
Where does causal knowledge in macroeconomics come from?

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d) Philosophy of social sciences

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Keywords: Macroeconomics, causal structure, structural econometrics, VAR models, microfoundations

Extended abstract

The aim of this paper is to present different methodological approaches in empirical macroeconomics and to point out that these different approaches can be regarded as giving different answers to the question from the title, and consequently offering different methods for obtaining knowledge about causal structure of macroeconomic phenomena. We will also point out to some of the difficulties each of these approaches faces.

In 1947 Tjalling Koopmans criticized Arthur Burns and Wesley Mitchell for the attempt of "measurement without theory" in their study of business cycles (Koopmans 1947). Empirical regularities that Burns and Mitchell observed with their "atheoretical" methods were mere aggregate descriptions of macroeconomic data, but every economy is made up from individuals, so aggregate macroeconomic relationships are just the product of behaviour of individuals. Therefore, it was obvious for Koopmans that observed aggregate regularities are the product of the simultaneous validity of a number of "structural" equations, the latter supposedly describing behaviour of individuals. An implicit interpretation seems to be that structural equations represent causal relationships, while observed aggregate relationships represent mere correlations arising out of simultaneous working of many causes.

The problem with the "atheoretical" approach is that without the help of the theory there is no way to get from the observed regularities to the structural equations that produce them. Theory should supply us with the form of structural equations and with restrictions on the coefficients of these equations. If there are enough restrictions supplied, we can use econometric techniques to estimate coefficients of structural equations from empirical data (this is the "identification" problem). Measurement is in this picture just the process of filling in the quantitative details of the theoretically given (causal) structure. This is the picture of econometric research developed by the Cowles Commission, whose member Koopmans was.

Cowles Commission approach came under attack from different positions. Robert Lucas (Lucas 1976) argued that existing structural macroeconomic models were inadequate for economic policy analysis because their parameters were not invariant to policy changes. One of the main reasons for this non-invariance was that these models did not account for the rational way in which agents form expectations about policy variables. We could also say that this non-invariance of "structural" macroeconomic models meant that they are missing important parts of (causal) structure of economic phenomena, and were therefore actually not structural. One way to answer Lucas' critique was to try to incorporate the missing part of the (causal) structure into macroeconomic models by building macroeconomic models in which rational agents are in general equilibrium. These macroeconomic models would then have proper "microfoundations", which is where the true structure of all economic phenomena presumably lies, in microeconomics. But microfoundations project has its own difficulties. Building macroeconomic models with proper microfoundations is usually feasible only in highly idealized models. Secondly, microfoundations are in practice usually achieved by a methodologically problematic shortcut of "representative agent" (Kirman 1992). Thirdly, practical application of models with microfoundations requires estimating parameters of "taste and technology", a task unlikely to be performed successfully (Sims 1986).

Another critique of structural macroeconomic models was that they could not be identified in practice, and that identification of models was usually achieved at the cost of their structurality (Liu 1960; Sims 1980). Sims' own approach was to give up the attempt of specifying the true "structure" of macroeconomic models *a priori* and try to learn as much as possible about it from the data alone. He proposed to build nonstructural macroeconomic models with as few *a priori* restrictions as possible. These models are called VAR models.

VAR models were soon deemed inadequate for policy analysis, one of the most important goals of econometric modeling (Cooley & LeRoy 1985; Leamer 1985). Atheoretical, unstructural VAR models are purely descriptive, but policy analysis requires modeling causal relationships. Granger causality test are performed in VAR models, but "Granger causality" is not causality at all, it is pointed out, but a name for a particular kind of correlation between variables. Furthermore, using impulse response functions for analysing policy impacts with VAR models requires making errors from different equations uncorelated, which in turn requires introducing some causal structure to the model. Imposing *a priori* restrictions and structure to the VAR model gives us structural VAR models, or SVAR models.

Although restrictions required by SVAR models may be weaker than restrictions required by models in Cowless Commission approach, we are in a sense back at were we started, requiring untestable *a priori* assumptions to ground policy analysis in VAR models. (Hoover 2012). The question is where does this *a priori* knowledgde of causal structure of economic phenomena come from? The answer that Koopmans and Lucas seem to be giving is that it comes from microeconomic theory. But how did this knowledge came to be incorporated in this theory? Microeconomic theory is based on the principle that individuals optimizing under constraints.

This principle by itself has no empirically observable consequences, and requires additional hypotheses about preferences and constraints. Causal knowledge supplied by microeconomic theory is therefore likely to be substantially dependent on these additional assumptions, which suggest which should shift our attention on the way additional assumptions are acquired.

To summarize, the problem of macroeconomics is that theory is often not substantive enough to structure empirical research successfully, and empirical research has hard time getting from observations to underlying causes without the help of *a priori* imposed structure. Lawrence Summers thinks we should give up attempts of developing econometric methodology for systematically gaining knowledge about causal structure of macroeconomic phenomena, because such attempts represent a "scientific illusion" (Summers 1991). Illusion or not, such attempts were defining methodological debates in empirical macroeconomics, and at the heart of these debates stand the question "Where does causal knowledge in macroeconomics come from?".

Short abstract

Different methodological approaches to empirical macroeconomics will be described and it will be explained that they represent different answers to the question from the title. Structural approaches require that macroeconometrical research should be explicitly founded on the (micro)economic theory in order to be able to measure the causal structure of the macroeconomic phenomena. Unstructural VAR approach suggest using econometric models to try to find out as much as possible about causal structure from the data, without prior restrictions from the theory. Problems with both are described.

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