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Part IV

Review of Economic Forecasts
for the Transition Period

Michael Sapir

Between V-E and V-J Day there developed, especially in Washington, a feeling of acute need for projections of broad economic trends during the transition period from war to peace. The extent and timing of tax policy changes, wage adjustments, and elimination of the whole elaborate structure of price, rationing, and other wartime controls were seen to hinge on the probable course of production, income, and employment as war expenditures were cut-back and the armed forces were demobilized.

Throughout the war, forecasting the pace of the economy was a useful tool of policy formation and administration. On the whole the record of these forecasts was good, in view of the large elements of the economy that were under controls. Although confidence was gained in manipulating the basic data and various analytical techniques, it was generally recognized that to forecast correctly a dynamic change in the over-all economic climate was far more difficult.

The *setting* for these transition forecasts was the high plateau of economic activity at the peak of the war effort in 1944 and early 1945 and the certainty of a rapid cut-back. (In fact, war expenditures and consequently output and employment in munitions industries began to fall significantly after V-E Day; it was clear that the pace after V-J Day would be greatly accelerated.) The major *purpose* of the projections was to serve as a guide and warning to policy makers with respect to the decontrol of wartime measures and the framing of correct policy decisions generally.

The present analysis of the period since V-J Day is designed to shed light on some reasons for the errors in the principal forecasts discussed in this paper. However, it can be considered also a search for a convincing explanation of what actually occurred. *Postmortems* as such either are of purely historical interest or may tend to take on a condemnatory or an excusatory character. They can be constructive, however, if they attempt objectively to analyze the types of factor involved, separating as far as possible those which might have been foreseen from those which cannot in fairness be charged to lack of analytical skill or judgment. This is extremely difficult. But it is the only way by which future work can benefit from past mistakes.[1]

[1] In this connection it may not be amiss to point out that more systematic gain

THE ROLE OF POLICY

A crucial question in forecasting is how far probable or possible future changes in policy should explicitly be assumed. All forecasting, of course, is based on assumptions. Does this mean that the sole or chief assumption should be that the federal policy existing at the time the forecasts are made will be perpetuated? Shall only certain or highly probable policy changes be taken into account? Or shall an attempt be made to appraise the strength of political forces and the probable or possible major shifts that may occur in economic policy and that will vitally affect the texture of the economic situation in the future?

The answer is of prime methodological significance. Should economists be political seers, public opinion analysts, and lay psychiatrists? Should they at least consult experts, who are perhaps better qualified to chart the course of Congressional action, to take the pulse of the veteran, the consumer, the business men, concerning postwar behavior?

The forecasts by federal agencies for the transition did make specific *assumptions* concerning policy. Not thought of as forecasts, nor yet quite as recommendations, they attempted to be perhaps something of both. From this viewpoint one may argue that what was attempted was not really economic *forecasts* at all, but rather merely a set of model projections, under specified and more or less plausible conditions.[2] Tax reduction, both personal and corporate, was a foregone conclusion, and the broad pattern of the probable

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may be got from analyzing the erroneous forecasts of the 'model builders' than from studying the more correct forecasts of those whose method depended more explicitly on general qualitative considerations or at any rate less elaborate quantitative techniques. In the writer's view to make forecasting a sound and realistic activity will always require a proper blending of quantitative and qualitative factors, an interplay of mechanical, historical-analytical, and judgmental factors. One is forced to the view that at least at present this activity partakes of the nature of an art rather more than a scientific process. To claim otherwise, as some do, seems unnecessarily pretentious.

[2] The specific Washington projections discussed below are those Everett Hagen describes in 'Forecasting Gross National Product and Employment During the Transition Period: An Example of the 'Nation's Budget' Method', *Studies in Income and Wealth, Volume Ten.* Hagen's results and methods are substantially

changes was well known. Actually tax policy was softer than we had assumed. The forecasts were in terms of first half of 1945 (or 1944) price levels and we assumed that there would be no important change in the structure of wage-price controls or policy. This set of assumptions turned out to be wrong. Should the forecaster have made another set (or sets) based on expectations of various degrees of price rise and wage adjustment? I think there is no doubt that a *range* of forecasts, positing alternative levels of taxation, prices, and wages, would be safer and sounder. The consequences of pegging to *one* set of assumptions only will be analyzed below.

Sound method probably calls also not for forecasts of specific concrete magnitudes—gross national product of $160 billion or unemployment of 8 million, etc.—but for probability ranges around the figures, based at least on hunches or calculated error bands. This is certainly safer and more in keeping with our present state of knowledge and technique.[3] Another possibility is then raised: perhaps the range within which forecasts or projections can safely be made, given certain assumptions, is too wide for meaningful policy guidance. For example, a forecast of real gross product to which an error band of + or −10 billion dollars must be applied means a difference of perhaps 5 or 6 million in the corresponding estimate of employment—and unemployment—between the extremes of the range. Obviously quite different policies are called for at such different levels. We may simply have to recog-

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representative of several similar sets done in the federal government during the same period; with one of these efforts the writer was himself deeply involved.

Hagen, in his opening words, clearly indicates the character of his figures: "The purpose of this paper is to illustrate a method of forecasting. . . ." This statement did not save us from having the projections treated as straight forecasts by the profession, the press, and business. In a sense the hedge implied in the above quotation is not quite legitimate, psychologically if not methodologically.

In focusing attention on Hagen's projections there is no intention to put them by implication in a more unfavorable light than others. In fact, his are at many points more reasonable and better. Rather they were chosen as a matter of expediency: they are representative, they have been published, and it is easier to deal *in extenso* with one rather than several sets of tables.

[3] Lawrence Klein has been a consistent proponent of such an approach.

nize a wide gap between the needs of policy makers and the poten-
tialities of our present tools and techniques; yet forecasts and
model projections must be drawn.[4]

ACTUAL DEVELOPMENTS VS. WASHINGTON FORECASTS: SUMMARY

Given the current and expected cut-backs in war expenditures, the
critical questions in the spring and summer of 1945 concerned the
absorptive capacity and resiliency of the civilian economy;
whether the primary impact would be quickly offset or would pre-
cipitate a series of further deflationary repercussions.

The general history of the more widely known forecasts made
in Washington is by now familiar. Their whole tone and emphasis
was on the drastic primary impact of curtailed government out-
lays—*followed by further derived effects*—on the levels of income
and employment in the private economy. A strong deflationary
tendency was predicted, despite recognized counterforces; in
Hagen's projections, over eight million unemployed were forecast
for the first quarter of 1946, with a steady decline thereafter.[5]

Actual developments since V-J Day have been drastically dif-
ferent. Our quantitative mistakes—$20 billion low on gross
national product, disposable income, and consumption, or 4 to 5
million high on unemployment—are not as disastrous as our quali-
tative. Quantitative errors kindle the rhetoric of hostile newspaper
writers who love to point an accusing finger at 'Washington econo-
mists'. But we forecast *deflation, deficiencies* of demand, a ten-
dency for prices to fall,[6] sizable unemployment, a rather bearish
mood in the business world. Instead, inflationary pressures have
been constant and general: prices and wages have risen, incomes

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[4] For a more optimistic view on the usefulness of projections for policy guidance,
even if the forecast interval covers the possibility of either inflation or deflation,
see Klein's comments on this paper.

[5] Other projections, based on an even more pessimistic view of the cumulative
deflationary pressure caused by the primary impact of reduced war outlays,
showed unemployment continuing to increase beyond the first quarter.

[6] Though emphasizing strongly the inevitable co-existence of strong inflationary
pressures in a great many specific markets and commodities, so that price and
other stabilization controls would continue to be needed.

are at record levels, sustaining demands far above available supplies; employment, after the first shock on the munitions industries has been high, and in no month since V-J Day has unemployment been more than $2\frac{3}{4}$ million.

Some have argued that the deflationary forecasts influenced the administration, inducing it to adopt wrong policies, i.e., too 'soft' a tax policy and too lax an administration of price and wage controls—practices contrary to the views and recommendations of the economists. But economists have far less direct influence on the shaping of policy than is implied.[7]

It is more fruitful now to turn to a summary examination of the factual record; to analyze the factors accounting for the errors of forecast; and thereby to glean what insights we can that may be of use in future work.

TABLE 1

Gross National Expenditures, First Half 1945 and Fiscal 1946

	First half 1945*	Fiscal 1946		% change from first half 1945 to fiscal 1946	
		Actual	Forecast	Actual	Forecast
	billions of dollars				
Gross national product	206.6	189.3	170.4	−8.4	−17.5
Government expenditures	98.2	53.6	57.8	−45.4	−41.1
Private gross capital formation	5.1	20.2	12.6	296.1	147.1
Consumer expenditures	103.4	115.5	100.0	11.7	−3.3
Disposable income	141.6	138.7	123.8	−2.0	−12.6

Actual data, in current prices, are from the Department of Commerce. The forecasts are in first half of 1945 prices.
* Seasonally adjusted annual rates. These figures are somewhat revised from those used as a basis for the projections. See Appendix tables.

The essential data comparing actual with forecast developments for fiscal 1946 are shown in Table 1 and Chart 1. The forecasts are couched in terms of first half of 1945 price levels. That is, they assumed no essential changes from that level and structure of prices. Predicated on a firm stabilization policy, the aim was to

[7] A. G. Hart, in an otherwise critical and polemical article in the *American Economic Review*, September 1946, is on this point correct. He suggests that a chief result of the forecasts was to weaken the economists' effectiveness in opposing inflationary policies, and the over-hasty dismantling of wartime controls ('National Budgets and National Policy: a Rejoinder', p. 635).

CHART 1

War and Postwar Trends in Gross National Product
Actual and Forecast Levels
(1939–44 Annual Data; First Half of 1945 and Quarters of Fiscal 1946)

Billions of dollars

Gross National Product

Actual

Forecast

Government Expenditures

Actual

Forecast

1939   1940   1941   1942   1943   1944   1945   1946
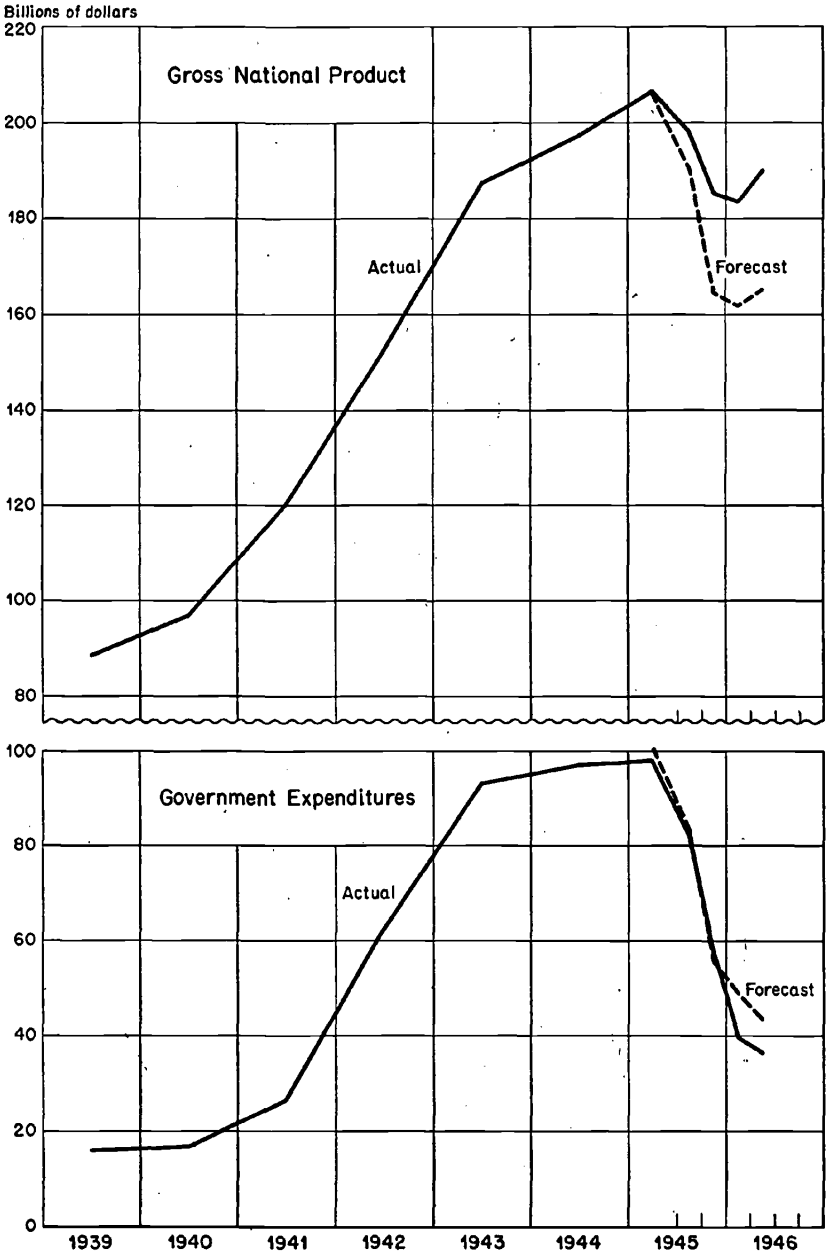
CHART 1 *(concl.)*

Billions of dollars

Private Capital Formation

Actual

Forecast

Consumer Expenditures

Actual

Forecast

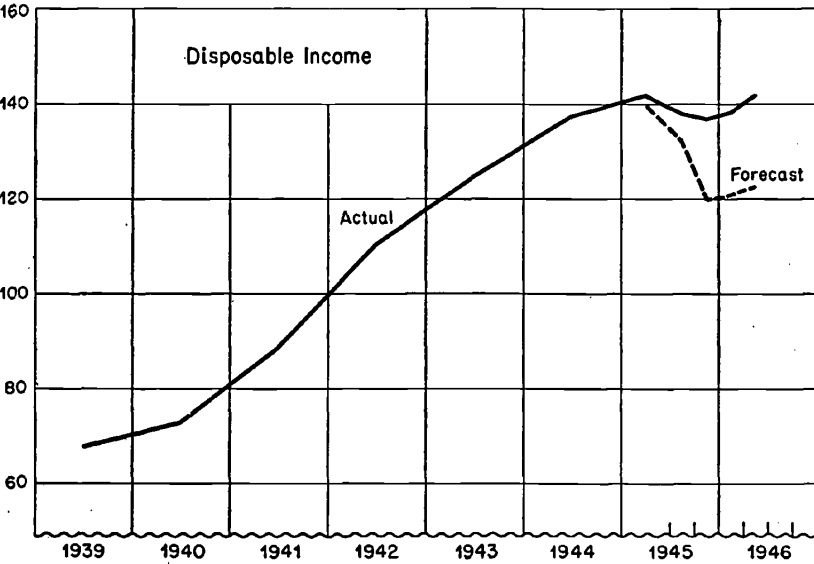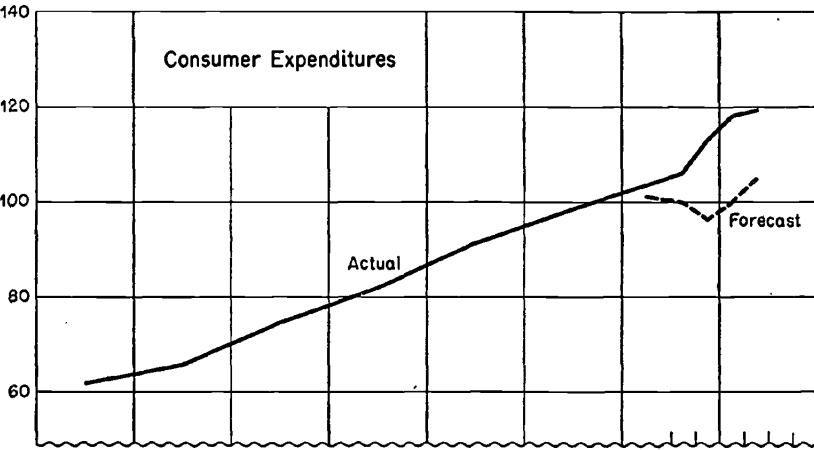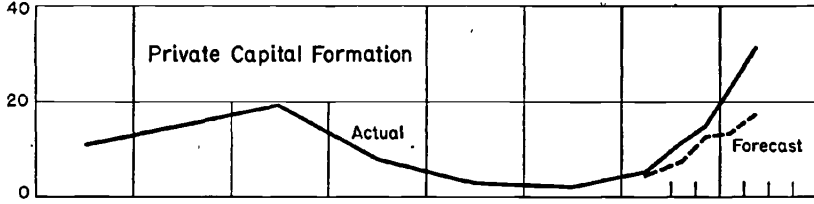**Disposable Income**

Actual

Forecast

1939 1940 1941 1942 1943 1944 1945 1946

U. S. Department of Commerce   Seasonally adjusted annual rates.

forecast levels of *real* output. The forecast levels of income, based on current dollar relations with gross national product, were more cautious. Although price indexes by which to deflate gross national product and income flows are grossly inadequate, both conceptually and statistically, the crudest attempts have nevertheless been made to suggest the importance of the price factor in the rise of economic activity since V-J Day and thus in the gap between actual and forecast levels.[8] We shall return to the question whether prices can be handled merely descriptively in this fashion or have to be given a more positive and 'causative' role in explaining the transition period thus far.

How does the record look? For fiscal 1946—approximately the year after V-J Day—the forecasts underestimated gross national product by 10 percent (current dollars), consumer expenditures by 13 percent, and disposable income by nearly 11 percent. In first half of 1945 prices (roughly) the corresponding underestimates for the first two items are 6 and 11 percent respectively (see App. III). The total labor force (including the armed forces) was overestimated on the average by 2.5 million, or 4 percent; the civilian labor force was overestimated by only 1 million, or 2 percent. Civilian employment was underestimated by 3 million, or 6 percent (offset largely by an error in the opposite direction for the size of the armed forces). Unemployment, estimated as a residual category (labor force minus employment), was overestimated by 4 million for the year,[9] an error of 186 percent! Obviously this small residual item reflects the total effect of errors in the larger components. Yet it is of course the error drawing the most caustic criticism from the press and elsewhere.[10]

The forecast and actual events for the fourth quarter of 1945

[8] The deflated figures and comparisons are in Appendix III. The essential nature of the forecasting errors is not altered by making primary comparisons with actual data at current prices.

[9] The error is greatest in the last half of fiscal 1946 (see App. Table 5).

[10] Such criticisms are in general quite unfair and full of animus. It should be admitted, however, that from a policy standpoint the estimate of *unemployment* is critical, since so many types of action hinge on its actual or expected size. Yet this is the magnitude we are least able to forecast (or even estimate!) with reasonable accuracy. Here is a concrete instance of the present inadequacy of our statistical and analytical tools for guidance of short-term policy.

and the first quarter of 1946 are more instructive, for it was in these quarters that deflation and unemployment were expected to appear on a big scale. In a fundamental sense what occurred in this crucial half year was bound to determine the later course of events.

For the fourth quarter a gross national product of $165 billion was forecast (it was $198 billion in 1944), and $207 billion in the first half of 1945 (adjusted annual rate). Actually gross national product in current dollars ran at an annual rate of $185 billion or 13 percent above the forecast. (The difference in first half of 1945 dollars was roughly 8 percent: see App. III). Private capital formation was underestimated by $2 billion or 15 percent; consumer expenditures by $17 billion, or 15 percent in current dollars. Forecast disposable income was off 12 percent, while total civilian employment was 3.5 million or about 7 percent low. Partly in consequence, unemployment was predicted at a level 4.5 million above the actual figure, 1.9 million.

TABLE 2

Labor Force and Employment, First Half 1945 and Fiscal 1946

	First half 1945	Fiscal 1946		% change from first half 1945 to fiscal 1946	
		Actual	Forecast	Actual	Forecast
	millions				
Labor force	64.6	60.5	63.0	−6.3	−2.5
Civilian employment	51.6	50.9	48.0	−1.4	−7.0
Armed forces	12.2	7.5	9.1	−38.5	−25.4
Unemployment	.8	2.1	6.0	162.5	650.0

The actual figures for fiscal 1946 are based on Monthly Report on the Labor Force data with rough unofficial adjustments both to allow for seasonal factors and to put them on a level comparable with the old MRLF series, i. e., prior to July 1945, on which the projections were based.

In the first quarter of 1946 the error in the forecast for gross national product was of about the same magnitude as in the preceding quarter. However, private capital formation (including the foreign trade balance) was missed by 42 and 41 percent (roughly) in current and in first half of 1945 prices respectively. Consumption expenditures, running at a rate of $121 billion, were $21.5 billion or 22 percent above the forecast figure. Even allowing for

the price rise, real consumption was underestimated by 16 per-
cent. For this quarter total civilian employment was underesti-
mated by 4.8 million or 9.5 percent while unemployment was pre-
dicted at a level of 8.1 million, three times the actual figure, 2.7
million (Chart 2).

TABLE 3

Gross National Expenditures
Fourth Quarter 1945 and First Quarter 1946
(billions of dollars; seasonally adjusted annual rates)

	1945 Fourth Quarter		1946 First Quarter	
	Actual	Forecast	Actual	Forecast
Gross national product	185.2	164.6	183.7	161.8
Government expenditures	57.2	55.5	39.6	49.0
Private gross capital formation	15.0	12.8	23.1	13.3
Consumer expenditures	113.0	96.2	121.0	99.5

Actual data from the Department of Commerce.

TABLE 4

Labor Force, Fourth Quarter 1945 and First Quarter 1946
(millions)

	1945 Fourth Quarter		1946 First Quarter	
	Actual	Forecast	Actual	Forecast
Labor force	60.8	63.2	59.2	62.8
Civilian employment	49.7	46.1	51.3	46.5
Armed forces	9.2	10.8	5.2	8.2
Unemployment	1.9	6.3	2.7	8.1

See note to Table 2.

The margin of error in the forecasts, those for unemployment
aside, averages 10–15 percent on the whole, somewhat less if the
price increase factor is taken into account. It cannot be claimed
that this is a very good record! A quantitative error of this size in
the opposite direction would, however, have hurt far less, for it
would have meant judging the economic *climate* accurately and
would have strengthened the bid of economists for a more signifi-
cant role in policy-determination. It also undoubtedly would have
altered the policy recommendations somewhat.

CHART 2

War and Postwar Trends in the Labor Force
Actual and Forecast Levels
(1939–44 Annual Data; First Half of 1945 and Quarters of Fiscal 1946)

Millions of persons
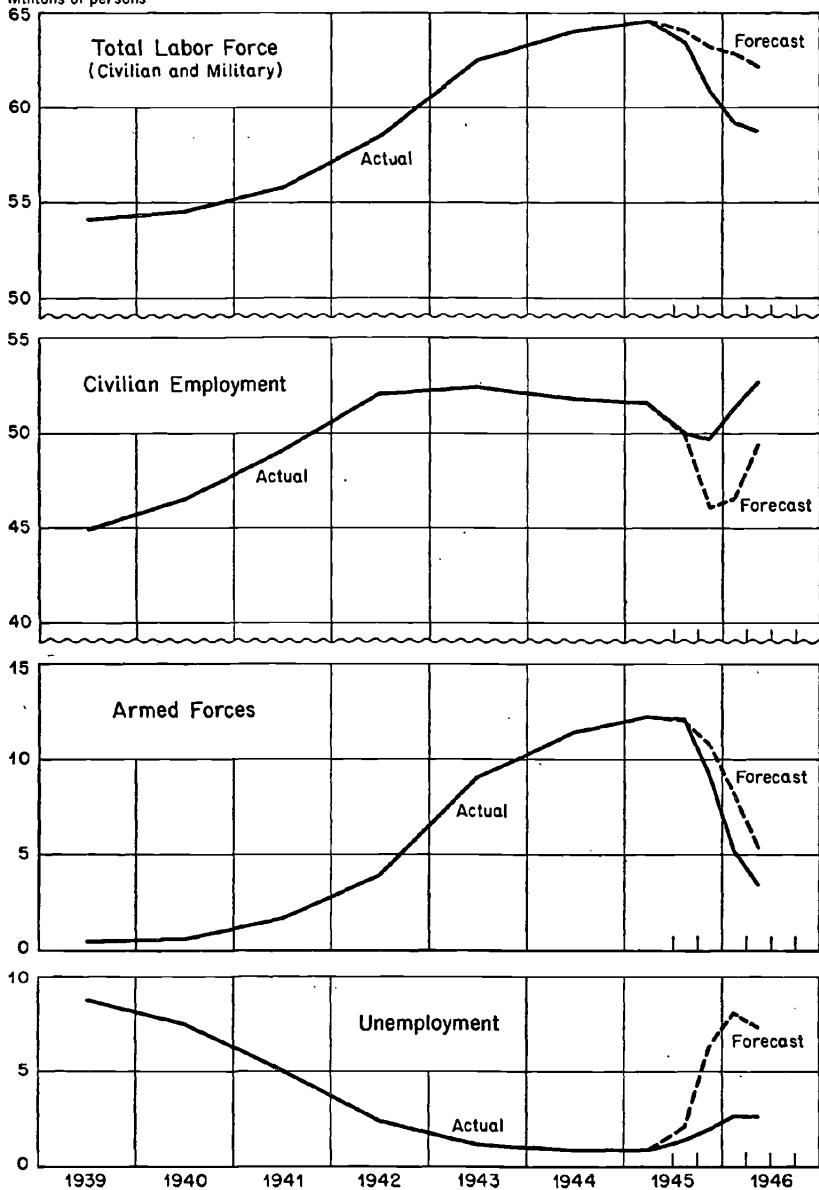
Adjusted MRLF data

Seasonally adjusted

NATURE OF THE 'MODEL SYSTEM'

A few words are in order about the nature of the assumptions and the methods of analysis used in Hagen's projections. A fuller and more systematic presentation is deferred to Appendix II.

The group of federal government economists whose forecasts ('model projections') are here under review are in general Keynesians in methods of analysis and in general philosophy. In approaching the analysis of the economic outlook for the transition period, it was natural to operate in terms of the over-all system of economic relationships developed by Keynes and subsequent writers. Increasingly these systems have been elaborated by econometricians into imposing mathematical models; more and more empirical statistical work has been done to give specific content to the analytical functions employed. The general framework for the analysis is usually some set of gross national product-national income accounts.

The econometric model employed by the Washington forecasters in mid-1945 is a simplified type of Keynesian model. The levels of output and employment in the economy as a whole depend on the level and distribution of effective demand for the final output. Whereas Keynes' theory is concerned with a complete system of mutually determining interrelationships, the present approach is truncated and simplified to suit the peculiar nature of the period. There is no explicit private investment function. Large parts of consumption are treated as independent of general levels of income and employment. A large part of total production and expenditures is arbitrarily determined, i.e., classified as autonomous (exogenous) variables. Whereas Keynes stresses the real relations, e.g., between consumption and income, most of the models used for the transition period were based on money relationships. Finally, the system was exceedingly simple and essentially static in that it involved no lags, rates of change, or expectational variables.

The determination of just which elements are actually 'autonomous', and precisely in what sense, is a matter subject to considerable ambiguity and dispute. The central notion is that, for the period in question at least, the levels, rates of change, etc. of the

items are totally or effectively independent of the general or expected level of economic activity. The considerations that lead to classifying any item as autonomous may vary greatly; and in reviewing the results it is of some significance whether supply or demand limitations have led to the classification of an item as autonomous.

Federal government expenditures were taken as given by settled-on rates of cut-back in war expenditures,[11] rates of demobilization of the armed forces, the necessary servicing of the public debt, and an expected stickiness in the size of civilian government payroll and other normal outlays. State and local government expenditures were simply assumed to rise slowly from wartime levels as needed public works projects were undertaken, public school teaching staffs expanded, and the like. It can, of course, be argued that large segments of government expenditures or receipts *are* dependent in some fashion on the general economic situation; e.g., tax *yields* are obviously dependent on the level of income, while tax rate *policy*, social security activity, public works outlays, etc. are or may be geared to actual or expected levels of employment or unemployment. Nevertheless, for the immediate postwar period it was reasonable on the whole to think of government expenditures (receipts not as clearly) as an autonomous item in the aggregate.

About private expenditures by business and consumers it is far more difficult to be sure. In general it was assumed that *demand* for investment goods by business and for durable goods and rental housing by consumers, whatever their ultimate relation to income, prices, etc., would in the short-run far exceed supply. Technical reconversion problems, labor and materials shortages, and other problems on the supply side would inevitably set upper limits on and actually determine the rate of expenditures. *In this sense only,* therefore, outlays for business plant and equipment, accumulation of inventories, residential construction, consumer durable goods,

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[11] It was taken for granted that neither war outlays nor the size of the army and navy would be 'artificially' maintained in order to prevent or offset unemployment or a threatened depression. On the other hand, no effort was made to substitute faster cut-backs and demobilization rates even though many persons felt the 'official' schedules were implausible.

and payments for rental housing were proximately taken as autonomous expenditures.[12]

The forecast expenditures for these items were assumed more or less independently of one another and of general economic activity. Nevertheless, this independence was vaguely tempered by qualitative consideration of what business men's expectations for the transition would be.

With assumptions about tax policy (types and rates of taxes) for specific periods, and assumptions about military and civilian transfer payment policy (the latter chiefly the average unemployment compensation per unemployed person), the forecasters worked out approximate relations between levels of income payments and disposable income and levels of gross national product (in some variants, *private* gross product). In general the forecasters were less certain about the way the income generated by gross national product would be distributed among wages, profits, entrepreneurial income, etc., especially in view of the *assumption* of constant price levels; Hagen's forecasts are therefore properly quite tentative on this point.

Given levels of the autonomous items of expenditure (including parts of consumption) and given an expected relation between gross national product and disposable income (for a given time period, with a given tax policy, etc.), the 'passive' or derived component of consumer expenditures (nondurable goods and services excluding rentals) could be projected. A simple set of equa-

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[12] Some obscurity concerning the treatment of business investment outlays cannot be fully cleared up. In the forecasts cognizance was taken of the results obtained in a Department of Commerce survey of business intentions to invest in the year after V-E Day. This expected level of 'demand' was in part related, of course, to expected high levels of economic activity and sales by industry; in part, however, the plans to invest were apparently tempered by realistic appraisal of minimum needs or of the probable availability of goods. Certainly economists in Washington were aware of the complex relations and the mutual interdependence between investment demand and other factors in the economic system. There is no satisfactory systematic explanation as yet, however, of the form or nature of the relations, long- or short-run. It might be argued that the forecasts did really treat investment as a partly derived factor, related obscurely to recent and expected levels of business, but that no mathematical or other explicit function was used. This is Hagen's position. The quantitative results of the forecasts would probably not be seriously affected in any case.

tions constituting the model employed could then be solved to give an equilibrium position at which the demand for (expenditures on) final goods and services would be equal to the estimated level of output, the associated level of income would be consistent with the level of gross national product and consumer expenditures, etc. Estimates of employment and unemployment were then derived by the methods indicated in Appendix II, given assumptions about output per man and hours of work.

Much more complicated and sensitive models, with different functional relationships, etc. are being applied by other workers in the field.[13] However, though theoretically and logically more sound, and though possibly more reliable as a normal procedure, they would hardly have saved the forecasters from the pitfalls that snared them. The crucial matter seems rather to be the relative roles played by mechanical-quantitative analysis on the one hand and qualitative judgment factors based on historical experience, intuitive insights, etc. on the other.[14]

EXPLANATIONS OF THE ERRORS

The broad nature of the record and comparisons between actual post V-J events and Hagen's projections have already been summarized. Anyone interested in the details, in further clues to what went wrong and why, may consult the Appendix tables.

It is more worth while now to analyze actual and forecast events, to venture hypotheses of explanation, to test them for their reasonableness and their possible relative significance in the total picture. As will become clearer below, no *single* hypothesis explains the results completely and satisfactorily. We forecasters misjudged critical elements in the postwar situation; various factors entirely

[13] See, e.g., Lawrence Klein, 'The Use of Econometric Models as a Guide to Economic Policy', *Econometrica*, Vol. 15, No. 2, April 1947.

[14] Lawrence Klein did make in 1945 an unpublished set of forecasts for the transition period, using econometric models. His estimates turned out to be far closer to the actual record. However, it is this writer's feeling that Klein's own explanation in the *Journal of Political Economy* for August 1946 is not wholly convincing (cf. Sec. A4). Nevertheless, a sharp line cannot be drawn concerning the accuracy of forecasts between Keynesian model-builders and all others. There were hits and misses in all schools of thought, though W. S. Woytinsky is probably right that the model builders came off worst; see his 'What Was Wrong in Forecasts of Postwar Depression', *Journal of Political Economy*, LV, 2, April 1947, p. 143.

unforeseen and in part unforeseeable were operative. Necessarily
therefore our attempt to perform a *postmortem* must be many-
sided. Our ordinarily complex social economy has been through
5 or 6 years of world conflict; it is now going through the myriad
readjustments to the postwar political and economic situation.
Antagonistic group interests; the desire for better things on the
part of the consumer, the veteran, the industrial worker; the
psychological let-up after years of tension and shortages; all these
and many other strands are interwoven in the texture of our tran-
sition experience.

The principal explanations and hypotheses may be classified
for convenience under three headings:

A *Misjudgment of economic factors and relationships*
    1 Errors of assumption about levels and trends of autonomous
      expenditures
    2 Misclassification of items as autonomous
    3 Relation of disposable income to gross national product
      (chiefly attributable to changes in policy, see below)
    4 Choice of consumption function
    5 Importance of accumulated liquid assets and deferred de-
      mand
    6 Other factors: price trends and expectations; speed of recon-
      version; and supplies of goods

B *Misjudgment of socio-psychological factors*
    1 Consumer behavior—postwar spree?
    2 Veteran psychology—labor force; spending
    3 Business man's outlook—bullishness; realization of consumer
      psychology

C *Differences in policy from those assumed* (chiefly affecting A3)
    1 Tax changes: corporate and personal
    2 Price control: farm prices; cost of living
    3 Wage control
    4 Demobilization rates and G.I. benefits

A   ECONOMIC FACTORS AND RELATIONSHIPS

A1 *Levels and trends of autonomous expenditures*
In over-all terms the error of forecast in the autonomous expend-
itures does not seem formidably large (see App. I, Table 9). De-

fined to include all the items treated as autonomous in the set of Washington projections under review, the total error for fiscal 1946 was about $4.3 billion, only about 2.3 percent of gross national product. For the fourth quarter of 1945 the error was $4.9 billion; in the first quarter of 1946 it was only $2.7 billion. Nevertheless, the total effect of this error on the forecasts was not insignificant.[15] Furthermore, it is probably fruitful to consider the differences in composition of the autonomous factors, since it may be supposed that the multiplier effects of different components are not equivalent, as is implicitly assumed in the procedure followed.

In purely descriptive terms, and treating autonomous expenditures as equivalent in their effects dollar for dollar, it would appear that a correct judgment concerning total magnitudes in the fourth quarter of 1945, other things being equal, would have led to an estimate of $173 billion for gross national product, or halfway between actual and forecast (see Table 5). In the first quarter of 1946, on the other hand, the effect would have been negligible, in terms of this gross approach.

It is impossible, however, to apply *ceteris paribus* to this case so rigidly. Had we forecast *total* autonomous expenditures accurately, presumably the various components would have been closer. Military demobilization would probably have been correctly foreseen, giving a smaller military payroll and larger military transfer payments. The net effect would have been some increase in the disposable income associated with a given gross national product and some *additional* effect on consumption. It is of course idle to carry this sort of *ex post* speculation much further. All the factors discussed are so complexly interrelated that a complete explanation in terms of separate and neatly identifiable elements is difficult.

Government war expenditures fell considerably more sharply after V-J Day than was expected. (A principal factor was the

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[15] Cf. Klein, *loc. cit.* Klein's dismissal of errors in the autonomous expenditures as of no real importance is due partly to his failure to include all the items, in particular the allowance for 'extra' nondurables consumption; partly to changes in the actual data after he wrote his analysis; partly to his neglect of the possible significance of the differences in components, e.g., government war expenditures as against private capital outlays.

speedier demobilization of the armed forces, involving a deeper cut in military payrolls which was partly offset by increases in rates of pay.) The level from which cuts were made was in fact already lower than that used in the forecasts, according to revised data for the first half of 1945 (App. I, Table 1). In addition, the rate of cut-back was faster on the whole than the official schedules seemed to call for just prior to V-J Day, and the time pattern was different. Thus, the fourth quarter of 1945 rate of adjusted war expenditures had been forecast at $40 billion; it is now estimated to have been $43 billion. The first quarter of 1946 ran to $24 billion instead of the expected $33 billion.[16] The corresponding differences in total government expenditures are approximately the same. To be sure, some of the difference between forecast and actual reflects price changes from first half of 1945 levels. Our price data are, however, inadequate to permit proper correction and it is safer to take the actual data at current prices.

Total private capital formation, *per contra*, was considerably underestimated for fiscal 1946. As against a forecast of less than $13 billion, actual outlays were almost $20 billion. The first quarter of 1946 rate was over $23 billion in contrast to an expected $13 billion (App. I, Table 5). A goodly portion of the difference is accounted for by much heavier private exports (in part due to favorable prices abroad, in part to heavy foreign demand) than expected, so that the net export balance, e.g., in the fourth quarter, was $2½ billion larger than forecast, in the first quarter of 1946, $2.7 billion larger.[17]

Inventory accumulation ran at less than a billion dollars in the

[16] Some items in the gross national product accounts appear to have been shifted from war expenditures to exports in the net foreign balance; e.g., shipments of goods by the War Department for our occupation and civilian personnel abroad are treated as paid for by the enemy (occupied) country, and are deducted from government expenditures. There are likewise peculiarities of both timing and classification of certain Lend-Lease settlements, as well as continuing obscurities in the proper treatment of government corporation activities. No significantly large magnitudes are involved in these debatable points of method and classification.

[17] There is no good reason for classifying the export balance as private capital formation. It is a balancing item in the total accounts for the economy vis-a-vis the rest of the world, and ought to be shown as such. The revised series on national income and product recently published by the Department of Commerce have

fourth quarter instead of the $4 billion predicted. Consumer and business demand was so brisk, in the face of production bottle-necks and shortages, that the desire for larger inventory-pile-up could not be implemented. In the first quarter, however, despite heavy demand for goods, business firms managed to accumulate inventory at an estimated annual rate of $3.4 billion; the predic-tion was $2.0 billion.

Construction, both residential and nonresidential, has run con-sistently ahead of expectations. In the fourth quarter of 1945 it was a little less than a billion dollars higher; in 1946—first quarter —it was $3 billion higher (at an annual rate) than Hagen forecast. About one-fourth of the difference is attributable to price in-creases, the rest to physical volume. What this means is that build-ing materials—lumber, brick, cement, plumbing supplies, etc.— have been available faster than forecast, although still in acutely short supply relative to demand. Similarly, the flow of producers' capital equipment has been faster than we had thought possible, running about $2½ billion higher on the average in fiscal 1946. Thus, business investment in plant and equipment was rather considerably heavier than expected. Does this mean that it was in fact behaving as an exogenous factor, but that supplies were simply larger than hoped for? Or does it mean that business men, reacting to rising prices and a heavy backlog of orders supporting heavy current sales, expected a prolongation of the boom and helped to realize it by stepping up their demand for investment goods? We shall return to this query.

The forecast magnitudes of consumer expenditures for durable goods and rents were almost precisely correct if price changes are disregarded. Since prices, especially of major durables such as cars and refrigerators, have risen, the rate of real consumption (or better, purchases) was smaller than expected. The disappointing output of passenger cars and a few other major durables accounts for this difference.

The portion of nondurable goods consumption—the special demand for clothing and household goods coming chiefly from

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made this change among many others (*National Income*, Supplement to *Survey of Current Business*, July 1947).

demobilized veterans and their families—treated in the forecasts as autonomous has unquestionably been higher than assumed. Had demobilization been correctly forecast, more allowance would have been made in nondurable goods expenditures for such special demands over and above the prewar 'normal' relation between nondurable goods and disposable income. Instead of $2.0 billion per quarter at an annual rate it would have been nearer $3.0 billion. This effect has also been taken into account in Table 5.

So much for the descriptive facts and for the gross over-all effect of errors in autonomous expenditures. Let us now raise specifically the question about the composition of autonomous items, about illogical or unreasonable classification of some, about possibly different multiplier effects rather than equal effects.

A2 *Misclassification of autonomous items*

As we have noted, government expenditures on the whole fell more than expected, while private capital formation rose more. Is the multiplier effect on income and employment of a dollar outlay of private investment greater than the corresponding effect of a dollar of government expenditure? For example, plant and equipment outlays involve the whole economy—heavy goods manufacturing, construction, the distributive trades, transportation, etc.—and the income-generating and employment-supporting effects of such expenditures are considerable. In contrast, items such as civilian and military government payroll, or interest on the public debt—the latter paid largely to banks, corporations, and high income individuals—are not likely to have such substantial effects on income and employment, and the 'leakages' out of interest income into savings are substantial. Such items make up a large part of government expenditures on goods and services as defined and measured by the Department of Commerce.[18]

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[18] There is indeed considerable economic logic behind the view that interest payments on the public debt ought to be considered as a pure transfer item rather than an item of final product. This has consistently been the British treatment; it has been adopted in the recent complete revisions by the Department of Commerce of their gross national product—national income series (*Survey of Current Business*, Supplement, July 1947). One wonders whether from the same viewpoint the pay of the armed forces ought not also to be treated as a transfer payment.

There is no way at present to measure or infer the possible quantitative significance of the differences in effects suggested; one must fall back on the general plausibility of the point.

Furthermore, was it correct to classify private capital outlays—plant, equipment, and net changes in inventories—as autonomous during the transition period? For normal periods economists agree that investment is some complex function of general business activity—past, current, and expected—and that there is mutual interaction and interrelation between investment and other economic sectors. For the short-run transition period after the war it seemed plausible to many economists to think of capital *expenditures* at least as effectively independent of current or recent levels of business. That is, it was felt that *supply* factors would be determining since demand far exceeded any conceivable rate of available supply. In addition, even *demand* was apparently thought to be autonomous at least as far as it was based on accumulated needs for capital replacement (deferred maintenance, etc.) and on minimum requirements for expansion of facilities for peacetime production.

The question is whether the realization during the early transition months of higher levels of national economic activity, and of sales and profits, than perhaps business men expected, has not led to upward revisions of capital expansion and replacement plans. Has a climate of expectations highly favorable to investment been created, within which investment in substantial measure has been acting as a derived and *related*, rather than as an exogenous magnitude?

In some measure Hagen did, as already noted, consider the interaction and repercussion effects between investment, total output, and employment. Main reliance on what might be expected in the way of capital outlays by the chief industry sectors of American business was placed in the results of a survey of business intentions to invest in plant and equipment, and inven-

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The services performed are after all of a clearly immeasurable and transcendental nature; it might be preferable in such cases to attempt no valuation along market lines.

tory, during roughly the year following V-E Day.[19] In broad terms the survey showed that manufacturing industry planned to spend $4.5 billion on plant, equipment, and major alterations, far above prewar levels, even allowing for higher prices of investment goods; railways and covered public utilities planned similar capital outlays of about $1.5 billion, well above immediate prewar levels, but not as high as 1929. Capital outlays in these industries comprised less than half the total for the economy in prewar years—the other portion was accounted for by communication and the remaining transportation industries, miscellaneous other public utilities, trade, service and finance industries, and farmers. As the survey offered no clue regarding investment intentions it was necessary to guess possible maximum outlays for these industries.

The Department of Commerce survey leaves several points obscure. It is not clear whether reporting firms were suggesting their maximum or a sort of 'optimum' *demand* for capital outlays, or some portion of that demand representing minimum essential needs, or giving their notions of what they could reasonably expect to spend in the tight supply situation for construction materials, labor, and various kinds of equipment. Secondly, it is not wholly clear whether the intentions to spend covered only *new* construction and equipment or might cover also used plant, chiefly government surplus items. The forecasters assumed, in using the survey results as a guide to probable outer limits of expenditure for plant and equipment, that a considerable amount would be purchases of government surplus property, and would not reflect current production. Capital expenditure has expanded much more than expected and has been much more completely *new* capital

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[19] The survey covered manufacturing, railroads, and electric and gas utilities—with a sample of nearly 7,000 firms in manufacturing, and coverage of about 90 percent of all activity in the other three industry groups. Firms were requested to give information on planned outlays for new construction and equipment, maintenance and repairs, and increased inventory and on how they expected to finance these investments, and to state what levels of sales they expected during the first postwar year since "it was considered that capital expenditures for the years after V-E Day would be geared to sales expectations for the period shortly beyond that date". For a full discussion of this survey and analysis of its results see the articles by D. S. Wilson on 'Planned Capital Outlays and Financing', *Survey of Current Business*, June and July 1945.

formation since government surplus sales have moved slowly on the whole. The survey also failed to reveal plans and expenditures that were thought of as effectively independent of sales, profits, or other measures of economic conditions, as against those which were considered contingent and variable. There is some connection between this point and the one made above, since some outlays represent essential needs that cannot be postponed, for which firm commitments have been made, etc.[20]

It seems rather a distinct possibility that business firms did more consciously relate investment plans and decisions during the transition to current and prospective levels of sales, profits, etc. than most economic forecasters allowed for. Even more, as will be suggested, business men's *expectations* about the economic climate were much more optimistic than those of the Washington economists whose views commanded most attention; and actual developments may constantly have exceeded even those expectations, thus leading to further upward revisions of investment plans. This statement is borne out not only by plant and equipment expenditures but also by the sustained and general inventory boom we have been experiencing. Although explanation of the boom chiefly in terms of inventory accumulation is clearly inadequate, certainly the need for restocking of goods—refilling of pipelines—for civilian production has been a substantial factor in sustaining employment and has betokened a definitely optimistic feeling about the immediate future.

A3 *Relation of disposable income to gross national product*
A considerable part of the explanation of what went wrong with so many of the prominent Washington forecasts lies in their under-

[20] This sort of problem lies at the center of further exploratory work required to clarify the nature and operations of the investment function in our economy. The quarterly surveys of business plant and equipment outlays now being conducted by the Securities and Exchange Commission and the Department of Commerce obtain information on expected expenditures for two quarters ahead. There is real need to tie these data in with the kind of general economic climate the reporting firms expect, and to segregate, even roughly, expenditures that are really 'autonomous' and those considered to be likely or desirable depending on circumstances. Dynamic analysis, utilizing expectations and intentions data, is only in its infancy and can hope for many new clues and tools from such surveys.

estimate of the disposable income in the hands of consumers for any given level of gross national product. At levels of gross national product around $185 billion, the relation used by Hagen, for example, put disposable income in the fourth quarter of 1945 $7 billion below what it actually was. In the first quarter of 1946 the error was more like $9–10 billion (Chart 3).
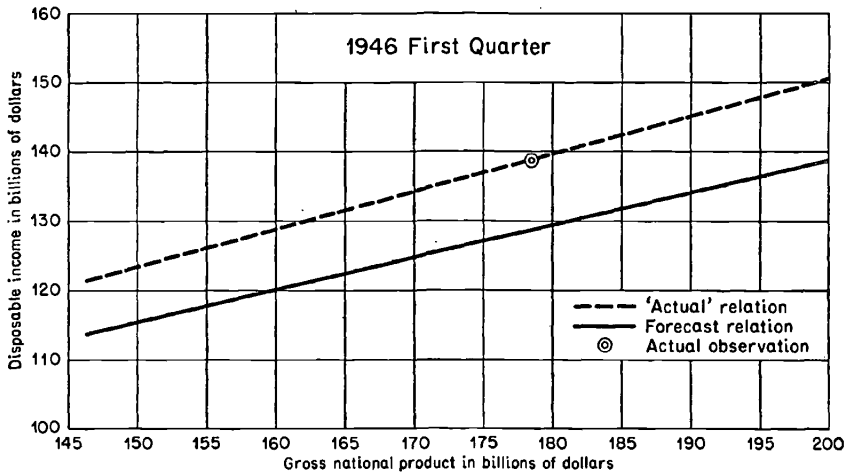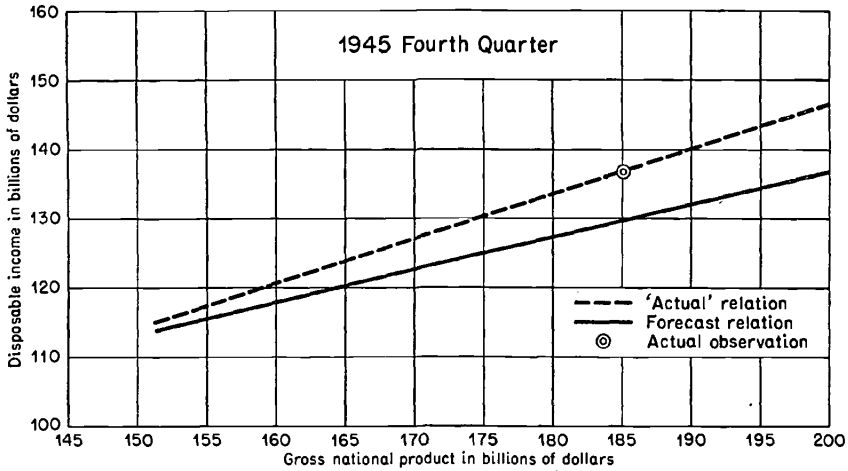
The forecasters' procedure was predicated necessarily upon specific assumptions concerning crucial policies affecting the levels of money incomes available for spending by consumers and business. The ratio of wages and salaries to gross national product is influenced by wage-rate policy in conjunction with price policy. In the forecasts it was assumed that the structure of wage-price control in effect on V-J Day would not be revised substantially. In fact, prices and wages rose considerably; and aggregate wages reached a level above the normal wartime relation with gross national product.

Farm entrepreneurial income likewise *rose*, absolutely and relatively, in the face of a declining gross national product. This too was due in part to a softening of price controls over farm products, and to a *change* in public policy.

Thirdly, an estimate of disposable income hinges in part upon assumptions about tax-rate policy and structure. The forecasts did take into account probable reductions in tax rates, both corporate and personal, at the beginning of 1946 (see App. II). Business and Congressional sentiment even before V-J Day made it clear that a substantial dismantling of the wartime tax structure was inevitable. The tax policy put into effect, however, was considerably softer than any of us expected or recommended. Consequently taxes have taken a smaller bite out of income produced and distributed.

Fourthly, transfer payments have been much higher than was expected. The far lower unemployment benefits have been more than offset by larger payments to veterans. In part this is due to the adoption by Congress of more liberal benefits to GI's, in part to faster demobilization. Military transfer payments per man have been higher than military pay per man so that the net effect on

CHART 3

Relation between Disposable Income and Gross National Product: Actual and Forecast 1945 Fourth and 1946 First Quarters

1945 Fourth Quarter

Disposable income in billions of dollars

- - - 'Actual' relation
——— Forecast relation
◎   Actual observation

Gross national product in billions of dollars

1946 First Quarter

Disposable income in billions of dollars

- - - 'Actual' relation
——— Forecast relation
◎   Actual observation

Gross national product in billions of dollars

income payments of speedier demobilization has been upward as demobilization proceeded.

Not all the elements explaining the higher level of income are matters of governmental policy changes. For example, business

charges to depreciation and other business reserves appear to have been lower than expected for a given level of gross national product; corporations have adopted a slightly more liberal dividend policy so that corporate savings are a smaller proportion of profits.

The net effect of these and other factors was to give a level of disposable income perhaps $7–10 billion higher for a given gross national product than expected. This difference, had it been correctly gauged, would have changed substantially all the forecasts of gross national product, consumption, employment, and unemployment. The estimation of the 'correct' functional relation operating in 1945–46 between disposable income and gross national product is necessarily very rough (despite one actual observed point and knowledge of policies in effect). However, a crude approximation, sufficient for present purposes, has been developed by the writer in order to suggest the relative importance of this error. Using the correct functions in the model system employed by the forecasters, and *holding other factors constant*, the system yields a solution for gross national product in the fourth quarter of 1945 of $171 billion instead of the forecast $165 billion (Table 5).[21] Since actual gross national product in current prices was $185 billion, roughly 30 percent of the difference would have been accounted for. Consumer expenditures likewise would have been estimated about $5 billion higher. Employment, estimated upon the same assumptions as were in fact made, would have been forecast roughly 1.5 million higher and the unemployment estimate would have been lower by the same amount.

For the first quarter of 1946 the effect of this disposable income factor is even greater, chiefly because of the larger tax reductions than expected. Use of the correct function for income would, *ceteris paribus*, have led to an estimate of gross national product $10 billion higher than that forecast, accounting for about half of

[21] A correct appraisal and forecast of the disposable income-gross national product function would necessarily have involved different forecasts of other elements, so that the condition of *ceteris paribus* cannot be strictly adhered to, even theoretically. For example, the estimate of autonomous factors would have been altered too, since, owing to faster demobilization, government war expenditures would have been set lower (reduced military payroll)—incidently offsetting some of the effect on the forecasts otherwise attributable to use of the correct disposable income function.

the difference from the actual figure of $184 billion in current prices. The employment estimate would have been correspondingly increased about 3 million, and unemployment would have been lower by the same amount. The effects would have been substantial.

TABLE 5

Effect of Alternative Assumptions on Forecasts
Fourth Quarter 1945 and First Quarter 1946
(billions of dollars)

	Gross national product	Disposable income	Consumer expenditures
Fourth Quarter 1945			
Actual data	185.2	136.9	113.0
Forecast	164.6	119.9	96.2
Effects on forecasts if (cet. par.)			
1 *Autonomous expenditure*[a] had been correctly forecast	173	124	100
2 *Disposable income function*[b] had been correctly forecast	171	128	101
3 *Total consumption function*[c] had been used	177	126	109
First Quarter 1946			
Actual data	183.7	138.1	121.0
Forecast	161.8	120.9	99.5
Effects on forecasts if (cet. par.)			
1 *Autonomous expenditures*[a] had been correctly forecast	167	123	103
2 *Disposable income function*[b] had been correctly forecast	172	135	108
3 *Total consumption function*[c] had been used	170	125	108

Actual data from Department of Commerce.
[a] Including an assumed excess of nondurables expenditure over the normal relationship.
[b] Using a crude approximation to the actual relation between disposable income and gross national product in each period (see Chart 3).
[c] Relationship fitted to data for 1929, 1933, and 1935–40, giving: consumer expenditures = 6.80 + .05 time + .806 disposable income (where time = given year −1935).

Clearly, much of the error involved in the income-gross national product relation is attributable to wrong guesses or judgments about policy changes, in part to deliberate avoidance of attempts to guess the probable course of, e.g., stabilization policy. Are the forecasters to be taken to task for this? Or is it sufficient excuse that they at least explicitly set forth the policy assumptions on which the forecasts were made? In any case for better understand-

ing and as a basis for improving future work it is well to know where error is due to faulty judgment or assumption and where to faulty statistical technique or economic reasoning.

A4 *Use of component rather than total consumption function*

All or a large part of the forecast error may be attributed to the choice of the wrong functional relation between consumption and disposable income (and possibly other variables). That is, economists may have selected an essentially incorrect theory of consumer behavior, at least for the period in question. This view, suggested by many, and subscribed to by the writer as a plausible partial explanation, has forcibly been put forward recently by Klein.[22] The view is essentially as follows: Since individuals ordinarily decide how much of a given income they will spend and save respectively, the community, an aggregate of individuals, does also.[23] Once having decided what to spend, the individual or community allocates spendings in various proportions among the various types or categories of goods and services (the 'grossest' categories being the tri-partite division into durables, nondurables, and services). The commodity pattern of consumption is presumably determined, within the total spendings budget, by many factors: habitual living standards, complementarity relationships among items, relative prices, etc.

The Washington 'model builders' elected a somewhat different theory and approach, based on the wartime behavior of consumer expenditures. In the prewar period there had been an apparently quite close simple linear relation between disposable income (or disposable income and time) on the one hand, and consumer expenditures for durables, nondurables, and services, respectively, on the other. During the war, with shortages or the elimination of major durables such as automobiles, and shortages of many services (e.g., domestic service), consumption for these two categories

[22] 'A Post-Mortem on Transition Predictions of National Product', *Journal of Political Economy*, LIV, 3, August 1946, especially pp. 298–9.

[23] Cf. Keynes, *General Theory of Employment, Interest and Money* (Harcourt, Brace, 1935), especially Chapters 8 and 9. Keynes of course measures his consumption and income concepts in terms of real wage units; also, he allows for various qualitative and psychological determinants of consumption in addition to the income factor.

fell in greater or lesser degree below the 'normal' relation (Chart 4 and App. Table 7). Despite this fact, and in apparent contradiction to the simple Keynesian hypothesis about total consumption and income, *the expenditures for nondurable goods in the war years stayed amazingly close to the simple regression line based on 1929–40 experience.*[24] Instead of 'spilling-over' into nondurable expenditures, the money not spent on durables and services flowed into savings, swelling the community's holdings of liquid assets such as currency, bank deposits, and federal government securities.

Many economists in Washington reasoned that nondurable expenditures would continue to vary closely with income, and essentially in accordance with the prewar function. However, in view of the special intense demands of veterans and their families for clothing, household textiles, and the like, some small deviation above normal—$2 billion—was allowed for. Expenditures for services (aside from rents) were estimated to rise toward the normal relation as supply conditions eased. Outlays on durable goods of course were expected to remain far below the normal relation to income, and to rise only as fast as increasing production permitted. Rents likewise were expected to rise very slowly, given continued rent controls and the almost complete inelasticity of supply of dwelling units in the short run. *Total consumption* was the sum of these four components.

Should we have used the prewar total consumption function and raised our estimates of consumer expenditures, gross national product, and employment? Does it give us an essentially correct interpretation of consumer behavior, from which the war years represent a peculiar and temporary aberration? There is considerable warrant, of course, in both theory and experience, for thinking that consumers first determine the proportions of income spent and saved, then allocate spendings among various categories.

[24] Nevertheless, as can be seen easily on Chart 4, from 1941 to the first half of 1945 nondurable expenditures also were depressed, on the average 5 percent below the regression line. There were shortages of some nondurables as well as of durables, e.g., meat and butter, clothing, gasoline. Likewise, price control operated quite effectively as a damper, even after allowances for hidden price increases, upgrading of goods, etc.

CHART 4

Relation between Consumer Expenditures and Disposable Income
1929 – 1946

Total Consumer Expenditures

The fitted line represents the net relation between consumer expenditures and disposable income, with time held constant at zero, in the total regression equation.
Consumer Expenditures =
6.80 + .05 Time + .806 Disposable Income
(Time = given year minus 1935)

Disposable income in billions of dollars

Durable Goods

The fitted line represents the net relation between consumer expenditures for durable goods and disposable income, with time held constant at zero, in the regression equation:
Consumer Expenditures for Durables =
−3.50 − .059 Time + .150 Disposable Income
(Time = given year minus 1935)

Disposable income in billions of dollars

CHART 4 *(concl.)*

Nondurable Goods

Consumer expenditures for nondurable goods in billions of dollars

Disposable income in billions of dollars

The fitted line represents the net relation between consumer
expenditures for nondurable goods and disposable income,
with time held constant at zero, in the regression equation:
Consumer Expenditures for Nondurables =
3.51 + .095 Time + .427 Disposable Income
(Time = given year minus 1935)

Services

Consumer expenditures for services in billions of dollars

Disposable income in billions of dollars

The fitted line represents the net relation between consumer
expenditures for services and disposable income, with time
held constant at zero, in the regression equation:
Consumer Expenditures for Services =
6.79 + .014 Time + .229 Disposable Income
(Time = given year minus 1935)

U. S. Department of Commerce
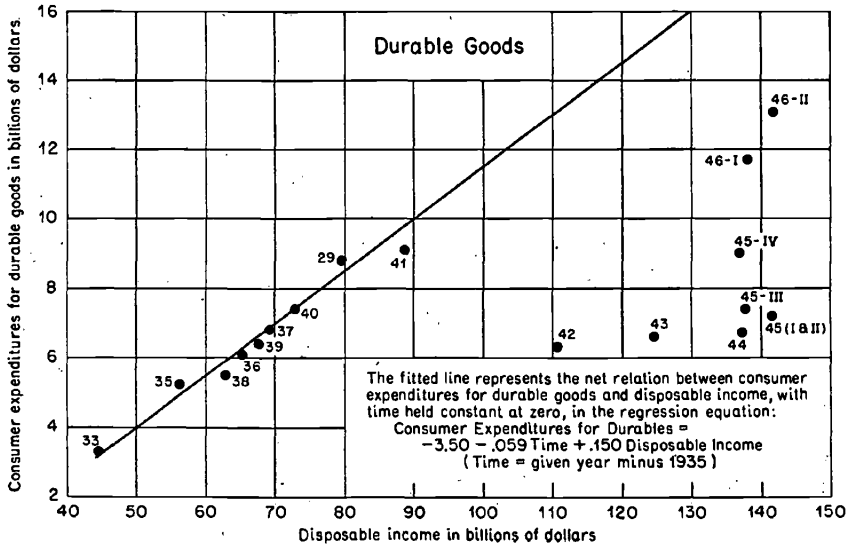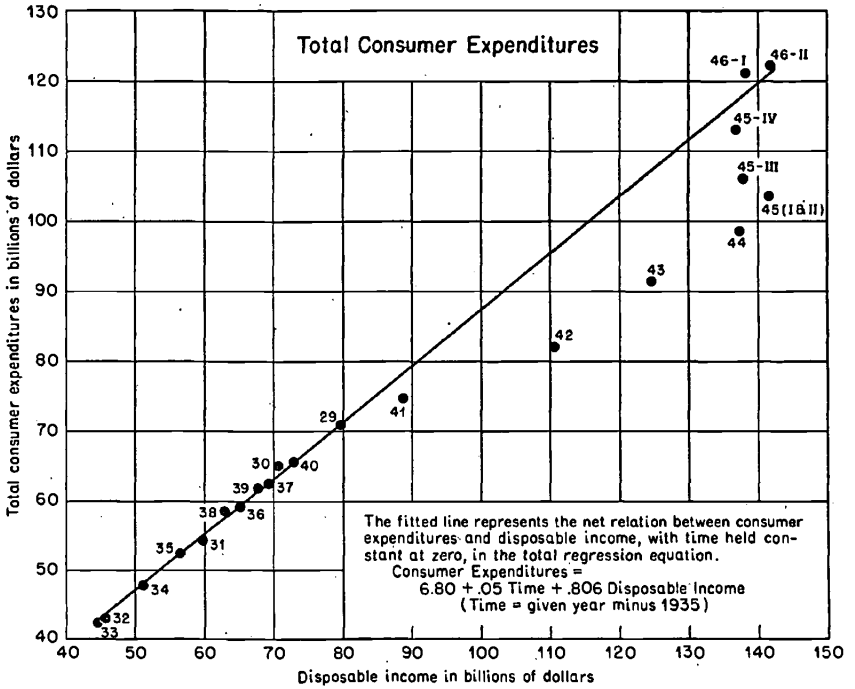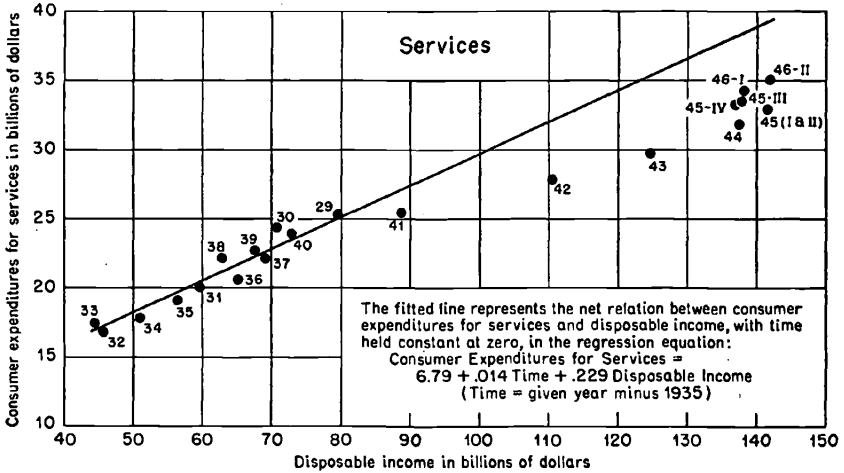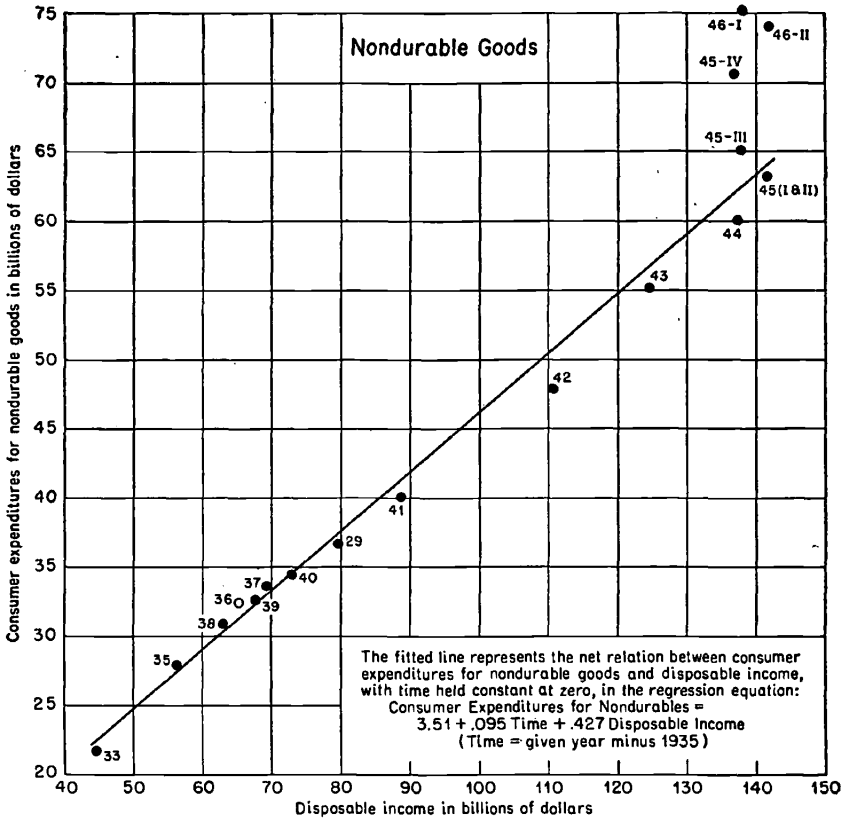
Certainly application of this approach would have vastly improved
the forecasts. For example, had the total consumption function
been used in the model system, and other assumptions and rela-
tionships held constant, the estimate for gross national product in
the 1945 fourth quarter would have been $177 billion (the forecast
was $165 billion and the actual $185 billion), accounting for 60
percent of the error in the forecast, and presenting a more 'effi-
cient' hypothesis than that based on the autonomous expenditures
or on the error in the disposable income function (Table 5). Of the
total error, $17 billion, in the forecast for consumer expenditures,
$13 billion or 75 percent would have been accounted for by this ap-
proach. For the first quarter of 1946 this consumption hypothesis
is almost as good an explanation of the errors as the disposable
income factor. It would have accounted for $8 billion of the gross
national product discrepancy and $8 billion of the error in con-
sumption (35–40 percent of the total error).

Clearly an error of this sort in the choice of an appropriate
theory of consumer behavior and an appropriate consumption
function is not in itself a sufficient total explanation. Other kinds
of errors of assumption contributed to the forecasting errors, as
has been demonstrated.[25] But the evidence that this theory of
consumption behavior is the correct or at least most plausible,
and that the total consumption function more nearly correctly
fits actual experience during the transition period should be re-
viewed.

The underlying theory has the force of simplicity, considerable
logic, and apparent consistency with prewar experience. (There
is much greater theoretical justification, however, for considering
that *real* consumption and *real* income are functionally related,
as Keynes assumes, than that the money flows in current prices
give the proper relationship.) Theory calls for other possible vari-
ables than current income in explaining the total variation in con-
sumption—preceding year's income, rate of change in income,
changes in the price level, interest rate, holdings of liquid assets,
etc. However, most empirical studies suggest that these variables

[25] Klein, *Journal of Political Economy*, LIV, 3, p. 298, is too sweeping in his claim
at this point.

do not add much to the statistical explanation of consumption, *at least for 1929-40.*

Important too is the question of just what type of function fitted to which period most accurately represents the true normal relation between aggregate consumer expenditures, disposable income, and other significant variables.[26] Most of the functions used by the Washington forecasters were of the simplest variety, relating consumption with income alone, either in 'real' or current dollars, or adding a time trend term. In general they were fitted only to 1929–40, chiefly on the statistical ground that adequate and consistent series are not available earlier. It is generally conceded that a longer period is necessary to represent properly the long-run consumption function, to separate secular from cyclical influences, etc.[27] Nevertheless, the differences in the forecasts due to using other *total* consumption functions would certainly have been fairly small and unimportant in comparison with the difference between using *any* total function and a battery of *partial* or *component* consumption functions.

In apparent support of the contention that consumers behaved after V-J Day in accordance with the simple aggregate consumption function used in the Washington models is the statistical record of consumption. According to recent Department of Commerce estimates, total consumer expenditures in the fourth quarter of 1945 were only 4 percent below the calculated function value at

[26] Our recent experience certainly emphasizes that the analysis of the basic determinants of consumption over time is still in its infancy, and that much more methodological and exploratory work is necessary. The literature on the subject is already voluminous. Of recent materials only a few are cited here: Arthur Smithies, J. L. Mosak, and Morris Livingstone, 'Forecasting Postwar Demand', *Econometrica*, Jan. 1945; W. S. Woytinsky, 'Relationship Between Consumers' Expenditures, Savings, and Disposable Income', *Review of Economic Statistics*, Feb. 1946; also in the same journal, V. Lewis Bassie, 'Consumers' Expenditures in War and Transition', Aug. 1946; Irwin Friend, 'Relationship between Consumers' Expenditures, Savings, and Disposable Income', and L. H. Bean, 'Relation of Disposable Income and the Business Cycle to' Expenditures', both in the Nov. 1946 issue. See also T. Haavelmo, 'Methods of Measuring the Marginal Propensity to Consume', *Journal of the American Statistical Association*, March 1947; Louis Paradiso, 'Retail Sales and Consumer Incomes', *Survey of Current Business*, Oct. 1944. See also Part V of this volume.

[27] This view has been fully and forcefully developed, for example, by Modigliani.

the actual disposable income. In both the first and second quarters of 1946 the observed data were practically on the regression line (see Table 6 and Chart 4). As tentative third quarter figures further reinforce the hypothesis, there is about one full year of post V-J experience suggesting the active operation of the total consumption function. Does this prove the hypothesis we are discussing? Or are other explanations equally cogent? Is the close correspondence between observed and calculated values for consumption systematic or fortuitous? What will tend to happen from now on as supplies of durable goods become more plentiful: will total consumption rise above the prewar function or will it remain on or close to it, and will nondurable expenditures recede as durables and services rise toward 'normal'?[28] What would nondurable outlay have been if durables had been produced in larger amounts?

TABLE 6

Estimates of Consumer Expenditures at Actual Disposable Income
Third Quarter 1945 to Second Quarter 1946
(billions of dollars; seasonally adjusted annual rates)

Period	Actual disposable income	Total consumer expenditures		
		Actual	Using total con-sumption function[a]	Method used in forecasts[b]
1945 III	137.9	106.0	118.5	105.6
1945 IV	136.9	113.0	117.7	107.4
1946 I	138.1	121.0	118.6	110.8
1946 II	141.9	122.1	121.7	117.3

Actual data from Department of Commerce.
[a] Total consumption = 6.80 + .05 time + .806 disposable income (time = given year − 1935). Fitted to the data for 1929, 1933, and 1935–40.
[b] Expenditures for durables, rent and part of the excess of nondurable consumption treated as autonomous. Nondurable expenditures estimated from relation to disposable income and time. The estimates for services (excluding rent) are the relationship values arbitrarily lowered in the same proportions applied in the original forecasts to allow for deficiencies on the supply side.

It is the phenomenal and quite unexpected rise in nondurable expenditures since the war that has been most striking. In the fourth quarter of 1945 these expenditures ran $7.6 billion above

[28] The spread appears to be increasing, for figures for the fourth quarter of 1946 (*Survey of Current Business*, Feb. 1947) show total consumption running $5 billion (at an annual rate) above the calculated value. Furthermore, nondurables continue to rise sharply and are *more* rather than less above the function value.

the relationship value and in the first quarter of 1946, $11.6 billion, or 18 percent, above. Their trend increase since the war has been very sharp (see Chart 4). It appears that consumer income, which could not find customary outlets in durable goods during the first postwar year, has 'spilled over' into the nondurable goods areas, in which supplies have been more abundant, prices possibly relatively favorable, etc.[29]

Why did this spill-over effect fail to appear during the war? Why did the prewar total spending-saving relation cease to operate? During 1942–45 the ratio of savings to disposable income rose at times to as high as 30 percent; the normal range is 10–15 percent. Several factors were contributory: significant shortages in many nondurable goods—clothing and household textiles, gasoline, and many others; price and rationing controls that were effective far beyond expectations and had a great deal to do with dampening consumption; a powerful, sustained, positive national campaign to encourage savings, particularly in the form of government war bonds. Although, as noted earlier, nondurable expenditures stayed near the 'normal' regression line, they fell somewhat below it. There seem in any case to be both logical and psychological reasons why they did not rise above it. An individual can consume only so much food, etc. Even allowing for a tendency to shift to higher-priced (and perhaps higher-quality) goods when income rises, there is still a saturation point. Price controls and rationing would brake increases in money expenditures further. Quality deterioration, less variety of choice, etc. all tended to

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[29] To explain the heavy shift of demand to nondurables, Klein, *Journal of Political Economy*, LIV, 3, advances as an additional hypothesis the argument that prices of nondurables have in fact been significantly lower relatively than prices of durables (meaning of course major durables). The prices of unavailable durables are of course effectively infinite! However, the writer is inclined to doubt the quantitative significance of this factor in explaining consumption behavior, even if price relationships have been as alleged. The practical point is that no matter how *low* the prices of durables might have been, actual expenditures could not have been larger, for there was no more to be bought. That is, prices must be considered in relation to the urgency and extent of demand—in the case of major durables, for which accumulated deferred demand is large, total demand for some time to come will probably far exceed any conceivable supply at any price. For normal periods, of course, the relative price factor may be more significant in determining the level and pattern of consumption.

dampen consumer enthusiasm for frittering away wartime earnings. On the more positive side, many thousands of families found it possible for the first time to save substantial amounts systematically; payroll deductions for war bonds, in particular, were a convenient means. Scarcity of major durable goods meant postponement of purchases and the earmarking of savings. Shoddy clothing, beyond minimum current requirements, and more expensive restaurant meals are not attractive competitors of the shiny new cars and refrigerators, the dream-houses, etc. promised for the postwar world.

Why then did this restraint seem to evaporate so swiftly and completely at the end of the war? Houses, cars, and durable goods were still unavailable; why did consumers 'boil over' in impatience? The fact that it was no longer patriotic to skimp and be shabby may be part of the answer. Several additional factors, however, also bound up with the aftermath-of-war psychology, contribute to an explanation. It is these factors, discussed below, that make the analysis based simply upon the restoration to full effectiveness of a prewar 'normal' total consumption function seem a little too pat, too mechanical.

It is perhaps idle to speculate whether, if durables had been available in greater quantity, we would have experienced the nondurable goods spending spree. Would total expenditures have considerably *exceeded* the total relationship value, or would they have been about the same, and the allocation among categories been different? Some of the lines of the hypothesis suggested below tend to support the feeling that a large part of the nondurables splurge would have occurred in any case, and that total expenditures would have been considerably higher than they have been. One wisp of suggestive evidence: data for the third quarter of 1946 show that while the annual rate of durable goods outlay went up from $13 billion to $15 billion, a rise of 14 percent over the second quarter, nondurables outlay rose from $74 billion to $78 billion. Moreover, this put nondurables outlay 15 percent above the expected relationship value—a greater relative excess than in any period except the first quarter of 1946. In the fourth quarter of 1946, when durables rose to a rate of nearly $17 billion, outlay for

nondurables rose $3.5 billion to a total of nearly $82 billion, or 17 percent above the normal relation.

The apparent wartime behavior of nondurable expenditures was misleading in another sense. Reliance on the money relationship with income tended to obscure the extent to which physical consumption was declining owing to shortages, and real satisfactions diminishing owing to quality deterioration, upgrading of merchandise, etc. Had the analysis been in real terms, however crude the deflators, the actual decline of consumption below 'normal' would have been more apparent. As a result of wartime unavailability or shoddiness of many nondurables, consumer inventories of clothing, household textiles, etc. have been considerably depleted. There has undoubtedly been a substantial accumulation of deferred replacement needs and demands, not alone for veterans but for the civilian population in general. Closely related is the unusual spurt in marriages and births. Retrospectively, some special allowance for the effect of this accelerated rate of family formation on postwar consumption seems to have been called for; only in part was it taken care of by the modest allowances for excess nondurables consumption in the projections by Hagen and others.[30]

Another question has to do with the possible nonlinearity of the consumption function at the high levels of income prevailing in recent years, far above prewar, on which our relationships are based. The hypothesis of linearity is the simplest and seemed to work in the past but we have little 'normal' experience with sustained high-level income and consumption by which to test alternative hypotheses, although there is some theoretical reason for expecting the function to become concave downward.[31] If the 'true' function is of this character, actual consumption has been above its expected value.

In summary, the view that a large part of the forecasters' error lay in using component rather than total consumption relation-

[30] Cf. V. Lewis Bassie, *loc. cit.*

[31] This may depend in part on what happens to the relative size distribution of income as income rises and the effect of changes in the distribution on consumption. At present these points are among the most obscure in the analysis of consumption.

ships remains highly plausible. The evidence supporting it is rather strong, though still circumstantial and possibly fortuitous. In any event it is not in itself a sufficient explanation of the entire error, as was noted. However, several other factors help to explain the behavior of consumption during the transition period.

A5   *Accumulated liquid asset holdings*

The possible influence of cash balances on changes in the level of consumption has been discussed at length recently. Although it adds something to the explanation of consumption trends, the size of personal cash or liquid asset holdings before the war was too small, even relative to income levels, to make much difference. During the war, holdings of cash and war bonds by individuals rose enormously, relative to both prewar holdings and wartime incomes. The possibility that they might appreciably affect the level of postwar consumption must be considered, but unfortunately cannot be tested adequately as yet.[32]

The most concrete and suggestive evidence is that offered by the National Survey of Liquid Assets.[33] This study tends to sup-

[32] The most extreme views on these possible effects have been advanced especially by W. S. Woytinsky, 'Postwar Economic Perspectives', Part IV, *Social Security Bulletin*, March 1946. For further discussion see the articles in the *Proceedings of the American Economic Association*, May 1945, especially one by J. J. O'Leary, 'Consumption as a Factor in Postwar Employment'. As early as mid-1943 E. T. Weiler also cautiously suggested the danger under certain conditions of a postwar inflation attributable to accumulated liquid savings. Cf. 'Wartime Savings and Postwar Inflation', *Survey of Current Business*, July 1943. Also see Gardiner C. Means in the *American Economic Review*, Papers and Proceedings, May 1946; V. Lewis Bassie, *loc. cit.*

[33] This study, conducted for the Federal Reserve Board by the Bureau of Agricultural Economics, was based on a national sample of about 3,000 households. Families were interviewed early in 1946 concerning their holdings of liquid assets (defined as demand and time deposits, and United States savings bonds); total income and total net savings in 1945; and their intentions to spend or otherwise use their liquid assets during 1946 or beyond for durable goods, housing, and other items. The results of this survey are extremely interesting but at many crucial points inconclusive. They bring out an expected high concentration of liquid asset holdings among families; e.g., 60 percent of the total assets held by the top 10 percent of spending units classified by *size of assets*, involving total holdings of $3,400 or more; however, when classification is by 1945 incomes, 36 percent of total liquid assets are held by the top 8 percent of income recipients, or those with incomes of $5,000 or more. The bottom 20 percent of income recipients (under

port the idea that on the whole families did not intend and did not want to spend their liquid assets in 1946 on such things as automobiles, refrigerators, and consumer goods generally. Apparently people preferred if possible to buy out of income, or perhaps borrow on short-term (by means of installment credit).

To conclude that the study fails to indicate any tendency for accumulated liquid savings to support abnormal spending and contribute an inflationary effect would be hazardous. In the first place the results of the sample survey when 'blown-up' fail to account for large amounts of aggregate bank deposits known to be in the hands of individuals, although the check with national totals of United States savings bonds is much closer. The survey omits also holdings of cash, the circulation of which has been enormously expanded. To assume that considerable portions of these omitted amounts may be held by middle and low income groups is reasonable. Further, liquid assets designated as possibly 'hot money' for 1946 in consumer durable goods markets amount to perhaps $10 billion, certainly not an inconsequential potential addition to spending from current income. Finally, and most important, the survey failed to put intentions and attitudinal questions in the most significant form: to wit, the possible effect of liquid asset holdings on decisions to spend or save (including going into debt) from current income, i.e., the effect on the total propensity to consume function. The survey did tend to show that people at *a given level of income* did not expect to save as much in 1946 as they had in 1945. But whether this might mean a significantly lower saving-income ratio than before the war is not revealed.

We must therefore still leave some things to inference. Certainly there is reason for doubting the firmness of intentions to buy or not. How will people react when they actually see the new

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$1,000) accounted for 7 percent of holdings. The concentration of current savings (out of 1945 incomes) is somewhat greater, as might be expected. Description of the methods and results of the survey and considerable analysis of the findings are contained in several reports; see the three BAE reports, *National Survey of Liquid Asset Holdings, Spending and Saving*, released June-August 1946; and three articles on 'A National Survey of Liquid Assets', *Federal Reserve Bulletin*, June, July, and Aug. 1946.

automobiles, etc., or when they see their neighbors with them?
How will higher prices—coupled perhaps with expectations of
further rises—affect demand?[34] On the whole, the more dispersed
the holdings and the smaller the average amounts held, the greater
the likelihood they may be spent in a diffused and unplanned way,
since the incentive to plan or to accumulate further is less likely
to be strong. The aggregate amounts of liquid assets held by low
or medium income families are not inconsequential—even though
a small fraction of total holdings—and their rather wide dispersion
in small average amounts, tends to make them a volatile factor
in consumer goods and housing markets.[35] That liquid asset hold-
ings have been operating since V-J Day to induce abnormally
heavy consumer expenditures (chiefly for nondurable goods and
some services), is certainly a possible and even strong hypothesis.

A6   *Other economic factors*
As noted earlier, the projections under discussion were couched
in terms of real output, valued at first half of 1945 prices (in some
models 1944 prices). The specific assumption was that price and
wage control policies in effect on V-J Day would remain substan-
tially unaltered. It was expected (implicitly) that prices would not
change or would change so little and so gently as to affect the
course of economic development insignificantly. Have prices and
price expectations not been playing a much more active and posi-
tive role in the transition period?

Despite strong Administration pleas for the continued need of
stabilization controls—supported in part at least by some ele-
ments of labor and business—several programs were rapidly
abandoned or weakened after V-J Day. Furthermore, there was a
rather steady pressure by lobbyists, in the press, etc. for the elim-
ination of all price controls, for drastic cuts in taxes (especially
corporate taxes), for the abolition of materials production and
distribution controls by the Civilian Production Administration,
etc. A climate of expectations looking to much freer markets was

[34] The Survey of Liquid Assets tended to suggest that if prices rose in 1946, people
would spend more and save less rather than lower their standard of living or
abandon their plans for improving it through increased purchase of durables, etc.
[35] See *Relation of Saving and Holdings to Income* (BAE, July 1946), Part Two, p. 14.

implanted in business; to the public, price inflation seemed likely.[36]

Between V-J Day and the end of 1945 numerous controls were relaxed, several subsidy programs were dropped, a large number of items minor to the cost of living index were decontrolled, a considerable number of wage increases granted under a liberalized wage-price policy were reflected in upward adjustments of price ceilings, etc. Nevertheless, prices did not move strongly upward at first: by the end of 1945 the cost of living index was .5 percent above the August 15 level; the wholesale price index was up 1 percent; the index of prices received by farmers was up 1.5 percent.[37] By June 1946, however, these indicators stood 3, 7, and 7 percent respectively above their positions on V-J Day.

The rising trend of prices has been enough to support a considerable speculative fever—apparent in the scramble for inventories, in the housing and building materials fields, and in other commodities markets. It has been reflected in the behavior of the stock market since V-J Day (Chart 5). Given the kind of postwar consumer psychology that seems to have been prevalent, and the large volume of pent-up demand for goods and services, the price increases we have had, together with expectations of further rises, have probably led to increased rather than decreased real consumer demand for goods in general. (Evidences of 'buyer strikes' for specific commodities, e.g., meat or butter, are likely to be dangerously misleading.)

It is thus likely that rising prices have contributed actively to both investment and consumption demand during the transition, creating a buoyancy that helped sustain employment and income through the reconversion period.

The physical process of reconversion itself has also been faster on the whole than was thought possible in August 1945. Well under way in 1944, it probably went further than WPB rules sanctioned.[38] Moreover, just as business—for its own purposes—

[36] President's Executive Order 9599, looking to the earliest possible removal of wartime controls without endangering economic stability, probably contributed to this state of mind.
[37] The handiest compendium of post V-J Day price, wage, and other stabilization developments is to be found in the Quarterly Reports issued by OPA and OWMR.
[38] C. Lowell Harriss made essentially this point in commenting on this paper.

Chart 5

Retail, Wholesale, and Stock Market Prices
1945 – First Half 1946

Index
120

Retail and Wholesale Prices
(Index 1944 : 100)

Wholesale

Retail

U. S. Department of Labor

Index
160

Stock Market Prices
(Index 1935-39 : 100)
Average Weekly Data

VE Day

VJ Day

Standard and Poor's Corp. – 402 stocks
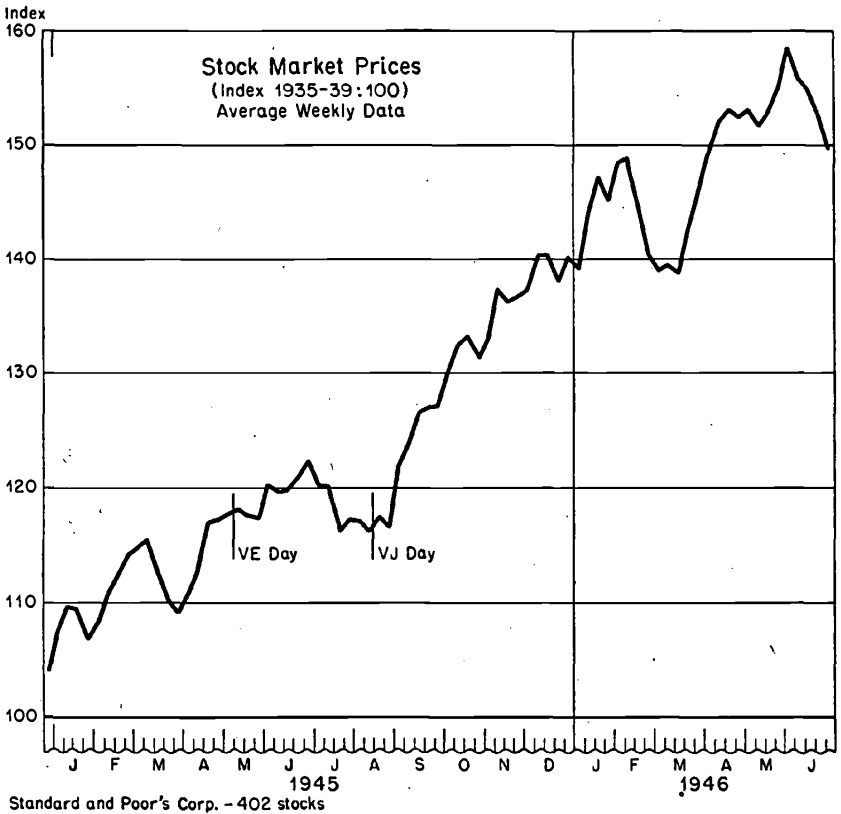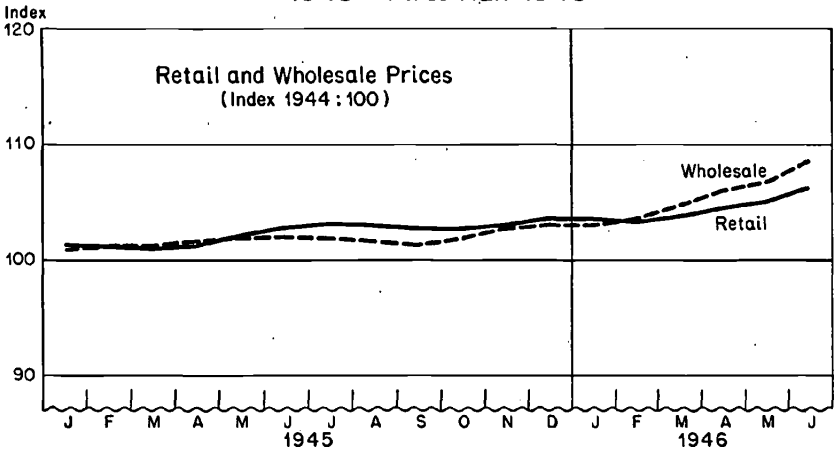
tended to play up the problems of conversion to war, so it probably 'over-sold' on problems of reconversion. Expectations of excess profits tax removal early in 1946 also tended to favor piling up reconversion costs as much as possible in late 1945. Consequently, employment and wages were unexpectedly well-sustained, especially relative to current production and sales, by converting industries; and supplies of goods, despite disappointments and set-backs (as e.g., in the case of automobiles), in general were more quickly available than was implicitly assumed in the projections.

Although the factors discussed above have undoubtedly contributed to the postwar boom, they seem to the writer relatively minor facets of the explanation. A more important line of analysis is the kind of socio-psychological climate that has prevailed since the war, particularly its effects on consumption.

B   POSTWAR SOCIAL AND PSYCHOLOGICAL FACTORS

It may be argued—quite seriously—that the explanation of post V-J Day consumption behavior lies essentially in the socio-psychological realm rather than in any systematic economic or statistical analysis. Perhaps the relative youth of the forecasters made them insufficiently aware of and unimpressed by the lessons of aftermaths of other wars; economists of an older vintage tended to do better because they relied more on history.

Release from wartime tensions and repressions, the desire to cut loose, to spend and enjoy, is a favorite 'popular' theory.[39] Its popularity does not make it any the less important from a scientific viewpoint, even though its terms of reference are somewhat vague, its concepts 'fuzzy', and evidence in support of it indefinite or at least nonquantitative.

What are the tangible elements of such a theory? How does one go about showing that it 'works'? Several suggestions come to mind, but almost all are either insusceptible to statistical treatment or else the necessary data do not exist.

One of the more significant and concrete ideas that such an 'institutional' approach suggests is the need, especially in the

[39] See, e.g., the rather interesting treatment of the Washington forecasts by Jesse Friedman in the *New York Times* Sunday Magazine, Sept. 15, 1946, 'When Economists Gaze into the Crystal Ball'.

aftermath of war, to analyze consumption in terms of groups of people rather than classes of commodities. While the latter is essentially technological, taxonomic, or statistical in nature, the former is necessarily conceived in terms of diverse social patterns, the dynamics of motivation and response, etc.

No better example can be found than the obvious need for studying the postwar income-spending-saving psychology of the veterans. It is not enough to deal only with the 11 million men and youths demobilized between V-J Day and the end of 1946. The social behavior pattern we are concerned with involves additional millions of civilians—wives and sweethearts, parents, even old friends—whose desires and actions have been merged in greater or lesser degree with those of the boys coming back home again. At the time of or after discharge veterans have been treated fairly liberally by the government as far as money payments are concerned—these 'transfer' payments exceed the army or navy pay previously earned. During the war large numbers of men in the armed services saved regularly, even if in small amounts, chiefly in the form of war savings bonds.[40] Obviously no group in our population underwent as much strain or suffered such deprivations as the armed forces. There is abundant reason to have expected, therefore what apparently has occurred, that demobilized veterans have been consumer-goods hungry, eager for relaxation and good times, eager to 'get away from it all'. Needing or strongly desiring new clothing, wanting to take in sports, leisurely travel, and recreational activity of all sorts, desiring to find a home and start a family—requiring also furnishings and equipment—all these factors have certainly operated to make of veterans and collateral relatives perhaps the freest spending social group since V-J Day. And as the number demobilized and the money income were much larger than had been generally forecast in Washington, it is likely that in the market effects of veteran spending we have an especially important partial explanation of errors in the forecasts.[41] The

[40] Since National Service Life Insurance policies involve no true savings feature and carry no cash surrender values, they are not a factor.

[41] How the labor market behavior of veterans also helps to explain the low levels of actual unemployment (as currently defined and measured in the official Census statistics) since V-J Day is shown in Appendix I, Tables 2–5.

small numerical allowance made in the forecasts for such an effect now appears to have been woefully inadequate.

But veterans cannot be the sole explanation. Industrial workers in the war centers, some groups of farmers, government workers, etc. must have felt a sense of relief from war accumulated fatigue and tension, a diminishing of the pressure to abstain from spending as they pleased, to save and buy war bonds, etc. Although a 'spending spree' psychology in the population at large is difficult to define or measure, it is not unlikely that it has been operating. There are many straws in the wind. As has been seen, the abnormally and unexpectedly large nondurables consumption has been reflected in record retail sales. Particularly have the sales of 'luxury' items, despite high prices and excise taxes, been rising further than ever above 'normal' relationships to income. Expensive types of clothing, jewelry, alcoholic beverages, restaurant meals are among the items reflecting such a national splurge.[42] Attendance at sports events, recreational travel (by auto and by public transportation), and other 'enjoyment' services have expanded greatly since the war. The Liquid Assets Survey furthermore suggested, as noted, that people felt they would spend more in 1946 than 1945 partly because they expected higher prices but yet would not want to lower their standard of living. This insensitivity to higher prices—in many cases even coupled with realization of shoddy quality and 'bad buys'—has probably been much greater in the postwar months than it normally would be. Consumer debt has begun to rise significantly, as durable goods trickle back even though at high and rising prices. Although there have been instances of effective consumer resistance to high prices, there has clearly been in general an enormous excess of demand in all markets, contributing to higher price and larger money expenditures.

Not only consumers but business men also have shared in the typical postwar psychology, and by their bullish activities heightened the boom. The considerable excess of business investment in new plant and equipment over the forecasts is in part due to

[42] See Louis Paradiso, 'Retail Sales and Consumer Income Since V-J Day', *Survey of Current Business*, Oct. 1946.

speedier completion of reconversion and greater availability of supplies. In part, however, and more significantly, it is due to more intense demand arising from a bullish climate of opinion. A rising trend of intentions to spend on plant and equipment is revealed by the successive quarterly surveys conducted jointly by the Department of Commerce and the Securities and Exchange Commission covering all nonagricultural industry.[43] Actual estimated outlays for the fiscal year 1946 turn out to be $9.0 billion—considerably higher than expectations on V-J Day.

Similarly, the demand for goods to fill up inventory pipe lines has been somewhat stronger and more sustained than was expected. Even allowing for price rises, the rate of real inventory accumulation has been the highest ever recorded. Nevertheless, because the tremendous market demand makes accumulation difficult, actual inventory holdings have never become abnormally large in relation to sales.[44] Inventory holdings may even be somewhat larger than reported, because business men desire to conceal swollen inventories or because new firms are not included in current samples.

This active sustained business demand reflected a very powerful undercurrent of optimism among business men regarding the transition period. For one thing, because they are closer to markets and customers, they realized better than most economists the intensity of needs and pent-up demands for countless consumer goods. In other words, they grasped the underlying psychology of consumers and encouraged it in various ways. They could not believe that a serious 'slump' was around the corner just because the government had stepped out of the market so fast—after all, they had a large and growing volume of unfilled orders for peacetime products. Everywhere there was evidence of a prosperity spirit—plenty of 'restless' money, not too critical of either price or quality.

The optimism with which the business community viewed the

[43] See the quarterly releases issued jointly by these two agencies, which show for a sample of corporations the actual outlays for two quarters and expected outlays for an additional two quarters.

[44] Cf. D. S. Wilson, 'Postwar Role of Business Inventories', *Survey of Current Business*, Oct. 1946.

postwar world—at least for some time ahead—was evident also in the behavior of the stock market. Before V-J Day the market apparently had discounted completely the effect of cut-backs in government military procurement programs—since these began early in 1945, even before V-E Day, some of the shock had already been absorbed. Anticipating the end of the war, the WPB already in 1944 aided business in preparing for reconversion, allowing some re-tooling, clearing of plants, etc. In the weeks just before V-J Day the stock market sagged (Chart 5). However, from about V-J Day on the steady and spectacular rise in the whole market was sustained without serious break until February, when some big strikes crippled production. Expectations of price increases, tax reductions, and large volume sales apparently far outweighed in business minds the impact of reduced government spending.

Given such a climate of business and consumer expectations, how could virtually full production and full employment fail to be maintained? Looking backward it seems incredible that we could have missed the signs so badly. Since some can honestly say their forecasts were more accurate even if less complete, less systematically and sophisticatedly arrived at, it will be instructive to see what they predicted. Only a small and perhaps not representative sample—inside and outside government—can be touched on here. Our chief aim is to examine their *methods* to the end of knowing what lessons for the future can be learned from them.

OTHER FORECASTS

The Washington forecasts so far discussed represent the most ambitious and concerted attempt to suggest the probable economic pattern for the transition period. They proceeded, on the basis of certain assumptions, by quantitative and mathematical methods and relationships, to lay out a complete and internally consistent set of projections for all important sectors of the economy. The results have been thoroughly discussed above.

About the same time, that is, during the summer and early autumn of 1945, many other economists were engaging in this pastime of projecting postwar trends. Some kept their results darkly secret. Others, in as well as out of Washington, felt repelled,

unconvinced by the deflationary prospects held out by the fore-casters already discussed. From those who failed to convert their hunches and intuitive insights into concrete or systematic sets of forecasts we cannot easily learn anything concerning methods or processes of analysis.

It is impossible, and hardly the purpose of this paper, to canvass and analyze all the forecasts made before or around V-J Day by economists and statisticians in government, business, labor, or academic circles. This may be the task of some future economic historian.[45] Instead I shall briefly discuss or mention only a few sets of forecasts; they must serve as representatives for many others.

Woytinsky's forecasts

Woytinsky has set forth his views in four substantial articles, col-lectively entitled 'Postwar Economic Perspectives'.[46] Basically, his approach is historico-analytical rather than through the use of systematic econometric methods ('model-building', etc.). Care-fully and skilfully he marshalls the facts of experience concerning the aftermath of World War I in terms of inflation and deflation, boom and bust. References are made to other postwar periods, for this and other countries. He concludes that it was highly im-probable, indeed almost impossible, for deflation to set in after World War II, as expected in the dominant Washington projec-tions. Instead he strongly advances the thesis that an inflationary boom was practically inevitable.[47] Why?

[45] A very useful tabular summary and comparison of many of these forecasts—including projections to 1950 as well as for the transition period—appeared in *Business Conditions*, Federal Reserve Bank of Chicago, Oct. 1946. In an unpub-lished discussion paper on the *Consumption Function Controversy*, prepared for a Federal Reserve System Committee on Forecasting Techniques, Martin Bronfen-brenner has some interesting comments on the forecasts and explanations of the errors. See also Woytinsky, *Journal of Political Economy*, April 1947, p. 143.

[46] *Social Security Bulletin*, Dec. 1945; Jan., Feb., and March 1946. Most of the material and analysis relevant to our discussion is in the last of the series. The basic estimates and judgments were formed in the summer and early autumn of 1945.

[47] *Social Security Bulletin*, March 1946, p. 16: "However, the hypothesis of an expansive economy in postwar years has not been picked up at random. . . . It has been selected rather on the basis of economic and historical analysis that pointed to this type of development as most probable."

First of all, any major war diverts a large share of the national resources to the production of munitions and war goods. In the face of inflated incomes and the expansion in total productive activity originated by the war, civilian wants go unsatisfied. As a consequence partly of goods shortages, partly of positive inducements, consumers save disproportionately large amounts of their income; 'liquid assets' accumulate in various forms. But large portions of them at least simply represent deferred spending— they are 'tagged' in general for things temporarily gone without. Or as Woytinsky aptly puts it, whereas in peacetime "a consumer saves mainly for a rainy day . . . in wartime he saves mainly for a bright day. He thinks of the day when the war will be over, when new cars, refrigerators, washing machines, radios, and other coveted durable goods will reappear on the market; when he will be able to buy or build a home to his taste; when he again can buy gasoline freely; when the horrors of war will no longer interfere with his desire for leisure and pleasure."[48]

This was presumably the consumer motivation and psychology during and after World War I; it appeared to be so on an even greater scale during and after World War II. Wartime accumulations of liquid assets were vastly larger than ever before in our history; the backlog of demand for goods, for houses, for travel, and education was apparently tremendous.

Not only was consumer demand active and high. Business firms too had to abstain from expansionary investments in facilities, to get along on thinner inventories than customary, etc. They too had accumulated huge cash and security reserves out of wartime profits.

Almost of necessity then, the economic system, after a long hard war, tended to expand to the limits of its productive capacity and mass unemployment was next to impossible. In the recent war and its immediate aftermath there were additional special factors differentiating the postwar outlook from, say, the situation leading to the 1920–21 collapse. Prices were held under control this time; rationing was quite successful. Consumers on the whole disciplined themselves to new wartime restrictions and shortages. Continued controls after V-J Day held inflationary forces in check,

[48] *Ibid.*, p. 20.

or at least within bounds, during the period when reconversion to civilian production was under way and supplies were quite stringent. It takes considerable time for civilian output to satisfy accumulated demand; this time the backlog was far greater than in 1919. A deflationary spiral, due to insufficiency of demand, is impossible in this situation; the primary impact of a sharp cutback in war expenditures never gets a chance to break into a round of secondary repercussions. Still another factor this time was the much stronger postwar debt position of consumers: in the 1920's there was a heavy accumulation of debts. On V-J Day consumer mortgage and short-term debt were at very low levels; consumers thus entered the postwar period "with solid titles to a higher standard of living".[49] Finally, the reconversion process this time, though a larger undertaking than in 1919, had been better planned for. Started earlier, it has been a longer and more gradual readjustment, permitting smoother absorption of released manpower.

In this general climate of economic expectations, established on general historical and qualitative grounds, Woytinsky set forth his projections—actually forecasts—of labor force and unemployment. Methodologically it is particularly of interest that he focused his attention on *unemployment* and derived his estimate quite directly and independently. This is in sharp contrast to the gross national product models, in which unemployment is a residual and which so far offer little in the way of a systematic or stable approach to the estimation of this crucial magnitude.[50] The key to his method for the transition period was the judgment that minimum frictional unemployment in a full employment situation normally would be about 2.5 million persons. During the immediate postwar period, however, demand pressures were expected to create an unusually tight labor market, causing him to forecast unemployment below 2.5 million. In fact, he predicted that un-

[49] *Ibid.*, p. 23.

[50] In private conversation with the author, Woytinsky ventured the opinion—which he has subsequently published—that such a residual estimate of unemployment might very well be subject to an error of 10 million—on an estimate of say 2 to 8 million!—owing to the possible compounding of errors in labor force, real gross product, and output per manhours. See his article on the forecasts, *Journal of Political Economy*, April 1947, pp. 144–5.

employment would increase 1.5 million between August 1945 and August 1946, to a level of 2.3 million.[51] The Census Bureau figures show that it actually increased 1.2 million, i.e., to 2.1 million. Careful analysis of labor market trends—demobilization, labor force participation of veterans, exit from the labor force of women, youth, and the aged, lay-off rates in munitions industries, and reabsorption rates in the rest of the economy, etc.—led him to forecast peak unemployment in March 1946, with a subsequent decline—almost precisely the pattern of events.[52]

The significance in this instance is, I think, clear. There is no substitute in many cases for specialized and intensive analysis of a particular sector of the economy, based on its own characteristics and evidence. Might this not apply also to the special area of price behavior and relationships; to the area of consumption in some measure; and to still other sectors in addition to the labor market? How can the important and valid elements of such a segmental or partial approach be most fruitfully blended with the still valid and powerful methods of the gross national product 'models'? How can we most successfully combine the historical-qualitative view with the systematic mathematical-quantitative? In this direction, apparently, lies our chief hope of raising the present imperfect 'science' of forecasting to a truer science.

Forecasts by the Econometric Institute, Inc.

We shall now briefly examine the forecasts of a private business research and forecasting organization that sells its services to

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[51] *Social Security Bulletin*, March 1946, Table 13, p. 24.

[52] With other elements of Woytinsky's forecasts this writer takes issue. For example, he forecast a gross national product in 1944 prices for 1946 of $160 billion (*ibid.*, p. 17), $5 billion less than Hagen's estimate. Yet this was supposed to be consistent with the forecast of more than full employment. What this implied, or was based on, is a forecast of a much sharper decline in productivity—output per hour—than that assumed by the 'model builders'. It is sharper also than has occurred, due allowance being made for the crudeness of the data. Woytinsky imputed far too much significance to the shift in output and employment from munitions (chiefly durable goods manufacturing) industries to other sectors of the economy. Analyses by Mosak and others fail to support this hypothesis. This is not the place, however, for a more extended discussion of Woytinsky's analysis. Interested readers should go directly to his writings.

business men and investors. The Econometric Institute, Inc., of which Charles Roos is Chairman of the Board of Directors and President, employs a considerable staff of trained statisticians and econometricians. During the summer of 1945, in several issues of its confidential weekly letter, *Economic Measures*, it analyzed various elements of the then current situation and published forecasts for a year or so ahead on labor force, employment and unemployment, income payments, etc.

Unfortunately—and quite understandably—the material sheds little or no light on the underlying methods of analysis and projection.[53] It is not clear how much is based on qualitative judgment or historical analysis, whether this group works with an essentially complete mathematical model, a system of functional interrelationships, trend analyses, etc. or uses a combination of these approaches. Also, nothing is said directly about the nature of the assumptions underlying the forecasts—particularly in the matter of government policies on taxes, wage rates, price controls, etc.

The most informative and basic data are in *Economic Measures* for August 30, 1945, devoted chiefly to analyzing and forecasting labor market conditions after V-J Day. The data are available in published form.[54] In this set of projections, the total civilian labor force in May 1946 was forecast at 54.2 to 55.2 million. The actual Census MRLF figure (revised weights) is 57.2 on the new basis; adjustment to the old MRLF basis would bring this to roughly 55.4. The size of the armed forces in May was only 3.4 million as compared with a forecast of 5.5 million. The forecast of the total labor force was thus about 2 million high. The more rapid demobilization than expected was offset by a greater decline in the total labor force.

On the basis of a predicted *minimum* level of 170 for the FRB total index of industrial production in the first quarter of 1946

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[53] A statement on the letterhead paper of the Index Number Institute, Inc. (closely allied with the Econometric Institute, Inc.) notes that the forecasts are reviewed and changed weekly "in accordance with current economic data and *scientifically accepted forecasting techniques*".

[54] See bound *Hearings on S 380* (Full Employment Act 1945) before a Subcommittee of the Senate Committee on Banking and Currency, July to September 1945, pp. 906–12 (Government Printing Office, 1945).

(seasonally adjusted), the associated level of civilian employment for May 1, 1946 was set at 52–53 million. This assumes a 38 actual hours work-week in manufacturing and a work-week averaging 8 percent higher in other industries, and corresponds to a 'full-employment' situation. Associated frictional unemployment is thus 2.3 million. At the same time, May employment in manufacturing was forecast at 13.9 million.

The MRLF figure of unemployment for May was 2.3 million; total civilian employment adjusted to the old MRLF basis was about 53 million. The BLS estimate of employment in manufacturing was 14.2 million compared with 13.9 million forecast. This comparison is not too meaningful; for, subsequent to the preparation of the Institute's forecasts, the BLS estimate of employment in manufacturing in May 1945 was revised from 15.3 million to 16.3 million. The decline from May 1945 to May 1946, revised basis, was 2.1 million as compared with a forecast decline of 1.4 million. The FRB index of industrial production was at 160 instead of the expected 'minimum' 170, a difference consistent with the larger than forecast decline in manufacturing employment.

In an earlier analysis (end of June) the Institute made some over-all projections of national income by a few major industrial sectors for the second half 1945 and the two halves of 1946.[55] It predicted also income payments and disposable income by months through March 1946. The pattern of the forecasts was one of gentle decline in total national income from V-J Day on into late 1946; in fact it was assumed that total *private* national income would remain at a practically constant level, the fall in total income coming almost entirely from military pay. Total national income was actually $1 billion higher in the first half of 1946 than in the second half of 1945. While total private income was $10 billion higher rather than equal to that in the second half of 1945. As already mentioned, civilian employment was running higher than forecast, although clearly this factor cannot account for the entire difference in national income.

Again in terms of income payments, the forecasts made in mid-

[55] This material is copyrighted and quotation prohibited.

1945 by the Econometric Institute ran about $10 billion (annual rate) lower than the actual figures show for the half-year October 1945 to March 1946—considerably closer than the Washington 'model-builders' came. There is again no way to analyze the forecast or account for the error. Part of it is attributable to the fact that military transfer payments per veteran ran substantially higher than any of us expected.

Not all the elements in these various forecasts appear to be fully consistent. It is impossible to go into the matter, owing to lack of indicated methodology but it is to be hoped that the Econometric Institute will see fit to publish at least an outline of their methods. The principal thing of interest to us is that these predictions were correct about the general economic climate of the transition. It expected inflation, not deflation; full or more than full employment rather than mass unemployment; excessive and generally sustained rather than deficient demand. In fact, it came exceedingly close on labor market conditions, and even underestimated the inflationary factors on income.

Conclusions

Both Woytinsky and the Econometric Institute assumed that the situation after V-J Day was likely to be one of full employment, with great stringency in the labor market. Thus unemployment would be down to rock-bottom frictional levels. In making this correct appraisal they obviously used different assumptions and methods than the Washington model-builders. Presumably, too, their methods were strikingly different.[56]

Clearly, sole or chief reliance on gross national product models, using mathematical relationships based on the experience of the 'thirties, seems to be inadequate for forecasting in a rapidly changing postwar transition.[57] Those of us in Washington who did use

[56] Another interesting and basically correct forecast of the labor market and employment situation after V-J Day is a brief article by J. Steindl, 'The Transition in the United States', *Oxford Institute of Statistics Bulletin*, Vol. 7, No. 13, Sept. 22, 1945; see especially p. 215. Steindl foresaw a postwar boom based essentially on accumulated deferred demand, starting in spring 1946 and lasting 1½ to 2¼ years.

[57] This is not to be taken too literally or categorically. Klein, using the econometric model approach, did forecast an inflationary situation, low unemployment,

this approach of course also introduced judgment factors, hunches, etc. But it is evident that there was much to be learned from the history of wars and postwar inflation; from closer scrutiny of and better insight into consumer psychology, veterans' behavior, etc. It is also clear that those who came closer to the mark for fiscal 1946 did so in part because they took a flyer on forecasting price and wage-rate trends, tax changes, etc., either explicitly or implicitly.

It will be instructive, and crucial, to see whether those who did well in round one will continue to be successful. Only from a series of carefully annotated and dated experiments, the results of which are observed and analyzed by economic forecasters, can we collectively hope to make real progress in methods of prediction.

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and considerably higher gross national product and consumer expenditures than the Washington forecasts analyzed above. He kept his forecasts, made in summer 1945, under lock and key but ought now to be given due credit. It would be instructive if he too would publish his results and explain in some detail his assumptions and methods.

APPENDIX I

APPENDIX TABLE 1

Gross National Product, 1939–Second Quarter 1946
First Half 1945 and Quarterly Data at Seasonally Adjusted Annual Rates
(billions of dollars)

	Gross national product	Govt. expenditures	Private capital formation	Consumer expenditures	Disposable income
	ACTUAL DATA (DEPARTMENT OF COMMERCE)				
1939	88.6	16.0	10.9	61.7	67.7
1940	97.1	16.7	14.8	65.7	72.9
1941	120.2	26.5	19.1	74.6	88.7
1942	152.3	62.7	7.6	82.0	110.6
1943	187.4	93.5	2.5	91.3	124.6
1944	197.6	97.1	2.0	98.5	137.4
1945	199.2	83.6	9.1	106.4	139.6
1945 I & II	206.6	98.2	5.1	103.4	141.6
1945 III	198.2	81.0	11.2	106.0	137.9
1945 IV	185.2	57.2	15.0	113.0	136.9
1946 I	183.7	39.6	23.1	121.0	138.1
1946 II	190.2	36.7	31.4	122.1	141.9
	FORECASTS				
1945 I & II	206.2	100.7	4.5	101.0	139.6
1945 III	190.0	83.0	7.4	99.6	132.0
1945 IV	164.6	55.5	12.8	96.2	119.9
1946 I	161.8	49.0	13.3	99.5	120.9
1946 II	165.2	43.5	17.1	104.6	122.5

Because of rounding, totals may not add. The figures shown here for the first half of 1945 were the official estimates at the time the forecasts were made.

APPENDIX TABLE 2

Labor Force, 1939–Second Quarter 1946

First Half 1945 and Quarterly Data Seasonally Adjusted

(millions of persons)

	Labor force	Civilian employment	Armed forces	Unemployment
	ACTUAL DATA			
1939	54.1	44.9	.4	8.8
1940	54.5	46.5	.5	7.5
1941	55.7	49.1	1.6	5.0
1942	58.4	52.1	3.9	2.4
1943	62.5	52.4	9.0	1.1
1944	64.0	51.8	11.4	.8
1945	62.9	50.4	11.2	1.3
1945 I & II	64.6	51.6	12.2	.8
1945 III	63.4	50.0	12.1	1.3
1945 IV	60.8	49.7	9.2	1.9
1946 I	59.2	51.3	5.2	2.7
1946 II	58.7	52.7	3.4	2.6
	FORECASTS			
1945 I & II	64.6	51.6	12.2	.8
1945 III	64.0	49.9	12.0	2.1
1945 IV	63.2	46.1	10.8	6.3
1946 I	62.8	46.5	8.2	8.1
1946 II	62.1	49.4	5.3	7.4

Actual data for 1941 through the first half 1945 are 'old' MRLF figures from the Bureau of the Census, as published before the revisions introduced in July 1945 (see MRLF 39, Sept. 20, 1945 for a discussion of the revision). Data for 1939 and 1940 are unofficial BLS estimates on a comparable basis. Figures for the third quarter of 1945 through the second quarter of 1946 are based on the revised MRLF series, as published after the introduction of revised weights in December 1946 (MRLF 54). They have been adjusted to eliminate seasonal variation and further adjusted to 'old' MRLF levels.

APPENDIX TABLE 3

Gross National Product and Labor Force
First Half 1945 and Fiscal 1946

	First half 1945 actual[a]	Fiscal 1946		
		Actual	Forecast	Ratio: actual to forecast
		(billions of dollars)		
Gross national product	206.6	189.3	170.4	1.11
Government expenditures	98.2	53.6	57.8	.93
Federal government	90.4	45.3	49.8	.91
War	84.3	38.0	41.8	.91
Nonwar	6.0	7.3	8.0	.91
State and local government	7.8	8.4	8.0	1.05
Private gross capital formation	5.1	20.2	12.6	1.60
Construction	2.0	5.2	3.1	1.68
Producer durable equipment	5.6	9.1	6.5	1.40
Net change in business inventories	−1.6	2.1	2.5	.84
Net exports, etc.[b]	−.9	3.7	.6	6.17
Consumer goods and services	103.4	115.5	100.0	1.16
Durable goods	7.2	10.3	10.1	1.02
Nondurable goods	63.2	71.2	58.8	1.21
Services	32.9	34.0	31.0	1.10
		(millions of persons)		
Labor force	64.6	60.5	63.0	.96
Civilian employment	51.6	50.9	48.0	1.06
Armed forces	12.2	7.5	9.1	.82
Unemployment	.8	2.1	6.0	.35

Actual gross national product items are from the Department of Commerce. Actual labor force figures are based on the MRLF data with rough unofficial adjustments both to allow for seasonal factors and to put them on a level comparable with the old MRLF series, i.e., prior to July 1945, on which the projections were based. Because of rounding, totals may not add.

[a] Billions of dollars at seasonally adjusted annual rates.
[b] Also includes the small item 'Net exports and monetary use of gold and silver'.

APPENDIX TABLE 4
Gross National Product and Labor Force
Third and Fourth Quarters 1945

	Third Quarter 1945			Fourth Quarter 1945		
	Actual	Forecast	Ratio: actual to forecast	Actual	Forecast	Ratio: actual to forecast
	($ bil.)			($ bil.)		
Gross national product	198.2	190.0	1.04	185.2	164.6	1.13
Government expenditures	81.0	83.0	.98	57.2	55.5	1.03
Federal government	73.1	75.4	.97	49.3	47.7	1.03
War	66.4	68.2	.97	42.6	39.7	1.07
Nonwar	6.6	7.2	.92	6.7	8.0	.84
State and local government	7.9	7.6	1.04	8.0	7.8	1.03
Private gross capital forma-						
tion	11.2	7.4	1.51	15.0	12.8	1.17
Construction	2.8	2.3	1.22	3.6	2.8	1.29
Producer durable equip-						
ment	6.7	5.0	1.34	8.3	6.0	1.38
Net change in business in-						
ventories	.3	1.0	.30	.8	4.0	.20
Net exports, etc.	1.4	−.8		2.4	0	
Consumer goods and services	106.0	99.6	1.06	113.0	96.2	1.17
Durable goods	7.4	8.0	.92	9.0	9.0	1.00
Nondurable goods	65.1	60.4	1.08	70.6	57.7	1.22
Services	33.5	31.2	1.07	33.3	29.5	1.13
	(millions of persons)			(millions of persons)		
Labor force	63.4	64.0	.99	60.8	63.2	.96
Civilian employment	50.0	49.9	1.00	49.7	46.1	1.08
Armed forces	12.1	12.0	1.01	9.2	10.8	.85
Unemployment	1.3	2.1	.62	1.9	6.3	.30

See Appendix Table 3 for sources and notes.

APPENDIX TABLE 5
Gross National Product and Labor Force
First and Second Quarters 1946

	First Quarter 1946			Second Quarter 1946		
	Actual	Forecast	Ratio: actual to forecast	Actual	Forecast	Ratio: actual to forecast
	($ bil.)			($ bil.)		
Gross national product	183.7	161.8	1.14	190.2	165.2	1.15
Government expenditures	39.6	49.0	.81	36.7	43.5	.84
Federal government	31.1	40.9	.76	27.7	35.1	.79
War	23.8	32.6	.73	19.2	26.5	.72
Nonwar	7.3	8.3	.88	8.6	8.6	1.00
State and local government	8.5	8.1	1.05	9.0	8.4	1.07
Private gross capital formation	23.1	13.3	1.74	31.4	17.1	1.84
Construction	6.5	3.3	1.97	8.0	4.1	1.95
Producer durable equipment	9.5	7.0	1.36	12.0	8.0	1.50
Net change in business inventories	3.4	2.0	1.70	4.0	3.0	1.33
Net exports, etc.	3.7	1.0	3.70	7.4	2.0	3.70
Consumer goods and services	21.0	99.5	1.22	122.1	104.6	1.17
Durable goods	11.7	10.5	1.11	13.1	13.0	1.01
Nondurable goods	75.1	58.2	1.29	74.0	58.9	1.26
Services	34.2	30.8	1.11	35.0	32.7	1.07
	(millions of persons)			(millions of persons)		
Labor force	59.2	62.8	.94	58.7	62.1	.95
Civilian employment	51.3	46.5	1.10	52.7	49.4	1.07
Armed forces	5.2	8.2	.63	3.4	5.3	.64
Unemployment	2.7	8.1	.33	2.6	7.4	.35

See Appendix Table 3 for sources and notes.

APPENDIX TABLE 6

Disposable Income and Total Consumer Expenditures, 1929–1946

	Disposable income	Expenditures		Ratio: actual to calculated
		Actual	Calculated	
	(billions of dollars)			
1929	79.6	70.8	70.7	1.00
1930	70.7	64.9	63.5	1.02
1931	59.6	54.2	54.6	.99
1932	45.6	43.0	43.4	.99
1933	44.5	42.4	42.6	1.00
1934	51.0	47.7	47.9	1.00
1935	56.3	52.2	52.2	1.00
1936	65.2	59.1	59.4	.99
1937	69.2	62.5	62.7	1.00
1938	62.9	58.5	57.6	1.02
1939	67.7	61.7	61.6	1.00
1940	72.9	65.7	65.8	1.00
1941	88.7	74.6	78.6	.95
1942	110.6	82.0	96.3	.85
1943	124.6	91.3	107.6	.85
1944	137.4	98.5	118.0	.83
1945	139.6	106.4	119.8	.89
1946	146.0	127.2	125.0	1.02

Disposable income and actual expenditures are from the Department of Commerce. Data for 1929–38 from *Survey of Current Business*, May 1942; for 1939–40 from *ibid.*, April 1944; for 1941–44 from *ibid.*, Feb. 1946; for 1945–46 from *ibid.*, Feb. 1947.

The calculated expenditures are based on the following relationship to disposable income (t = given year minus 1935): total consumer expenditures = 6.80 + .050 t + .806 disposable income.

APPENDIX TABLE 7

Actual and Calculated Consumer Expenditures by Major Components, 1939–1946

	Expenditures		Ratio: actual to calculated
	Actual	Calculated[a]	
	(billions of dollars)		
DURABLE GOODS			
1939	6.4	6.4	1.00
1940	7.4	7.1	1.04
1941	9.1	9.5	.96
1942	6.3	12.7	.50
1943	6.6	14.7	.45
1944	6.7	16.6	.40
1945	7.7	16.8	.46
1946	14.1	17.8	.79
NONDURABLE GOODS			
1939	32.6	32.8	.99
1940	34.4	35.1	.98
1941	40.1	42.0	.95
1942	47.9	51.4	.93
1943	55.1	57.5	.96
1944	60.0	63.0	.95
1945	65.6	64.1	1.02
1946	77.3	66.9	1.16
SERVICES[b]			
1939	22.7	22.3	1.02
1940	23.9	23.6	1.01
1941	25.4	27.2	.93
1942	27.8	32.2	.86
1943	29.7	35.4	.84
1944	31.8	38.4	.83
1945	33.1	38.9	.85
1946	35.8	40.4	.89

Disposable income and actual expenditures are from the Department of Commerce. Data for 1939–40 from *Survey of Current Business*, April 1944; for 1941–44 from *ibid.*, Feb. 1946; for 1945–46 from *ibid.*, Feb. 1947.

[a] Calculated expenditures are based on the following relationships to disposable income (t = given year minus 1935):

$$\text{Durables} = -3.50 - .059t + .150 \text{ disposable income}$$
$$\text{Nondurables} = 3.51 + .095t + .427 \text{ disposable income}$$
$$\text{Services} = 6.79 + .014t + .229 \text{ disposable income}$$

The data for disposable income are the same as those in Appendix Table 6.

[b] Expenditures of military personnel abroad are included in the expenditures for services since 1942.

APPENDIX TABLE 8

Analysis of Consumer Expenditure Forecasts
Third Quarter 1945 to Second Quarter 1946
(dollar figures in billions; seasonally adjusted annual rates)

	Expenditures			Ratio, actual to:	
	Actual	Forecast	Calculated[a]	Forecast	Calculated
Third Quarter 1945					
Total consumption	$106.0	$99.6	$118.5	1.06	.89
Durable goods	7.4	8.0	16.6	.92	.45
Rent	6.0*	6.0	6.9	1.00	.87
Nondurable goods	65.1	60.4	63.4	1.08	1.03
Services (excl. rent)[b]	27.5	25.2	31.6	1.09	.87
Fourth Quarter 1945					
Total consumption	113.0	96.2	117.7	1.17	.96
Durable goods	9.0	9.0	16.4	1.00	.55
Rent	6.0*	6.0	6.9	1.00	.87
Nondurable goods	70.6	57.7	63.0	1.22	1.12
Services (excl. rent)[b]	27.3	23.5	31.4	1.16	.87
First Quarter 1946					
Total consumption	121.0	99.5	118.6	1.22	1.02
Durable goods	11.7	10.5	16.6	1.11	.70
Rent	6.1*	6.0	6.9	1.02	.88
Nondurable goods	75.1	58.2	63.5	1.29	1.18
Services (excl. rent)[b]	28.1	24.8	31.6	1.13	.89
Second Quarter 1946					
Total consumption	122.1	104.6	121.7	1.17	1.00
Durable goods	13.1	13.0	17.1	1.01	.77
Rent	6.1*	6.1	7.0	1.00	.87
Nondurable goods	74.0	58.9	65.1	1.26	1.14
Services (excl. rent)[b]	28.9	26.6	32.4	1.09	.89

Actual data from the Department of Commerce. Forecasts represent those made
within the government August–September 1945 and presented by E. E. Hagen in
'Forecasting Gross National Product and Employment during the Transition
Period', *Studies in Income and Wealth, Volume Ten.*
* Estimate.
[a] On the basis of the actual level of disposable income, the relationships are cal-
culated from the functions (t = given year minus 1935):

$$\text{Total consumption exp.} = 6.80 + .050t + .806 \text{ disposable income}$$
$$\text{Durables} = -3.50 - .059t + .150 \text{ disposable income}$$
$$\text{Rent} = 2.75 + .017t + .029 \text{ disposable income}$$
$$\text{Nondurables} = 3.51 + .095t + .427 \text{ disposable income}$$
$$\text{Services (excl. rent)} = 4.04 - .003t + .200 \text{ disposable income}$$

The actual levels of disposable income are 1945 III, 137.9; 1945 IV, 136.9; 1946 I,
138.1; 1946 II, 141.9.
[b] Include expenditures of military personnel abroad.

APPENDIX TABLE 9

Autonomous Expenditures

Third Quarter 1945 to Second Quarter 1946

(dollar figures in billions at seasonally adjusted annual rates)

	Actual	Forecast	Ratio: actual to forecast
Third Quarter 1945			
Total autonomous expenditures	$107.6	$106.4	1.01
Government expenditures	81.0	83.0	.98
Private capital formation[a]	11.2	7.4	1.51
Autonomous consumption[b]	15.4	16.0	.96
Fourth Quarter 1945			
Total autonomous expenditures	90.2	85.3	1.06
Government expenditures	57.2	55.5	1.03
Private capital formation[a]	15.0	12.8	1.17
Autonomous consumption[b]	18.0	17.0	1.06
First Quarter 1946			
Total autonomous expenditures	83.5	80.8	1.03
Government expenditures	39.6	49.0	.81
Private capital formation[a]	23.1	13.3	1.74
Autonomous consumption[b]	20.8	18.5	1.12
Second Quarter 1946			
Total autonomous expenditures	90.3	81.7	1.11
Government expenditures	36.7	43.5	.84
Private capital formation[a]	31.4	17.1	1.84
Autonomous consumption[b]	22.2	21.1	1.05

Actual data from the Department of Commerce.

[a] Includes 'Net exports of goods and services' and 'Net exports and monetary use of gold and silver'.

[b] Includes consumer durables, rental payments, and expenditures for nondurables in excess of the 'normal' relationship.

Methods and Assumptions of the Washington Forecasts

The set of forecasts reviewed in this paper was generally representative of a whole set made by various government 'shops' in Washington at the same time, i.e., near V-J Day.[1] Common to all were certain minimum[2] assumptions for the transition period, chiefly concerning government expenditure, tax policy, transfer payments policy, and demobilization; reliance on the analytical framework of gross national product and national income, and the use of 'model systems' of projection; and relatively heavy reliance on mathematical, or at least implicit functional, relationships among important sectors of the economy.

The general character of analysis applied has already been discussed. Certain classes of expenditures, the autonomous, or exogenous, elements, comprising in fact the greater part of gross national product, were assumed to be determined independently of levels of total economic activity, at least in the short-run transition period. Similarly, several items on the income-flows side of the account were assumed to be known in advance or estimatable independently of the general situation.

Assumptions were made concerning the structure of federal government policies and policy changes operating during the transition period. The forecasts were in terms of these policy assumptions, and warnings given that the results would differ so far as *different* policies were adopted. In this very real sense the estimates were model projections rather than forecasts.[3]

We now examine more closely the framework of analysis utilized by Hagen and others.

[1] Cf. E. Hagen's paper in *Studies in Income and Wealth, Volume Ten.*

[2] Certainly this is true with respect to the basic methods of analysis and framework of assumptions which were worked out in common through an interdepartmental committee centered in the Office of War Mobilization and Reconversion, although specific *numerical* assumptions and results differed in each set of projections. The differences, at least as far as fiscal 1946 was concerned, were inconsequential to the major conclusions and policy implications. As noted earlier, the set of projections with which Hagen is associated were in many cases 'better'—though still badly off—than some of the other sets kept under wraps or at best 'leaked' unofficially. With one of these alternative sets the writer was closely connected.

[3] Hagen, especially his introductory remarks.

ASSUMPTIONS

1 *Price and Wage Controls*

It was assumed that the general structure of price, wage, and other stabilization controls would be necessary during at least the early transition period, and would be retained and operate about as it was on V-J Day. Since slowly rising prices, and some upward wage-rate adjustments were characteristic of the wartime system of stabilization controls, continuation of this trend also was implied. Changes in the price level would be so small, in any case, that they would not vitiate the projections made in terms of the first half of 1945 (or in some cases 1944) price levels. No general upward revision of price ceilings or wage rates was allowed for, and no important areas of decontrol.

2 *Taxes*

Hagen's projections involved the following assumptions:

a) At the beginning of 1946 the corporate excess profits tax would be reduced to 65 per cent, and completely repealed in 1947. (Some of the other forecasters assumed full repeal for 1946; none, however, expected or assumed the further reduction of the effective rate of the combined surtax and normal tax from 40 to 38 percent.)

b) Federal excise and customs tax rates (indirect business taxes) would be reduced to 1942 levels in February 1946, with further reductions in 1947. (Actual tax *yields*—at 1942 rates —were treated as a function of consumer expenditures and of disposable income.)

c) Federal personal income tax rates would be reduced effective at the beginning of 1946 by repeal of the 'normal' tax, and by the equivalent of about a 5 percent reduction in each surtax rate bracket. (The actual reductions were more liberal involving application to the normal tax of the surtax exemption of $500 per exemption unit, the reduction of surtax rates by 3 percentage points, and an additional 5 percent reduction in the total tax liability as thus computed.)

d) Social insurance tax rates would remain at previous levels.

3 *Transfer Payments Policy*
  a) The levels of mustering-out pay and dependency allowances
     per man in the armed forces assumed were multiplied by the
     number demobilized or by the total in the armed forces
     respectively to give aggregate military transfer payments.
  b) Nonmilitary transfer payments were estimated chiefly on the
     basis of an assumed $500 benefit per unemployed person.

4 *Other Assumptions*
  a) Income originating in government (all levels) was arbitrarily
     estimated. Pay of the armed forces was estimated by multi-
     plying the expected schedule for the size of the forces by the
     estimated average pay per man. Civilian government em-
     ployment and average pay was assumed; so also was interest
     on the public debt.
  b) Business reserves (chiefly depreciation) were largely assumed
     at wartime levels, though varied slightly according to the
     levels of gross national product.

AUTONOMOUS EXPENDITURES

1 *Government Expenditures for Goods and Services*
  a) War expenditures, munitions and construction, military pay-
     roll and subsistence, etc., given by war procurement sched-
     ules, demobilization policy, etc.
  b) Nonwar expenditures, chiefly wages and interest, estimated
     as noted above, plus other goods and services. State and local
     outlays arbitrarily raised from wartime levels.

2 *Private Gross Capital Formation*
  a) Private construction (residential and nonresidential)—esti-
     mated on the basis of expected labor and material supply
     restrictions and bottlenecks; demand assumed adequate for
     any conceivable supply.
  b) Business outlay for new plant and equipment, a definitely
     'mixed' category, partly based on an estimate of accumu-
     lated needs and deficiencies during the war, a demand largely
     independent of general economic conditions; partly based on
     expected limitations of supply, especially for construction;

partly based on investment demand geared to current and expected levels of activity. An upper limit for total investment in *new* plant and equipment—considered as an upper limit on demand—was assumed largely on the basis of Department of Commerce surveys of business intentions or plans to invest during the year after V-E Day,[4] and sketchy analysis of wartime additions to our national productive facilities.

On the whole it seems correct to say that the demand for or at least expected outlays for such investment goods in the aggregate was estimated as an autonomous expenditure. However, some forecasters may have felt they treated it in a derived fashion, related to gross national product, levels of sales, etc., but employed no precise mathematical or quantitative relationship. The *practical* effect of such alternative formulations can safely be ignored, although the theoretical force of the distinction is great, especially for the longer-run analysis of postwar investment prospects.

c) Net inventory accumulation—assumed to be based on accumulated wartime deficiencies of goods on the part of manufacturers, wholesalers, and retailers, with actual accumulation limited by supply (rates of production) in the face of active buyer demand. Rough allowance was made for partial satisfaction of business demand for goods out of usable government surpluses.

d) Net exports, etc.—based largely on assumptions about United States foreign lending policy, conditioning effective demand abroad for United States export goods, and assumed levels of imports.

3 *Autonomous Consumer Expenditures*

a) Durable goods—expenditures limited by available supplies (rates of production), especially for major durables (autos, etc.), and tight price controls. Although demand for many minor durables was thought of as a derived item, the entire durables category was in fact treated as autonomous.

[4] See *Survey of Current Business*, June and July 1945.

b) Rent—outlays for housing determined by supply and con-
trolled level of rents.

c) Excess nondurables, allowance arbitrarily made for special
deferred or replacement demand, chiefly by veterans for
clothing, etc., causing nondurables outlay to rise $2 billion
above the normal prewar relation with disposable income.

DISPOSABLE INCOME

a) For each half year (or quarter) after V-J Day a relation be-
tween disposable income and gross national product was
established hinging on the appropriate assumptions about
tax-rate policy, transfer payment policy, etc. The amount of
disposable income to be expected at various arbitrarily
selected levels of gross national product was worked out,
giving a set of 'observations' defining a simple (linear) func-
tion. Some components of disposable income (e.g., govern-
ment payroll, military and civilian, and military transfer
payments) were assumed invariant at all levels of gross
national product for any period; on the other hand, levels of
taxes, corporate and personal, vary with gross national
product and income payments under a given set of tax rates.
Similarly, business reserves, indirect business taxes, and
civilian transfer payments vary—each in its own way—with
changes in the levels of gross national product and income
payments. In the case of Hagen's projections, the various
assumptions worked out as follows, where Y_d = disposable
income:

1945, second half: $Y_d = 41.8 + .475 \text{ (GNP)}$
1946, first half: $Y_d = 45.2 + .468 \text{ (GNP)}$

These functions were then applied in the solution of the
system for consistent levels of gross national product, in-
come, etc., as described below.

'DERIVED' CONSUMER EXPENDITURES

Normally, all consumption appears to depend closely on levels of
disposable income (in association with other factors, e.g., a time

trend). However, during the transition period outlays for durables and for rent were assumed to be *autonomous*, owing to restricted supplies.

Outlays for nondurable goods and for services other than rent were assumed to vary according to the prewar relation with disposable income and time (in some of the models, with income alone). This meant, given a relation between disposable income and gross national product, that nondurables and services depended upon gross national product and implicitly to the level of autonomous expenditures. An 'excess' of nondurables above the relationship and a diminishing 'deficit' of services below the relationship were allowed for.

SUMMARY: THE EQUATION SYSTEM USED IN THE MODEL

The system used in the projections is an extremely simplified and truncated Keynesian model. It is simplified because no lags, rates of change, cash balances, correction for price changes, etc. are introduced. It is truncated in terms of a complete system of mutually interdependent variables in that the greater part of gross national product is treated as autonomous, and only consumer expenditures for nondurables and services are derived from a relationship with income. Given the aggregate level of income associated with any gross national product, its distribution among types of income share was determined essentially on the basis of regression relationships, arbitrarily modified. These figures, however, were considered too shaky to be presented for publication.

The following terms and simple relationships give the essentials of the model system used.

Basic terms

GNP = gross national product or expenditures

T_e = autonomous expenditures

= government expenditures for goods and services + private gross capital formation (incl. net foreign balance) + consumer durables + consumer rental payments + 'excess' nondurables expenditures

T_y = difference between GNP and disposable income of individuals

= corporate income and profits taxes + indirect business taxes + corporate undivided profits + depreciation and other business reserves + contributions to social insurance funds—transfer payments + personal tax and nontax payments (several of these items essentially autonomous)

C = total consumer expenditures

C_{nd} = consumer expenditures for nondurables and services (excl. rent)

Y_d = disposable income of individuals

Equations

1) GNP = T_e + C_{nd} = T_y + Y_d (basic identity equations)

2) Y_d = f (GNP) = a + b (GNP) for given assumptions as to tax and transfer payment policy; specifically,

(2a) Y_d (1945 second half) = 41.8 + .475 (GNP)

(2b) Y_d (1946 first half) = 45.2 + .468 (GNP)

3) C_{nd} = 7.55 + .092 t + .627 Y_d; t = (given year minus 1935)

(3a) (nondurables = 3.51 + .095 t + .427 Y_d)

(3b) (services, excl. rent = 4.04 − .003 t + .200 Y_d)

4) Substituting (2a) and (2b) respectively for Y_d in (3), we get

(4a) C_{nd} (1945 second half) = 34.7 + .298 (GNP)

(4b) C_{nd} (1946 first half) = 36.8 + .293 (GNP)

5) Substituting these expressions for C_{nd} in equation (1) it is *possible to obtain, with a given level of T_e,* a consistent set of estimates for GNP, Y_d, C, C_{nd}, etc.

Estimates of Employment and Unemployment (see Hagen, op.cit.)

1) Labor force—independently projected, on basis of judgment how fast the wartime abnormal bulge in labor force would disappear. Size of the armed forces determined by demobilization and recruitment schedules made available at the time by the Army and Navy.

2) Employment
   a) Average weekly hours in private nonagricultural industry
      assumed by· Hagen to fall smoothly from 44.6 in the first
      half of 1945 to 40 in the fourth quarter 1946, or 10 percent.
   b) Productivity (output per manhour) in civilian industry
      assumed by Hagen to fall 6 percent from the first half of 1945
      to the third quarter of 1946.
   c) Quarterly index of output per worker in civilian industry
      constructed on basis of (a) and (b).
   d) This index of output per worker (1945 first half: 100)
      applied to actual dollar output per worker in first half of
      1945. Resulting figures divided into projected civilian gross
      product (GNP minus military payroll and interest on public
      debt) gave the estimate of civilian employment. With the
      size of the armed forces assumed to be known, total employ-
      ment was thus obtained.
3) Unemployment = labor force − total employment
   In other sets of projections slight variations from the above
   procedure were made. E.g., the trend of output per worker in
   private nonagricultural industry was estimated on the basis of
   judgment about the net effect of various factors; gross private
   nonagricultural output was given by deducting from projected
   gross national product the income originating in government
   and an estimated agricultural gross product (based on rough
   ratios to total gross national product in the peak war years);
   these two factors in combination gave employment in private
   nonagricultural industry. The armed forces, civilian government
   employment, and agricultural employment were independ-
   ently and arbitrarily estimated. The sum of all these com-
   ponents gave total employment which, together with the pro-
   jected labor force, gave the residual estimate of unemployment.

Deflated Gross Product: Projections and Actual

All the comparisons between projections and actual developments since V-J Day used data in current prices. The projections were made on the assumption of effective price controls; Hagen states that his figures are assumed to be in the first half of 1945 prices. (Other sets of forecasts were also couched in real terms, usually stated to be 1944 prices.) He is careful to point out that changes in relative prices would somewhat alter the structure of demand, although properly depreciating the quantitative significance of this factor if price changes are moderate. He felt that 'real' government outlays for goods and services would be completely inelastic in price. Demand for construction and investment goods is likewise so large relative to possible supplies in the short-run that the effect of even fairly large price increases could be assumed to be of secondary importance.

The prewar functions used for estimating consumption expenditures are of course in money terms, undeflated for price changes. Implicitly this assumes unit price elasticity for total expenditure and for each of the three major components dealt with. As a first approximation this appears reasonable enough, and seems to fit the historical data. It does make somewhat ambiguous the nature of the consumption projections and of the implicit price-level assumptions contained in them. (Similarly, the estimates of national income and disposable income associated with the projected (real) gross national product are rather tentative and 'as is' since they too are based on current money relationships rather than real output relationships.)

Formidable statistical as well as theoretical obstacles stand in the way of properly deflating gross national product and national income series, especially in wartime or an immediate postwar transition when the character and composition of production are changing rapidly. Nevertheless, even a rough statistical attempt is worth making for several reasons. It allows for a somewhat more proper comparison of actual results with the forecasts. It allows also for a rough check on the apparent actual trend of out-

put per man or per manhour since V-J Day and the importance of error in this item in the forecasts of employment.

No detailed analysis is attempted here of price trends and real output trends derived from deflated series. Instead we present simply some crude deflated figures, unofficial and quite tentative, and useful chiefly in suggesting that the price inflation factor since V-J Day is not the predominant influence explaining the error in the forecasts.

APPENDIX TABLE 10

Gross National Product, Actual and Forecast
Current and Constant Prices

	Forecast First half 1945 prices	Actual data		Ratio, actual to forecast:	
		Current prices	First half 1945 prices	Current prices	First half 1945 prices
		(billions of dollars)			
Fiscal 1946					
Gross national product	170.4	189.3	181.5	1.11	1.07
Government expenditures	57.8	53.6	49.5	.93	.86
Private gross capital formation	12.6	20.2	19.3	1.60	1.53
Consumer expenditures	100.0	115.5	112.7	1.16	1.13
Fourth Quarter 1945					
Gross national product	164.6	185.2	178.5	1.13	1.08
Government expenditures	55.5	57.2	52.8	1.03	.95
Private gross capital formation	12.8	15.0	14.9	1.17	1.16
Consumer expenditures	96.2	113.0	110.8	1.17	1.15
First Quarter 1946					
Gross national product	161.8	183.7	175.4	1.14	1.08
Government expenditures	49.0	39.6	34.7	.81	.71
Private gross capital formation	13.3	23.1	22.4	1.74	1.68
Consumer expenditures	99.5	121.0	118.3	1.22	1.19

Appendix Table 10 compares the course of gross national product and a few major components in current and first half 1945 prices for the fiscal year 1946 and for two selected quarters with the forecasts (in first half 1945 prices).

The deflated figures in Appendix Table 10 were actually ob-

tained by more detailed deflation of expenditure components. All available price index series were used, but their nature is such that little reliance can be placed in them. Nevertheless, they are useful in suggesting roughly the trend of real gross national product since the war.

The deflated private nonagricultural gross national product implicit in the figures shown here is not identical with that used in obtaining the output per manhour index discussed in Appendix IV. The latter was derived by a somewhat different approach, not permitting the showing of results by expenditure categories. The results of the two attempts are reasonably similar, particularly in view of the sizable error attaching to measurements of this type.

APPENDIX IV

Productivity Trends (Output per Manhour) since V-J Day

As noted in Appendix II, assumptions about postwar trends of output per man and per manhour were basic to the estimates of civilian employment and unemployment. Hagen suggested that

the net effect of the various factors tending to raise or lower output per unit of labor input would be to reduce civilian output per manhour 6 percent from the first half of 1945 to the third quarter of 1946. The chief factors tending to raise output are less fatigue when fewer hours are worked, withdrawal from the labor market of less efficient workers, return of veterans in the prime of physical vigor, and the introduction of new and better techniques and equipment. The factors reducing manhour productivity are principally a shift of employment from manufacturing to agriculture, service, and trade industries; from more to less efficient industries within manufacturing; and the temporary effects of the physical reconversion process itself.

Using rough and unofficial figures on deflated gross product in private nonagricultural industry and corresponding estimates of employment and manhours, it appears that output per man fell 9 percent from the first half of 1945 to the second quarter of 1946; output per manhour 6 percent.[1]

Hagen's assumption of a net 6 percent decline in output per manhour in private nonagricultural industry and·in total civilian output (*including* agriculture and civilian government) between the first half of 1945 and the third quarter of 1946 was confirmed by events. In view of the crudity of the concept and the measures employed, this is striking. The trend in output per man likewise appears to have been about as predicted. Within a sufficient margin of error, therefore, it seems reasonable to conclude that only a small part of the error in the forecasts of *employment*—the crucial item—can be attributed to the element of output per worker or per manhour. Rather it was the misjudgment of the course of total real output that led to understatement of employment and to a serious overstatement of unemployment.

[1] Still other estimates made on a slightly different basis suggest a somewhat sharper drop in output per manhour from the first half of 1945 to the second quarter of 1946 (about 10 percent). They tie in with the real gross national product estimates in Appendix III. A forecast of a 10 rather than a 6 percent decline in output per manhour, *cet. par.*, would have led to a civilian employment prediction of 50.9 million, 2.4 million more than Hagen's forecast for the second quarter of 1946.

COMMENT

LAWRENCE KLEIN

Mr. Sapir's paper on the forecasts for the transition period is highly competent and thorough. Since I am in substantially complete agreement with its contents I have little to say in the way of critical disapproval. I prefer to confine my remarks to the elaboration of some points mentioned by Sapir.

While I do agree with most of the technical details of Sapir's paper, I feel that on one matter his emphasis has been somewhat misplaced. He stresses the idea of forecasting as an art rather than as a science. If methods of forecasting are not made scientific, we are, indeed, in a sorry state. The main interest in forecasting, at present, is for its use as an instrument of public economic policy. If an artist is required in order to use the forecasting instrument, we had best search for new instruments. Economic policies must be made independent of particular artists and must be obtained from tools that will yield the same result in the hands of different manipulators. If forecasting is to be used in formulating economic policy, scientific methods must be developed. The quantitative statistical (econometric) methods developed in recent years have the property of being scientific, and I feel that the best way to develop the science of forecasting is to develop econometric methods. Sapir, of course, discusses the fate of econometric methods for the transition period forecasts and considers various ways in which these methods might have been better utilized; at the same time, he lays great stress on various 'fuzzy' methods not easily adapted to scientific treatment.

The appropriate procedure in forecasting by econometric methods is: (1) Construct a mathematical model of the economic system. The components of this model fall into four categories: technological equations, economic behavior equations, legal rules, and definitions. Technological equations are, for example, the input-output relationships, technically called production or transformation functions. These equations act usually as constraints upon the movement of the system. Allowance must be made in them for technological change. The economic behavior equations are those that depict the actions of the fundamental units of the

system (households, business firms) within the framework of a particular type of market system and mode of production. Examples of economic behavior equations are the familiar profit maximizing equations of the firm or the consumer demand equations of the household. The legal rules act as constraints autonomously imposed upon the system by the government. A tax law is an example of a legal constraint. In mathematical form this law may state that taxes are a function of income. Taxes and income are variables of the equation system, but the parameters of the functional relation between these variables are determined by governmental action. Since households and business firms must operate within the framework of the particular legal rules in existence, these rules become constraints upon the economic behavior decisions of these units. Finally, the definitions are introduced for accounting purposes. They state, for example, that the rate of change in the stock of fixed capital equals net investment or that gross national expenditures equal the sum of expenditures by consumers, business firms, and government. The definitions express exact relations among the variables of the system, but the technological and economic behavior equations are not exact; they are subject to a multitude of disturbances. The agricultural production functions may not give the correct input-output relationship if there is a large uncontrollable disturbance in the weather; consumers may not spend according to their customary patterns if there are temporary shortages of necessities. Endless disturbing factors cause the observations to deviate from the equations of the system. The legal rules, in principle, could be made into exact relationships without error, but a complete representation of laws will often lead to complicated equations. Consequently, approximations are usually substituted for the true legal rules and these approximations are subject to errors of estimation. For example, the highly complex laws on personal income taxation cannot be exactly represented by a simple linear relationship between total taxes and total income for the entire community. The approximation function will have to make allowance for a margin of error.

(2) After the mathematical model has been established, the econometrician uses the past data to estimate the parameters of

the equation system. The disturbing factors are always present, and it is possible to estimate the difference between the observations of the past data and the values of variables calculated from the estimated equations. From the difference, an estimate of the disturbances, the average variation of the disturbances in the past can be determined; this should give us some idea of the amount of variation to expect in the future. For the period of forecast some variables are usually known in advance—government expenditures, tax rates, population, lagged variables, controlled prices, etc. If the values of these predetermined variables are inserted into the estimated statistical equation, estimated values of the other variables in the system can be obtained for the forecast period.

A forecast from such a statistical model is not exact because the equations upon which the forecast is based are not exact. Essentially two types of error are involved, and proper allowance must be made for both. The econometrician estimates the parameters of his model equations from a sample of past data. The parameters are not known precisely because they are estimated from a finite sample (often small, say 20 years' observation, in econometric work). There are, however, mathematical statistical methods of estimating the sampling errors involved in the determination of the parameters of the model. In addition to the sampling fluctuations, there are the above mentioned disturbances in the equations of the system. The fluctuations of the disturbances can be estimated from the past observations. By combining the two types of error, a single error can be attached to the forecast of economic variables from the statistical model. This gives a range of forecast rather than an unique point. It is customary to make some assumptions about the population distribution patterns of the error terms, and if this is done, a definite probability can be assigned to the chance that the forecast will actually be in the computed range.[1]

Nothing in this method is 'fuzzy', yet I believe that many of the 'fuzzy' matters that bothered Mr. Sapir are properly dealt with.

[1] Detailed examples of all the steps in this approach are given in the author's paper, 'The Use of Econometric Models as a Guide to Economic Policy', *Econometrica*, Vol. 15, 1947, pp. 111–51.

The disturbances, like Sapir's 'fuzzy' phenomena, are not directly measurable, but their average variation can be estimated from the past behavior of the system. For the interwar period the disturbances represent the aggregate effect of the post World War I buyers' strike, the development of new industries (automobiles, radio, refrigerator, talking films), the formation of the Congress of Industrial Organizations, the strikes of the late 'thirties, the beginning of World War II, the Spanish War, the Sino-Japanese War, etc. A very large number of events caused people to deviate from their estimated behavior patterns. The estimated disturbances obtained from the interwar period should not be much different from the postwar disturbances. In the postwar period there were strikes, decontrol, shortages, and many other disturbances. Though these factors were large, it hardly seems possible that they add up to more than the disturbances of the interwar period. During the war there were direct controls (i.e., new legal rules), and consequently many of the equations of the model were virtually suppressed, but during 1946, many of the direct controls were removed. The best estimate of the disturbing factors would seem to come from the past estimates of these factors. In this way, some of the qualitative variables, cited by Sapir, are accounted for in the forecasts even though they are not directly observable. It is wrong to think that the econometric method ignores the qualitative variables. On the contrary, the econometric methods attempt to account for these variables scientifically.

There is an essential difference between the models of the interwar and postwar transition periods, on the one hand, and the war period, on the other hand. The war may be looked upon as a large disturbance which should be incorporated into the model, but this has not been the procedure of econometric model builders. If the models were based on the data of several centuries covering several wars, this approach could conceivably be adopted, but since our data contain at most two wartime observations it seems preferable to treat a war economy differently. During World War II new legal rules and new types of market were imposed upon the system. The wartime and peacetime models differed essentially in structure; hence the wartime data were not used to determine the

parameters of the statistical model. Except for certain known controls in specific markets 1946 was assumed to be like the inter-war years in all structural characteristics. The econometrician should take into account any disturbances definitely known in advance for the period of forecast. If he knew, for example, the extent of demobilization in 1946 he should have taken it into account; however, the various disturbances that are not known in advance can be accounted for only in the random perturbations which are part of the econometric models and which have been estimated (in terms of average variation) from the past data. Changes in the structural characteristics of the system must, of course, be separated from random disturbances. If changes are known in advance with certainty, they cannot be incorporated into the random disturbances.

Sapir has pointed out that the appropriate forecast intervals for gross national product may cover a range that includes more than one type of policy. This may be true, but it does not mean that such forecasts are not useful. If the forecast of gross national product is such that there is a 70 percent probability that GNP will in some future period be in the range $170 ± $13 billion (in fixed prices), where $195 billion corresponds to full employment, the type of policy recommendation seems obvious—one of expansion.[2] The size of the expansionary policy cannot be determined from a consideration of the forecast range and the full employment GNP alone. However, if the cost of instituting programs of different quantitative magnitudes and the cost of adopting a policy to combat deflation when the true situation is inflation (the probability that the forecast interval will include the observed point is 70 percent) are known, the size of the anti-deflationary policy to be adopted can be chosen. Similarly, appropriate anti-inflationary policies can be selected if the entire forecast interval exceeds $195 billion.

If the interval includes $195 billion it may appear that no appropriate policy can be chosen because the interval includes the possibilities of both inflation and deflation. If all costs other than those

[2] It is assumed, for purposes of illustration only, that 70 percent is a significant probability level. The risk that is to be run must be decided upon in advance.

of being unprepared to combat inflation or deflation are disregarded as unimportant, the policy is obvious: give anti-*inflationary* agencies enough resources to combat the worst possible *inflation* inside the forecast interval and give anti-*deflationary* agencies enough resources to combat the worst possible *deflation* inside the forecast interval. If the cost of instituting different policies and the costs of choosing the wrong policy are known and taken into account, an appropriate policy can be chosen also for the case in which the interval covers the full employment level of GNP.

The fact that a forecast of GNP may involve an error of as much as ± \$13 billion at the 70 percent probability level should not discourage policy makers from using econometric methods. Both types of error make substantial contributions to the total error. In some models I have found that the contributions of the sampling fluctuations and of the disturbances are approximately equal. The sampling fluctuations are specific to the econometric method, but can be reduced by improving the data, i.e., by getting more observations and more reliable observations. We can hope to reduce much of the error if the official data collecting agencies realize the importance of the forecasting problem and provide the econometricians with better source material. By way of specific suggestion, it would be extremely valuable if the time series used to estimate the parameters of the models could be extended quarterly back to 1900. The other type of error, the disturbances in behavior patterns, is not specific to econometric methods. These errors are part of the structure of the economic system and will be present in any method of forecasting. It is an important contribution of the econometric method to estimate the variation in these disturbances (they are not directly observable) and show approximately how large they are. If economic activity is subject to big perturbations in our present type of system, we must realize this fact and take it into account in our policies. The large disturbances estimated by the econometric models emphasize the need for good economic policies, thereby eliminating the great uncertainties now present. Instead of discouraging the policy makers, the large disturbances, as estimated from the econometric models, should spur them on to intensified activity.

EVERETT E. HAGEN

In 'The Reconversion Period: Reflections of a Forecaster' (*Review of Economic Statistics*, May 1947), I commented briefly upon the forecasts for the reconversion period. Several comments I would make concerning Mr. Sapir's manuscript are implicit in that article. I shall add here only three brief statements.

1) Though Sapir refers to the "Washington forecasts", he discusses only one, that by me, which is not in all respects typical of others. I regret he has not treated others; especially the one with which he was closely associated.

2) I wish to express my hearty concurrence with Klein's comments concerning the possibility and the need for developing economic forecasting as an econometric science. This way lies progress.

3) Klein refers to the inevitable disturbances in the system of equations on which a forecast is based. It is not necessary, however, to accept as inevitable the margin of error in forecasting caused by these disturbances. That error may be reduced by the improvement and expansion of surveys of investment intentions.

Capital formation requires planning. It therefore can be *known* before the event. The event, it is true, differs from plans made some time earlier because men do not correctly anticipate their own reactions to a given set of circumstances, and because changes in expected economic conditions cause revision of plans. It may well be possible, however, to discover by experience (aided by *a priori* judgment) the appropriate adjustment for these two factors, so that investment intentions can be used as a basis for a fairly accurate short run forecast of capital formation. In this way, investment can be forecast from actual intentions rather than from the economic data that ordinarily determine intentions, so that error due to disturbances in the investment equations can be reduced. The improvement of surveys of investment intentions may well be the most important single step that can be taken at present toward improving forecasting techniques.

CLAYTON GEHMAN

Mr. Klein has pointed out some of the difficulties of the early gross national product models and has said in an article in the *Journal*

of Political Economy for August 1946 that we should not prematurely despair of determining from observed data the investment, inventory, housing, etc. functions in order to inject dynamic elements into this system of forecasting.

On this viewpoint I have three comments. First, I agree heartily that the strategic factors in the economic situation should be studied intensively. In some instances this requires compilation of better basic data, in others, more competent analysis. It seems to me that the technology of compiling statistics has improved more rapidly in recent years than the analytical capacity to exploit them. Also, I would like to emphasize that analysis should not be confined to information that can be treated quantitatively. Developments often become of strategic importance in the economic situation primarily because their influence is not measurable, especially in advance.

Second, the real world of fact is continually undergoing structural changes. The burden of evidence appears to be that in any critical period the influence of the unique factors is more important than the persistence of established relationships. A system of forecasting that works only when there are no abnormal conditions has decided limitations.

Third, forecasters cannot wait until a system is perfected. Called on every day to present their judgments concerning the future, they must select the approach and the data that promise the best results in the time allowed them.

Before discussing some of the specific limitations in using gross national product models to forecast changes in the economic situation, I think it probably fair to say that most compilers and users of the GNP would be among the first to point out that it does not describe the economic world completely and that it must be supplemented if economic fluctuations are to be analyzed. Also, I think it important for us all to acknowledge the great usefulness of the work in that field, even though some of us have grave doubts about the predictive value of the GNP models. Business forecasts in the past would probably have been more accurate if reliable estimates of the GNP had been currently available.

In my opinion there were several serious limitations in the use

of the GNP models to forecast economic developments in the transition period; these limitations would generally apply also in forecasting for any period marked by pronounced changes in the economic situation. I shall mention briefly some of these limitations without attempting to list them in the order of their importance.

1) The availability of the model data only in dollar terms would not have been especially serious if it were possible to compile accurate price series. The importance of this consideration was, as I see it, strikingly demonstrated in the forecasts made in 1945. Most persons, including many not using the models, were impressed by the unusually high level reached by deflated consumer expenditures during the war, especially for nondurable goods. As a result, they found it difficult to believe that consumer buying would expand after the war except chiefly for automobiles, appliances, and houses.

2) The assumption of constant prices was quite misleading in a period when big changes in prices were in prospect. It is true that one of the assumptions under which the models were developed was that price controls would remain effective, but the question whether, and by how much, controls would become ineffective, was an essential part of the economic forecast.

3) Another problem was that the changes shown by the figures used in the models could be determined by either demand or supply conditions and it made a great deal of difference in the business situation which would be dominant. For example, a small figure for inventory changes has an entirely different significance if it reflects inability of manufacturers and distributors to get sufficient goods than if it reflects an attempt to reduce inventories.

4) The models could not indicate the importance of orders in the situation. Many goods are ordered far in advance, sometimes because they take long to produce, sometimes because buyers are concerned about supply and price protection. In either case the orders, or their absence, profoundly influence the markets for raw materials, equipment, and labor long before they show up in the expenditure figures.

5) Individual types of item influenced by diverse factors were

summarized in broad aggregates and no notion of the strategic significance of some of the components was conveyed by the dollar amounts. For example, during the early part of 1946 net merchandise exports were a small proportion of total GNP but gross exports of scarce food supplies were sizeable and no doubt added considerably to speculative activities in domestic markets.

6) The practice of showing an evenly graduated development of affairs tended to create the illusion that the pattern of events would be orderly while at that very moment most people recognized that the situation was basically disorderly.

7) While the models provided an accounting in advance of how production and income could be balanced at certain levels, the levels themselves were projected on the basis of numerous assumptions, some explicit, many implicit. The internal consistency of the arithmetic of the models, however, provided no check whether the assumptions were realistic.

8) The models, based as they were on measures of current output and income flow, did not provide a statement of the important balance sheet items such as inventory holdings, plant capacity, and the money supply. Information regarding the over-all size of these items here and in foreign countries and their distribution by type of asset or type of holder was of crucial importance. Another important balance sheet item for the economy is the nation's goodwill, and the actions taken to foster it at home and abroad often have had profound economic effects. It must be admitted, however, that political considerations cannot be anticipated accurately by any system of forecasting.

<div align="center">MORRIS A. COPELAND</div>

Both Sapir and Klein suggest a contrast between the type of business forecast that is based on one or more model analyses and the type that bases a considered judgment on all the pertinent facts deemed important. For convenience these two types may be referred to as 'model' and 'judgmental' forecasts.[1]

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[1] Sapir speaks of the latter as "forecasts of those whose method depended more explicitly on general qualitative considerations, etc." Klein uses the term "armchair comments" (Cowles Commission Papers, New Series, No. 18, University of Chicago, 1946, p. 302) in contrasting what is here referred to as a 'judgmental'

Klein, less modest than Sapir in his claim for model forecasting, takes Sapir to task for speaking of model forecasting as an art. He urges that in a model forecast the findings for the future as of any date have scientific objectivity, while judgmental forecasts are subject to the judgmental whims of the individual forecaster. He does not mean, I take it, that the element of judgment does not enter into model forecasts. Rather, it enters in large part at an earlier stage. The forecaster exercises judgment in the selection of models. If the forecaster is employed by government or by a business enterprise or private organization the executive or administrative officer exercises judgment in selecting the forecaster. But once the forecaster has been employed and has adopted his models, Klein would apparently urge, his findings are not subject to the eccentricities of the individual forecaster's judgment.

The category 'judgmental forecasts', it must be admitted, is less clearly defined than the category 'model forecasts', and 'judgmental forecasts' differ widely in dependability according to differences in the quality of the forecasters' judgment as well as differences in their command of relevant facts. But clearly this says nothing about whether 'model forecasts' are in general more dependable than judgmental forecasts. Model forecasters seem sometimes to forget that several V-J Day judgmental forecasts were more nearly correct than the model forecast that has received so much attention.[2]

'Objectivity' in the sense in which model forecasts possess it and judgmental forecasts do not is not necessarily a virtue. It is a good talking point in selling a model forecast technique to an administrator, because it makes the technique sound as if it were scientific. But if two models have provided equally good fits to past data and one is currently malapropos, the malapropos model is as 'objective' as the other. Moreover, the 'objectivity' of model forecasts is not scientific objectivity in the sense that it commands general accept-

forecast with the model approach. If such an epithet is to be applied to either judgmental or model forecasts it would seem to be applied more appropriately to the latter since they have tended to substitute *a priori* findings for a direct examination of all the relevant facts.

[2] Sapir recognizes these judgmental forecasts in a footnote.

ance by competent economists. And it will not become scientific objectivity unless and until model forecasting generally displaces judgmental forecasting and unless and until one model is generally accepted as the best model for a forecast under specified circumstances (the complete specification of circumstances having been generally agreed to in advance of their occurrence).

But does a model forecast really eliminate the judgment of the forecaster? When Klein suggests modification of a computed projection in the light of relevant facts becoming available subsequent to the computation, he is surely admitting an important element of judgment. Again, when he tells us that a model may be a good fit in one period and not in another, he admits a further element of judgment. The forecaster must judge whether the model will describe the period ahead. And judgment is likely to be involved in the application of a model to any specific problem. Is it, for example, wise to use an annual model to forecast the first half of calendar 1947 by deducting from the fiscal year projection a figure, partly actual, partly judgmental forecast, for the last half of calendar 1946? Would it be wise to use an annual model to forecast the second quarter of 1947 by deducting a figure for the three preceding quarters from the fiscal year projection?

Nor is this the end of the matter. Two classes of autonomous variables are used in model forecasts: (a) variables referring only to the past, e.g., fiscal year 1946 disposable income, and (b) variables involving the future, e.g., fiscal year 1947 investment. The former may fairly be regarded as objectively determinable. But the determination of the latter is essentially a judgmental forecast.[3] Thus model forecasts are necessarily based on judgmental forecasts, unless the model is such that all autonomous variables refer only to the past.

To one who seeks objectivity, this presents a problem. Klein's solution does not seem altogether satisfactory. He offers us not a single projection, but a whole table of projections based upon different judgmental forecasts of investment and prices. This pro-

[3] Klein refers to this second class of autonomous variables only incidentally. He characterizes some as "variables ... *known* in advance—government expenditures" (the italics are mine).

cedure does not avoid the judgmental forecasting of autonomous variables. Essentially it amounts to offering not a definite projection, but a range of reasonable values for his judgmental forecasts of these autonomous variables. The wider the range the larger the number of forecasters who will accept it. Also, the wider the range the less useful the forecast, and the more the forecaster leaves to the presumably less competent judgment of his reader. If the buck is not to be passed to the reader, the range must be narrow enough and Klein's judgmental forecast of investment and prices definite enough to give unambiguous answers to such quesions as: Is the GNP likely to be higher or lower in the first half of 1947 than in the last half of 1946?[4]

Thus far it has been argued that model forecasts inevitably depend upon the judgment of the forecaster. But a model can give a forecaster a false sense of security, can lead him to avoid using his judgment about pertinent facts when such avoidance is unfortunate. This, I think, is the real lesson of the V-J Day forecasts. Model forecasts can give us projections of derived variables (e.g., disposable income and consumer expenditures) without requiring us to make direct judgmental forecasts for these variables. But such projections are not a satisfactory substitute for direct judgmental forecasts of such items as disposable income and consumer expenditures based on current information about transfer payments, deferred demand, wartime savings, etc. A model affords a very important check on the consistency of one's forecasts of the various debit and credit components of GNP, but it does not relieve the forecaster of the obligation to use his best judgment in providing direct judgmental forecasts of all the components (derived as well as autonomous) in the light of all the relevant facts at his disposal.

As I have implied, there has been a tendency for some forecasters to specialize in the model approach, avoiding direct judgmental forecasts of the variables they have regarded as dependent, and for other forecasters to specialize in judgmental forecasts on the basis of an extensive factual inquiry, avoiding making model

[4] I have encountered at least one advocate of Klein's model who vigorously asserted that Klein's forecast for the first half of 1947 did *not* answer this question.

forecasts. This unfortunate type of specialization is the modern counterpart of the old divergence between the *a priori* and the empirical approach. Model forecasts clearly rely heavily upon *a priori* reasoning. Judgmental forecasts also use logical inference, but their chains of reasoning are less involved and their consideration of facts is often much more extensive.

The moral of these comments seems clear. No forecaster should specialize in either model or judgmental forecasts. The two approaches to forecasting should not be separately used; rather each approach should be used to complement the other.

RUFUS S. TUCKER

Mr. Sapir's paper is an able one on the technical level; as he properly points out, passably good economic forecasting is at present an art rather than a science. He seems, however, to share with Mr. Klein the belief that forecasting can be made into a real science; and in fact seems to believe that the time when that will occur is not far distant. On this I must take exception. Since the days of the early Babylonian star gazers, imaginative thinkers have indulged the hope that prophecy might become a science, and have frequently persuaded themselves and others that that desirable goal had already been attained, or at least was just around the corner. If the word scientific is stretched to include everything that involves complicated formulae and specialized jargon understood only by experts, the goal has indeed been attained. But if it is restricted to a body of theory that is not only inherently logical but consistent with known facts, and that can be put to practical use so as to yield reliable results without the intervention of accident or the addition of sound 'unscientific' judgment, then I believe the goal will never be attained.

As I see it, the chief reason the government forecasters for 1946 were so wrong is that they were attempting an impossible task with inadequate tools and in the light of an unsound economic theory. I much prefer Mr. Woytinsky's approach, which is similar to the approach every intelligent man uses in connection with his personal or business problems, i.e., to study the present in the light of the past, making as sure as possible of the facts, statistical

and other, and attempting to give proper weight to the resemblances and differences between the past and the present. Among the most important facts are purely psychological ones which cannot be measured statistically, or at least not in such a way as to make historical comparisons reliable. And especially a wise statistician who attempts to be really scientific, and not merely apparently so, will rigorously refrain from putting any reliance on results obtained by extrapolation of regression formulae. He will also be suspicious of any estimates of long-time trends that are based either on short periods which may be dominated by cyclical movements or on sufficiently long periods if the data are inadequate or incorrect.

It is probably not appropriate to include in this volume any description of the projection I published in January 1945; but since Mr. Sapir referred to two other projections, I would like to point out that this one of mine, although prepared almost a year earlier than Mr. Hagen's and by much less superficially scientific methods, was closer to being correct, especially in the items private capital and consumers' expenditures. The figures in Table 10 of my Projections of National Income, published in the National Industrial Conference Board *Business Record* of December 1944–

| | 1945–1946 | | |
	Actual	Tucker	Hagen
	(billions of early 1945 dollars)		
Gross national product	181.5	192.0	170.4
Government expenditure	49.5	64.5	57.8
Private capital expenditure	19.3	16.5	12.6
Consumers' expenditure	112.7	111.0	100.0
Disposable income	(134.6–136.3)	123.75	123.8
	(millions of persons)		
Labor force	60.6	60.6	63.0
Civilian employment	51.0	48.7	48.0
Armed forces	7.5	7.75	9.1
Unemployment	2.1	4.15	6.0

January 1945, have been converted into early 1945 dollars and the average for 1945 and 1946 taken to represent the fiscal year 1946. The money figures representing actuality, except for disposable

income, and Hagen's forecasts are from Appendix Table 10 of Mr. Sapir's report. My original projections were in 1935–39 dollars; they were converted into early 1945 dollars on the assumption that the general price level had risen 50 percent, the assumption I then had in mind, although I did not state it in my article. My estimate of 4,150,000 unemployed is not far off if the veterans in schools and in the 52-20 club are regarded as unemployed. Both Mr. Hagen and I were fooled by the rapid reduction of government expenditures and taxes.