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Volume Title: The National Bureau Enters Its Twentieth Year

Volume Author/Editor: Wesley C. Mitchell

Volume Publisher: NBER

Volume URL: <http://www.nber.org/books/unkn39-4>

Publication Date: 1939

Chapter Title: How The National Bureau's Program Is Made

Chapter Author: Wesley C. Mitchell

Chapter URL: <http://www.nber.org/chapters/c4461>

Chapter pages in book: (p. 9 - 28)

PART I

HOW THE NATIONAL BUREAU'S PROGRAM IS MADE

The founding of the National Bureau in 1920 was an expression of the faith in science inspired by the cumulation of discoveries and their applications to practical activities of an ever-widening range. Our founders held that work of a strictly scientific type is possible in economics. They believed that clearer insight into economic processes would enable society to derive larger benefits from technological advance. They devised an organization that they thought well adapted both to carry on economic research and to command public confidence in the results. They hoped enough fellow citizens shared their vision to support the venture they were starting.

The most distinctive feature of the founders' plan, and the one that probably did most to win support, was designed to meet a heavy handicap under which economists labor. It is harder for an investigator who deals with human behavior to be objective than for an investigator who deals with gases, electrons, stars, or physiological processes. Preconceptions, social aspirations, material interests are more likely to warp the thinking of an economist than of a mathematician, an astronomer, or a chemist. Our founders recognized that they themselves were not free from biases and that any investigators they might engage would be similarly hampered. Moreover, they had observed how prone organizations are to reflect the interests of their sponsors. They knew no radical cure, but thought the National Bureau might be kept impartial by making biases offset one another. To that end they provided that the diverse viewpoints from which social issues are regarded shall be represented in the Board of Directors. They required that every nominee to the Board 'shall be certified by the appointing body to be a person of scientific and judicial habit of thought'. They imposed upon the Directors the duty of reading all manuscripts submitted for publication and gave them the right to express dissenting opinions in the final reports. They adopted a self-denying ordinance restricting the National Bureau to ascertaining as accurately as may be economic facts that men of all persuasions should consider in deciding what practical policies to adopt or support. They stipulated that reports are to refrain scrupulously from saying what 'ought to be done' in any matter except the collecting and analyzing of economic data.

These provisions have been of inestimable value in fostering a scientific spirit within the governing board and staff, in securing support, and in gain-

ing acceptance of findings upon controverted issues. Our experience during nineteen years has demonstrated that radicals and conservatives, representatives of labor and of capital, practical men and economic theorists can work harmoniously upon scientific researches for the common welfare.

CHOOSING THE SUBJECTS OF RESEARCH

Responsibility for deciding what enterprises the National Bureau shall embark upon from year to year is laid upon an Executive Committee and a Director of Research, both elected by the Board of Directors.

This responsibility is heavy. The increase of economic knowledge and its diffusion are aims that may be furthered in numberless ways. The narrow field of established knowledge is bordered by a broad twilight zone of surmise and conjecture, which fades out into the black realm of ignorance. Explorers may push out in many directions from what is known, seeking to convert surmise into 'warranted assertions', or to get first inklings of matters that have been beyond man's ken. Some explorations are suggested by members of our Board, others by members of the staff who in working on old problems find new ones, others by investigators associated with our cooperative programs, others still by official bodies or private groups that face questions they think we may help to answer. But our resources in money, time, and intellectual capacity are limited. Always we are confronted by more alluring projects than we can manage. Choice of some means rejection or postponement of others. On the wisdom of the decisions we make depends our usefulness and our right to survive.

Problems must be Socially Significant and Susceptible of Scientific Treatment

An individual investigator may take idle curiosity as his sole guide. It is well that many have done so, for human life has been vastly enriched by the enlargement of thought that comes from following wherever curiosity leads. Also the older sciences record brilliant examples of work that seemed to have no practical usefulness when done yet turned out later to have applications of great value. But a research organization created to serve the public, in a field where scientific procedure is compatible with meeting many needs, is morally bound to take into account the relative social significance of different projects when deciding how to use the resources entrusted to it.

While society's need for knowledge concerning pressing issues has first claim upon our attention, we try to restrict ourselves to undertakings in which scientific methods can be applied. Preliminary reconnaissance must make us

certain first that a problem can be formulated definitely; second that we have or can acquire the techniques needed for attacking it effectively; third that reliable observations have been made by others or can be made by us.

If we felt any inclination to retire to an ivory tower, the conditions of our existence would forbid. Some funds are given to the National Bureau without definite restrictions upon the uses to which they shall be put. We hope that donors will continue to feel such confidence in us; but we know that they will do so only so long as our policies seem wise to them. Other funds are given expressly for investigations that the givers wish to have made. Still other funds are granted to sustain certain branches of our work, and our discretion in using them is confined to allocations within narrow limits. Our founders intended the National Bureau to be an independent agency; but the independence we strive to maintain is exercised within a democratic community in which many groups have needs we should meet if we can, and standards of value we should and do respect.

Limitations upon the Number of Undertakings

While our program is thus influenced by many factors, responsibility for shaping it rests primarily upon the National Bureau itself. Wise use of the funds entrusted to us involves wise use of the time of our staff and our Directors, and that time is limited. Every undertaking we assume, whether on the initiative of others or ourselves, requires first, planning, supervision, and review by the staff; second, reading by the Directors if the results merit publication. To scamp planning or supervision would lower the standards of our staff work. To send the Directors so many manuscripts that reading degenerated into a formality would deprive us not only of a safeguard against bias but also of constructive criticisms that have contributed notably to the value of our reports. It has been suggested that the Directors might lighten their burden by deputizing a carefully chosen group to examine certain manuscripts on their behalf; but so far they have been gratifyingly reluctant to shift their responsibilities to others.

If we had more income we might enlarge the staff. We should like to take that step whenever it would enhance efficiency. But when we add investigators to conduct new researches we hamper in some measure work already in progress. Obviously, the time spent by staff members on quasi-executive tasks and appraisals of projects and findings reduces the time available for their own researches. We think it better to maintain the quality than to increase the quantity of our output; we cannot maintain quality if we disperse the energies of our staff and the time of our Directors over many projects.

Investigations should Contribute to One Another

Thus our researches must have social significance; they must be susceptible of scientific treatment; they must be so limited that we can do thorough work upon each. So much is fairly clear. A less obvious principle of choice is that investigations should facilitate, test, and illuminate one another. Our program should have unity in the sense that each investigator can see what he is contributing to the whole and what help he can get from the work of his colleagues.

ESTIMATES OF NATIONAL INCOME AS A GUIDE TO
ECONOMIC RESEARCH

To bring out the interrelations among the numerous researches the National Bureau has made in the past and those now in progress or in prospect we start with the estimates of national income upon which we have spent so much effort. They may be made to play somewhat the same role in unifying economic inquiries that income statements play in systematizing business operations.

Technicalities aside, these estimates are attempts to measure what Alfred Marshall called the National Dividend. In his words the "*National Dividend is at once the aggregate Net product of, and the sole source of payment for, all the agents of production within the country: it is divided up into Earnings of labour, Interest of capital, and lastly the Producer's Surplus, or Rent, of land and of other differential advantages for production. It constitutes the whole of them and the whole of it is distributed among them; and the larger it is, the larger, other things being equal, will be the share of each agent of production.*"¹

With the data now available, we find that the most reliable estimates of the National Dividend can be made at the stage of disbursement—that is, our estimates are the closest approximations we can make to 'the aggregate of all incomes paid to individuals plus net savings of all enterprises'. But according to the definitions we use, and in harmony with Marshall's concept, this aggregate is identical both with the net value of all commodities and services produced and with the value of all goods that individuals consume, plus their savings, plus the net savings of enterprises. The chief limitation of our estimates, aside from their margins of error, is that we exclude goods and services

¹ Marshall adds in a footnote: "It is to be understood that the excess of Profits over Interest is here provisionally reckoned among Earnings . . ." The passage has slightly different forms in successive editions of his *Principles of Economics*. See the index under 'National Dividend'.

that do not pass through markets, except commodities consumed by their producers, payments in kind to employees, and the rental values of houses lived in by their owners.

Stated in this summary fashion, estimating national income may seem a simple, though time-consuming, job of collecting and combining data. But any thoughtful person who begins work on that assumption soon finds that the consistent application of definitions to the many items he has to cover presents grave difficulties. If he seeks help from precedents, he discovers that his predecessors worked with widely different concepts of national income, and that these differences interfere gravely with comparisons among the statistical results. If several estimators collaborate, they discover that their opinions diverge and they cannot proceed with mutual confidence until they have threshed out controversial issues. The Conference on Research in National Income and Wealth, formed at the suggestion of the Universities-National Bureau Committee in 1935, took as its first task clarification of the conceptual schemes on which all estimates are based, implicitly if not explicitly. The Conference organized a series of discussions in which specialists developed and debated the implications of their working concepts. Volumes I and II of *Studies in Income and Wealth*, published by the National Bureau in 1937 and 1938, show what progress the Conference has made toward defining technical terms in ways that facilitate practical work with the available materials. Our current estimates of national income are a product of these discussions as well as of careful work with statistical data.

We present the national totals broken down in three ways. First, we estimate the amounts received as wages and salaries, sums 'withdrawn' from business receipts by entrepreneurs, rents, dividends, and interest. Second, since the data come to us from different industries, we can classify income by its industrial sources and estimate what part is derived from farming, manufacturing, trade, finance, government, etc. Third, our studies of capital formation make possible estimates of the apportionment of the income received by individuals and business enterprises between net capital formation and consumers' outlay. We supplement our estimates of net national income, broken down in these three ways, by estimates of the 'gross national product', which includes 'national income' plus depreciation charges.²

Our income estimates with their three breakdowns sum up the economic facts of greatest significance to society, and also guide efforts to find out other things. For these estimates set many problems, put them in an illuminating

² See Simon Kuznets, *National Income and Capital Formation, 1919-1935* (National Bureau of Economic Research, 1937), pp. 3-7, ff.

perspective, and indicate how progress toward the solution of one helps in attacking others.

PROBLEMS SET BY ESTIMATES OF NATIONAL INCOME

Distribution of Income by Size

First comes the time-honored problem how national income is distributed. To Ricardo this problem meant the proportions in which the annual produce of society is divided among landlords, capitalists, and laborers. Our breakdown by type of income is a factual solution, though we use a somewhat fuller classification than Ricardo did, distinguishing when we can between wages and salaries, between entrepreneurial incomes and dividends, setting interest out by itself, and taking rents to be payments for the use of natural resources or man-made improvements. Our latest estimates indicate that 70 per cent of all income payments to individuals went to employees in 1929 and 11 per cent to entrepreneurs. Of the rest, over 7 per cent was in dividends, nearly 7 per cent in interest, and less than 5 per cent in rents.

A second problem of distribution, seldom considered by economic theorists, is factually solved by our breakdown according to industrial origin. For example, in 1929, when national income reached 83 billion dollars, manufacturing accounted for 24 per cent of the total, trade and service 13 per cent each, finance 11 per cent, public utilities and government 10 per cent each, and agriculture 9 per cent, while construction work, miscellaneous occupations, and mining produced the remaining 10 per cent.

Even more important is another question with which economic theory has done little—the 'distribution of income by size'. We cannot study the huge stream of wages and salaries, and the other smaller streams, without wondering how incomes are divided among individuals. Many people get wages and interest, or entrepreneurial income and salaries; they may get rents, interest, and dividends but no wages. Doubtless every conceivable combination of income types really occurs on a considerable scale; for entrepreneurial income and wages, which may be thought the unlikeliest combination, go to the many farmers and other small business men who work part of the time for hire.

The number of persons receiving incomes of different size in each year 1914-19 was given in the second volume of our first report, *Income in the United States*. But Dr. Macaulay's estimates had some characteristics of a statistical *tour de force*. Built up by skillful combination of many disparate samples they were regarded by their maker as merely the best results he could wring from inadequate data. Other investigators have sought to improve

upon Dr. Macaulay's pioneer work but a large element of conjecture remains in the most recent tables, those prepared by the National Resources Committee for 1935-36 primarily upon the basis of family budgets collected by the Study of Consumer Purchases.

The Income Conference holds that its most pressing task is to make more secure and to extend what is known about this subject. To improve the basic data it has stimulated two states that impose taxes on incomes below the federal exemption limits, Wisconsin and Delaware, to tabulate their returns, and is cooperating with a group in Minnesota who have undertaken a study of the state's income. It is considering how to use the data on family incomes in 1929 and 1933 gathered by the Financial Survey of Urban Housing, and the present and prospective census returns on residential rents or values. Meanwhile Dr. Kuznets and Mr. Friedman are working up the samples of professional incomes, about which information has been especially vague, gathered by the Department of Commerce and entrusted to the National Bureau. If carried out as we should like, these projects and certain others less easy to explain may yield tables showing the distribution of income by size that are more reliable and more detailed than any of their predecessors. The results should be cross-classified by region, occupation, industrial source, type of income payment, and perhaps other characteristics. There should be supplementary studies of the relations between the incomes of individuals and of families, primary and secondary incomes, and fluctuations from year to year in the incomes of identical individuals and families. Finally, the work should be so planned that future annual estimates can be made without inordinate labor. How active a share in this highly desirable program the National Bureau should take is one of the chief issues in our current efforts to determine the wisest use of our resources.

Types of Economic Fluctuation

According to our latest figures national income fell from 72 billion dollars in 1920 to 58 billions in 1921, then rose waveringly to 83 billions in 1929, collapsed to 39 billions in 1933, and recovered to 63 billions in 1936. These startling changes prompt the question: Why cannot the people of the United States provide themselves with an income that increases steadily with their numbers, their capital equipment, and their technological skill? 'Acts of God' affecting the annual harvests have a part in causing the changes, but a little reflection convinces one that acts of men must bear most of the responsibility.

For some fifteen years the National Bureau has devoted much energy to studying the short-period fluctuations in economic activities called 'business

cycles'. Our first objective is to ascertain as accurately as possible what 'cyclical behavior' is characteristic of different types of production, construction, transportation, prices, sales and stocks of commodities, disbursements of incomes, business profits and losses, dealings in securities, investments, savings, interest rates, banking, and international economic relations. Because cyclical fluctuations are international in their incidence and scope, we have thought it indispensable to include Great Britain, France, and Germany besides the United States. To get comparable results for different activities, different business cycles, and different countries, we had to invent a technique of measuring cyclical behavior, to improve upon the early model by experiment, and to apply the improved model uniformly to a large number of series. And to get a clear view of fluctuations so brief as business cycles we use time-consuming monthly data when they can be had.

Business Cycles: The Problem and its Setting laid down the guiding lines of this investigation in 1927. Willard L. Thorp's *Business Annals*, published the year before, was part of the technical apparatus. Leo Wolman's *Planning and Control of Public Works* and Arthur D. Gayer's *Public Works in Prosperity and Depression* dealt with one instrumentality for mitigating cyclical fluctuations from which much had been hoped. John Maurice Clark's *Strategic Factors in Business Cycles* made preliminary use of some statistical results; Carl T. Schmidt's *German Business Cycles, 1924-1933*, employed a simplified form of our analysis, and four *Bulletins*³ explained our methods or presented results. The analysis of cyclical behavior has grown upon our hands, which we take to mean that our original plans had more promise than we knew when we made them.

We have learned through hard experience that much specialized knowledge of economic activities is needed to interpret the varieties of cyclical behavior revealed by our measures. What we had thought of as a volume rather easy to write when the figures were ready has developed into several monographs, each to be prepared by a collaborator chosen for his special competence. Publication of the monographs should begin this year and run on through the early 1940's. The final stage of our work on business cycles—if the implication that such studies should have an end is allowed to pass—that is, the preparation of a synthetic account of how business cycles come about, can proceed while the later monographs are being finished. Thus, if all goes as we hope, the National Bureau will produce, first, well-attested motion pic-

³ Numbers 31 'Testing Business Cycles' (out of print); 37 'The National Bureau's Measures of Cyclical Behavior'; 61 'Production during the American Business Cycle of 1927-1933'; 69 'Statistical Indicators of Cyclical Revivals'.

tures of cyclical fluctuations in different parts of the economy, accompanied by appropriate explanations; second, a composite motion picture of business cycles as wholes, made by superimposing the pictures of the numerous parts. The outcome should be a better understanding of the problem our national income estimates present so forcibly—why the flow of goods and services the people of this country produce for one another's use fluctuates so violently.

When our estimates of national income and capital formation have been carried back to 1880 a second type of economic movement, secular trends, will be thrown into high relief. Certain trends are treated in Leo Wolman's *The Growth of American Trade Unions, 1880-1923*, and his later book, *Ebb and Flow in Trade Unionism*; the two volumes on *International Migrations* edited by Walter F. Willcox, Frederick C. Mills' *Economic Tendencies in the United States: Aspects of Pre-war and Post-war Changes*, and Arthur F. Burns' *Production Trends in the United States since 1870*. When national income is estimated on a monthly basis, as by the Department of Commerce at present, still a third type of fluctuation is brought out. This is examined in Simon Kuznets' *Seasonal Variations in Industry and Trade*.

These several researches did not grow directly out of our work on national income, but they do grow into it. Secular, cyclical, seasonal, and random movements pervade the whole economy and influence the amount of income we produce, the way in which we distribute it, and the uses to which we put it. Realistic studies that cover appreciable periods must deal with aspects of these movements. To gather all that we and others have learned about them, and the additional knowledge that is being gained from year to year, into an analytic history of national income in the United States is a task for the future. It would bring into focus thousands of sprawling economic inquiries and direct future inquiry into profitable channels. Also it would diminish the confusion of public opinion about the teachings of experience, the economic bearings of current proposals, and the relative importance of the changing issues of the day. Much more detailed work must be done before such a crowning achievement will be possible, but it is wise to cherish the aspiration as a guide to planning.

Types of Income Payment

A third set of investigations suggested by national income estimates is study of the leading types of income. Our figures make wages and salaries substantially larger than all the other income streams put together; they vary in different years from a little more than two-thirds to not quite three-quarters of all payments to individuals. In fields where we can draw the line between

them, wages is two or three times as large as salaries in aggregate amount, the ratio being lower in bad times than in good. The second stream in size is what we call 'withdrawals by entrepreneurs', that is, the sums that men engaged in business for themselves take out of current receipts for personal use. Third or fourth in size, according as a year is prosperous or depressed, are dividends and interest payments.

We have devoted and are devoting most study to the largest of these streams. In 1923 our staff and sixteen collaborators produced a report on *Unemployment and Business Cycles*, which was supplemented by Willford I. King's *Employment, Hours and Earnings, 1920-1922*. The late Harry Jerome's *Migration and Business Cycles* and *Mechanization in Industry*, Dr. Wolman's two books on trade union membership, the studies that Dr. Willcox edited on migrations, and chapters in such general surveys as *Recent Economic Changes*, Dr. Mills' *Economic Tendencies and Prices in Recession and Recovery* deal primarily with labor problems. Dr. Wolman projects a systematic study of wage rates, wage incomes in money and commodities, as well as hours of labor. The last-mentioned topic is especially interesting in that studies of working hours are our best means of gauging the efforts men expend in getting their incomes.

Profits we have treated, not as incomes paid to individuals but as sums accruing to business enterprises. In 1934 we published Ralph C. Epstein's *Industrial Profits in the United States*, an analysis of the best sample of income statements that has been made available, and in 1935 William A. Paton's *Corporate Profits as Shown by Audit Reports*.

Frederick R. Macaulay's *Some Theoretical Problems suggested by the Movements of Interest Rates, Bond Yields, and Stock Prices in the United States since 1856* contributes to the understanding of income from interest, though it deals with rates instead of aggregates. Rent, the smallest of the income streams in our classification, comes in for much attention in the *Economic Position of Non-farm Residential Real Estate, A Statistical Handbook*, prepared by David L. Wickens and soon to be submitted to the Directors.

Presumably we shall have occasion from time to time to study in greater detail the several types of income; certainly we must deal with them in our business-cycle program. Whatever we do in this direction will have its bearings and significance made clear by reference to the estimates of national income as a whole.

Industrial Sources of Income

Just as the breakdown of national income by types of payment suggests studies of the several streams of income, so the breakdown by industrial

sources suggests studies of the contributions of different industries through the production of goods or services. Our present figures reveal dramatic changes in the absolute and relative amount of these contributions within the seventeen years 1919-35, and doubtless the backward extension of the estimates to 1880 will reveal still greater shifts.

Dr. Kuznets has made a generalization of large consequence concerning the relative contributions to national income expressed in current prices by the 'commodity producing', 'commodity handling', and 'service rendering' industries. In 1919 the commodity producing industries—agriculture, mining, manufacturing, and construction—contributed a trifle more than half of the total, much less than is commonly supposed. This share declined to less than a quarter at the bottom of the depression in 1932, and recovered to a third in 1934. The commodity handling industries—transportation, other public utilities, and trade—made a contribution that rose and fell with the total, so that their share kept fairly close to one-quarter. The service rendering industries—finance, government, professional and domestic service, and a small miscellaneous group—increased their share from about a quarter in 1919 to about half in 1932, and in 1934 were still contributing about five-twelfths. Of course these fluctuations are partly cyclical in character, and so contribute to our business-cycle program. But there is also a large secular component—one that concerns all interested in the enduring welfare of the country. Kuznets' generalization suggests and should be checked by investigations of the income produced by different sources from agriculture to government over as long a period as possible.

As yet we have not ploughed this entire field but we have cultivated patches in it. Certain phases of agricultural production have been studied intensively by Eugen Altschul and Frederick Strauss, the latter now aided by access to the records and advice of the Bureau of Agricultural Economics. Some of their results were published in *Bulletin 67*, 'Technical Progress and Agricultural Depression', and fuller reports are promised. Changes in manufacturing production, employment, capital investment, and productivity are being investigated by Solomon Fabricant under a grant from the Maurice and Laura Falk Foundation. Construction, public and private, has been dealt with by Wolman and Gayer in their monographs on public works. Kuznets' estimates of capital formation rest primarily upon the production of commodities classified by ultimate use and durability. Mills' price studies have included production in physical terms. The first of our monographs on cyclical behavior, after the exposition of methods, will treat the production of commodities, the second, construction.

With the commodity handling industries we have dealt incidentally in many connections, notably in the studies of capital formation and in the explorations of distributional costs and pricing policies at retail now being conducted by the Conference on Price Research. But we have not gone expressly into transportation, public utilities, or trade except in chapters of *Recent Economic Changes* and in our business-cycle work.

Our recently inaugurated studies in finance treat a 'service industry', as do those proposed in fiscal policy. Their aim is to describe financial organization as well as to trace the effects of financial activities and fiscal arrangements upon the economy as a whole. We are also dealing with professional incomes and real estate, the economic importance of which in American life has been curiously neglected.

In the industrial breakdown of our national income estimates real estate is credited with 'producing' 4 billions in 1919, 7 billions in 1928, and less than 3 billions in 1933-34. These sums constitute roughly a fifteenth, an eleventh, and a seventeenth of the total. They include net rents to individuals owning property let to others, the rental value of non-farm dwellings occupied by their owners, and the incomes of corporations in the real estate business. Even on the basis of current income, real estate is a considerable item; on the basis of capitalized values it takes the highest rank, if we accept the estimates of national wealth prepared by the Federal Trade Commission.⁴

Extensive studies in this field were financed by a grant from the Social Science Research Council. The first fruit is the above-mentioned statistical handbook, a survey of the values, rents, financing (1930-34), and construction (1890-1936) of non-farm residential property, supplemented by data on the incomes of occupants, 1929 and 1933. Never before have the basic facts concerning this huge item of national wealth been brought together in such comprehensive fashion. We hope that what has been done by Mr. Wickens may be continued, and that the materials he has assembled will be used in many much-needed analytic studies.

Capital Formation and Consumption

How closely the National Bureau's studies of capital formation and of national income are integrated has already been indicated. Dr. Kuznets' estimates of capital formation were based primarily upon a detailed study of the commodities produced in the United States during 1919-35. These commodities were divided first into consumers' and producers' goods; second,

⁴ *National Wealth and Income; a Report by the Federal Trade Commission* (69th Cong., 1st Sess., Senate Doc. No. 126, Washington, 1926). For summary see p. 26.

the consumers' goods were divided into perishable, semidurable, and durable; third, both consumers' and producers' goods were divided into finished and unfinished; finally, these categories were subdivided into goods that reached their ultimate users each year and goods remaining in the hands of producers or distributors at the end of the year. The values of all the items were taken at cost to the final recipients.

This elaborate analysis of the flow of commodities through the economic system made possible annual estimates of consumers' outlay upon perishable, semiperishable, and durable commodities; business outlay upon durable producers' goods; public construction; change in business inventories and stocks of monetary metals. By using Dr. Fabricant's estimates of capital consumption gross additions to capital were reduced to net additions, and supplemental computations took care of net changes in claims against foreign countries. Putting all these computations together, Dr. Kuznets obtained estimates of both gross and net annual additions to durable goods, business inventories, and balances due to or from foreign countries. In 1920-29 the additions varied between 13.6 and 9.3 per cent of national income. But in 1931-34 net capital formation became a negative item. In 1933 the net decline in capital is estimated at 3 billion dollars, or 7.3 per cent of the current national income.⁵

There is no need to dilate upon the significance of these findings. More clearly than any previous investigations they show the uses to which the nation puts its annual income under different circumstances, and the wide fluctuations in the process by which it provides equipment for future comfort and production. Also they help toward an understanding of business policies, of consumers' habits, and of business cycles. In the past, few matters of economic concern have been discussed so much upon the basis of conjecture and so little upon the basis of knowledge as savings and investment. What we have learned about capital formation and consumption should raise the theoretical and practical treatment of that disputed theme to a higher and securer level.

Prices

National income can be estimated only by using money as a common denominator of the endless variety of goods included. Of course a nation's material comfort depends, not upon the billions of dollars its citizens receive during a year, but upon the goods they buy with their money. If prices were fairly stable we might disregard this distinction, and assume that changes in

⁵ The percentages are computed from three-year moving averages; see Simon Kuznets *National Income and Capital Formation*, 1919-1935, p. 13.

the dollar volume of national income represent corresponding percentage changes in what the classical economists called 'real income'. But the violent price fluctuations since 1915 forbid such an assumption. To make our dollar estimates of national income reasonably representative of changes in 'real income', we have to go through the arduous and unsatisfactory process of converting estimates in terms of current prices to estimates in terms of average prices during some base period. The base used is 1929. In current prices national income declined 14 billion dollars from 1920 to 1921; in 1929 prices this loss is cut to 4 billions. The rise from 1921 to 1929 is 25 billions in current prices and 29 billions in 1929 prices. The fall from 1929 to 1933 is 44 billions in current prices and 32 billions in 1929 prices. These huge differences show how indispensable knowledge of price fluctuations is to the interpretation of national income estimates.

This importance looms larger when one tries to answer any of the questions they raise. Distribution of income by size, for example, depends upon the unit prices individuals can command for their personal services or the uses of their property, as well as upon how many units of personal or property service different individuals are able to sell at these unit prices. That price movements play a large role in business cycles, in labor problems, in capital formation and consumption need not be argued or even illustrated. In an economic system organized primarily upon the basis of making and spending money incomes, prices influence every operation from the consumer's decision what to buy to the corporation's decision how to invest. What goods producers will make in what volume, what factors of production they will use in what combinations, what means of transportation and of merchandizing they will choose, whether business sentiment will be optimistic or pessimistic—these are but a few of the issues that hang largely upon interrelations among prices and expectations of price changes.

Aside from explorations incidental to our first estimates of national income, the National Bureau's systematic work in this field began with Frederick C. Mills' studies of *The Behavior of Prices*, published in 1927. Since then Dr. Mills has been dealing with prices and production conjointly; his results are presented in *Economic Tendencies* and *Prices in Recession and Recovery*. The fundamental character of price research was recognized by the Universities-National Bureau Committee in recommending the organization of a Conference on Price Research in 1935. And this body, under the chairmanship of Dr. Mills, is finding much to do. The relationships of prices to costs, the way in which the benefits of technical progress are apportioned through prices, the influence of price rigidity or flexibility, and the effects of govern-

mental regulation of prices are some of the topics in which it is actively interested.

Finance

According to our latest estimates, only \$1,316,000,000 of income can be attributed to banking in its banner year, 1929—less than 1.6 per cent of the national total. In 1933 its contribution was \$407,000,000, hardly more than 1 per cent of the total. Thus, as a source of income, banking is a minor industry. However, its role in business activities is as crucially important as the role of railways in industrial operations. All but a small fraction of business payments are made by checks; many enterprises borrow part of their working capital directly or indirectly from banks and secure their fixed capital from or through them; banks provide cash for payrolls; they finance many consumer purchases; they are the largest lenders to the government; they hold investors' securities and collect their incomes. Upon the ability of banks to extend credit depends the possibility of expanding trade in good times, and in times of stress their strength determines whether a business recession will be mild or develop into a panic. In short, where people get their livings by making and spending money the whole process of producing and distributing income depends upon banking operations.

Thus it was a logical development of earlier undertakings for the National Bureau to draw up a program for financial research in 1937 at the invitation of the Association of Reserve City Bankers. Successful work in this field depends upon the counsel and continuing cooperation of men engaged in practical work. Under the guidance of a competent Committee on Research in Finance, a small staff has been actively investigating several methods of financing consumers. Other features of the country's financial organization may be inquired into after the little known but rapidly developing activities of consumer financing have been explored.

A second project, the bond standards study, has been carefully planned with the cordial cooperation of numerous governmental and private agencies. A statistical record is being compiled of each railway, public utility, and industrial bond issued in the country from 1900 to 1938, including conditions of issue, amount, ultimate repayment or default, prices and yields, rating, etc. In view of the dependence of our financial and other institutions on bond investments as a major source of income, it is hoped that this study will make clearer the investment problems with which they must cope. Active work upon the preliminary phases of this large project began early in 1939. Highly specialized as these inquiries are, they promise to fill in blank areas on the map

of business-cycle research, and to contribute knowledge of the financial organization as a whole indispensable for understanding fluctuations in national income.

Fiscal Policy

Applying our criterion again, we find that all governmental units in the United States are credited with originating 10 per cent of the national income in 1929, 18 per cent in 1933, and 14.5 per cent in 1935. The large increase in the percentage between 1929 and 1933 was due, not to an increase in the actual income attributed to government, for the dollar figures declined from 8.5 to 7.0 billions, but to an extraordinary shrinkage in income from other sources. Every year before 1933 manufacturing held first place among the sources recognized by our industrial classification. In that year government took first place; but as business conditions improved it fell back to second place in 1934 and to third in 1935, though the dollar figures were substantially larger in 1934 and 1935 than in 1933. Both because of the magnitude government has attained as a direct source of income, far surpassing banking, and because it exercises a pervasive influence upon the whole economy, governmental activities claim a place in our program.

We have under consideration tentative plans for entering this field. Our Committee on Research in Fiscal Policy, under the chairmanship of W. L. Crum, has projected a study of the economic effects of federal taxation. The aim is to ascertain as definitely as conditions allow how taxes upon capital gains, undistributed profits and excess profits, progressive surtaxes, tax exemption of certain securities, and the definition of income used by tax officials affect the status and operation of the entire economic organization. If this investigation is made and yields satisfactory results, the Committee holds that the work should be broadened to include not only other federal taxes and taxes levied by other governmental units, but also the economic effects of governmental debts and expenditures.

ECONOMIC INTERRELATIONS AS A SOURCE OF CONFUSION AND AS A BASIS FOR ORGANIZING INQUIRIES

One of the fundamental difficulties of the social sciences, often held responsible for their late development and relative immaturity, is that every human activity both influences and is influenced by every other human activity. If everything depends upon everything else, how can one hope to understand anything?

The bewildering complexity of economic interrelations is most explicitly presented by the modern theories of pricing. The classical economists felt justified in analyzing the factors that govern the price of one good in terms of a second, on the assumption that all other conditions remain the same. Leon Walras emphasized the unreality of this primitive procedure. Going to the opposite extreme, he insisted that the demand for every good in a market depends not only on its own price but also upon the prices at which all other goods in the market can be had, and that the supply of every good is similarly dependent not only upon its own cost of production but also upon the costs of producing all other goods. On this showing, the proper way to study pricing is to consider the determination of the prices of n goods at the same time. Walras attacked this problem by using several sets of simultaneous equations, of which the first will suffice for illustration. Each of the n equations in this set represents the demand for one commodity as some function of its price and the price of every other commodity. Despite its formidable appearance, Walras demonstrated that the problem as he stated it is theoretically determinate, because the number of simultaneous equations that can be set up is equal to the number of the unknowns. Marshall's summary statement about the national dividend, quoted above, involves a similar conception of interdependence among all prices, branches of production, and shares in distribution.

Interdependence of economic factors is no figment of a mathematical imagination but a fact of experience that in simple form forces itself upon the attention of every man of affairs and every housewife. It confronts realistic investigators at every turn. Whether we deal with industrial contributions to national income, its distribution by types of payment or among families and individuals, or the production of consumers' goods and industrial equipment, or the system of prices, or the workings of financial institutions, or the fiscal policies of government, or the secular, cyclical, random, and seasonal movements to which economic activities are subject, we deal with a host of inter-related factors. It is no accident that the preceding review mentions several of our investigations two or three times under different headings. A thorough analysis of any topic in our program would bring in every other topic, plus many we have not treated. For example, if we started with changes in production we should be led to economic fluctuations of all types in prices, income payments, capital formation and consumption, banking, taxation, and national income. Discussion of the economic effects of federal taxation involves production, distribution, and consumption in all their branches. A study of prices leads to every phase of economics, not to mention excursions into

sociology, political science, psychology, anthropology, history, and engineering. Just as obviously, studies of economic fluctuations cover the whole field, with overlaps upon the other social sciences and technology.

If we failed to take account of these baffling interrelations, we should do superficial work. An investigator who is trying to understand the actual quotations for several grades of wheat in Liverpool during a certain period is drawn into studies of dietary habits in many lands, of wheat, rye and rice harvests, of visible stocks, transportation rates, milling and baking costs, import duties, and doubtless other matters. Nor can a realistic student of business cycles isolate any factor in his problem by assuming that other factors remain the same. For example, when he tries to account for the increase in coal output during cyclical expansions, the very gist of his explanation is that most other branches of production are expanding, that larger money incomes are being disbursed, that business men are expecting greater sales, and so on through the long list of interlocking changes that make this phase of business cycles what it is.

On the other hand, if we insisted upon taking account of all the interrelations among economic phenomena we believe exist, we could accomplish nothing in the way of realistic investigation. The mathematical economists who have developed Walras' conceptual scheme warn readers that it cannot be applied in practice. The data for drawing up the simultaneous equations cannot be collected. Similarly, the student of actual price quotations, or business cycles, or any social topic realizes that he cannot grasp all the influences bearing upon his phenomena or all the influences radiating from them.

This predicament in which the social sciences are caught is not peculiar to them, as is sometimes suggested. Astronomers, for example, face similar difficulties when they try to account for tides, or for the motions of the heavenly bodies. Theoretically, the motion of every particle of matter in the universe is influenced by the motion of every other particle. To account fully for the height of the tides, or the motions of a planet or a star, is as hopeless as to work out the simultaneous determination of the prices of n commodities. Nonetheless, astronomers make useful tables showing roughly the height of the tides in many ports of the world at specific hours of the day and month; also tables showing where in the heavens we may expect to see the moon, sun, planets, and certain stars on future dates.

Likewise in economics we can get useful approximations, if we follow the sensible example of astronomers and effect a shrewd compromise between the insatiable demands of our conception that all things govern one another and the limitations of our techniques of observation and analysis. We need to

bring into our problems enough factors to make the conclusions illuminate actual experience; we need to keep them simple enough so that we can think them through. What factors we shall admit and what functional relations we shall assume connect them are determined at the outset by intuition, often developed by analysis of what would happen under various simplified conditions we can conceive. Imaginary experiments of this sort are almost always helpful, and sometimes indispensable, in the early stages of a realistic investigation. Then we can turn to observation of the factors in our first list and analysis of the assumed relations among our observations. By trial and error, which when properly conducted is far removed from groping in the dark, we can improve upon our first judgments about the significant factors, upon our early guesses at the relations they sustain to one another, and upon our original observations. However long and however skillfully we work, we cannot expect to get complete explanations, but often we can realize the hopes of our founders by raising surmises to the level of 'warranted assertions', and sometimes we can discover things of which we had no previous inkling.

If we accept literally the proposition that all things economic mutually govern one another, researches selected at random must be related in numberless ways. But this corollary does not mean that it would be wise to select subjects at random. On the contrary, the more an investigator realizes the interdependence of the phenomena with which he deals, the more he needs to organize his studies on systematic lines. By methodical planning, so limiting each piece of research that he can deal with it effectively, and moving on from a subject he has partly clarified to closely related subjects, he establishes a semblance of order amidst the welter of interrelations that seem hopeless when viewed as a whole. Indeed, he converts interrelations from a source of confusion into a guide to fresh scientific effort. Even more than an individual investigator, a group of investigators need a coherent program that will enable every member to grasp the bearings of what he is doing upon the work of his colleagues and the bearings of what his colleagues are doing upon his own work. How far the National Bureau has progressed toward this goal has been set forth above. As our program is carried out, not only its details but also its general outlines should become clearer to all concerned.

Each topic is purposely limited in scope. What appear to be major factors are observed and analyzed with care; minor factors may be dealt with summarily or passed over without mention. Our studies of labor have not taken up the influence of banking or taxation upon wage rates and employment, though we know such influences exist. Nor do our studies of capital formation have anything to say about trade union membership, though we suppose

there is a connection. Each piece of research must have a focus and a perspective of its own if we are to think clearly. But these limitations are not so narrow as to make each area of research a separate island in an uncharted ocean. A more appropriate image is that of several parties of explorers who look over a vast range of country from different mountain peaks, from each of which some of the other peaks and parts of the surrounding lands are visible, but no one of which commands a clear view of the whole area. Explorations conducted in this way yield more valuable results if each party carries with it a base map indicating the position of its peak in relation to the other peaks that should be occupied by exploring parties. As explained, a base map for the National Bureau's explorations is provided by our estimates of national income. The areas under survey from two or more peaks overlap, so that separate parties can supplement one another's work, each making observations that amplify and check the observations of the others. This amplification and cross-checking render the results of the current surveys more reliable and therefore securer basing points for future surveys of the districts marked 'unknown' or filled in by conjecture on our national-income map.

Work done in this fashion has the great advantage of yielding cumulative results. Each fresh observation affords a means of testing earlier results, confirming or amending them. An analytic device invented for one purpose may be adapted to other uses. Materials collected by one survey are often useful for ends the collectors did not have in mind. We are not continually scrapping old results and making fresh starts, but rather using what we have already learned as a means of learning more. Cumulative growth has made science a potent force in increasing man's control over nature. The hope of developing sciences that will give control over social forces lies in applying methods that enable successive investigators to build upon what their predecessors accomplished.

RELATION OF THE NATIONAL BUREAU'S PROGRAM TO OTHER INVESTIGATIONS

Fortunately for all concerned, the National Bureau is only one among many agencies for economic research in this and other countries. There are governmental bureaus, national and local, devoted to collecting, tabulating, and analyzing data. Several research bureaus work under independent charters or in close affiliation with universities. A goodly number of large business enterprises have staffs engaged in statistical or economic research, some of which publish results periodically or occasionally. Finally, hundreds of economists