

PHILOSOPHY OF ECONOMICS

MICROFOUNDATIONS?

REPRESENTATIVE AGENTS A modern economy consists of many agents with different interests. Out of their activities, some order emerges. A well-known explanation of this phenomenon is that an “invisible hand”, to use Adam Smith’s original metaphor, guarantees that these self-centred activities result in a socially satisfactory outcome. And yet, although many economists invoke this story, most of their macroeconomic models give no representation of this coordination process, or of activities in need of coordination. What they do instead is to assume that their choices reduce to the choice of one “representative” agent, and that the maximization of the utility of this agent coincides with the aggregate choice of heterogeneous individuals.

Why do they make this assumption? Because, Kirman (1992) argues, they want to give “microfoundations” to macroeconomics. Economists want to reduce macro phenomena—typically, price-quantity equilibria—to the behaviour of individuals, as described by what they regard as an adequate behavioural model, namely utility maximization.¹ The reduction must, however, guarantee that two target properties of equilibria are recovered, namely their stability and their uniqueness. Stability would justify the economist’s story on how economies reach equilibrium. Uniqueness would legitimize the use of comparative statics to evaluate the effect of changes, such as those induced by policy.

The easiest way to guarantee stability and uniqueness is by postulating that the whole economy behaves as one “representative” individual. This ensures *by fiat* that the excess function of the aggregate, and not only of each individual, is

unique and stable. Alternatively, one would need to spell out the (perhaps strong) individual-level conditions under which the collectivity behaves like one individual. The representative individual would then be nothing more than a useful fiction, which allows one to interpret observed trades as an adjustment process (“tâtonnement”) around a stable equilibrium. However, Kirman notes, unless the conditions for this process to obtain are satisfied, the assumption that the economy behaves like one representative individual is more than an innocuous fiction, introduced for analytic convenience. On the contrary, it is a substantive assumption, introduced to make the stability and the uniqueness of equilibria possible.

UNJUSTIFIED AND MISLEADING As it turns out, Kirman argues, the representative agent assumption is “unjustified” (117): “well-behaved individuals need not produce a well-behaved representative agent” (134). As demonstrated by Sonnenschein, Debreu, and Mantel, only few properties of the demand function of individuals carry over to the demand function of the aggregate. In particular, the Weak Axiom of Revealed Preference may be violated by the aggregate, which may choose x when y was available in one situation, and choose y when x was available in another situation.² The representative agent assumption is made to circumvent this problem. But since the assumption is unjustified, what one gets are at most pseudo-microfoundations.

Moreover, the representative agent assumption “leads to conclusions which are usually misleading and often wrong” (117).

Even on the assumption that the choice of

¹The ultimate motivation might be to understand economic phenomena in terms of intentions, as Hoover (2015) notes. The issue, however, is whether a representative agent is necessary to that. (Both Hoover and Kirman deny that.)

²Nor are stability and uniqueness deducible under more restrictive assumptions on the dispersion of preferences or incomes across individuals (cf. 127-28).

heterogeneous individuals is reducible to the choice of a representative agent at one time, there is no guarantee that the choice of the individuals at another time, say after a policy intervention, also reduce to that of the representative agent. The reason is that the choice of the aggregate depends on the distribution of income among the individuals. Usually, distributional issues are assumed away. However, if the policy affects the distribution, “the representative constructed *before* the change may no longer represent the economy *after* the change” (123). That is, “the reaction of a representative agent to change need not reflect how the individuals of the economy would respond to change” (1134).

And even on the assumption that aggregate choice does coincide with the choice of the representative individual, both before and after the change, it is not possible to use the representative agent to answer the question, which of the two possible outcomes, that before the change or that after the change, does society prefer? This is because the representative individual may prefer a to b , and yet all the represented individuals strictly prefer b to a (124). The reason is that the aggregate utility function may be such that an outcome a lies on an indifference curve with higher utility than the indifference curve where an outcome b lies, even though the represented individuals’ utility functions are such that b has always lower utility than a . In Kirman’s words, “the preferences of a representative agent over choices may be diametrically opposed to those of society as a whole” (134). Since the preference orderings of individuals and representative agent do not coincide, one cannot use the utility of the representative agent to justify policies that are meant to benefit society, namely the individuals, whom the representative agent is supposed to represent.

In addition, many of the claims, which economists think to have tested by means of representative agent models may be vitiated by the very assumption that heterogeneous individuals may be reduced to a representative agent.

[...] whenever a representative agent model is tested,

one is testing a joint hypothesis: the particular behavioral hypothesis one is interested in and the hypothesis that the choices of the aggregate can indeed be described as the choices of a single utility-maximizing agent. (125)

Here is one example. The “permanent income” hypothesis says that agents’ consumption at any time depends on not only their current income but also on their expected income, with the result that consumption is spread over their lifetimes. If the hypothesis were true, the agents’ consumption should change in response to (unpredictable) shocks to their current income, such that their consumption changes based on a revised estimate of their permanent income. The so-called “excess smoothness” of consumption, namely the observation that the consumption function is much smoother than the income function (e.g., labour income in the U.S. is a random walk), has been taken to reject the permanent income hypothesis. Excess smoothness, however, has been studied in a representative agent framework, such the representative agent, rather than the permanent income hypothesis, might be the culprit. It is possible to defend the representative agent hypothesis by letting the changes in consumption depend on two components, namely the perception that the current change is permanent or transitory. However, the decomposition into these two components seems arbitrary, unless a justification is given for why the representative agent perceives shocks in this way. Economists are happy with a complicated story on how a representative consumer with a 100-year horizon reacts to changes in income in order to preserve a tractable maximizing model. However, aggregating over several heterogeneous and myopic individuals, who use simpler but still consistent ways of analysing their income processes may produce a similar result. In consequence, “not only the resolution of the paradox of “excess smoothness” but the very existence of the issue may be a result of the choice of this framework” (126).

Rather than proposing ever more complicated dynamic optimization schemes for representative agents,

it makes sense to explore the patterns that may develop from aggregation over heterogeneous individuals, who make simpler but still coherent calculations. (127)

HETEROGENEITY TO THE RESCUE? Kirman argues that

[...] contrary to what current macroeconomic practice would seem to suggest, requiring heterogeneity of agents within the competitive general equilibrium model may help to recover aggregate properties which may be useful for macroeconomic analysis. (134)

In particular, restricting the characteristics, such as preferences and incomes, of the agents to approximate a single agent doesn't suffice to restore the stability and uniqueness of the equilibria. And yet, he notes that—ironically—stability and uniqueness may be guaranteed, at the aggregate level, *in virtue of* the individuals' heterogeneity—that is, in virtue of the (large) dispersion of their characteristics.

For instance, it has been shown that, if the income distribution is decreasing, such that each successively higher income class contains a smaller proportion of agents, then the law of demand holds, meaning that the demand curve for each good is downward sloping and that equilibria are unique and stable—even though the law may not hold for the individual. Similarly, if agents have very spread out preferences, the law of demand holds at the aggregate level—irrespective of whether individuals are utility maximizers. It remains an open question to what extent can dispersion of characteristics recover structure at the aggregate level.

Adding heterogeneity of characteristics to the general equilibrium model is, in any case, not enough. To recover many interesting phenomena (e.g., cycles and fluctuations; cf. 133), what is needed, in addition, is to assume direct interactions between the individuals, through which

individuals determine prices, and not just take prices as given. Modelling interactions is made possible by advances in game theory, under the relaxation of the assumption that individuals' interests are symmetric, and in finance, under the assumption that traders with different opinions influence each other, imitate each other, etc. The order that emerges in these conditions (without assuming utility maximization) is different from the equilibria guaranteed by a maximizing representative agent, in that the equilibria may not be stable or unique. Yet, it may exhibit very regular characteristics, in a statistical sense.³

Despite the possible advantages in assuming heterogeneity and interactions, Kirman suspects that the entrenchment of the framework of utility maximization will slow down the abandonment of the representative agent assumption (134). He has more recently (2010) argued that the faith in this framework has led to a crisis of economics, which has become manifest with the inability to predict or adequately treat the recent financial crisis. Whether the framework should be given up is, of course, a contentious matter.

References

- Hoover, K. (2015). Reductionism in economics: Intentionality and eschatological justification in the microfoundations of macroeconomics. *Philosophy of Science*, 82:689–711.
- Kirman, A. (2010). The economic crisis is a crisis for economic theory. *CESifo Economic Studies*, 56(4):498–535.
- Kirman, A. P. (1992). Whom or what does the representative individual represent? *Journal of Economic Perspectives*, 6(2):117–36.
- LeBaron, B. (2006). Agent-based financial markets: matching stylized facts with style. In Colander, D., editor, *Post Walrasian Macroeconomics: Beyond the Dynamic Stochastic General Equilibrium Model*, pages 221–35. Cambridge: Cambridge University Press.

³One example are the stylized facts of finance (e.g., fat-tailed distribution of returns; volatility clustering and persistence) (see, e.g., LeBaron 2006).