

COMMENTS ON THE QUESTION: WHAT KIND OF ECONOMETRIC RESEARCH
IS REQUIRED FOR ECONOMIC POLICY?

By

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A. The Problem

The question to be discussed is: Where should research in econometrics be directed in order to make it as useful as possible for economic policy? The answer obviously must depend upon a number of circumstances:

1. Technological Structure

For a highly industrialized country the type of econometric research which appears to^{be} most urgent, may be different from what is required for a country where, for example, agriculture is the dominant industry. Economic policy may require another type of research in a country with low foreign trade than in a country where foreign trade is large in relation to the national product. Etc.

2. Pattern of Human Behavior

In a country where trade unions cooperate with the government in forming economic policy, the problems requiring research may be of another nature than in a country where the trade unions act independently of government. Differences in the behavior of the entrepreneurs and consumers, the attitude of labor regarding interregional migration and other behavioural peculiarities may call for different types of research.

3. Objectives of Economic Policy

The nature of the objectives, which economic policy attempts to achieve, will to a considerable extent determine the kind of econometric research required. For example, a "full employment policy"

requires a more extensive knowledge of how the economy functions than a policy which has a balanced budget and the upkeep of a gold standard as major objectives. A policy which, besides the efforts of achieving "full employment," attempts to establish a particular income distribution and to influence the allocation of resources also in other respects, will require still more extensive knowledge etc.

4. Means of Economic Policy

The establishment of objectives and the choice of means of economic policy is closely interrelated. The more ambitious the objectives, the more differentiated are the means required, and the more detailed are the econometric investigations needed. Of particular importance is the extent to which direct control of prices and quantities are applied.

5. The Length of the "Research Investment Period"

When investing in research the problem of short term versus long term projects arises in the same way as regarding other investments. Thus the answer to the question where econometric research should be directed, will depend not only upon the expectations of the fruitfulness of a particular type of research, but also upon the attitude towards the "discount factor,"

Only by making certain assumptions regarding points 1-5 can we expect to be able to give an answer to the question asked above. However, also the costs of research may have to be taken into consideration. One might attempt to give an answer in various ways. One way is to suggest particular types of models which can be expected to be useful for economic policy. Another way is to point out important policy problems the solution of which may be

facilitated by means of econometric research. Our comments at the staff meeting will presumably primarily be concerned with the policy problems. (Some suggestions are made in section E.) Only some very general remarks will be made regarding particular types of policy models (section D). As a basis for these comments a tentative classification of policy objectives and policy means is presented in sections B and C.

B. Classification of Objectives

The objective of economic policy may be formulated in alternative ways. The classification below gives a list of terms in which such a formulation might be given:

1. Employment.
2. Capital formation.
3. Private consumption.
4. Collective consumption.
5. Exports and imports.
6. Income distribution.
7. Balance between leisure and the input of labor and entrepreneurial services.
8. Improvement of the choice ability of households, e.g. by supplying information which is significant for the choice.
9. Improvement of the efficiency of production.
10. Modification of the preference scales of households regarding the choice of consumption goods and the supply of labor, e.g. by means of advertising and other forms of persuasion.
11. The degree of interference with the individual household sovereignty. (Among the motives for such an

interference may be mentioned the desire to provide for sufficient education; to protect children with regard to nourishment, housing, clothing etc.; to protect workers against accidents etc; to protect other groups of individuals with low choice ability in particular respects; to discourage consumption which creates external diseconomies or encourage consumption which creates external economies in consumption; to provide for security, e.g. by means of an agricultural structure which can prevent starvation in case of war and isolation, by means of building regulations, etc.)

12. Economic stability.

13. Development of backward areas.

C. Classification of Means of Economic Policy

The purpose of the following classification is to furnish a rather comprehensive list of policy means which may be applied in order to achieve given objectives, with no implication whatsoever regarding the answer to the question: Which means should be applied.

I. Budget Policy:

1. Expenditures on Goods and Services:

- 1.1 Fixed property
- 1.2 New building and construction
- 1.3 Equipment and materials
- 1.4 Repairs and maintainance
- 1.5 Wages and salaries of government employees
- 1.6 Other goods and services

2. Transfer Expenditures

2.1 Subsidies

examples of activities and commodities subsidized in Norway at present:

cultivation of new land and establishment of new farms

fertilizers

repairs of small farm houses

building of certain types of modern farm equipment

feedstuffs

grain production

butter production

milk production

meat and pork production

forest cultivation

wood for heating

fishing tools

fish export promotion
coastal and local shipping
bread
margarin
sugar
some textiles

2.2 Transfers of income

Examples from Norway:

Old age pensions
child pensions
veteran pensions
illness and invalids benefits
unemployment benefits
stipends etc.

2.3 Transfers to foreign countries

3. Interest Expenditures.

4. Lending and Redemption of Loans.

4.1 Lending to Government Enterprises
Examples from Norway:

forests
railroads
telephone and telegraph
radio
post
hydro-electrical power plants
army and navy factories
other government manufacturing plants

4.2 Other Granting of Loans, Purchase of Securities and Budget
Surplus

4.3 Redemption of Loans

Internal Loans

Foreign Loans

5. Tax Incomes

5.1 Input-Independent Taxes

5.2 Income (and wealth) Taxes

5.3 Consumption Taxes

5.4 Fees etc.

6. Other Transfer Incomes

7. Surplus of Government Enterprises

8. Interest and Other Property Incomes

9. Borrowing

9.1 Internal

9.2 External

II. Investment, Production, Price, and Wage Policy of Public Enterprises:

III. Interest Policy:

1. Control of short term interest rates by means of a discount policy
2. Control of long term interest rates by means of open market operations.
3. Eventual direct fixing of maximum or minimum interest rates on bank loans and deposits.

IV. Credit Policy:

1. Fixing of reserve requirements, and other credit regulations.
2. Granting of credit by government banks.

V. Currency Policy:

1. Control of exchange rates
2. Currency rationing.

VI. Direct Physical Control Over:

1. Production
2. Import and Export
3. Consumption
4. Capital Formation
5. Use of Input Goods and Labor
6. Labor Supply

VII. Direct Fixing of Prices and Wages:

1. Fixing of minimum prices and wages.
2. Fixing of maximum prices and wages.
3. Fixing of "Atomistic Equilibrium Prices" in Markets With Monopolistic Tendencies.
4. Fixing of "Long Term Atomistic Equilibrium Prices" in Markets With Short Term Fluctuations of "Cob Web-Nature".

VIII. Institutional Arrangements of Various Kinds:

Examples particularly related to Norwegian economic policy:

1. Organization of production committee, branch councils and other forms of "industrial democracy"
2. Arbitration courts for wage disputes.
3. Cooperatives of various kinds facilitated by the government.
4. Nationalization
5. Building regulations, water regulations, irrigation regulations, fishing regulations, lumbering regulations, etc.
6. Anti-monopoly regulations of various kinds.
7. Amalgamation of related industries
8. Concentration of production in the most efficient firms within industries with surplus capacity.

9. Standardization of products, particularly of intermediate products, e.g. building materials, electrical equipment etc.
10. "Pooling" of firms within an industry, e.g. organization of truck centrals in order to avoid empty driving, milk centrals in order to decrease the cost of milk delivery, etc.
11. Special education and training (or reeducation and retraining) in order to increase the working ability of labor, e.g. by improving the work technique, the knowledge of production methods etc.
12. Supply of information for individuals and enterprises regarding
 - a) the labor market, e.g. by means of a labor exchange
 - b) the commodity markets, e.g. by improved statistics, forecasts, etc.
 - c) methods of production, organization, bookkeeping etc.
13. Prevention of false advertising.
14. Quality control and supply of information to the public regarding the quality of goods, e.g. by publishing consumers guides.
15. Advise regarding choice of occupation.
16. Persuasion in order to change preference scales of consumers, workers, credit institutions, and other entrepreneurs.
17. Rationalization and modernization of firms, e.g. ⁱⁿ agriculture, fisheries, transport, etc.
18. Mechanization of agriculture, forestry etc.
19. Seasonal adjustment of building and other activities which vary with the seasons.

D. Types of Policy Models

1. A General Static Model:

$$(1) \quad W = W(x_1, x_2, \dots, x_m, y_1, y_2, \dots, y_n, z_1, z_2, \dots, z_k)$$

$$(2) \quad y_i = f_i(x_1, x_2, \dots, x_m, z_1, z_2, \dots, z_k) \quad i = 1, 2, \dots, n,$$

where (1) defines social welfare as a function of a set of government variables (x_1, x_2, \dots, x_m) , a set of private variables (y_1, y_2, \dots, y_n) and a set of exogenous variables (z_1, z_2, \dots, z_k) ; and where (2) gives the solution of a market equation system for each private variable at a given set of values of the government and exogenous variables. The policy problem may be conceived of as a question of maximizing (1) with respect to the government variables, subject to the constraint (2). In this way the values of x_1, x_2, \dots, x_m (and consequently of y_1, y_2, \dots, y_n) are determined.

2. Some possibilities of specialization:

a) The government variables (x_1, x_2, \dots, x_m) may be conceived of as exogenous (function (1) above is not included in the model). By assuming alternative values of the government variables (and of parameters which can be changed by the government) one may calculate the corresponding values of the private variables and leave it to the politicians to choose between the alternatives. Klein's models in his *Econometrica* paper on "The Use of Econometric Models as a Guide to Economic Policy"¹⁾ appear to be of this type. Such models should be useful for economic policy to the extent that they may indicate the effects of a particular government policy. Regarding their practical applications for policy purposes, it would seem to be advantageous if

1) *Econometrica* Vol. 15, 1947.

all relevant government variables, e.g. interest rates, direct taxes, indirect taxes, government expenditure on goods and services etc., were specified as separate exogenous variables and not lumped together or included only in the parameters. Furthermore, it would be convenient if all policy objectives which can be expressed quantitatively, e.g. employment, capital formation, exports, imports etc. (see section B), also were specified as separate variables. Neither of these requirements have been met by the econometric models published as yet. I leave it to the statisticians to investigate the statistical possibilities of fulfilling these requirements.

b) One may attempt to solve the policy problem in two steps, viz. 1) a preliminary decision can be made on certain broad "basic objectives," e.g. in the form of a particular "final bill of goods," and 2) a more detailed test is undertaken to ascertain whether the objectives are feasible within the framework of technological, behavioural, and institutional constraints which government policy is confronted with. We shall give a very simplified example of a model designed for the process of deciding upon basic objectives:

$$(1) \quad W = W(C, T, I, A, B, L, N),$$

$$(2) \quad R = C + I + A - B,$$

$$(3) \quad R = R(C, L, N),$$

In this model (1) defines social welfare as a function of private consumption C , collective consumption T , capital formation I , exports A , imports B , a variable L , measuring the inequality of income distribution, and labor input N ; (2) defines the national product R ; and (3) defines national product as a behavioural function of the level of consumption C , inequality of income distribution L , and labor input N . The values of the variables C , T , I , etc., are determined by maximizing

(1) subject to the restrictions (2) and (3). Having preliminarily determined a "final bill of goods" on the basis of a model of this type, the feasibility test may be undertaken for example by means of an input-output model of the Leontief type.

Welfare models of the type discussed above appear to underly more or less explicitly the statements on economic objectives being made from time to time by various governments. However, no numerical models of this type are known to have been constructed. It seems worth while making some experiments in this field.

c) Instead of maximizing a welfare function of the type described above, one may choose to maximize one of the variables in this function, e.g. C, I, or N, subject to given technological and behavioural restrictions. Investigations which Lawrence R. Klein has undertaken along this line, lead to conclusions regarding the optimum conditions which seem to be of significance for economic policy. Under his assumptions the Central Planning Board should, in order to achieve the given objective, not directly imitate competitive entrepreneurs. Because of the fact that the Board must affect, by its policy, certain market variables, an element of imperfect competition is introduced into the model.¹⁾ Further theoretical and econometric research along these lines appears to be highly desirable from a policy point of view.

d) As already mentioned inter-industry models can be applied in order to translate a given bill of goods into requirements of input and output in the various industries. We may distinguish between three types of such models:

- 1) Static models with constant input-output coefficients, i.e. no substitution between alternative, input combinations (Leontief)

1) Lawrence R. Klein: An objective Planning Calculus. Manuscript yet not published.

2) Static models allowing for substitution between different activities (Koopmans).

3) Dynamic models allowing for substitution (Danzig).

3. Models of the type described under 2a) may furnish significant information regarding the repercussions of a given government policy. The particular merit of the models described under 2b), c) and d) seems to be that they are more directly shaped for solving particular policy problems.

E. Econometric Research in Relation to Particular Policy Problems

1. Many of the econometric models which have been constructed in the past are designed for the purpose of predicting the prospective aggregate demand for goods and services. Comparing such a prediction with an estimation of the aggregate supply of goods and services at "full employment," it is assumed that conclusions can be reached as to whether some government action should be undertaken in order to increase or decrease aggregate demand.

However, an aggregate demand of a given size may lead to very different consequences according to how it is composed. Even if supply conditions are unchanged, a given aggregate demand might in one situation lead to "full employment," while in another situation it might imply a considerable unemployment in some fields simultaneously with the existence of a shortage of labor in other fields. One may want to pursue a different policy in such situations. If so, more detailed information is required regarding partial supply and demand. It would be required even if economic policy was limited to government actions with overall effects, e.g., open market operations, changes in reserve requirements, and income tax policy. It is more and more necessary the wider the application of more differentiated policy measures. Experience seems to indicate that a rather complex and differentiated policy is required in order to maintain "full employment" without a continuous price increase, or in other words, in order to avoid an inflationary development without resorting to an undesirable chronic unemployment. Thus, even if a no more radical goal than "full employment" is established as the major and exclusive objective of economic policy, it seems to be necessary to know something about the prospective balance between demand and supply for particular groups of goods and services rather than for the aggregate of all goods and services, although an insight into the latter balance is also highly desirable. Since it seems rather hopeless at the present time to elaborate

an econometric model which is fitted for predicting both the aggregate demand and the partial demand for a number of commodity groups, I am tempted to ask: Wouldn't it be easier and more rational first to elaborate econometric models fitted for predicting demand and supply of some particular groups of commodities and rely upon more or less intuitive guessing when predicting the remaining parts of aggregate demand and supply? Or in other words: To what extent is it possible to combine the application of partial econometric models with intuitive methods when predicting future demand and supply of resources?

2. More ambitious policy objectives may shift priority of research towards other fields. Section B enumerates a number of objectives which are more or less interrelated. We shall point out types of econometric research which seem to become necessary if some of these objectives are adopted as goals of economic policy.

3. The objective of achieving a particular income distribution, e.g., in the form of an ex ante allotment of definite shares of national income to particular groups of income receivers. Experience seems to indicate that the better organized the income receivers are, the more likely are such objectives to play an important role in economic policy. A basic requirement of such a policy is, of course, a good ex post income statistics with breakdowns by income size, industrial distribution, etc. Furthermore, a clarification and standardization of the income concepts is needed. In addition, information is required regarding the quantitative changes in income distribution which the government may expect to bring forth by means of particular policy measures, e.g., changes in taxes, transfers, subsidies, interest rates, etc. Here is an important field for econometric research where very little has been done previously.

Experience further seems to indicate that the more explicitly policy is concerned with achieving particular objectives regarding income distribution, the

more likely is this objective to imply a further equalization of incomes. The high level of taxation which such a policy presupposes does not only raise difficult administrative problems, but is also likely to affect the allocation of resources and the balance between leisure and work. The effects in these respects of alternative forms of taxation might presumably be clarified by means of econometric research, e.g., by making use of interview methods.

4. The objective of **achieving higher efficiency.**

a) In relation to a policy of increasing the capital formation (by government investments or by a policy of stimulating private investments) during periods when total demand is "too low." The question is: What kind of additional capital formation will contribute most to future welfare?

b) In relation to a policy of limiting capital formation in periods with "too high" total demand. The question is: What kind of investment plans should be discouraged?

c) In relation to a policy which attempts to account for external economies in production even under conditions of balance between total demand and supply.

d) In relation to a policy of fixing prices at their atomistic equilibrium level in case of imperfect competition or eventually fixing prices at their long-term equilibrium level in case of violent short-term fluctuations due to imperfect foresight (fluctuations of "cobweb-nature").

e) In relation to the question whether new production methods should be introduced, e.g., utilization of atomic energy for industrial purposes.

f) In relation to a policy of structural reorganization in order to increase efficiency of production.

5. Problems arising in connection with a policy of conscious deviation from the particular allocation which under given conditions a complete individual

household sovereignty might be expected to bring about. As an example of such a policy may be mentioned the maintenance, for security reasons, of a minimum agricultural production in a country where the comparative costs of agricultural production are high.

6. The problems indicated under 3-5 seem to call for rather extensive inter-industrial studies. It further appears that they call for investigations regarding the demand for particular groups of consumers goods; regarding the plans for investment in particular categories of capital; and regarding the supply of different kinds of labor; rather than for a concentration of research on aggregate consumption demand, aggregate investment demand, and aggregate labor supply.

If the maintenance of a free choice of consumption goods and of occupation is regarded as a major and unmodifiable objective, investigations into the internal structure of consumption demand and labor supply are more urgent than it would be if consumers goods rationing and forced labor supply were considered permissible. However, in both cases information on inter-industrial relationships would be equally necessary.