



## On the Need for New Economic Foundations: A Critique on Mainstream Macroeconomics

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### Abstract

*The body of macroeconomic theory known as the neoclassical-Keynesian synthesis, hereafter mainstream macroeconomics, has dominated the practice of economics since the middle of the twentieth century and is largely unchallenged in institutions that teach economics. Not only does mainstream macroeconomics underlie monetary and fiscal policies intended to promote economic growth, full employment, and price stability, but it also provides the lens through which economic activity is measured and performance is evaluated. Most importantly, it has spawned a generally accepted ideology or conventional wisdom that frames economic issues and 'acceptable' policy responses to them. Woe to the economist or politician who strays beyond the constraints imposed by the beliefs emanating from this body of theory. Mainstream economic theory has always had its critics, but the failure of mainstream economists to predict the collapse of 2008 and the failure of the policy responses to the crisis have stimulated a new round of criticism. This paper surveys a range of criticisms made by economists and non-economists alike and finds that grounds exist for the rejection of mainstream macroeconomic theory. It is mathematically incoherent and irrelevant insofar as the assumptions upon which it is based are not supportable; its concepts are abstract and not measurable, and not capable of addressing the real questions of sustainability, economic stability, power, justice, and equity that affect the human condition. The conclusions reached are: 1) mainstream economic theory took a profoundly wrong path in the mid-twentieth century 2) foundations for a new synthesis of economic thinking are needed capable of addressing the issues that emerged in the late 20<sup>th</sup> century and integrating findings from other sub-disciplines of economics and other sciences.*

### 1. Introduction

John Ralston Saul, a social critic who has freed himself from the chains of political correctness, in his 1995 Massey lecture, "The Unconscious Civilization," assessed economics in the following terms:

*"Economics, as a prescriptive science is actually a minor area of speculative investigation. Econometrics, the statistical, narrow, unthinking, lower form of*

*economics is passive tinkering, less reliable and less useful than car mechanics. . . . economics has been spectacularly unsuccessful in its attempts to apply its models and its theories to the reality of our civilization. It's not that the economists' advice hasn't been taken. It has, in great detail, with great reverence. And in general, it has failed."*<sup>1</sup>

This is a serious condemnation, and Saul is not alone. The list of those who have critiqued various aspects of neo-classical economics begins as early as 1898 when Thorstein Veblen penned "Why is Economics not an Evolutionary Science?" published in *The Quarterly Journal of Economics* which includes such eminent authors such as Oskar Morgenstern<sup>2</sup>, Nicolas Georgescu-Roegan<sup>3</sup>, Fred Hirsh<sup>4</sup>, Kenneth Boulding<sup>5</sup>, Wassily Leontief<sup>6,7</sup>, Herman Daly<sup>8,9</sup>, Robert Nadeau<sup>10,11</sup>, Charles Hall<sup>12</sup>, Eric Beinhocker<sup>13</sup>, Steve Keen<sup>14</sup>, Giovanni Dosi<sup>15</sup>, John Kay<sup>16</sup>, Daniel Kahneman<sup>17</sup> and David Graeber<sup>18</sup>, to name a few.

Is the condemnation warranted? If it is, can mainstream economics be adjusted or is it time to devote effort to the task of formulating a new set of principles that should underlie a new synthesis in economics? These are the questions addressed in the following essay.

## **2. Elements of Mainstream Macroeconomic Theory**

Mainstream macroeconomic theory frames economics as a global optimization problem that can be stated in the following terms: maximize the value of production subject to the availability of the factors of production, labour and capital. Production is the value added by labour and capital to freely available natural resources. Mainstream economics is, in essence, a theory of value.

Mainstream macroeconomic theory is a structure of deductive reasoning based on two first order behavioural axioms: consumers act rationally to maximize their individual utility, and; producers are price takers who adjust output levels to maximize profits. Two second order restrictions on these behaviours are assumed to be true: Individual consumer utility functions are separable and hence additive, and; individual producer cost curves are U-shaped, thereby giving rise to increasing marginal costs (decreasing returns to scale).

Under these conditions, according to generally accepted macroeconomic theory, utility or value added is at its maximum when prices are set at the point where marginal costs equal marginal revenues at the intersection of downward sloping demand curves and upward sloping supply curves. At this point of competitive general equilibrium, profits for all producers are zero. It follows from this theory that market prices are objective and universal measures of value that can be used as weights for aggregation. Macroeconomics can then be legitimately specified in terms of relationships among a small number of aggregate variables such as gross domestic product, consumption, investment, savings, exports, imports.

If it is further assumed that labour and capital are immobile, international trade between nations is mutually beneficial. This is known as the law of comparative advantage.

## **3. The Conventional Wisdom**

Mainstream economics has spawned and rationalized the ideology of free-market capita-

lism. Tenets of the conventional wisdom that emerge from and are rationalized by mainstream economics can be summarized as follows:

- The economy is a self-regulating system set in motion by the ‘invisible hand’ identified by Adam Smith in his *The Wealth of Nations*. Barring market imperfections, the factors of production, labour and capital will be optimally utilized in the creation of value.
- The main objective of economic policy is to ensure sufficient economic growth to achieve ‘full’ employment and price stability.
- Externalities, such as pollution and global warming, are the result of market failures and these are best addressed by economic instruments such as special taxes or cap and trade systems that internalize external costs rather than by bureaucratic regulatory intervention.
- Concentrations of market power or monopolistic practices are market failures that can be addressed by competition policy.
- Profit maximizing behaviour by private enterprise that creates shareholder value is socially beneficial.
- Producers and consumers alike should be free to pursue private interests.
- Speculation and hedging are stabilizing activities and are of social value.
- Market prices, once corrected for imperfections, are objective indicators of value and lead to an optimal allocation of resources.
- Cost-benefit analyses using market prices for summing and comparing costs and benefits and a discount rate for establishing the present value of future costs and benefits are appropriate for establishing public policy.
- Private enterprise and private ownership are to be preferred over government and state ownership in the provision of goods and services.
- Market determined wage rates reflect workers’ productivity and generate an appropriate distribution of income.
- Globalization involving free trade among nations is mutually beneficial.
- The performance of the economy can be adequately monitored by measuring the rate of change of a few macro economic variables: total production indicated by GDP, the rate of unemployment, inflation, the rate of savings and investment, consumption, exports and imports, the foreign exchange rate, and productivity indicated by output per employee or total factor productivity.

#### **4. What’s Wrong with Mainstream Macroeconomic Theory?**

A first basis for rejecting a theory would be to show that the theory is irrelevant either because the wrong problem is being addressed, wrong in the sense that it is not one that is empirically given or because the theory is cast in terms of concepts that cannot be observed with the consequence that the theory cannot be empirically rejected.

A second basis for rejection would be to show that inappropriate, inadequate, or over-simplifying assumptions have been made. Arguments of the second kind are often identical with the first kind.

A third basis would be to show that, even if the assumptions are granted, the asserted conclusions do not follow. This basis for rejection is unequivocal.

From the arguments below, mainstream macroeconomic theory and the conclusions derived may be rejected on the grounds of all three bases.

## 5. Relevance for Current Economic Issues

It has been asserted that the first criterion for the rejection of mainstream macroeconomic theory would be the identification of generally agreed upon important issues that cannot be addressed by the theory. The existence of such issues goes to the relevance of the theory. This is not to say that there aren't sub-disciplines or specializations in the field of economics that do address these issues, but they do so from within a narrow context either by adding concepts to mainstream macroeconomics or without reference to it. It is often the case that add-ons contradict the basic assumptions of macroeconomic theory. There are several such issues.

- *Biophysical constraints*: Global warming, caused in part by the limited capacity of sinks to absorb carbon dioxide emissions, 'peak oil' reflecting the finite endowment of conventional oil, the collapse of fisheries, the deterioration of soils, the pollution of air and water are all important examples of biophysical constraints. Mainstream macroeconomics is unable to address the issue of biophysical constraints because the implicit assumption of freely available sources and sinks for material and energy is in conflict with the existence of biophysical constraints. Further, macroeconomic variables are aggregates expressed in value units whereas biophysical constraints are naturally expressed in physical units and have physical properties specific to each source or sink.
- *Conflict between the goals of 'economic growth' and 'sustainability'*: Ever since the publication of the Brundtland report in 1987, the objective of sustainable development and the concept of sustainability have been widely embraced.<sup>19</sup> Economic growth in mainstream macroeconomics is constrained only by the sources of value, namely labour and capital, whereas sustainability is concerned with long-term pathways that lie within biophysical constraints and the limits imposed by our understanding. The inability of mainstream macroeconomics to incorporate biophysical constraints, as noted above, and its emphasis on short-term prediction make the theory inappropriate for sustainability analysis.
- *Financial Shocks*: It is widely accepted that macroeconomists failed to predict the financial collapse of 2008 or even the possibility that such a collapse could occur. Worse still, it is becoming clear that prescriptions of macroeconomists have failed to return the economic system to levels of performance achieved before the shock. Nor is it clear that the economic system hasn't undergone a sufficient change in structure that such a return is even possible. At a minimum, an economic theory capable of addressing financial shocks must include asset valuation and debt; both are balance sheet items

or stocks. As mainstream macroeconomics is confined to flows in the real economy, it is not surprising that those who focus on macroeconomic variables would not see signs of an impending crisis. Further, as pointed out by George Soros in his theory of reflexivity<sup>20</sup>, bubbles and their collapse involve disequilibrium and the dynamics of the responses to shocks, all of which are well outside the general equilibrium, comparative static orientation of conventional macroeconomic theory.

- *Income Distribution*: That the distribution of income is becoming more skewed and that such skewed distributions are the major cause for concern are well documented.<sup>21</sup> Mainstream macroeconomic theory holds that the distribution of income that results in free-market capitalism is optimal with the consequence that there is no need to monitor it. However, as we have seen, the basis for that conclusion is flawed.
- *Performance indicators*: Mainstream macroeconomics offers only a single variable to indicate economic performance, namely total value added or the familiar Gross Domestic Product (GDP). Much has been written on the inadequacy of GDP as a performance indicator, the most prestigious of which is the recent report by the Commission on the Measurement of Economic Performance and Social Progress appointed by President Sarkozy.<sup>22</sup>

## 6. Global Optimization

It is the property of an optimization problem that extrema exist and can be reached only if all the control variables upon which the maximum depends are under the control of a single individual or agent.<sup>23</sup> Since economies consist of many agents and each transaction involves at least two agents, it is clear that, in general, agents do not have complete control over their activities. Therefore, it is inappropriate to cast economic theory as an optimizing problem. From this argument, game theory, insofar as it places decision making in the framework of games of strategy and takes into consideration the conflicting interests of participants, would appear to be a more apt description of the meta-problem.<sup>24</sup>

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## 7. The Complexity of Human Behaviour

There is growing evidence to refute the axiom that human behaviour can be characterized as the pursuit of self-interest. For example, “. . . discoveries in evolutionary biology, neurocognitive science, and child development reveal that people are biologically predisposed to be empathetic – that our core nature is not rational, detached, acquisitive, aggressive, and narcissistic, but rather, affectionate, highly social, cooperative and interdependent.”<sup>25</sup> The size and nature of the groups within which empathetic or cooperative behaviour is operative or dominant have perhaps evolved over time from the family to the tribe, then to the settlement, the city-state, the nation and increasingly to all people. That humans seek to maximize utility has been questioned by Herbert Simon who proposes that satisficing behaviour or ‘good-enough’ decision making is apt to be more prevalent.<sup>26</sup> Daniel Kahneman has accumulated a body of

evidence from which he concludes that humans are genetically programmed for fast thinking or intuitive behaviour, rather than rational behaviour that requires an investment of effort.<sup>27</sup> Using case study data, Elinor Ostrom has shown that effective management of common-pool resources, such as a fishery, requires co-operative behaviour and that examples of effective management can be found.<sup>28</sup> The evidence suggests that human behaviour is too diverse and complex to be represented as an aggregate consumer agent.

## **8. Externalities, Common-Pool Resources, and Positional Goods**

The second order condition that individual utility functions are separable does not correspond to a reality in which externalities, common-pool resources and positional goods are important. An externality is a cost or benefit that accrues to a third party or parties not involved in a transaction between two parties. The transaction price agreed upon by the two parties to the transaction does not then reflect the true social costs/benefits associated with the transaction and results in more or less than optimal production in competitive markets. Releasing pollutants into air and water, and emitting carbon dioxide into the atmosphere are examples of important externalities. In the real world, external costs may well be as important as the costs internalized in product prices. When externalities are present, it is clear that the utility of the party receiving the external (dis)benefit depends on the actions of others. Positional goods, those whose value is derived at least in part on exclusivity, have the same consequence insofar as the utility of the owner of the positional good depends upon those not having access to it.<sup>29</sup> Extraction by an agent from a common-pool resource with the property of subtractability, such as a fishery, reduces access by other agents. Externalities, common-pool resources and positional goods are all instances where individual utility functions are interdependent. The consequences are utility functions are not additive and global optimization is not possible.

## **9. Increasing Returns to Scale and Market Power**

There is little or no empirical evidence in support of the second order condition that the cost curves of individual producers are U-shaped. Steve Keen argues that constant or decreasing marginal costs are a more realistic condition.<sup>30</sup> Indeed, the domination of many markets by a small number of powerful corporations suggests decreasing marginal costs which may well be the rule. Brian Arthur cites examples of industries with decreasing costs and argues that decreasing costs are increasingly important in his paper entitled “Increasing Returns and Path Dependence in the Economy”.<sup>31</sup> This implies that corporations are not price takers; rather, they set prices as a mark-up over cost. The size of the mark-up is what the market will bear and is a reflection of market power.

## **10. Factors of Production**

Mainstream macroeconomic theory rests on the assertion that labour and capital, as sources of value, are the factors of production. Sometimes land is included as a third factor, but the value of land derives only from the labour and capital expended in improvements. Production is then the value added to freely available natural resources by labour and capital. Kenneth Boulding has written that progress in economics will be impeded as long as labour

and capital are considered to be the foundational elements in production, just as, he points out, progress in Chemistry was impeded as long as fire, water, air and earth were considered to be foundational elements, and that it was not until atoms were considered to be foundational that great progress was made in Chemistry. Boulding suggested that the foundational elements for production should be materials, energy, and know-how. Control might be added as a fourth factor. Production in this framing of economics consists of the transformation of materials using energy and know-how subject to on-going control.<sup>32, 33</sup> Note that labour is at once a source of energy, know-how and control: capital is at once saved labour; it embodies know-how and control and enables the use of energy from non-human sources. It follows that the concepts of 'labour' and 'capital' confound those suggested by Boulding. Further, if the concept of energy is not explicitly recognized in macroeconomic theory, coherence with the laws of thermodynamics cannot be assured.

## 11. General Equilibrium and Time Structure

Mainstream macroeconomic theory is concerned with economic systems in equilibrium. Just as a mechanical system is in equilibrium when the sum of the forces acting upon it is zero, an economic system is said to be in a state of equilibrium when economic forces of demand and supply are balanced. Equilibrium in a single market is achieved when the quantity of a good sought by buyers is equal to the quantity produced by sellers. General equilibrium is achieved when the markets for all goods and services are in equilibrium. Macroeconomic theory is then a structure for comparing the equilibrium states of an economy before and after the application of an external force taking into consideration that a force directly affecting a single market will impact all markets. The theory is not concerned with processes by which the change is propagated throughout the system nor the time paths of the variables between equilibrium states. There are a number of problems with the comparative statics – general equilibrium approach for representing economic systems. The use of Newtonian mechanics as a model for economic theory is inappropriate. There is no reason to believe that the behaviour of economic agents is subject to inviolable laws as is the case with mechanical systems; the 'forces' of supply and demand are abstract, unitless and in no way analogous to the forces acting upon a physical object. The economic system depicted by neo-classical theory does not encompass the most important characteristics of the Earth system in which human activity plays an important role. The Earth system is far from (thermodynamic) equilibrium; Earth system processes, subject to the laws of thermodynamics, transform low entropy energy from the Sun into high entropy energy radiated from the Earth's surface into space. Work that is useful for human purposes can be accomplished by tapping into the movement of energy through Earth's systems or by reconfiguring those systems. Should thermodynamic equilibrium be reached, all matter would end up in a uniform mix of everything, water would collect in the world's oceans and all biomass would be burnt to ashes; the planet would be without life.<sup>34, 35, 36</sup> The time dynamics of the Earth processes are critical; if all such processes were instantaneous, thermodynamic equilibrium would be reached and life would not be possible. Gregory Bateson concluded that "Interactions among component processes take the form of causal chains that may be complex. The representation of time structure is essential. When sequences of cause and effect become circular, then the mapping of those sequences onto timeless logic becomes self-contradictory or paradoxical."<sup>37</sup> Perhaps this explains why the mathematics of mainstream economics is so convoluted that few can

understand it. Kenneth Boulding wrote that “Equilibrium has become a kind of holy sacrament in economics and has seriously diverted attention from the real world of Heraclitean flux . . . The economic system is a structure in space-time. Consequently, it is evolutionary, subject to constant and irreversible change.”<sup>38</sup> Macroeconomic theory, focusing exclusively on equilibrium states and comparative statics, risks irrelevance insofar as it neglects far-from-equilibrium processes essential in the course of evolution.

## **12. Stocks and Flows**

Mainstream macroeconomic theory is specified almost exclusively in terms of relationships between flow variables. Kenneth Boulding observed that “Another taxonomic and conceptual problem that has plagued economics from the time of Adam Smith is the confusion between stocks and flows . . . The capital stock is a population of items, production is births into that population, consumption is deaths . . . Furthermore, the idea that production is consumption is only partly true. What we get satisfaction from, for the most part, is use, not consumption . . . This has led to an extraordinary neglect of information collection about the capital structure . . . and the absurd view that it is income which is the only measure of riches.”<sup>39</sup> If well-being depends at least in part on the existence of stocks, it is a small wonder that GDP, a flow variable, is a poor indicator of well-being.

## **13. Mobility of Capital and Comparative Advantage**

The law of comparative advantage that provides the rationale for ‘free trade’ rests on the assumption that the factors of production, labour and capital are immobile. Herman Daly has written that “Without that assumption, (Ricardo’s very restrictive assumption that capital is immobile between nations), the principle of comparative advantage collapses and the rationale for globalization along with it.”<sup>40,41</sup> What is left is the absolute advantage enjoyed by powerful nations by way of military prowess, endowments of valuable natural resources such as oil, protected intellectual property, social order, and investments in a highly trained workforce and public infrastructure.

## **14. Scientific Method**

Unlike physical sciences, macroeconomics is not based on a methodology that allows it to reject hypotheses. Scientific hypotheses must be stated in terms of concepts that can be observed and measured if hypotheses are to be falsifiable. Economic concepts, such as utility, markets, and supply and demand curves, are appealing abstractions, but they are neither observable nor measurable. For example, the hypothesis that demand curves are downward sloping cannot be falsified as demand curves cannot be observed. In his book, *Technopoly*, Neil Postman,<sup>42</sup> the well-known critic of modern culture, observes that “The status of social science methods is further reduced by the fact that there are almost no experiments that will reveal a social science theory to be false.”

## **15. Measurement and Quantification**

The system of national accounts, that is the standard for national and international stati-



tical programs, serves to measure aggregate macroeconomic variables such as production, consumption, investment, price inflation, labour income and employment needed for the quantification of the relationships among them. It is perhaps worth noting that macroeconomics is perhaps the only science whose practitioners are so far removed from the processes of measurement; in many sciences theories about the real world are accompanied by theories of measurement. Oskar Morgenstern, in his assessment of the accuracy of national income statistics<sup>43</sup>, concludes that the measurement processes used by statistical offices in the compilation of national income statistics are subject to such wide margins of error that the use of statistical techniques to make inferences about the parameters of the relationships is problematic.<sup>44</sup> It is also to be noted that, in spite of the fact that the dominant economic system is called capitalism, there are few measurements of stocks of capital, if any.

## 16. Mathematical Incoherence

Even if the behavioural axioms for consumers and producers are accepted along with the second-order restrictions, macroeconomic theory is mathematically incoherent. It can be shown that the addition of downward sloping demand curves for individual consumers to form market demand curves does not necessarily result in downward sloping market demand curves. It can also be shown that supply curves for producers cannot be added together to form market supply curves. These arguments were made by Oskar Morgenstern in his “Thirteen Critical Points in Contemporary Economic Theory: An Interpretation”.<sup>45</sup> The proofs for these statements are presented by economist and mathematician Steve Keen in the recently published book entitled *Debunking Economics*.<sup>46</sup> Interestingly, Keen found that the aggregation problems for demand curves and the non-existence of a supply curve had been discovered and published in economic literature by William Gorman in 1953 and George Stigler in 1957. These results had been ignored or glossed over even by Gorman himself and in economics textbooks from Samuelson to Mankiw, with the consequence that most economists are not aware of them.<sup>47, 48</sup>

Any one of the preceding arguments provides sufficient grounds for the rejection of mainstream macroeconomic theory. Taking into consideration the irrelevance of the theory for addressing major challenges, the weakness of the axioms and assumptions upon which the deductive reasoning is based, and the mathematical incoherence of the reasoning, the case in support of Saul’s indictment is indeed strong. It is particularly devastating that economic theory which relies almost exclusively on deductive reasoning for its validity is found to be mathematically incoherent. John Kay, in his essay “The Map is not the Territory” discusses the dependency of macroeconomics on deductive reasoning.<sup>49</sup>

## 17. Concluding Observations

The mainstream economics upon which the conventional wisdom that shapes economic policy is based is fatally flawed. I think that Dosi is correct in his assessment that economics took a wrong turn in the middle of the twentieth century. Until that time, economics was more pluralistic, encompassing perspectives from several schools of thought. Perhaps it was the mathematical formalism introduced by Paul Samuelson in his *Foundations of Economic Analysis* that served to propel the neo-classical synthesis to its position of dominance.

“*There is an urgent need to enunciate the foundations upon which a new economic synthesis can be based.*”

Many of the prescriptions that emanate from conventional wisdom must be questioned if not abandoned. For example, if labour is not a binding constraint on production, stimulating economic growth as a means for achieving full employment may be inappropriate. It is likely the case that sources of energy and materials and sinks for wastes, notably carbon dioxide,

are increasingly important as binding constraints. Even so, as energy and the engines that use energy to produce useful work continue to displace labour as a source of work, increasing output does not lead to proportional increases in employment. Conventionally, income from employment and savings from employment income are the means by which people have access to the goods and services they require over their lifespan. Able-bodied people unable to find employment are stigmatized as a burden on society and are denied access to all but the most basic of goods and services. The challenge will be to find means other than employment for providing fair or equitable access to needed goods and services. Second, it is clear that cost-benefit analyses of social programs using market prices for weighing costs and benefits and a discount rate for calculating present values are inappropriate insofar as market prices cannot be considered an objective measure of societal values even in the absence of externalities.

There is an urgent need to enunciate the foundations upon which a new economic synthesis can be based. A starting point may be found in the work of Kenneth Boulding, particularly his book *Ecodynamics: A New Theory of Societal Evolution* published in 1978.<sup>50</sup> Boulding proposes an evolutionary approach to economics. The distinguishing feature of evolutionary systems is its focus on the generation of unpredictable novelty in systems far from thermodynamic equilibrium and the propagation of novelty from generation to generation. In human populations, knowledge is accumulated in the collective mind-space of society and is embodied in artifacts that transform materials and energy to provide the services needed for the sustenance of human life. It follows that economics needs to encompass two kinds of entities: processes that transform materials, energy and information, both naturally occurring and purposeful, and agents, individuals and institutions that create and control biophysical processes directly and indirectly. This emphasis on knowledge generation is echoed in the work of Brian Arthur in his 2009 book entitled *The Nature of Technology: What it is and how it evolves*.<sup>51</sup>

Much valuable research has been done in specialized sub-disciplines of economics and other disciplines, including economic history, the history of economic thought, institutional economics, ecological economics, bio-physical economics, behavioral economics, political science, and evolutionary systems. The needed new synthesis should be capable of incorporating many of the findings from these fields of research.

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## Notes

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