

## Comment on L. H. Summers, "The Scientific Illusion in Empirical Macroeconomics"

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The paper by Summers gives a very pessimistic view of economics as a science. In the following I make some general comments on the paper, and will not discuss Summers' evaluation of the different contributions to econometrics, since my own background is economic theory and not econometrics.

As far as I can tell, the main message in the paper is that in economics, we should reinvent the inductive method and directly project the real world into empirical macroeconomic models or, perhaps, even be satisfied with some stylized facts about the real world and build them into *ad hoc* specified macroeconomic models.

Even after reading Summers' paper, I do not see any evidence that the success of economic policy and our understanding of the real world will improve by not going all the way around economic theory and econometrics.

I find that our understanding of economic institutions and processes, and the basis for macroeconomic policy, have improved by the development of economic theory and by the fulfillment of some of the intentions put forward in the research program launched by Tinbergen, building on Frisch's ideas. But, of course, we are far from having the same understanding of the functioning of a specific economy as we have of many specific physical systems.

Summers contrasts the success of and excitement about experiments in the natural sciences and the lack of excitement about the results of econometricians. However, I do not see why experiments in the natural sciences and econometric work *should* play a parallel role. The relation between theory and experiments that prevails in other sciences cor-

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responds more naturally to the interaction between real economies and economic theory. We see immediately that money is part of the institutional arrangement in all economies; this is not a hidden fact which econometricians have to discover. The main challenge is to build a theoretical model, where this fact is explained endogenously. And vice versa. Theoretical work can have implications in determining which institutional arrangements are in fact introduced into economies. An example is the theory of economies with incomplete markets. This theory provided the insight that agents should be able to make positive profit by introducing new market possibilities, such as special options on currencies, which have indeed been introduced.

One major difference between physics and economics is that economic institutions are created by the participants in the economy. There are no hidden facts on this level. What is hidden, however, is the individual behavior of the participants in an economic system. It is also on this level that experiments have begun to be performed in economics. Examples include tests of the behavioral assumptions and predictive power of the equilibrium concepts in simple games. Moreover, when discussing the differences between economics and e.g. physics, the examples taken from physics are often very "simple". There are many physical systems where it is impossible, even if many stylized facts about the partial behavior are known, to explain and predict how the system as a whole behaves.

Section III in Summers' paper is devoted to explaining why sophisticated econometric work has so little impact. In order to answer this question, in my opinion, we have to look at the basis for econometric work, i.e., macroeconomic theory. My answer to the question would simply be that at its present stage, macroeconomic theory is not developed enough.

Macroeconomic theory today has to a large extent taken over the deductive method from microeconomic theory. But macroeconomists start out with very simplified models. These models use very few commodities, a single (or few) representative consumer(s) and producer(s), perhaps a public sector, and very simple institutional arrangements. This primitive micromodel, now called a macromodel, is then used to derive conclusions which are treated as if they were outcomes in an economy with many interacting agents. A typical example is the popular overlapping generations model.

However, there is nothing in economic theory which provides any reason why these macroeconomic models should give a good description of the way an economy with many agents operates; on the contrary. We know e.g. that it is only in economies where all the consumers have identically homothetic preferences that the demand side can be represented by a representative consumer, if all income distributions are

allowed. Moreover, if only a fixed income distribution is considered, there are severe restrictions on the preferences of the individual agents; see e.g. Shafer and Sonnenschein (1982). It is also well known that even if the demand side can be aggregated via a representative consumer, the welfare implications of economic policy for the representative consumer can be the opposite of the welfare implications for all the original consumers; cf. Jerison (1984).

Correspondingly, we know that individual demand functions satisfy the weak axiom and the strong axiom of revealed preference. However, we also know that these properties do not aggregate. In fact, the famous Sonnenschein-Mantel-Debreu theorem showed that the aggregate excess demand function loses all its properties if there are sufficiently many consumers. It was proved that any homogeneous continuous function which satisfies Walras law can be obtained as an excess demand function for a suitably chosen economy (except for boundary behavior); for references, see e.g. Shafer and Sonnenschein (1982). Thus, there is no reason to believe that an economy with one representative consumer behaves in the same way as an economy with many interacting consumers. Consequently, there is nothing strange about the fact that macroeconomic relations are rejected.

In my opinion, however, the critique of current macroeconomic theory does not imply that empirical studies should instead be based on theoretical shortcuts such as representing the economic system by a few schematic, overall equations. The only way to obtain better empirical macroeconomic models is to develop a more advanced macroeconomic theory. One way of achieving this might be to take aggregation from the micro level to the macro level seriously. It should also be noted that in the above-mentioned Sonnenschein-Mantel-Debreu theorem, there is no restriction on the *distribution* of the preferences and initial endowments of the consumers in the constructed economy. Only the usual assumptions on *individual* consumers are satisfied.

Most economic theory is based on a description of individual agents and no assumptions are made on the distribution of agents' characteristics. A few results have been obtained, however, which show that properties of aggregate behavior, can be obtained; these properties are not merely inherited from individual behavior by making distributional assumptions.

On the production side, there is e.g. the classical result by Houthakker (1955) which shows that specific aggregate production functions can be obtained from distributions over individual production activities. Another example is the paper where Dierker *et al.* (1984) prove that a smooth demand function can be obtained, even if the individuals exhibit discontinuous demand behavior, by making assumptions on the distribution of the preference relations of the consumers. A further important example

may be found in Hildenbrand (1983, 1989). He showed that "the law of demand" for the aggregate demand function can be obtained by making assumptions on the income distribution. Even if his results are based on extreme assumptions, they demonstrate that the aggregate, at the same time as it loses some of the properties of individual behavior, acquires new properties and they indicate that distributional assumptions might be important for the macro level.

Another line of research where distributional assumptions have also been shown to be fruitful is represented by Caplin and Nalebuff (1990) and Dierker (1989), where quasi-concavity of the profit function is obtained from distributional assumptions on the preferences of the consumers.

Of course, when empirical work takes its starting point in macroeconomic theory and not only in some clever direct observations of the real world, it runs into all the difficulties which econometricians are faced with and which require sophisticated methods to overcome. This may be exemplified by (i) the difference between theoretical variables, true variables and observational variables as stressed by Haavelmo, and (ii) the problems which arise because experiments cannot be carried out as in physics (or game theory), so that there are only a few local observations instead of the functions which are used in the theory.

One way of overcoming some of the problems associated with the lack of macroeconomic theory has been to build empirical microeconomic models instead. Here the representative consumer and producer are avoided, but it is assumed e.g. that the consumers have direct or indirect utility functions of a very simple functional form, with corresponding functions for the production sectors.

These models, with their full specification of the economy, are of course very well suited for studying the effects of economic policy. But again, since the basic description of the economy is very special, one cannot have too much faith in the conclusions which are derived from them.

Since we know how weak the macroeconomic theory behind empirical macroeconomic models is, it should be clear that the results of estimating each of the different models cannot arouse too much excitement. Also, it is not surprising that the economic policy conclusions derived from the different models vary a great deal, not only in the size of the effect but also in sign.

For the time being, however, these models are the best tools for studying economic policy issues. Therefore the skill of econometricians should be used to make the models as good as possible. It is unclear to me how a research strategy based on inductive empirical investigations can guide us in e.g. the design of new economic institutions and the evaluation of different economic policies.

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