,000	2.01	333.31
New York	709,174	34,175,000	2.08	361.99
Pennsylvania	460,628	19,646,000	2.34	299.31
Rhode Island	25,608	1,522,000	1.68	268.05
Vermont	14,542	536,000	2.71	245.31
North Central:				
Illinois	383,164	19,786,000	1.94	318.81
Indiana	192,114	7,619,000	2.52	279.57
Iowa	127,059	4,449,000	2.86	273.91
Kansas	94,014	3,410,000	2.76	263.79
Michigan	325,497	14,172,000	2.30	282.82
Minnesota	143,829	5,169,000	2.78	286.59
Missouri	139,481	7,066,000	1.97	232.79
Nebraska	59,027	2,236,000	2.64	262.45
North Dakota	28,924	760,000	3.81	262.40
Ohio	338,214	17,221,000	1.96	253.88
South Dakota	31,930	901,000	3.54	274.91
Wisconsin	147,615	6,212,000	2.38	293.39
South:				
Alabama	92,895	3,239,000	2.87	150.88
Arkansas	49,598	1,781,000	2.78	139.19
Delaware	16,597	891,000	1.86	325.42
Florida	123,843	5,342,000	2.32	228.74
Georgia	125,198	4,418,000	2.83	177.41
Kentucky	78,332	3,594,000	2.18	153.17
Louisiana	120,523	3,742,000	3.22	246.65
Maryland	103,849	5,079,000	2.04	268.47
Mississippi	55,444	1,811,000	3.06	122.60
North Carolina	154,700	4,959,000	3.12	176.97
Oklahoma	96,969	3,159,000	3.07	223.87
South Carolina	80,527	2,391,000	3.37	176.34
Tennessee	106,402	4,038,000	2.64	166.36
Texas	346,615	13,300,000	2.61	249.22
Virginia	118,701	5,193,000	2.29	192.56
West Virginia	76,244	2,419,000	3.15	186.09
West:				
Arizona	45,990	1,486,000	3.09	281.63
California	727,557	27,148,000	2.68	314.51
Colorado	69,210	2,519,000	2.75	279.76
Idaho	29,229	861,000	3.39	237.81
Montana	34,989	1,074,000	3.26	327.99
Nevada	10,482	506,000	2.07	294.12
New Mexico	38,367	1,077,000	3.56	264.71
Oregon	91,236	2,903,000	3.14	336.72
Utah	34,723	1,146,000	3.03	208.18
Washington	129,610	4,963,000	2.61	305.42
Wyoming	18,434	536,000	3.44	329.86
District of Columbia	27,735	1,871,000	1.48	302.10

Col. 2: Biennial Survey of Education, 1953–54, ch. 2, pp. 76–77, table No. 26.
Col. 3: Personal Income by States since 1929, supplement to Survey of Current Business, 1956, pp. 140–141, table No. 1.
Col. 4: Computed from cols. 2 and 3.
Col. 5: Biennial Survey of Education, 1953–54, pp. 102–103, table No. 39.

TABLE A–X.—*Expenditures for research and gross national product*

[All figures in thousands of dollars]

Year (1)	Gross national product (2)	Total expenditures for research and development (4+5+6) (3)	Federal expenditures on research and development [1][2] (4)	Private commercial expenditures on research and development (5)	Private nonprofit expenditures on research and development [1] (6)
1937	90, 780, 000	------------	124, 000	------------	------------
1938	85, 227, 000	------------	108, 000	198, 680	------------
1939	91, 095, 000	------------	------------	------------	------------
1940	100, 618, 000	------------	74, 100	280, 132	------------
1941	125, 822, 000	727, 900	197, 900	510, 000	20, 000
1942	159, 133, 000	860, 300	280, 300	560, 000	20, 000
1943	192, 513, 000	1, 032, 400	602, 400	410, 000	20, 000
1944	211, 393, 000	1, 817, 200	1, 377, 200	420, 000	20, 000
1945	213, 558, 000	2, 040, 700	1, 590, 700	430, 000	20, 000
1946	209, 246, 000	1, 787, 800	917, 800	840, 000	30, 000
1947	232, 228, 000	1, 999, 900	899, 900	1, 050, 000	50, 000
1948	257, 325, 000	2, 074, 800	854, 800	1, 150, 000	70, 000
1949	257, 301, 000	2, 142, 000	1, 082, 000	990, 000	70, 000
1950	285, 067, 000	2, 342, 800	1, 082, 800	1, 180, 000	80, 000
1951	328, 232, 000	2, 680, 500	1, 300, 500	1, 300, 000	80, 000
1952	345, 445, 000	3, 326, 200	1, 816, 200	1, 430, 000	80, 000
1953	363, 218, 000	4, 649, 000	2, 099, 000	2, 370, 000	180, 000
1954	361, 167, 000	------------	2, 084, 200	------------	------------
1955	391, 692, 000	------------	2, 133, 400	------------	------------
1956	414, 686, 000	------------	2, 282, 000	------------	------------
1957	------------	------------	2, 560, 800	------------	------------

[Percent]

Year (1)	Total expenditures on research and development as percent of gross national product (3÷2) (7)	Federal expenditures on research and development as percent of gross national product (4÷2) (8)	Private commercial expenditures on research and development as percent of gross national product (5÷2) (9)	Nonprofit expenditures on research and development as percent of gross national product (6÷2) (10)	Federal expenditures on research and development as percent of total expenditure on research and development (4÷3) (11)
1937	------------	0. 14	------------	------------	------------
1938	------------	.13	0. 23	------------	------------
1939	------------	------------	------------	------------	------------
1940	------------	.07	.28	------------	------------
1941	0. 58	.16	.41	0. 02	27. 19
1942	.54	.18	.35	.01	32. 58
1943	.54	.31	.21	.01	58. 35
1944	.86	.65	.20	.01	75. 79
1945	.96	.74	.20	.01	77. 95
1946	.85	.44	.40	.01	51. 34
1947	.86	.39	.45	.02	45. 00
1948	.81	.33	.45	.03	41. 20
1949	.83	.42	.38	.03	50. 51
1950	.82	.38	.41	.03	46. 22
1951	.82	.40	.40	.02	48. 52
1952	.96	.53	.41	.02	54. 60
1953	1. 28	.58	.65	.05	45. 15
1954	------------	.58	------------	------------	------------
1955	------------	.54	------------	------------	------------
1956	------------	.55	------------	------------	------------
1957	------------	------------	------------	------------	------------

SOURCES TO TABLE A-X

Col. 2: Figures for 1936-56 from Survey of Current Business, July 1957, pp. 8-9, table No. 2.
Col. 3: Calculated from cols. 4, 5, and 6.
Col. 4: Figures for 1937-38 from Research—A National Resource, vol. 1, p. 66, table No. 1.
Figures for 1940-57 from Federal Funds for Science, V, pp. 46-47, table No. 10.
The 1956 and 1957 figures are estimates.
Col. 5: Figures for 1938 and 1940 are estimated from information given in Research—National Resource, vol. II, p. 173. On the basis of the cost of research as $4,000 per man-year of research personnel, together with that in 1940 there were 70,033 research workers in American industry (41 percent more than in 1938), the figures for 1938 and 1940 can be derived. It is assumed that Government expenditures in 1938 and 1940 for research was entirely performed by a Government agency.
Figures for 1941-52 from Department of Defense, Growth of Scientific Research and Development, p. 10, table No. 1. These figures apply only to industrial research in the natural sciences (including medicine) and engineering. However, because private industry's research in the social sciences is probably quite limited, expenditure for research and development in the natural sciences and engineering seems adequate. In view of the fact that the source makes no mention as to how the data were compiled, whether or not items such as capital outlay, etc., were included, it seems that not too much confidence can be placed in the data. Such suspicion is reinforced by the fact that NSF data for 1953 show an almost $1,000,000,000 increase in industrial research and development expenditures over the 1952 figure given by Department of Defense.
Figure for 1953 from Reviews of Data on Research and Development, No. 1, p. 2, table No. 1. This figure is also for research in natural sciences alone.
Col. 6: Figures for 1941-52 from Department of Defense, Growth of Scientific Research and Development, p. 10, table No. 1. Same comment here as to reliability of the estimate as expressed above under col. 5.
Figure for 1953 from Review of Data on Research and Development, No. 1, p. 2, table No. 1.
All figures in col. 6, as in col. 5, refer only to expenditures for research and development in the natural sciences and engineering. The exclusion of the social sciences is probably more serious in the case of the nonprofit institution than with private industry.
Cols. 7, 8, 9, 10, and 11: Calculated from cols. 2 and 3, 2 and 4, 2 and 5, 2 and 6, and 3 and 4, respectively.

NOTES TO TABLE A-X

[1] Cols. 4, 5, and 6 refer to sources of funds for research and development. The actual performance of the research may, in the case of Government funds, be done, say, by a private commercial enterprise.
[2] In col. 4 the figures for 1956 and 1957 are estimates, all other figures are actual expenditures, not obligations, for fiscal, rather than calendar, years. Such figures exclude development expenditures from Department of Defense procurement funds and the pay of military personnel engaged in research and development. The magnitude of these latter elements was, in 1955, $635,000,000 for research and development from Department of Defense procurement funds, and $157,000,000 of pay of military personnel engaged in research and development. (Source: Federal Funds for Science, V, for fiscal 1955, 1956, and 1957, p. 4.) It is the exclusion of these 2 categories of expenditures which probably accounts for the generally higher Federal expenditure figures given in Department of Defense publication, The Growth of Scientific Research and Development. Neither of the 2 sources include routine statistical collection and publication in the definition of research and development.
The World War II expenditure on research and development by Federal Government includes expenditure for construction of production facilities (Oak Ridge, Los Alamos) for the atomic bomb. To this extent, Federal research and development expenditure is overstated for World War II.
GENERAL NOTE.—All data, insofar as can be determined, include expenditures for research and development plant and equipment.
Since expenditures on research and development cannot be defined precisely, a good deal of variation exists in data derived from different sources.

TABLE A-XI.—*Federal research and development expenditure, by function, 1953-56* [1]

[All figures in thousands of dollars]

Fiscal year	National security	Veterans' services	International affairs and finance	All other [2]	Total Federal research and development expenditures (cols. 2, 3, 4, 5)	All other research and development expenditures as percent of total Federal research and development expenditures (cols. 5, 6)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1953	1, 830, 920	4, 600	1, 792	281, 572	2, 118, 884	13. 29
1954	1, 804, 310	5, 130	1, 143	291, 886	2, 102, 469	13. 88
1955	1, 745, 672	5, 312	1, 144	331, 879	2, 084, 007	15. 93
1956	1, 862, 902	5, 870	1, 421	358, 901	2, 229, 094	16. 10

[1] Federal research and development expenditure here includes capital outlay and apparently normal statistical collection.
[2] The "All other" includes a multitude of functions which are given separately in the source. It encompasses: Social security, welfare, and health; housing and community development; education and general research; agriculture and agricultural resources; natural resources; transportation and communication; finance, commerce, and industry; labor and manpower; and general government.

Sources: Cols. 2 and 5: Figures for 1953 from NSF, Federal Funds for Science, III, pp. 28-30, table No. 3. Figures for 1954-56 from NSF, Federal Funds for Science, IV, pp. 24-26, table No. 3. 1955 and 1956 figures are estimates. Cols. 6 and 7: Calculated as shown on table.

TABLE A–XII.—*Basic and applied research and development in Federal obligations, 1953–57*

Fiscal year	Total current Federal obligation for research and development	Federal obligation for basic research and development	Federal obligation for applied research and development	Federal obligation for basic research and development	Federal obligation for applied research and development
	Thousands	*Thousands*	*Thousands*	*Percent*	*Percent*
1953	$1,919,500	$116,000	$1,803,500	6.0	94.0
1954	1,744,000	116,000	1,628,000	6.7	93.3
1955	1,887,500	130,100	1,757,400	6.9	93.1
1956	2,205,205	162,100	2,043,100	7.4	92.6
1957	2,382,400	215,100	2,167,300	9.0	91.0

NOTE.—All of the figures in this table are Federal Government obligations, as distinct from expenditures; hence these data are not exactly comparable with those presented in other tables.

Sources: Figures for 1953 from Federal Funds for Science, III, p. 9; 1954 from Federal Funds for Science, IV, p. 9; 1955–57 from Federal Funds for Science, V, p. 11. Figures for 1956 and 1957 are budget estimates.