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**The Lucas Critique – is it really relevant?**

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**Abstract:** As one of the founding fathers of what became the modern macroeconomic mainstream, Robert E. Lucas has made several important contributions. In the present paper, the focus is especially on his famous ‘Lucas critique’, which had tremendous influence on how to build macroeconomic models and how to evaluate economic policies within the modern macroeconomic mainstream tradition. However, much of this critique should not come as a total surprise to Post Keynesians as Keynes himself actually discussed many of the elements present in Lucas’s 1976 article.

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**Key words:** Lucas, microfoundations for macroeconomics, realism & Post Keynesianism

I have benefitted from useful comments from Robert Ayreton Bailey Smith and Peter Skott.

## Introduction

In 1976, Robert Lucas published a contribution that since has had an enormous impact on modern macroeconomics. Based on the Lucas critique, the search for an explicit microfoundation for macroeconomic theory began in earnest.

Later on, consensus regarding methodological matters between the New Classical and the New Keynesian macroeconomists emerged. That is, it was accepted that macroeconomics could only be done within an equilibrium framework with intertemporal optimising households and firms using rational expectations. As such, the representative agent was born. Accepting such a framework has of course not only theoretical consequences but also methodological ones as for instance pointed out by McCombie & Pike (2013). Not only should macroeconomics rest upon explicit and antiquated, although accepted, microeconomic axioms; macroeconomic theory also had to be formulated exclusively by use of mathematical modelling<sup>1</sup>. Likewise, the focus of the macroeconomic analysis was primarily narrowed down to supply side effects only. Demand side effects – shocks of an exogenous nature – were in general not able to affect the macroeconomic outcome although they might have a minor role to play in the very short run.

Finally, after years of debate between the two schools of macroeconomic thought concerning theoretical aspects, the New Neoclassical Synthesis (NNS) with its base line DSGE model took over and became synonymous with the term modern macroeconomics. Methodologically, the approach is one of uniformity: do economics the way we do it within the framework of NNS and DSGE models. That is, you must use a mathematical approach when studying macroeconomics.

As such, the Lucas critique initiated a transformation of macroeconomics which much later on resulted in the present macroeconomic mainstream of the NNS. That is, the Lucas critique has had a tremendous impact on macroeconomic theory and policy analysis.

To give credit to Lucas (1976), the next section aims partly to give a review of this important contribution, and partly to point out some of the consequences that the Lucas critique had on the development of macroeconomics. Next, the focus is on Lucas and the Post Keynesians. In general, it is argued that Keynes himself, to some degree in his *General Theory* and elsewhere, addressed problems of a similar nature to those discussed in Lucas (1976). As such, Post Keynesians should be familiar with and accept much of what is included in the Lucas critique. Finally, the paper is closed by some concluding remarks.

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<sup>1</sup> This is in good accordance with Lucas as stated in Lucas (2001:279&294): “I came to the position that mathematical analysis is not one of many ways of doing economic theory: It is the only way. Economic theory *is* mathematical analysis. Everything else is just pictures and talk ... It is a method to help us get to new levels of understanding of the ways things work”. Therefore, to Lucas, there is only one way to gain scientific progress in economics, it has to do with technical matters: “better mathematics, better mathematical formulations, better data, better data-processing methods, better statistical methods, better computational methods”; Lucas (2004:22).

## A review of Lucas (1976) and some fundamental macroeconomic consequences

Perhaps the name of Robert Lucas is primarily associated with the introduction of rational expectations in economics; however, he has contributed with more to theory than just that. In 1976, he published what later became seen as one of the most influential articles in macroeconomics of the 1970s: 'Econometric Policy Evaluation: A Critique', as Lucas (2001:291) himself seems to acknowledge: "This 'Lucas critique' ... is probably the most influential paper I have written".

A core concern of Lucas was to state that there are limits to the use of short-term forecasting. A key point was that with macro econometric models of the 1970s you should not, in general, have expected to be able to make quantitative policy evaluations, as he noted, "simulations using these models can, in principle, provide *no* useful information as to the actual consequences of alternative economic policies" due to "the deviations between the prior 'true' structure and the 'true' structure prevailing afterwards"; Lucas (1976:20). That is, the "true" structure of the economy in question is, at least to some degree, a function of the economic policy actually conducted, since policy actions might somehow change the behaviour of households as well as firms<sup>2</sup>. Only if the "agents' views about the behavior of shocks to the system are invariant under changes in the true behavior of these shocks" do we have the stability needed to do policy evaluations. Such an assumption of stability, however, is an extreme one, as Lucas proceeded to explain. Therefore, "the kinds of policy simulations called for by the theory of economic policy are meaningless"; Lucas (1976:25), as you should expect the likelihood of systematic changes in parameters to be rather high<sup>3</sup>. That is, the parameters are policy regime dependent.

As emphasized by LeRoy (1995), Lucas (1976) should not only be seen as a critique particularly concerning Keynesian macroeconomic model building<sup>4</sup>. More so, he criticised how policy analysis, in general, was in conflict with general equilibrium theory<sup>5</sup>. As such, policy changes have "to be modelled as parameter shifts

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<sup>2</sup> As such "forecasting accuracy in the short-run implies reliability of long-term policy evaluation"; Lucas (1976:22).

<sup>3</sup> In an effort to strengthen his points, Lucas goes on giving some theoretical considerations concerning consumption, changes in the investment demand due to changes in taxation and a Phillips Curve example. In all three cases, he is able to illustrate that shocks affect crucial parameters making a policy evaluation of long run consequences impossible. Only if the "parameters describing the new policy ... are known by agents"; Lucas (1976:39), are we able to forecast correctly the consequences of a change in economic policy.

<sup>4</sup> In general, Lucas is often seen as one of the most prominent anti-Keynesians. However, in Lucas (2004), he expresses himself somewhat differently to say the least. Up front, he states concerning his own upbringing: "My credentials? Was I a Keynesian myself? Absolutely. And does my Chicago training disqualify me for that? No, not at all"; Lucas (2004:12). Although he regarded Keynes's standing with that of Einstein's as an undergraduate he confesses that he "had no idea what was actually in Keynes's book"; op. cit. p.13. However, later on, when addressing the postwar period with its focus on stabilizing the overall spending flows, he thinks of this as "a great political achievement. It gave us a lasting image of what we need economists for ... we have to earn our living by helping people diagnose situations that arise and helping them understand what is going on and what we can do about it. That was Keynes's whole life. He was a political activist from beginning to end. What he was concerned about when he wrote the *General Theory* was convincing people that there was a way to deal with the Depression that was forceful and effective but didn't involve scrapping the capitalist system. Maybe we could have done it without him, but I'm glad we didn't have to try"; Lucas (2004:24).

<sup>5</sup> "The essence of Lucas's criticism ... was that because the policy variables  $x_t$  are not characterized probabilistically, agents cannot be modeled as solving well-formulated optimization problems"; LeRoy (1995:239-40).

and that policy should be governed by simple rules”; LeRoy (1995:239). Therefore, the question of how economic policies should be evaluated, changed from considerations concerning different changes in given policy instruments to considerations of alternative policy rules “which allowed individual agents to formulate forward-looking dynamic optimization problems”; Rudebusch (2005:246), within a general equilibrium framework. Thus, as Lucas stated himself in his Nobel Prize Lecture; his 1976 critique had shown: “that the conventional rejections of the natural rate hypothesis depended critically on *irrational* expectations”. As a consequence of this, the macroeconomic analysis had to undergo fundamental change. From then on, “it was necessary to put macroeconomics on a general equilibrium basis that incorporated rational expectations”; Lucas (1995:255)<sup>6</sup>. Moreover, such a change, of course, has consequences, as stated above, not only theoretically and methodologically but also policy wise. Within such a framework, seen from a modern NNS perspective:

“the design of economic policy consists of three parts: a model to predict how people will behave under alternative policies, a welfare criterion to rank the outcomes of alternative policies, and a description of how policies will be set in the future”; Chari & Kehoe (2006:5).

In principle, without question, Lucas is quite right in his critique concerning the lack of stability for policy evaluation. However, you could argue that in general changes in economic policy are almost never of a significant magnitude. Rather, implemented changes in policy are more or less always of an incremental nature; making the Lucas critique right but not as important as it would be if changes in policy were of a more radical nature. Likewise, politicians are normally more concerned with the short run consequences of their policy actions rather than the longer ones. As changes in economic behaviour of households and firms, and, more generally, changes in economic structure take time to unfold themselves, Lucas’ critique again is quite right but not that restrictive considering only the short run effects of given incremental policy change. Of course, it had to be admitted that due to the influence of the modern macroeconomic understanding of our time, politicians might also nowadays have an eye on the longer run consequences of changes in economic policy and other kinds of shocks to the economy. Often the long run perspective seems even more important than short run considerations; take for instance the discussion about fiscal sustainability and how it restricts the manoeuvrability of short run fiscal policy changes. Likewise, Lucas himself also argued that changes in behaviour and economic structure might appear rather fast if not even immediately; Lucas (1976:39-40).

As such, the conclusion made by Lucas is crystal clear:

“given that the structure of an econometric model consists of optimal decision rules of economic agents, and that optimal decision rules vary systematically with changes in the structure of series relevant to the decision maker, it follows that any change in policy will systematically alter the structure of econometric models”

Furthermore, such a fact is fundamental for “issues involving policy evaluation” as it:

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<sup>6</sup> As pointed out in the press release from the Royal Swedish Academy of Sciences, Lucas was awarded The Nobel Memorial Prize in Economics “for having developed and applied the hypothesis of rational expectations, and thereby having transformed macroeconomic analysis and deepened our understanding of economic policy”; Fischer (1996:11).

“implies that comparisons of the effects of alternative policy rules using current macroeconomic models are invalid regardless of the performance of these models over the sample period or in ex ante short-term forecasting”; Lucas (1976:41).

Trying to overcome the fallacies of the macro econometric policy evaluations of the 1970s, Lucas suggested that certain changes in the performance of macroeconomics were needed. Models should be explicit and complete, as all-important variables should be determined endogenously within the model rather than being postulated exogenously. As such, fluctuations in macroeconomic outcome could be explained as a result of households and firms decisions in an equilibrium-like process of adjustment. That is, as stated by advocates of the modern NNS, policy analysis in general could only be taken seriously if “the parameters of preference and technologies are reasonably argued to be invariant to policy”. Likewise, you have to do policy analyses that explicitly “include a clear specification of how a current choice of policy will shape expectations of future policies”; Chari & Kehoe (2006:4&5).

That is, in sum, Lucas stated that i) economic behaviour, in general, is governed by certain explicit rules, as behaviour is goal oriented, ii) the economic behaviour of both households and firms has, in some regards, an intertemporal character, iii) both households and firms act economically to some degree on expectations, iv) and these expectations may change, for instance as a result of changes in economic policy, and thereby cause both households and firms to reconsider what to do in the future, v) as such, reduced-form equations might be affected, in general, by iii) and iv), and might become unstable over time and, vi) economic models have to be based on an explicit microeconomic principle of optimisation<sup>7</sup>.

That is, macroeconomics must be applied based on an intertemporal general equilibrium understanding with optimising agents using rational expectations. Using such expectations, “agents learn from their mistakes, use their intellectual capacity to understand the way the economy works and exploit available information in an efficient way”; Svensson (1996:2). In trying to achieve this, macroeconomics is essentially transformed to become microeconomic as macroeconomic behaviour becomes similar to microeconomic behaviour – the representative agent seeking optimality and the policymaker seeking to minimise a social-loss function<sup>8</sup>. As such, the efficient application of monetary and fiscal policy has to be based on neoclassical welfare-economic principles as stated above by the NNS. You must have “a disciplined way of establishing the connection between particular policy actions and their consequences for resource allocation and individual welfare”; Lucas (1986:122); that is, you have to use a welfare criterion when you have to choose between different policy proposals. In principle:

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<sup>7</sup> Furthermore, the Lucas critique advocated that structural changes be of great significance, however, Lucas seems to exclude institutional changes from his definition of structure. As we know from history, institutional changes can be very important indeed, and can have huge impact on how economic policy can be conducted (take for instance the case of the EMU). That is, to some extent the Lucas critique is in itself open to a Lucas-like critique.

<sup>8</sup> Actually, rather ironically, accepting the use of a representative agent in macroeconomic modeling is in conflict with the Lucas critique as argued by Kirman (1992:123). When an economic policy change is implemented, “the change involved will frequently affect individuals differently. Indeed, many policy changes have this as their objective. As soon as this is the case, the representative constructed *before* the change may no longer represent the economy *after* the change”. And furthermore, as pointed out by McCombie & Negru (2014:62), to accept the birth of the representative agent in macroeconomics is to accept that “the single individual, devoid of social context and institutions, excludes the interactions of individuals with each other and the way this shapes, and is shaped by, social institutions”.

“an efficient monetary/fiscal authority will choose a history-contingent sequence of income tax rates and money growth rates (inflation tax rates) so as to maximize the expected discounted utility of the typical consumer, subject to the constraints that the system be in competitive equilibrium, given taxes, and that the present value of government obligations (goods consumption plus debt service) not exceed the present value of its revenues (taxes plus seignorage)”; Lucas (1986:122).

Following such a policy strategy, “we obtain a method for evaluating policies that has comprehensible units and is built up from individual preferences”; Lucas (2003:2). With this kind of strategy, together with the acceptance of the representative agent, the macroeconomic analysis actually transforms itself to become a microeconomic analysis.

Furthermore, if economic fluctuations – the business cycles – are to be explained by equilibrium-like reactions of agents to unanticipated changes in relevant variables, that must, in general, “imply severe limitations on the ability of government policy to offset these initiating changes”; Lucas & Sargent (1979:10). That is, the need to do economic policy in order to stabilise the macroeconomic outcome over time is hardly ever present seen from a Lucasian perspective. As such, to achieve optimal outcomes, the task of fiscal policy is restricted to minimise intertemporal distortions. Likewise, as is the case with monetary policy, it should be based on rules that are credible and transparent.

As stated in the introduction and above, modern macroeconomics nowadays is characterised by the New Neoclassical Synthesis. Mainstream macroeconomists agree, in general that the DSGE model is *the* relevant model when you have to perform a macroeconomic analysis. As such, Woodford (2009:268) stated that:

“there are no longer such fundamental disagreements among leading macroeconomists about what kind of questions one might reasonably seek to answer, or what kinds of theoretical analyses or empirical studies should be admitted as contributions to knowledge”.

This statement of Woodford is based on five observations, which, in general, are in agreement with the Lucas critique.

First, mainstreamers argue that macroeconomic analysis has to do with intertemporal optimisation within a general equilibrium framework. Having agreed on that, in general, you have to acknowledge that “microeconomic and macroeconomic analyses are no longer considered to involve fundamentally different principles”; Woodford (2009:269). Secondly, mainstreamers argue that you should base quantitative policy analysis on econometrically validated structural models. Thirdly, a relevant macroeconomic analysis has to incorporate expectations that have been endogenously formed. Furthermore, such policy analyses have “to take into account the way in which expectations should be different in the case that an alternative policy was to be adopted”; Woodford (2009:271-72). Fourth, mainstreamers accept, in general, that real disturbances or shocks – that is, changes in technology, preferences, and economic policy – are an important source behind economic fluctuations in real life. Fifth, and finally, economic policy wise, an optimal monetary policy defined by a Taylor Rule regime, is seen as very effective especially concerning inflation control.

As such, the Lucas critique together with other of Lucas’s theoretical contributions has had an important and lasting impact on macroeconomic theory and how macroeconomists evaluate economic policies, as, for

instance argued by Snowdon (2007)<sup>9</sup>. Based on the victorious Lucasian impact on the creation of the NNS, Chari & Kehoe (2006:3&26) argue that the advances in macroeconomic theory have not only “been restricted to the ivory tower”, they have also influenced to a huge degree how economic policy nowadays is conducted. This led them to conclude that: “The marginal social product of macroeconomic science is surely large and growing rapidly”<sup>10</sup>.

### **Lucas and the *General Theory***

As stated in the above section, Lucas (1976) presented a number of core statements, which have had tremendous influence on how modern macroeconomic mainstreamers do economics. However, in general, the content of many of these statements should not come as a total surprise to Post Keynesians, albeit that they are non-mainstreamers. This is of course partly due to the significant impact that Lucas (1976) has had on the development of macroeconomic theory and econometrics since the article was published, but also partly because Keynes in his *General Theory* and elsewhere touched on some of these statements.

According to Lucas, it is essential to have a microeconomic foundation of macroeconomics. As macroeconomics is the outcome of what happens on every market in the economy where households and firms act accordingly to their goal oriented behaviour – basically, they try to do the best they can economically in given situations – Lucas is right in his quest for a micro foundation<sup>11</sup>. However, such a foundation need not be one of optimality. As we know empirically, neither households nor firms act precisely as intertemporal optimising agents with rational expectations making first best solutions. With certainty, we know that both households and firms use ‘rules-of-thumb’ when they act economically. That is, they seek the best of the second best solutions possible. In an economic environment of uncertainty – epistemologically as well as ontologically – they act on expectations determined by knowledge that, to some degree, is imperfect and sometimes even false. Therefore, their behaviour is not characterised by rational expectations in the traditional meaning of the concept. Rather, as Keynes expressed it, they act on rational beliefs.

As argued by McCombie & Negru (2014:59), Keynes actually accepted the need of giving “some sort of intuitive explanation of macroeconomic phenomena in terms of an individual’s behaviour”. As such, in his *General Theory*, Keynes always started out by focusing on microeconomic behaviour. This can clearly be

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<sup>9</sup> See, among others, Fischer (1996) and Hall (1996) for a more thorough examination of the general writings of Lucas.

<sup>10</sup> Others might conclude differently. For instance, McCombie & Pike (2013:521) write: “In spite of the sub-prime crisis, the New Neoclassical Synthesis is seen by many to be relatively unscathed (but with the imperative to build in assumptions that allow for debt default and bankruptcy) and the erroneous Treasury view of the 1920s has returned to U.K. macroeconomic policy ... It is as if the Keynesian revolution had never occurred”.

<sup>11</sup> Somehow you may wonder why there is not a similar need of giving microeconomics a macroeconomic kind of institutional framework within which both the behaviour of the individual household and firm is conducted and the forces of the market mechanism on every single market unfolds itself. Neither households nor firms behave as free atoms in the universe. They are both somehow restricted by a given – although over time changeable – institutional setup.



observed in his arguments concerning how firms invest, how households consume and how and why people demand liquidity. Furthermore, in his macroeconomic model of Chapter 3 in the *General Theory* – the principle of effective demand – the focus is actually on how the individual firm tries to get an economic outcome where expected profit is maximised. Thereafter, Keynes tries, in detail, to explain why positions of maximised levels of expected profits – kinds of microeconomic optimal outcomes – in general, do not lead to a macroeconomic outcome of optimality (an example of atomistic fallacy)<sup>12</sup>. In the beginning of the 1930s, the macroeconomic outcome in the real world was, of course, one of involuntary unemployment as described by Keynes.

As explained by Akerlof (2007:6), the Lucasian strategy for doing macroeconomics overturned the Keynesian understanding with five neutrality results: “the independence of consumption and current income ... the irrelevance of current profits to investment spending ... the long-run independence of inflation and unemployment ... the inability of monetary policy to stabilize output ... and the irrelevance of taxes and budget deficits to consumption”. As such, modern macroeconomics created a macroeconomic universe that in principle, as least in the longer run, is one of harmony. When the representative agent finds his optimal outcome so does automatically the macro economy. Therefore, as Lucas has stated at many occasions, with the rational expectations revolution, there is no longer any need to distinguish between micro- and macroeconomic. We only need to talk about economics.

Furthermore, the introduction of the representative agent making a planning of intertemporal consumption – identifying equilibrium points on the productive frontier – gave way to another kind of neutrality: that of money. This approach allowed the concerns of money and pre-finance of production to be excluded from causal macroeconomic structures. To a Post Keynesian, of course, such a reduction completely distorts the structure of economic existence. It has no relevance.

However, as any Post Keynesian would argue, such a representation of macroeconomics does not have much to do with reality<sup>13</sup>. Moreover, macroeconomics has to deal with the problems of the real world – historically, macroeconomics as a discipline was born due to the huge mismatch problems of the 1920s and early 1930s. To Keynes and other economists, economics is not for the ivory tower of academics alone. As argued in Mankiw (2006), economists also have a very important role as engineers. As noted by Mankiw (2006:29): “God put macroeconomists on earth not to propose and test elegant theories but to solve practical problems”. That was the case in the 1930s, and that is still the case in the 2010s. One would need to be more than ordinarily tone deaf not to acknowledge this when considering what happen to most economies after the financial crisis of 2007-09.

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<sup>12</sup> As pointed out by Davidson (2015:374): “Keynes’s general theory – using Marshallian microfoundations – could show that, as a matter of logic, less than full employment equilibrium could exist in a purely competitive economy with freely flexible wages and prices”.

<sup>13</sup> Not only Post Keynesians argue along such lines, as an example, Akerlof (2007) argues in length that there is a missing link in modern macroeconomics. Mainstream macroeconomics do not include norms, although we know with certainty that economic behavior to a large extend has to do with norms of different kinds. And changes in norms might trigger off macroeconomic fluctuations.

Such a view of economics is in good accordance with Baddeley (2014:99), who stated that DSGE modelling is “based on a number of unrealistic assumptions about rational, self-interested, atomistic behaviour”. However, macroeconomists – mainstreamers as well as non-mainstreamers – may learn some important lessons from behavioural economics. From this school of economics, we know that individuals in their behaviour are influenced by many factors. As such, individuals act, at least to some degree, on conventions, social norms and social preferences; e.g. also Akerlof (2007). Likewise, in a less perfectly functioning world than that of the modern macroeconomic mainstream understanding, individuals also rely on herding behaviour and learn about economics in a social context<sup>14</sup>.

However important such considerations might be, it is no simple task to implement the above mentioned aspects in macroeconomics<sup>15</sup>. Although admittedly difficult, macroeconomists should not upfront reject to try to do so. Efforts to incorporate some of the above mentioned aspects in macroeconomics might be a promising way to introduce relevant (and most needed) dimensions of heterogeneity in the theory.

Finally, as explained by Chick (2003), the mode of thought<sup>16</sup> to be found in the *General Theory* – and generally accepted by many Post Keynesians – is quite different from that of a more traditional mainstream mode of thought. And different modes of thought affect both which methods that are defined as acceptable to use, how to build theoretical models, and how to pose policy proposals and make policy conclusions within a given paradigm of economics. To Keynes, according to Chick (2003: 307), the *General Theory* “is founded on a concern with time, uncertainty and organicism”. That is, the macroeconomic system presented in the *General Theory* is an open kind of system. To a Lucasian, the macroeconomic system should rather be seen as a closed system. Such a system is of course in nature more deterministic than the system of Keynes and the Post Keynesians<sup>17</sup>. Therefore, at least to some degree, the two paradigms are incommensurable in the Kuhnian sense of the concept.

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<sup>14</sup> For instance, as pointed out by Baddeley (2014:100): “Herding can be analysed as a response to uncertainty and imperfect information”. And the *General Theory* is of course a book that in many aspects is focused on how to cope with the problems of uncertainty. To give an example, take the case of Keynes’ use of the concept of *animal spirits*: “Keynes analysed animal spirits just in the context of entrepreneurship: uncertainty about the future prevents entrepreneurs from properly calculating the future benefits of their business decisions and so animal spirits take over, precipitating ‘a spontaneous urge to action’”; op. cit. p. 104.

<sup>15</sup> “The macroeconomy is a complex system, and any approach that does not properly address the behavioural and socio-psychological factors driving the individual actors that constitute the macroeconomy is unlikely to capture the instability effectively”; Baddeley (2014:109). The important question is just *how* this should be done in practice.

<sup>16</sup> Mode of thought is defined by Dow (1996:10) as “the way in which arguments (or theories) are constructed and presented, how we attempt to convince others of the validity of truth or our arguments. It is concerned as much with the rhetoric used as means of communication as with the logical structure of the argument. It is a broader concept than ‘methodology’, and indeed influences our judgement as to what constitutes an acceptable methodological position”.

<sup>17</sup> A critical discussion of modern macroeconomic mainstream is given in Frydman & Goldberg (2013). Especially, they criticize the high degree of knowability that the mainstream requires of the individual agents in respect to their knowledge about market processes and market outcomes; therefore, the mainstream representation of the individuals behaviour is determinate probabilistic as “the model determines *exactly* all potential changes in participants’ forecasts and the precise probabilities of their occurrence – in the past, present and future, all at once”; that is, to a mainstreamer you can discover the one true model representing the macro economy as “conditional on its structure at any point in time, the model specifies *all* potential causal processes that might represent outcomes at any

## Conclusion

With the benefit of hindsight, Lucas (1976) together with other of Lucas's theoretical contributions actually launched a revolution in macroeconomic theory. Based on his critique, the quest for an explicit microeconomic foundation for macroeconomics began. As we all know, the outcome of such a quest was the making of the representative agent who optimises intertemporal choices using rational expectations in a general equilibrium setup. In doing this, Lucas somehow unified the New Classical economists with the New Keynesians as both schools of thought accepted and advocated the same kind of methodology<sup>18</sup>. As such, Lucas laid down the bricks to the road for the DSGE understanding, which has become the baseline model of modern macroeconomics based on the NNS framework.

However, to a non-mainstream macroeconomist the road that macroeconomics has taken historically since the publication of Lucas (1976) is not a happy one. As Skott (2014:513 & 2010:342) points out:

“The result has been a long and wasteful detour with enormous costs, both in terms of the loss of knowledge in the profession and, more importantly, mistaken policy ... [as such] ... the straightjacket of full intertemporal optimization misrepresents real-world decision making. It also reduces the ability of the theory to incorporate important aspects of reality in a tractable manner, and therefore encourages the theorist to ignore them”.

That is, of course, not the same as to state that the Lucas critique in general is irrelevant. Quite the opposite is the case. In general, Lucas was quite right on most points in arguing as he did in 1976. That is a lesson that has to be learnt by mainstreamers as well as by Post Keynesians and other non-mainstreamers<sup>19</sup>. Nonetheless, the recommendations by Lucas, which made the modern mainstream macroeconomic understanding of the NNS and the DSGE models possible, must be rejected. This has non-mainstreamers claimed for years. However, maybe somewhat surprisingly, most recently, this modern

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point in time”; op. cit. p. 119. Such claims have nothing to do with the facts of real life as “they rule out by design the central importance of non-routine change for how profit-seeking participants make decisions and for what markets really do in modern economies”; op. cit. p. 128. As such, to Frydman & Goldberg, the macroeconomic mainstream has undertaken a devastated research program when it comes to understand how a modern macro economy actually works.

<sup>18</sup> Although not all economists were that keen on accepting the hypothesis of rational expectations. As Blinder (1987:131) pointed out: “I think the weight of evidence – both from directly observed expectations and from indirect statistical tests of rationality ... – is overwhelmingly against the RE hypothesis. Furthermore, RE is not without theoretical difficulties. We all know that RE models often have multiple equilibria. More fundamentally, RE is theoretical coherent only in the context of a single-agreed-upon model. In an economy in which different people hold different views of the world, the very notion lacks clarity”. Also, some skepticism could be given to the assumption on stating that agents behave in a perfect optimizing way as: “Realism was sacrificed to rigor, as internal consistency replaced consistency with observations as the principle criterion by which models were judged”; Blinder (1986:212). In general, Blinder (1987:135) concluded, “The important thing is to make sure our models are congruent with the facts. Lucasians, it seems to me, reverse the sequence. They want to begin with fully articulated, tractable models and worry later about realism and descriptive accuracy”.

<sup>19</sup> Even Austrian economists who normally argue that formal models, in general, are not able to any relevant degree to capture the essence of the complexity of the dynamic markets processes seem to accept the Lucas critique as illustrated in Basse (2006). In this contribution, Basse argued that Austrians should incorporate a new and more powerful version of the Lucas critique as this new proposed strategy is no longer based on rational expectations and as such cannot be discarded by arguing that the rational expectations approach is questionable.

macroeconomic mainstream has been named 'post-real' macroeconomics by none less than Paul Romer. In his article a devastating critique is given to the DSGE-modelling. As such, he claims that macroeconomics has gone backwards theoretically for decades of years: for instance mainstreamers often wrongly sees monetary policy changes as imaginary shocks in their models, Romer using the Volcker term as an example<sup>20</sup>, and then of course there is the econometric problem of identification which mainstreamer do not handle seriously: "A modelling strategy that allows imaginary shocks and hence more variables makes the identification problem worse. This offers more flexibility in determining how the results from any empirical exercise turn out ... Post-real macroeconomists have not delivered the careful attention to the identification problem that Lucas & Sargent (1979) promised"; Romer (2016:8&11). In other words, phenomena of real life are, in general, not taken seriously by most advocates of the DSGE-modelling strategy<sup>21</sup>. As such, Romer (2016:20) concludes: "In the distribution of commentary about the state of macroeconomics, my pessimistic assessment of regression into pseudoscience lies in the extreme lower tail".

However, there is more than just one way to build a microeconomic foundation for macroeconomic theory. The solution need not be one of an intertemporal quest for optimality called forward by agents with perfect foresight or rational expectations or by aggregating the group of agents into a representative agent<sup>22</sup>. Instead, macroeconomic theory could be built on less perfect assumptions than those presented by the mainstreamers. As such, a case of bounded rationality concerning the economic behaviour of households and firms is not only a theoretical possibility; it is in fact also a case of empirical evidence; see e.g. Olesen (2010).

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<sup>20</sup> Romer (2016:4&5): "To my knowledge, no economist will state as fact that it was an imaginary shock that raised real rates during Volcker's term, but many endorse models that will say this for them ... More recently, "all models are false" seems to have become the universal hand-wave for dismissing any fact that does not conform to the model that is the current favorite".

<sup>21</sup> As Romer (2016:15-16&22) points out: "Because guidance from authority can align the efforts of many researchers, conformity to the facts is no longer needed as a coordinating device. As a result, if facts disconfirm the officially sanctioned theoretical vision, they are subordinated. Eventually, evidence stops being relevant. Progress in the field is judged by the purity of its mathematical theories, as determined by the authorities ... An indifferent tolerance of obvious error is even more corrosive to science than committed advocacy of error".

<sup>22</sup> As pointed out by, among others, Hoover (2010:332), perfect aggregation – the way to transform the group of agents into one representative agent – is not possible unless you accept that preferences are homothetic and identical. Furthermore, we also know "that identical micro-production functions obeying all the standard assumptions of neoclassical production theory cannot be aggregated to give a well-behaved aggregate production function, *even as an approximation*"; McCombie & Pike (2013:507). More fundamentally, as pointed out by Kirman (1992:132&134): "the representative agent approach is fatally flawed because it attempts to impose order on the economy through the concepts of an omniscient individual. In reality, individuals operate in very small subsets of the economy and interact with those with whom they have dealings ... well-behaved individuals need not produce a well-behaved representative agent; that the reaction of a representative agent to change need not reflect how the individuals of the economy would respond to change; that the preferences of a representative agent over choices may be diametrically opposed to those of society as a whole – it is clear that the representative agent should have no future".

Likewise, there is no one model for ‘all seasons’ regarding macroeconomics. And there is more than just one way to gain relevant knowledge about macroeconomic phenomena and macroeconomic processes of adjustment<sup>23</sup>.

As such, seen from the perspective of many Post Keynesians, the economic system is one of non-ergodicity rather than of ergodicity (or to use other concepts: non-repetitiveness and repetitiveness<sup>24</sup>). Therefore, ontology matters. As such, the macroeconomic landscape is expected to change over time. Naturally, the behaviour of households as well as firms and the way economic policy is conducted, just to mention two important aspects, are, at least to some degree, context determined and might change as the macroeconomic landscape itself undergoes changes. To a Post Keynesian understanding, to sum up, key concepts in trying to understand the functioning of modern monetary economies are *time*, *money* and *uncertainty*. Likewise, Post Keynesians also acknowledge the fact that the macroeconomic landscape unfolds itself through dynamic processes of path dependency.

Therefore, to a Post Keynesian, a modern economy is a monetary economy. That is, the real and the financial sectors of the economy depict deep patterns of interdependencies<sup>25</sup>. Seen from a Post Keynesian perspective – rather contrary to a Lucasian one – the influence of money is truly pervasive in nature economically as is the role of expectations.

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<sup>23</sup> Or as Skott (2014:503) states: “There can be no single, correct theory or model of ‘the economy’. The economy is not a well-defined object and, even if it were, a theory does not aim to provide a complete picture of reality ... Equally self-evident ... is the claim that there can be no single, correct method for gaining insights into the operation of the economy”.

<sup>24</sup> Recently, the use of the ENE-approach that Paul Davidson has advocated for years has come under attack by especially O’Donnell (2014-15&2016a-b). For a reply to the criticism see Davidson (2015a).

<sup>25</sup> An example of this kind of interrelationship has to do with expectations. In the *General Theory*, three different types of expectations are included. Short-period expectations, which have to do with the producers’ determination of next period’s production of goods, long-period expectations, which have to do with the producers’ investment planning for the future, and finally, the expectations of speculators, which have to do with future capital gains or losses on financial assets. This last kind of expectations links together in a fundamental way the financial sector with the real sector, as “Speculators’ expectations affect liquidity preference and, through the rate of interest, enter the theory of investment”; Chick (2003:315).

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