

On microfoundations of macroeconomics

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“We have reached the point at which there are graduate students for whom John Hicks’s IS/LM model is just a dim memory from an undergraduate textbook and whose first lecture in their graduate macroeconomics courses began with a Hamiltonian describing the dynamic optimization problem of what appears to be an individual agent” (Hoover, 2001).

1. Introduction

A good starting point for this discussion can be found in the quote “[t]he classical political economists were primarily macroeconomists and only a Keynes would have been needed to put their theoretical structure in order, their specificities notwithstanding” (Pereira and Lima, 1996). Classical economists such as Adam Smith and David Ricardo mainly focused on market phenomena in their work. The analytical and empirical role that they assigned to the individual in their arguments was relatively weak. Though the analytical ground clearly shifted to the individual with the rise of marginalism in the middle of the nineteenth century, still the market phenomena remained the focus in English political economists’ writings. The individual truly became the analytical centre of economics in the works of French economists such as Augustin Cournot and Leon Walras (Hoover, 2001).

Keynesian revolution gave macroeconomics its rebirth. What Keynes had in the back of his mind was that whole is more than the sum of the parts/units (Pereira and Lima, 1996).

“[T]he individual played an essential role in Keynes’s analysis, even though he denied the vision of macroeconomics as having been built upward deductively from self-sufficient, autonomous microeconomic units. Microeconomics on this interpretation of Keynes is the economics of a part in the context as a whole. Microeconomic parts are neither self-sufficient nor autonomous on this view; microeconomics presupposes, and takes, macroeconomics as given” (Hoover, 2010).

Around the mid-1950s, at least two approaches existed to study economy-wide phenomena: general equilibrium theory and (Keynesian) macroeconomics (Janssen, 1996). Some important theoretical issues in both these approaches were established by this time. Arrow and Debreu (1954) had proved the existence of general equilibrium point. Hicks (1937) had established IS-LM framework. Until the early 1970s, a degree of autonomy was widely accepted for the two branches, microeconomics and macroeconomics (Janssen, 1996).

It was within this context Jan Tinbergen developed an explicit methodology of policy evaluation where the policy maker aims at “targets” by choosing “instruments” (Hoover, 2015). To this end, Lawrence Klein and Jan Tinbergen were instrumental in estimating large macroeconomic models with hundreds of equations, which “adopted the aggregative architecture of Keynes’s *General Theory*”. This Keynesian macroeconomic approach was

dominant in policy making until 1970s. The central challenge to the Klein/Tinbergen type macroeconomic models was the famous “Lucas Critique” (Hoover, 2015; Da Silva, 2009).

According to Lucas, aggregate relationships modeled by macroeconometricians were the product of intentional behaviour of individual agents in an economy. Policy maker is not an outsider to the economy and they react to data generated by those intentional agents. On the other hand, agents are not passive and they try to understand and predict the policy makers’ behaviour and incorporate those predictions and resultant knowledge into their behaviour. Usually, policies are guided by policy makers’ preferred goals and, therefore, policy actions are not random. To the extent that policy actions are systematic or predictable, it would not be a difficult task for the individual agents in the economy to adjust their behaviour in light of the policy changes. Thus, contrary to what the Keynesian policy modelers assume, the relationships embedded in macroeconomic models would not remain unchanged to policy actions. In such a context, Tinbergen’s target/instrument relationship was bound to fail (Hoover, 2015). “The dare implication of [Lucas] critique is that the whole justification for policy interventions based on large-scale macroeconomic models vanishes: it was the death declaration of the Keynesianism of the time”¹ (Duarte, 2014).

The implied solution was to start building macroeconomics on first microeconomic principles taking the intentional, rationally behaving individuals/agents as the analytical unit (Da Silva, 2009; Hoover, 2001 and 2013; Palsson Syll, 2014). As Hoover (2015) puts it, “[t]he Lucas critique called for a radical *reductionism* – a bottom-up approach in which the behavior of aggregate quantities was derived deductively from the characterization of individuals”. Therefore, the microfoundation program in the 1970s can be taken as an obvious response to the Lucas critique. Macroeconomists started modeling macro relationships in such a way that the models would be immune to the Lucas Critique. “*Every New Classical or New Keynesian microfoundational model* – at first, explicitly but eventually only implicitly – *is justified in the minds of its advocates as an attempt to avoid Lucas’s criticism*. This is the linchpin of the history of microfoundations” (Hoover, 2013, emphasis added). On the other hand, microfounding attempts of macroeconomics may be partly due to the failure of important elements of empirical macroeconomics, particularly, the breakdown of the Phillips curve relationship that had been heavily used for policy purposes in 1960s (Janssen, 2006).

2. What is meant by microfoundations?

A good point of departure in explaining microfoundations is the concept of “methodological individualism”. The following are a few definitions of the concept in various writers’ own words:

“the doctrine that the only well-grounded explanations of social phenomena are ones that appeal to the actions and behaviours of individuals” (Hoover, 2009).

“mode of economic analysis that always begins with the behaviour of the individuals” (Blaug, 1992).

¹ In a more recent paper in 2016, Katherine Moos states that “Lucas critique altered the aspirations of economists and policymakers by undermining belief in the ability of economists to make meaningful interventions in the economy and therefore infusing implicit *policy nihilism* into macroeconomics” (emphasis added).

“the view according to which proper explanations in the social sciences are those that are grounded in individual motivations and their behavior” (Janssen, 2006).

Looking from this perspective, macroeconomics, subject matter of which is the economy as a whole, is expected to provide proper explanations only if it is grounded on individual motivations and behaviour. Lucas’ plea for the provision of microfoundations to macroeconomics is well summarized in a statement appearing in Hoover (2010).

“In economics, the only acceptable causal articulation must capture the intentional actions of economic agents. The fundamental explanatory trope of microeconomics is that *ought* implies *is*. Economics on this view is intentional; *it must capture the beliefs, expectations, and choices of individual agents*. Macroeconomics without microfoundations will fail to do so” (Hoover, 2010, emphasis added).

Providing microfoundations to macroeconomics (or microfounding macroeconomics) in this manner after 1970s includes a few basic features. First, the analysis is based on “deep parameters” corresponding to “policy invariant” basic variables such as *tastes* and *technology* (Hoover, 2001). Second, the centre of the analysis is rational constrained individual optimizers such as representative firms that maximize profits and representative consumers who maximize intertemporal utility subject to wealth/income/budget constraints in an environment with perfect capital markets (Wren-Lewis, 2007). In its most extreme form of the concept of representative agent, “the economy as a whole is represented as if it were the outcome of a single individual’s decision problem.² The possible differences between individual and aggregate economic behaviour are thereby assumed away” (Janssen, 2006). Third, rational expectations remain as a “consistency axiom” (Wren-Lewis, 2007), in the sense that they are “capable of being reconciled with different theoretical structures” (Arestis and Sawyer, 1994).

As Wren-Lewis (2007) states, two later developments have completed the microfoundations of macroeconomics. The first, developed by Michal Woodford (in Woodford, 2003), was the traditional objective function assumed for policy makers that can be derived, under certain conditions, from the utility of the representative agent. The objective function that includes output and inflation in quadratic terms indicates that, for the policy maker who is assumed to be benevolent, the trade-off between inflation and output stabilization is no longer ad hoc, but intentional. The second was the construction of large scale models that are being widely used by most of the central banks, particularly characterized by Dynamic Stochastic General Equilibrium (DSGE) models.

However, it is worth noting that there had been some microfoundation programs in the history before the Lucas critique came into play. For instance, James Dusenberry, Milton Friedman, and Franco Modigliani tried to explain the microeconomics of consumption. William Baumol and James Tobin discussed demand for money at micro level. Dale Jorgenson looked into investment. Don Patinkin analyzed the labour market (Hoover, 2001). Nevertheless, none of these attempts was eliminative in nature like the microfoundation program followed by the Lucas critique.

² Section 6 reviews the role of representative agent in microfoundation project at length.

3. Some immediate implications

New neoclassical synthesis

With the attempts of microfounding macroeconomics, the long lasting traditional distinction between classical and Keynesian schools began to disappear (Janssen, 2006). The resulting new neoclassical synthesis “incorporates elements from both the classical and the Keynesian perspectives into a single framework” (Goodfriend, 2004). Lucas’s idea of reductionism rapidly became the standard among the New Classical economists (Hoover, 2015). Then New Keynesians also explicitly began to seek rigorous microeconomic foundations for traditional elements of Keynesian economics (Froyen, 1994). This by no means implies the absence of differences between the two schools. New Keynesian economic models represent a number of different themes such as price stickiness, fixed-price equilibria, imperfect competition, efficiency wages and multiple equilibria (Janssen, 2006). Nevertheless, both schools, assuming rational expectations, base their analyses on rational and constrained optimizing firms and consumers. As Wren-Lewis (2007) puts it, “[in] fact, it would not be a complete exaggeration to say that two approaches differ only to the extent that one (the New Keynesian) assumes nominal inertia, while the other does not”.

Macroeconomics being replaced by microeconomics

According to Hoover (2010), when it comes to microfoundations, there are at least three theses with different methodological implications: (a) without individuals there would be no aggregates; (b) how individuals behave affects how aggregates behave; (c) aggregates are nothing else but summary statistics reflecting individual behavior. The nature of the microfoundations suggested by New Classical and New Keynesian economics is mainly represented by (c) above³ (Hoover, 2010).

A common feature in modern macroeconomics is that traditional macroeconomic concepts such as business cycle or inflation are now being studied using the same tools and techniques used in microeconomics. By relying on the assumption of representative agent, modern macroeconomics simply assumes away the heterogeneity that exists at the individual level (Janssen, 2006). Though there is some degree of exaggeration, the fate of macroeconomics in the context of its being microfounded is well reflected in Lucas’ well cited statement that “the term ‘macroeconomics’ will simply disappear from use and the modifier micro will become superfluous. We will simply speak, as did Smith, Ricardo, Marshall and Walras, of *economic theory*” (Lucas, 1987). An important implication is that macroeconomic propositions that cannot be reduced to microeconomics are likely to be ruled out and “this amounts to saying goodbye to almost the whole of *received* macroeconomics” (Blaug, 1992, emphasis added).

Internal consistency at the cost of external consistency

Wren-Lewis (2007) compares the method of rejection of model parameters in pre- and post-microfoundations approaches. In the former, though macroeconomic theory was used to

³ There are definitions of economics (which had come into existence number of decades before the Lucas critique emerged) that give rise to the reduction of macro to micro. For instance, Lionel Robbins (1935) defined economics as “the science which studies human behavior as a relationship between scarce means which have alternative uses”. Such a definition implies that, “if it is not microeconomics, it is not economics” (Hoover, 2010).

specify a model, parameter restrictions implied by theory were rejected in econometric tests. If a certain parameter is so rejected, it would not survive in the model. The theoretical justification for the inclusion of a certain variable in the model was often fairly loose. However, nowadays, in the context of DSGE models, the theoretical (or internal) consistency of the model plays an essential role. Parameter restrictions implied by theory are always insisted. Econometric (or external) consistency is secondary to the theoretical consistency of the models. According to the former approach, models that are not consistent with data had to be rejected. However, according to the latter, though internal consistency is vital, external consistency is not essential and it is just a pointer to future theoretical development. According to Wren-Lewis (2007), the methodological approach that characterizes the post-microfoundations approach “holds that internal consistency should never be compromised. Under this view, a model that is internally inconsistent is simply incorrect (and should be rejected), while a model that is externally inconsistent can be tolerated, at least until a better model is found”.⁴

Methodological shift of macroeconomics

Model testing in macroeconomics, for a long period of time, has been based on the scientific method developed by Karl Popper and eloquently advocated by Blaug (1980). Data consistency was the vital factor and when the theories are rejected by data such theories were usually replaced. Hausman (1995) developed an alternative methodological approach, which is sometimes labeled as axiomatic or deductive. According to this approach, economic theory is constructed from a small number of fundamental axioms, of which rationality is the most important one. Rationality is not just an article of faith, but an empirical proposition that is backed up by a various types of evidence. For instance, one of the key axioms of the rationality is the transitivity which says that if bundle A is preferred to bundle B and bundle B is preferred to Bundle C, then bundle A must be preferred to bundle C. As such, theories that are based on these axioms are presumed to be empirically relevant. When it comes to model testing, this alternative methodology follows Mill (1843) and stresses that a “theory proposes ‘tendencies’, and so correspondence with data will always be inexact. Even where data rejection appears clear-cut, this does not lead to complete theory rejection, but instead represents ‘puzzles’ that require theory adaptation or augmentation” (Wren-Lewis, 2007). Though Hausman developed this methodological approach only for the core of microeconomic theory, Wren-Lewis (2007) argues that microfoundation program has extended it to macroeconomic theory as well.

Issues related to policy making

It took nearly two decades for Real Business Cycle models to evolve into DSGE models, which are now heavily used as a policy tool. It is in this context that Wren Lewis (2007) argues that “microfounded models used for policy analysis can only develop as fast as theory allows”. He also uses a convincing example to explain this. Though “inflation inertia”⁵ is an effect that can be seen in most of the economies, still there is no clear microfounded explanation for it. How should policy makers proceed in this regard? Should they continue to

⁴ An example provided by Wren-Lewis (2007) is Uncovered Interest Parity (UIP), which is almost always included in current open economy macroeconomic models and empirical support for which is extremely poor. According to the above criteria, UIP is highly likely to be retained in models as it is internally consistent though not externally consistent.

⁵ Inflation inertia is the continuous rise in prices because of past inflation, even though there are no structural reasons for that to happen.

use models based on microfoundations ignoring inflation inertia until inflation inertia will be microfounded one day? Or, should they take inflation inertia into account in policy making using non-microfounded models? In this context, Wren-Lewis (2007) raises a sensible question: “[i]s it either inevitable or desirable that the phase of theoretical development will govern the tool that policy makers use?”

4. Can macroeconomics be reduced to microeconomics?

Whole is something more than mere sum of units

Microfoundation literature ignores the fact that there are some emergent properties at the macro level which do not have natural counterparts at the micro or individual level (Jansen, 2006). A simple non-economic example can be found in Grabner and Kapeller (2015). The difference between the words “dog” and “god” does not exist in their individual components or the letters d, o and g. Interestingly, it depends on the way the individual components are ordered (or, in their relations or structure). Taking an analogue from science, Hoover (2001) provides another example. Boyle and Charles Laws state the relationship between pressure, temperature and volume. Temperature and pressure are emergent properties that stem from the aggregation of molecules and such properties are absent at the level of molecules. The same is applicable to social and economic phenomena. For instance, the analysis of interactions and relations between individuals/units helps us understand the *emergent* features in the society such as preference formation in the context of social emulation, emergence of routines in organizations, evolution of cooperation, path dependence and technological lock-ins (Grabner and Kapeller, 2015).

There are also some emergent rationality traps due to the fact that myopic individually rational actions can lead to worst possible aggregate outcome. These cases can be expressed in the form of n -person prisoner’s dilemma. For instance, though one can improve his/her view in a theatre by standing up, there will be no collective improvement if everyone follows that rationale (Grabner and Kapeller, 2015). Tragedy of the commons, which implies unsustainable usage of a common good in the absence of a suitable mode of social coordination, is also another example (Hardin, 1968).

Methodological difference

Pereira and Lima (1996) points out that microeconomics and macroeconomics use two different methodological stances. Microeconomics employs primarily a logical-deductive reasoning while macroeconomics uses mainly a historical-inductive reasoning. The issue here is that logical-deductive microeconomics cannot provide historical-inductive macroeconomics with microfoundations.

Distinction is not merely conceptual, but ontological

According to Hoover (2009), the mistake that macroeconomists make is to believe that macroeconomic analysis is not ontologically independent. They believe that macro analysis is not solid unless they can trace the route where the macro analysis reduces ontologically to intentional individuals who make decisions in the light of their preferences, goals and beliefs.

Hoover (2009 and 2001) argues that macroeconomics can supervene on microeconomics, but in an antireductionist manner. The idea here is “not to reduce macroeconomics to microeconomics, but to show that macroeconomics could have an ontological anchor in the individual, while preserving ontological independence for causally interacting aggregates”. In this regard, Hoover cites David Levy’s (1985) argument that individuals necessarily employ macroeconomic concepts in their micro level decision making. For instance, any person who wants to make the micro-level decision of how much money to be saved for his/her child’s education has to form expectations of the impact of inflation, which is a macroeconomic concept. That is to say that “[m]icroeconomics of the real world necessarily uses macroeconomic models and concepts as an input” Hoover (2001). Though the reductionist view of supervenience of macro on micro requires that microeconomics and macroeconomics belong to two separate domains, they cannot actually be separated (Hoover, 2009).

Theory of the whole is prior to the theory of the individual

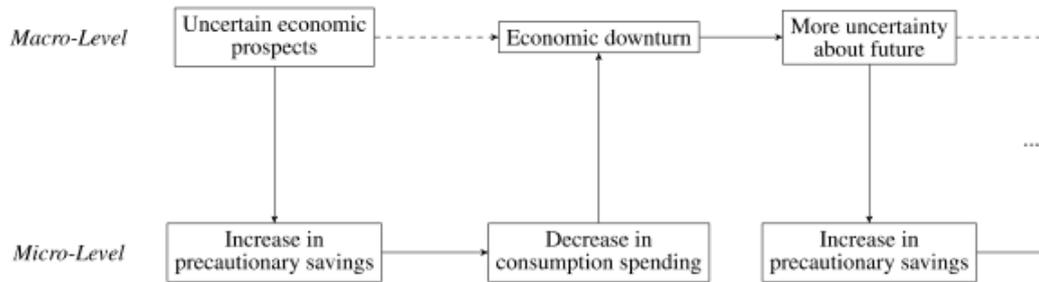
Either classical economists or Marx did not develop their theories of long-run development of a capitalist economy as a construction based on theories of individual behaviour. For those economists, “individual behaviour took its meaning and motivation from its social context so that the theory of the whole was prior to the theory of the individual”. To put what Marx said more precisely, “classes determine men, rather than men determining classes”. Viewed from this perspective, the argument that individual preferences are independent of economic changes does not make much sense. This is for the simple reason that such preferences are socially constructed. “Indeed, economic pressures shape individual preferences and define the social positions in which individuals make their choices” (Pereira and Lima, 1996).

Bidirectional causality

As King (2012) argues, in economics, causal process can operate in either direction between the individual and the entire economy, but not only from the individual agent to the entire economy. For him, macroeconomics and microeconomics are related horizontally rather than vertically. In this sense, *foundation* is a bad metaphor as one of the two sub disciplines cannot be the foundation of the other. A better metaphor would be a *bridge* between two buildings which stand on their own foundations (King, 2012).

Grabner and Kapeller (2015), viewing heterodox economics in a systemist framework, which has been suggested as an alternative to both individualism and holism, discuss some examples that can be presented here in support of King’s metaphor “bridge”. Figure 01 which shows paradox of thrift in a systemist framework demonstrates how causal arrow may run in both directions between microeconomics and macroeconomics:

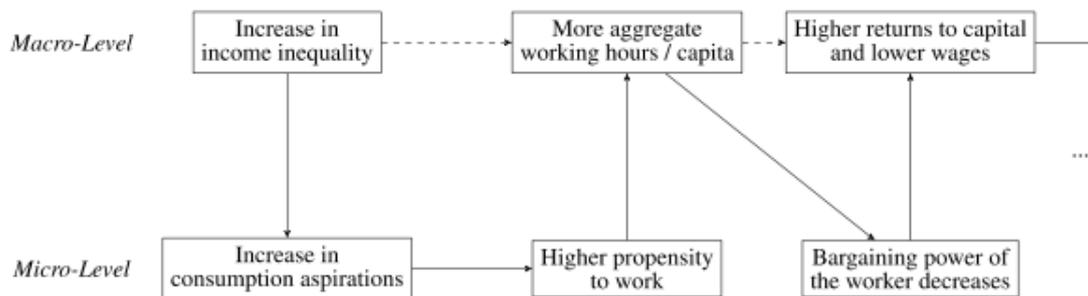
Figure 01



Source: Grabner and Kapeller (2015).

The example represented by Figure 02, which views income equality, labour supply and economic development in a systemist framework, can also be cited in support of King's argument that there is a bridge between two sub disciplines, but one cannot be the foundation for the other:

Figure 02



Source: Grabner and Kapeller (2015).

5. Can microfoundations be viewed as Nowakian idealization?⁶

According to Lezek Novak, “a theory is a formal structure and ... a complete theory is *idealized* when elements of that structure are set to limiting values so that they cease to contribute to the explanatory machinery of the theory” (Hoover, 2010). For instance, consider a complete theory of planetary motion governed by Newton's laws. One can reach an idealized version of this theory by setting the values of planetary diameters to zero, while retaining the measured value of their masses. This type of idealizations are frequently used in actual calculations.

In any theory, there are features that are of primary importance in achieving its goals than some other features, which can be thought of secondary.⁷ Various degrees of idealization can be achieved depending on how many secondary factors of the theory have been set aside.

⁶ This section entirely relies on Hoover (2010).

⁷ Distinction between primary and secondary factors has to be understood relative to the desired target of explanation (Hoover, 2010).

On the other hand, the explanatory range, the detail and the accuracy of a theory can be improved through reinstating, one by one, the secondary factors that have been set aside. Such a process, known as *concretization*, brings the idealized version ever closer to the reality.

Idealization can often be seen in microeconomics. For instance, monopolistic competition is a less idealized version than perfect competition. One can obtain perfect competition by setting the differences among the goods to zero. The rational economic man is also not a true description, but can be viewed as an idealization.

A question that can be raised in the context of microfounding macroeconomics is whether it can be taken as idealization. To answer this question, Hoover (2010) takes an example from the well-received graduate text book Blanchard and Fischer (1989). In chapter 8 of the book, a model to explain nominal rigidities and economic fluctuations assumes the following Cobb-Douglas utility function with an additional linearly separable term Y to represent individual preferences:

$$U_i = \left(\frac{C_i}{g}\right)^g \left(\frac{M_i/P}{1-g}\right)^{1-g} - \left(\frac{d}{\beta}\right) Y_i$$

where M_i is money holdings by i^{th} consumer/producer; Y_i is output of good i ; C_i is consumption of individual i and defined by the following constant elasticity of substitution aggregator function:

$$C_i = n^{1/(1-\theta)} \left(\sum_{j=1}^n C_{ij}^{(\theta-1)/\theta} \right)^{\theta/(\theta-1)}$$

where C_{ij} is consumption of good j by i^{th} individual; P is the general price level defined as a weighing of the prices of individual goods P_i :

$$P = \left(\frac{1}{n} \sum_{j=1}^n P_j^{(1-\theta)} \right)^{1/(1-\theta)}$$

According to Hoover (2010), these forms of functions are not chosen as “Nowakian idealizations of some actual preference function, but as tractable forms with well-known mathematical properties, some of which may be adjusted to approximate features of actual preferences”. They can be viewed as some non-ideal characteristics or particular concretizations of the model.

When it comes to general equilibrium, the suggested mechanism is that individual agents face a set of common prices which are adjusted until excess demand in all markets will be eliminated. In this context, simple but critical questions Hoover (2010) raises are that “who sets [those] prices? On the basis of what knowledge?” According to Hoover (2010), there are at least two approaches by economic theorists to answer these questions. The first approach simply abstracts away from the process of price setting and focuses only on the equilibrium by proving, in terms of the fixed point theorem, that equilibrium exists. In this attempt, in which how the equilibrium is established is not explained, equilibrium is considered the *deus ex machina*. Hoover (2010) goes on saying that “even the mathematics of discovering equilibria

in formal general-equilibrium models points to the character of the god in the machine". The second approach to the process of setting prices is to "give a name to the god in the machine – auctioneer". However, this auctioneer is by no means an idealization of the exchange process of macroeconomics. "Rather – implicitly or explicitly – it is a particular, and particularly unhelpful, concretization, which suggests falsely that the best analogue to a decentralized economy is a command economy in which information is processed centrally".

Apart from the question "who sets prices?", there are a few more conceptual difficulties in such a formulation. One of those is related to the fact that representative agent uses general price level as an input in making his choices (see the utility function of the agent). However, the general price level is an emergent property of macroeconomic systems and ontologically different from the prices of individual goods. This issue that macroeconomic concepts are needed in microeconomic decision making as inputs has been pointed out in the previous section.

Another conceptual difficulty associated with this microreduction is related to aggregation. Start with perfect competition where agents are price takers and small relative to the market. This is a properly formulated Nowakian idealization. On the contrary, if you assume that representative agent is also an idealization, in which the general equilibrium lies at one limit and the representative agent at the other, it would be an *improper* idealization. Why is it so? If the representative agent is held to follow the rule of perfect competition, then it is justified on the idealizing assumption that $n \rightarrow \infty$. However, the representative agent is itself an idealization where $n \rightarrow 1$. Somewhat inconsistently, here the representative agent is the whole market and is small relative to the market at the same time. The issue here can be summed up by a simple question: with whom does the representative agent trade?

A third aspect of the problem can be related to the fact that "the acceptable idealization of perfect competition in microeconomics applies for markets of particular goods, while macroeconomics must ... capture the economy as a whole" Hoover (2010). If the idealization starts from a general equilibrium system in which there are many goods and many individuals, the model involves two idealizations. According to one, the number of distinct goods approaches one. According to the second, diversity of types of agents approaches a single type while n agents do still exist. Aggregate demand is then equal to n times individual demand and aggregate supply can also be obtained in the same manner. Such adding up of individual demand/supply to a well behaved aggregate demand/supply function needs the strong assumption of homotheticity and identical goods and agents. The requirement of homotheticity cannot be taken as a Nowakian idealization because "[i]t does not eliminate a substantive factor as inessential by setting it to a limit. Instead, it is a particular concrete assumption upon which the result critically depends" Hoover (2010).

This section can be concluded by quoting the very last sentence of Hoover (2010). "The essence of [the] criticism of the common strategies of reducing microeconomics to macroeconomics is that it is based in model building that mixes legitimate idealizations with non-ideal, particular modeling assumptions and then relies on those assumptions at critical junctures in providing the derivation of the macroeconomic relationships from microeconomic behaviors".

6. Does the representative agent serve the purpose?

This section includes the critical thoughts of a few economists about the “representative agent”, the linchpin of the proposed microfoundations of macroeconomics. The representative agent in modern macroeconomic models maximizes utility subject to a budget constraint represented by the national income identity and simultaneously maximizes profits subject to an aggregate production function. The forms of these consumption and production functions are identical to the forms that are proved to be tractable in microeconomic analysis (Hoover, 2009). A number of economists argue that there is no formal justification for the representative individual used in modern macroeconomics. As Kirman (1992) puts it, “the assumption of a representative individual is far from innocent; it is the fiction by which macroeconomists can justify equilibrium analysis and provide pseudo-microfoundations”.

Does representative agent agree with methodological individualism?

As Janssen (1993) points out, methodological individualism is a desirable form of explanation of macroeconomic phenomena for at least two reasons. First, relationships with such individualistic foundations are more likely to be stable across various changes in policy regimes. Second, “one does not fall easily into the trap of postulating a suspect entity that behaves independently of individual members of a group and that serves the interest of the group”. In this context, Janssen argues that Arrow-Debreu general equilibrium approach is not consistent with methodological individualism because it relies on “Walrasian auctioneer” who is a suspect entity of the type stated in the above quote. In addition, “the restriction to single individual decision problems found in modern macroeconomics is self-imposed and not implied by the methodological position of methodological individualism” (Kirman, 1989 as cited in Janssen, 2006).

Insufficiency of representative agent models in analyzing macro problems

Many economists point out that representative agent models are neither sufficient nor suitable in studying macroeconomic problems, root of which is coordination failures. For instance, both Kirman (1992) and Stiglitz (1992) argue that representative agent models are incapable of explaining most of the macroeconomic phenomena for many peculiar features embedded in such models. First, since all individuals in representative agent models are identical, trade is highly unlikely to take place. Second, for the same reason, there cannot be any meaningful stock market. Third, in an environment where trade is absent, the concept of market failure may not make sense. Fourth, such models cannot accommodate information asymmetries⁸. Fifth, in such a model, government policies may not include distributional considerations. In summary, “the representative-agent, who is assumed to approximate the aggregate behaviour of the economy, assumes away the basic subject that should be dealt with in macroeconomics – namely aggregation problems and failures of coordination between the behaviour of individuals” (Prereira and Lima, 1996).

⁸ As Pereira and Lima (1996) put it, “asymmetric information could be reconciled with a representative agent model only by assuming a particular kind of schizophrenia on the part of the representative agent”.

Representative agent can disagree with agents

There is no plausible formal justification for the assumption that the aggregate of individuals may act in the same manner that an individual acts. Individual rationality in maximization does not necessarily imply collective rationality. On the other hand, the fact that the collectivity exhibits certain rationality does not necessarily imply that individuals act rationally (Kirman, 1992). Even if it is accepted that choices of the aggregate sufficiently represent the choices of a maximizing individual, still there is an issue here. The reaction of a representative to a certain change in a parameter of the original model may not be similar to the aggregate reaction of the individuals he “represents” (Kirman, 1992). In addition, there is no theoretical reason to conclude that the functional forms applicable to individuals will also be applicable to the aggregate of individuals. For instance, individuals’ production function is Cobb-Douglas does not necessarily mean that the aggregate production function is also Cobb-Douglas. By the same token, there is no valid reason for one to assume that the aggregate level functional forms apply to individuals (Hoover, 2001; 2009).

Representative agent can lead to misleading policy analyses

Suppose that a policy change is introduced in a model with a representative consumer. In such a situation, it is a common practice among economists that new equilibrium is examined in terms of the representative. The implicit assumption here is that the choices of the representative even at this new equilibrium coincides with the aggregate choices of the individuals in the economy. However, “the representative constructed *before* the change may no longer represent the economy *after* the change”. This is because the implicit assumption mentioned above holds only if we ignore ‘distributional changes’ that are likely to be brought about by the policy change. Usually, a policy change affects different individuals differently. Indeed, in some policy actions, the very objective is to exert different impacts on different type of individuals (Kirman, 1992). Kirman (1992) cites a few examples here: Gewek (1985) on effects on subsidies to production; Kupeic and Sharpe (1991) on volatility of stock market prices.

Is aggregation possible in the manner microfoundationists suggest?

Perfect aggregation from individual agents to a representative agent requires two things. First, individual agents must have identical utility functions. Second, these utility functions must be homothetic. Both these requirements are highly unrealistic. The requirement “identical” implies that a multimillionaire and a pavement hawker have the same preferences. The requirement “homotheticity” implies that the pavement hawker spends the same proportion of his income on a certain good as would the multimillionaire (Hoover, 2001 and 2010).

Furthermore, as Hoover (2001) suggests, the “[r]epresentative-agent model may help in pointing to some sorts of qualitatively useful relationships. But it is unlikely to provide quantitative restrictions on the behaviour of macroeconomic aggregates”. The reason for this can be revealed by thinking about the manner in which Alfred Marshall used the concept of the representative firm. For Marshall, representative firm did not mean the average or median firm. When he used the concept of representative firm, he wanted to avoid extreme behaviours of firms that may be in the form of size (too large or too small) or age (very young or very old) to explain how a typical firm behaves. In other words, he wanted to describe the usual behaviour of a firm under certain ideal conditions. However, the representative-agent models that are being used in modern macroeconomics try to do something quite different.

Those models attempt to describe the behaviour of the aggregate, not by considering seriously how the individuals behave in the aggregate, but by analyzing the aggregate as if it were one big individual subject to the constraints that in fact apply to real individuals (Hoover, 2001).

In the context of the ideas of various writers included in this section, Hoover (2001) is worth quoting here. “The advocate of the representative-agent model has no right to attack other macroeconomists for failing to provide microfoundations, for he fails to provide genuine microfoundations himself”.

7. Some final words

As mentioned in the introduction, microfoundations program can be thought of an obvious response to the famous Lucas critique. As such, it would be a sensible idea to inquire about the empirical validity of the Lucas critique. Estrella and Fuhrer (2003), which develop a few tests to check the empirical importance of the Lucas critique for several monetary policy models that are being extensively used in the literature, present evidence that some forward-looking models underpinned with micro foundations are less stable (and, therefore, more vulnerable to Lucas critique) than their better fitting backward-looking counterparts. They also observed that VAR and non-VAR macro models without explicit expectations were often stable empirically. Based on Estrella and Fuhrer (2003), Da Silva (2009) argues that it is not assured that the Lucas critique can be preemptively removed even if macro models are explicitly based on micro foundations. In a way, this is not a surprise as Lucas himself admits elsewhere that “the question of whether a particular model is structural is an empirical, not a theoretical one. If the macroeconomic models had compiled a record of parameter stability, particularly in the face of breaks in the stochastic behavior of the exogenous variables and disturbances, one would be skeptical as to the importance of prior theoretical objections of the sort we have raised” (Lucas and Sargent, 1978).

The idea that “first microeconomic principles are policy-invariant” can also be questioned (Da Silva, 2009; Palsson Syll, 2014). It is not possible to specify first principles such as preferences that depend on expectations and simultaneously time-invariant to policy changes that are being predicted (Da Silva, 2009). Palsson Syll (2014) adds to this when he argues that “[t]echnology and tastes cannot live up to the status of an economy’s deep and structurally stable Holy Grail. They too are part and parcel of an ever-changing and open economy”. A few more complications can be added to this. It is difficult to know a priori whether observed shifts in policy are strong enough to bring about a significant change to the current model representation of the economic variables. Also, it is difficult to know a priori how agents form their expectations. Furthermore, the stability across observed shifts in the context of historical data does not guarantee stability in the presence of shifts that are yet to occur (Da Silva, 2009).

A few key ideas are worth mentioning in order to summarize and conclude this discussion.

1. The whole is something more than mere sum of its parts. Always there exist some emergent properties at macro level.
2. King’s metaphor of “bridge” is more appropriate to characterize the relationship between two sub disciplines. Bidirectional causality between the two is clearly visible. Micro level

decision making needs macro concepts as inputs. In addition, individual preferences are influenced by macroeconomic phenomena such as recessions and financial crises. Also, a large part of individual preferences are, without a doubt, socially constructed. On the other hand, certain macro concepts may need micro level explanations. Areas such as demand for money and consumption are two common examples.

3. The accusation of macroeconomics for not taking beliefs, expectations and choices of individuals into account is a constructive comment that has to be accepted positively. Therefore, microfoundng macroeconomics is not something that needs to be refused altogether. However, there are two important things that are noteworthy in any attempt of seeking microfoundations for macroeconomics. First, not every macroeconomic concept needs microfoundations, and therefore, an across-the-board microfoundation program may be an unsuccessful exercise. Second, the rational, constrained optimizing agent used by New Classical and New Keynesian schools is just one of many alternatives of microfoundation methods available in the literature.⁹
4. Finally, if ignorance of the beliefs, expectations and choices of individuals in (Keynesian) macroeconomics is considered a grave mistake, Robert Lucas himself makes a similar mistake of the same degree by assuming that all agents are alike and thereby assuming the heterogeneity of the beliefs, expectations and choices of various individuals away.

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⁹ A detailed discussion of such alternatives is beyond the scope of this paper. Those who are interested are referred to Grabner and Kapeller (2015), Janssen (2006), Jo (2007) and Pereira and Lima (1996), and references therein, for details.

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