

Do we Need New Methodology in Macroeconomics?

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Abstract

The questions whether methodology employed by mainstream macroeconomics is sufficient and whether and in what extent innovative propositions in that field are in demand appears to of growing importance. In this article the concept of the role of representative agent for developments in economic science is thoroughly discussed. The strengths and deficiencies of the Representative Agent Model are examined.

The mainstream academic economic theory seems to rest on two fundamental pillars: the notions of representative agent and economic equilibrium. I would like to focus on the role of representative agent for developments in economic science. This concept has a very long tradition in economics, dating back to Marshall who used it to describe equilibrium in order to eliminate the problems of agent diversity from his analysis. This abstract construct helped to avoid the assumption that all enterprises are identical. Using this concept the author explained how an internally diversified branch generates a single equilibrium price for all enterprises.

In modern times the notion of representative agent is used to construct aggregate macroeconomic categories based on results of individual behaviours of economic subjects. The idea is to build microeconomic rationales for equations describing aggregate demand and supply and their components and to bypass difficulties associated with aggregation of microeconomic effects at the macroeconomic level.

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Undoubtedly, this way of looking at macroeconomic phenomena has played an enormously important role in the development of economics. The important changes in economic thinking inspired by Lucas are one example worth mentioning. Taking microeconomic foundations of decision-making as his point of departure, he showed that aggregated output does not necessarily change in accordance with Keynesian rules, i.e. it does not necessarily match the modified aggregated demand. Actors rationally try to anticipate a potential source of demand shock and to adjust their supply response accordingly. This may neutralise the intentions of monetary authorities which strive to influence the aggregated output by modifying the supply of money in the economy. The discovery of the significance of rational expectations in the behaviour of agents as well as modelling of such behaviours are among the most interesting and most significant achievements of modern economics. These developments were enabled through the use of the Representative Agent Model as an analytical tool. The analysis of behaviours of individual agents, used as a point of departure, was taken further to aggregation at the macroeconomic level. The role of rational expectations in the shaping of aggregate result was identified exactly once analysis went down to the level of a representative agent.

There are also other significant discoveries were enabled by microeconomic approaches to aggregates. For instance, the traditional aggregate function of consumption based on current disposable income could be challenged once the maximising tendencies among individual consumers were included in the picture. As a result, the theory of aggregated consumption was developed, taking account not only of current income but also anticipated one. For this reason, this theory is thought to account more effectively for long-term changes in aggregated consumption.

The transition from a representative agent to generalisations onto a population of agents is generally quite straightforward. It is assumed that an economic agent optimises the pursuit of its exogenous goal within the existing constraints. Such constraints may be static or dynamic (as in growth theories, for instance) and this influences the selection of the optimisation procedure. Importantly, the result of such optimisation procedure is also considered as pertaining to the aggregate. In other words, macroeconomic phenomena are reduced to the behaviours of individual agents. The aggregate is reduced to the individual agent while the latter becomes the subject-matter of macroeconomic study based on the assumption that agents' behaviours represent the behaviour of the aggregate. This is based on the naïve belief that if units (agents) display some typical behavioural attributes, then such attributes must be also displayed by aggregates which are composed of such units. In this way, aggregate values are explicated through individual behaviours of agents.

This approach clearly differs from the Keynesian tradition where certain aggregates explicated other aggregated values (for instance, aggregated consumption is a function of aggregated income).

However, this leads to a question about the nature of the representative agent and its consequences for macroeconomic analysis. Are the agent's reactions in line with aggregated relations? Let us assume that we have an economy which consists of two agents, X and Y , with the following respective import functions: and . Our aim is to define a representative agent with an import function of , which would correctly reflect the relationships between aggregate output and imports. To start with, let us assume a manufacturing volume of 100 for both X and Y . This means that imports for aggregate output equal 60. Therefore, a representative agent with an output figure of 100 will import $60/2=30$. The agent's import function equals . Therefore, if we have two agents with an import function of and an output of 100, then the aggregated imports would equal 60, i.e. exactly the same as the actual value for two agents, X and Y . However, this representative function of imports is unstable. Let us assume that X manufactures by 50 more and Y makes by 50 less. As the aggregated output is unchanged, our Representative Agent Model will still predict aggregated imports equalling 60. However, the actual figure will be 70. Now, let us consider an increase of 100 in aggregated output. Based on our Representative Agent Model we predict that aggregated imports will equal 90. However, the actual figure will change from 80 (if the entire increase is due to Y) to 100 (if the increase is due to X). Obviously, the model does not work well. The naïve belief about the compatibility of individual and collective reactions leads to a failure. In order to ensure such compatibility we must make more rigorous assumptions. One may identify conditions which will stabilise the model: the import functions for all agents must be the same. This leads to important observations. In order for the Representative Agent Model to generate real relationships between aggregates, the agent cannot be representative in the sense of being an average agent but it must be one of many identical agents. Therefore, this model eliminates the diversity between economic agents. For instance, a typical assumption regarding the attributes of agents that guarantees that a group behaves like a representative agent is that all of them have an identical homothetic utility function. Or, the function is not necessarily identical but homothetic and, additionally, the distribution of incomes is independent of prices. Another very important assumption which plays a crucial role in growth theory is that all enterprises have a homogenous first-degree production function.

If we eliminate diversity and reduce a group to the actions of an individual agent, this may have far-reaching theoretical complications. Let us consider the

example of the production of public goods. Public goods are characterised by non-rivalled, i.e. once they have been produced, nobody may be excluded from using them. If we assume that each member of a group pursues only an egoistic goal of maximising its income, nobody will undertake the effort to produce such public goods. Everyone will wait until goods have been produced by another group member. Therefore, if we assume that egoism is a typical attribute then public goods stand no chance of being brought into existence. However, both practical experience and economic experiments prove otherwise. Public goods originate not only through coercion exercised by governments but also through voluntary co-operation of local communities. Therefore, one must take account of the existence of agents with a prevailing altruistic motivation which are oriented towards co-operation in order to achieve a common, beneficial goal. How can we build representative agent categories based on diversified, sometimes very different, characteristics of individual agents? In cases where we are dealing with diversified units and when the aggregate result depends on types of interactions and reconciliation of various aims and views, an analysis reduced to a study of representative agents will fail. Instead, the opposite approach should be adopted: based on existing diversification of motivations one should examine the mechanisms which lead to a shared outcome.

Another problem with attempts to reduce aggregates to attributes of an individual agent is the restoration of equilibrium shaken by a disturbing factor. If a representative agent consumes its own products, then adjustments made by the agent within the consumption of its output are the mechanisms which restore economic equilibrium. How about situations an exchange between agents is required to restore equilibrium? Let us take the example of aggregate demand for money which has been inferred from a representative agent's optimising behaviour speaking, the demand will be negatively correlated with the interest rate and positively correlated with global output. Let us look at the difficulties in explicating the adjustment on the money market after an increase in aggregated output. The transaction demand will increase and, at a given interest rate and supply of money, this will lead to a surplus of demand over the supply of money. In order to satisfy its higher need for money, a representative agent will want to cash some of its assets. However, if the market behaves like the representative agent, everyone else will want to cash their assets as well. As a consequence, there would be nobody willing to get rid of cash and acquire non-cash assets. A representative agent cannot cash its own assets by itself. This example shows the trap of representative agent when discussing interactions at the macroeconomic level: we arrive at a methodological contradiction which cannot be overcome.

Analysis of the impact of policies on the economy based on the Representative Agent Model also faces some difficulties. As a rule, such analysis is performed with the use of comparative statics or by analysing transitions from one stationary period to another. Policy variables are modified and the new equilibrium is analysed for a representative agent. At this point an implicit assumption is made that after a change in policy the set of typical attributes of the representative agent remains unchanged. However, the simple example of import modelling has shown that the distribution of output increases between agents lead to a change within the representative agent itself. Therefore, changes in policy may influence agents in a variety of ways (in many a case, policies aims to achieve such varied impacts). Therefore, it may happen that the assumed structure of a representative agent will no longer represent the economy after a policy change. In an attempt to 'rescue' this model it is often assumed that such changes do not lead to 'distribution effects' i.e. effects related to the distribution of the modified value across all enterprises.

Attention should be drawn to another element which weakens the usefulness of the Representative Agent Model. The Model is based on an implicit assumption that adjustments between agents are made smoothly on a well-functioning market. Therefore, a solution which is optimal for a representative agent will also be optimal for the economy as a whole. However, adjustment processes are not necessarily so smooth and market failures may occur. This refers to situations where individual decisions are based on observations of other agents' behaviours. In that case reactions displayed by some agents are a function of actions undertaken by other agents. In that case we cannot assume that a population behaves like an individual agent because we are dealing with mutual interactions. The Representative Agent Model is not suited for analysing such situations. It is possible to demonstrate that the result of such mutual interactions may lead to more than one equilibrium. This depends on the flow of interactions and the degree of variety within interactions. From the perspective of the population as a whole, such varied equilibriums may have different values. It may happen that agents which optimise the pursuit of their goals will put the economy into a disadvantageous equilibrium. In that case we will say that interactions between agents are poorly coordinated if we want to optimise the aggregate goals. In order to avoid disadvantageous equilibriums it would be advisable to co-ordinate the interactions of agents which will otherwise lead to a disadvantageous aggregate result. This problem seems to have an important practical significance as the knowledge of erroneous coordination would inform policymakers, helping them to take corrective measures. However, if the Representative Agent Model is used, one loses sight of such important areas of study.

Do all the aforementioned weaknesses of the Representative Agent Model mean that its end is nearing? I do not think this is the case. It seems that economics is now at the stage where it is learning about the weaknesses of its previous and current methodologies. The road to developing new analytical methods seems to be fairly long.