

SAMUELSON AND THE KEYNES/POST KEYNESIAN REVOLUTION: THE
EVIDENCE SHOWING WHO KILLED COCK ROBIN

by

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For most students who studied economics in any American University during the last half of the 20th century, Paul A. Samuelson was thought to be a direct disciple of Keynes and his revolutionary general theory analysis. Samuelson is usually considered the founder of the American Keynesian school which he labeled neoclassical synthesis Keynesianism because of the classical microeconomic theory that Samuelson believed was the foundation of Keynes's macro analysis. As we will explain, Samuelson's neoclassical synthesis brand of "Keynesianism" was not analytically compatible with the theoretical framework laid out by Keynes in The General Theory of Employment Interest and Money [1936A].

Explaining the differences between Samuelson's version of Keynesianism and Keynes's General Theory is the essence of this paper. Given Samuelson's dominance of the American macroeconomic scene after the second world war, the analytical different foundation of Samuelson's Keynesianism vis-a-vis Keynes's General Theory aborted Keynes's truly revolutionary theory from being adopted as mainstream macro economics. Consequently in the 1970s academic literature, the Monetarists easily defeated the Samuelson's neoclassical synthesis Keynesianism on the grounds of logical inconsistency between its microfoundations and its macroeconomic analysis and policy prescriptions. The effect was, in the mid-1970s, to shift the emphasis for developing domestic and international choice of policies from prescriptions founded on Keynes' General Theory to the age-old laissez-faire policies promoted by classical theory that had dominated 19 and early 20th century thought. Consequently, socially acceptable policies to prevent unemployment, to promote economic development, and even the method to finance government social security systems have regressed, with the result that the "golden age of economic development" experienced by both OECD nations and LDCs during the more than

quarter century after world war II has disappeared¹ the technological advances in the study of economics.

As a result of the Monetarist victory over Samuelson's neoclassical Keynesianism in the 1970s. New Keynesian theory was developed to replace Samuelson's Keynesianism. Just as Friedman's Monetarism had conquered Samuelson's brand of Keynesianism, New Classical theory easily made a mockery of the New Keynesians approach which relied on the rigidity of wages and prices to achieve Keynesian-like results. New Classicists argued that price and wage rigidity was associated with government interference in the competitive market place. The result was to lead policy makers to dance to the Panglossian siren song that "all is for the best in the best of all possible worlds provided we let well enough alone" by encouraging adoption of policies of liberalizing all markets.

Accordingly, as we entered the 21 century, only the Post Keynesians remains to carry-on in Keynes's analytical footsteps and develop Keynes's theory and policy prescriptions for a 21st century real world of economic globalization.

I. THE COMING OF KEYNESIANISM TO AMERICA

In their wonderful book The Coming of Keynesianism to America, Colander and Landreth (1996, p. 23) credit Paul Samuelson with saving the textbook pedagogical basis of the Keynesian Revolution from destruction by the anti-communist spirit (Macarthyism) that ravaged America academia in the years immediately following the second world war.

Lori Tarshis, a Canadian who had been a student attending Keynes's lectures at Cambridge during the early 1930s had, in 1947, written an introductory textbook that incorporated Tarshis' lecture notes interpretation of Keynes's General Theory. Colander and Landreth note that despite

the initial popularity of the Tarshis textbook , its sales declined rapidly as it was attacked, by trustees of and donors to American colleges and universities, as peaching an economic heresy .

The frenzy about Tarshis's textbook reached a pinnacle when William Buckley, in his book God and Man at Yale (1951), attacked the Tarshis analysis as communist inspired.

In August 1986 Colander and Landreth [hereafter C-L] interviewed Paul Samuelson, [C-L, 1996, pp. 145-178] about his becoming an economist and a "Keynesian". Samuelson indicated that he recognized the "virulence of the attack on Tarshis" and so he wrote his textbook "carefully and lawyer like" [C-L, 1996, p. 172]. The term "neoclassical synthesis Keynesianism" did not appear in the first edition of Samuelson's textbook, Economics An Introductory Analysis[1948], which was published after the attack on Tarshis's text. This neoclassical synthesis terminology, however, does appears prominently in the later editions of Samuelson's textbook. From hindsight it would appear that Samuelson's assertion that his brand of Keynesian macroeconomics is synthesized with (and based on) traditional neoclassical microeconomic assumptions made the Samuelson version of Keynesianism less open to attacks of bringing economic heresy into University courses on economics compared to Tarshis's Keynesian analysis.

Unlike Tarshis's analysis which was based on separate aggregate supply and demand functions, the analytical foundation of Samuelson's Keynesianism was imbedded in Samuelson's 45 degree Keynesian cross. Samuelson derived this cross analysis from a single equation aggregate demand function. This mathematical derivation in conjunction with the claimed synthesis of neoclassical theory made it more difficult to attack the Samuelson version of textbook Keynesianism as politically motivated. Thus for several generations of economists educated after World War II, Samuelson's name was synonymous with Keynesian theory as various editions of

Samuelson 's neoclassical Keynesian textbook was a best seller for almost a half century. Even those younger economists who broke with the old neoclassical synthesis Keynesianism and developed their own branch of New Keynesianism based their analytical approach on the Samuelson's Foundation of Economic Analysis [1947] and its classical microeconomic foundations.

From an historical perspective it appears that Samuelson may have saved the textbook pedagogical basis of the Keynesian Revolution from Macarthyism destruction simply by ignoring the axiomatic foundation of Keynes's analytic revolution.

II. HOW DID SAMUELSON LEARN KEYNES'S THEORY?

In his 1986 interview Samuelson indicated that in the period before World War II, "my friends who were not economists regarded me as very conservative" [C-L, 1996, p. 154]. Samuelson graduated the University of Chicago in June 1935 and, as he explained to Colander and Landreth, were it not for the Social Science Research Council fellowship that he received upon graduation, he would have done his graduate studies at the University of Chicago [C-L, 1996. P. 154-5]. Consequently, it was the visible hand of a fellowship offer that placed Samuelson at Harvard when Keynes's General Theory was published in 1936. What information about Keynes's General Theory was Samuelson exposed to at Harvard?

Robert Bryce, a Canadian, had attended the same Keynes Cambridge lectures as Tarshis between 1932 and 1935. In a 1987 interview with Colander and Landreth [1996,pp. 39-48] Bryce indicated that in Spring of 1935 he [Bryce] spent half of each week at the London School of Economics and half at Cambridge. At LSE Bryce used his Cambridge lecture notes to write an essay on Keynes's revolutionary ideas - without having read The General Theory --for the people

at the LSE. This essay so impressed Hayek that Hayek let Bryce have four consecutive weeks of Hayek's seminar to explain Keynes's ideas as he had written them out in this essay. Bryce's lectures were a huge success at the LSE [C-L, 1996, p. 43].

In the fall of 1935 Bryce went to Harvard and stayed for two years. During that time, an informal group met during the evenings to discuss Keynes's book. Bryce, using the same pre-General Theory essay that he had used as the basis for his talks at the LSE, presented to this group what he believed was Keynes's General Theory analysis -- although he still had not read the General Theory. As Bryce put it "In most of the first academic year [1935-36] I was the only one who was familiar enough with it [Keynes' theory] to be willing to argue in defense of it." [C-L, 1996, p. 45-6]. So in 1936 Bryce's essay became the basis of what most economists at Harvard, probably including Samuelson, thought was Keynes's analysis -- even though Bryce had not read the book when he made his presentations. Even in 1987, Bryce stated that, "anyone who studies that book is going to get very confused. It was ... a difficult, provocative book" (C-L, 1996p. 44-46).

The immediate question therefore is: "Did Bryce ever really comprehend the basis of Keynes's analytical framework?". And if he did not, how did that affect how the young Samuelson and others at Harvard in 1936 learn about Keynes's analytical framework. Bryce's presentations at the LSE and Harvard were supposed to make Keynes's ideas readily understandable -- something that Bryce believed Keynes could not do in his General Theory book. Bryce indicated that in his first year at Harvard "I felt like the only expert on Keynes's work around" [C-L, 1996, p.45]

Samuelson has indicated that his first knowledge of Keynes's General Theory was gained from Bryce [C-L, 1996, p. 158]. Moreover, even after reading the General Theory in 1936,

Samuelson, perhaps reflecting Bryce's view of the difficulty of understanding Keynes's book, found the General Theory analysis "unpalatable" and not comprehensible [C-L, 1996, p. 159]. Samuelson finally indicated that "The way I finally convinced myself was to just stop worrying about it [about understanding Keynes's analysis] . I asked myself: why do I refuse a paradigm that enables me to understand the Roosevelt upturn from 1933 till 1937? ... I was content to assume that there was enough rigidity in relative prices and wages to make the Keynesian alternative to Walras operative" [C-L, 1996, pp159-160].

Keynes's biographer, Lord Skidelsky [1992, p. 512] recognized the problem with this Samuelson interpretation of Keynes when he wrote " the validity of Keynes's 'general theory' rests on his assertion that the classical theory... is, as he put it in his lectures, 'nonsense' . If it [Walrasian classical theory] were true, the classical 'special case' would, in fact, be the "general theory"^[ii] and Keynes's aggregative analysis not formally wrong, but empty, redundant. It is worth noting, at this point, that mainstream economists after the Second World War treated Keynes's theory as a 'special case' of the classical [Walrasian] theory, applicable to conditions where money wages and interest were 'sticky'. Thus his theory was robbed of its theoretical bite"ⁱⁱⁱ.

Apparently Samuelson never tried to comprehend Keynes's analytical foundation and framework. For in 1986 Samuelson was still claiming that "we [Keynesians] always assumed that the Keynesian underemployment equilibrium floated on a substructure of administered prices and imperfect competition" [C-L, 1996, p.160]. When pushed by Colander and Landreth as to whether this requirement of rigidity was ever formalized in his work, Samuelson's response was "There was no need to" [C-L, 1996, p. 161].

Yet specifically in chapter 19 of The General Theory and even more directly in his

published response to Dunlop and Tarshis, Keynes [1939b] had already responded in the negative to this question of whether his analysis of underemployment equilibrium required imperfect competition, administered prices, and/or rigid wages. Dunlop and Tarshis had argued that the purely competitive model (i.e., the Walrasian model) was not empirically justified, therefore it was monopolistic price and wage fixities that was the basis of Keynes's unemployment equilibrium. Keynes reply was simply :”I complain a little that I in particular should be criticised for conceding a little to the other view” [Keynes, 1973b, p. 411]. In chapters 17 -19 of his General Theory, Keynes explicitly demonstrated that even if perfectly flexible money wages and prices existed (“conceding a little to the other side”), there was no automatic mechanism that could restore the full employment level of effective demand . In other words, Keynes's general theory 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.

Obviously Samuelson, who became the premier American Keynesian of his time, had either not read, or not comprehended, (1) Keynes's response to Dunlop and Tarshis or even (2) chapter 19 The General Theory which was entitled “Changes in Money Wages”. In chapter 19 Keynes explicitly indicates that the theory of unemployment equilibrium did not require “a rigidity” in money wages [Keynes, 1936a, p. 257]. As Keynes put it:

“For the classical theory has been so accustomed to rest the supposedly self-adjusting character of the economic system on the assumed fluidity of money wages; and, when there is rigidity, to lay on this rigidity the blame of maladjustment..... My difference from this theory is primarily a difference of analysis” [Keynes, 1936a, p. 257].

Keynes [1936a, p. 259, first emphasis added] indicated that to assume that rigidity was the

sole cause of the existence of an unemployment equilibrium lay in accepting the argument that the micro-demand functions “can only be constructed on some fixed assumption as to the nature of the demand and supply schedules of other industries and as to the amount of aggregate effective demand. It is invalid, therefore to transfer the argument to industry as a whole unless we also transfer the argument that the aggregate effective demand is fixed. Yet, this assumption reduces the argument to an ignoratio elenchi.”

An ignoratio elenchi is a fallacy in logic of offering a proof irrelevant to the proposition in question. Unfortunately Samuelson invoked the same classical ignoratio elenchi when he argued that Keynes’s general theory was simply a Walrasian general equilibrium system where, if there is an exogenous decline in effective demand, rigid wages and prices created a temporary disequilibrium that prevented full employment from being restored in the short-run.^{iv}.

As Keynes went on to explain, “whilst no one would wish to deny the proposition that a reduction in money wages accompanied by the same aggregate effective demand as before will be associated with an increase in employment, the precise question at issue is whether the reduction in money wages will or will not be accompanied by the same aggregate effective demand as before measured in term of money, or, at any rate, by an aggregate effective demand which is not reduced in full proportion to the reduction in money-wages” [Keynes, 1936a, pp.259-60]. Keynes then spent the rest of chapter 19 explaining why and how a general theory analysis must look at the relationship between changes in money wages and/or prices and changes in aggregate effective demand – an analysis that, by assumption, is not relevant to either a Walrasian system or Samuelson’s neoclassical synthesis Keynesianism..

At the same time that Samuelson became a Keynesian by convincing himself not to worry

about Keynes's actual analytical framework, Tarshis had obtained a position at Tufts University, a mere half-hour of travel from Harvard. Tarshis would often meet with the group at Harvard, including Bryce, who were discussing Keynes. Tarshis notes that "Paul Samuelson was not in the Keynesian group. He was busy working on his own thing. That he became a Keynesian was laughable." (C-L, 1996, p. 64).

Yet, Paul Samuelson has called himself a "Keynesian" and even a "Post Keynesian" in several editions of his famous textbook. Nevertheless, as we will explain in section IV infra, Samuelson's theoretical "neoclassical synthesis" axiomatic foundations is logically not the general theory spelled out by Keynes.

III. THE AXIOMATIC DIFFERENCES BETWEEN SAMUELSON'S NEOCLASSICAL KEYNESIANISM AND KEYNES/POST KEYNESIAN THEORY

At the same time that Samuelson was developing his neoclassical synthesis Keynesianism, he was working on his masterful Foundations of Economic Analysis [1947]. In his Foundations Samuelson asserts explicitly (or implicitly) certain specific classical axioms are the basis of both classical micro theory and therefore, his neoclassical Keynesian macroeconomic analysis. For example Samuelson noted that "in a purely competitive world it would be foolish to hold money as a store of value as long as other assets had a positive yield" (Samuelson, 1947, pp. 122-4). This statement means that (1) any real producible capital goods that produce a positive yield are a gross substitute for money and (2) money is neutral. Thus at the same time Samuelson was promoting his pedagogical brand of Keynesianism in his textbook he was arguing that the gross substitution axiom and the neutral money axiom are the foundations upon which all economic analysis must be built. (We shall indicate infra that Keynes specifically rejected these two classical axioms as a

foundation for his General Theory.)

Furthermore in an article published in 1969 Samuelson argued that the “ergodic hypothesis [axiom]” is a necessary foundation if economics is a hard science.[Samuelson, 1969, p. 184]. (As explained in section IV infra, Keynes also rejected this ergodic axiom.) What is this ergodic hypothesis?

If one conceives of the economy as a stochastic (probability) process, then the future outcome of any current decision is determined via a probability distribution. Logically speaking to make statistically reliable forecasts about future economic events, the decision maker should obtain and analyze sample data from the future. Since that is impossible, the assumption of an ergodic stochastic process permits the analyst to assert that samples drawn from past and current data are equivalent to drawing a sample from the future. In other words, the ergodic axiom implies that the outcome at any future date is the statistical shadow of past and current market data.

A realization of a stochastic process is a sample value of a multidimensional variable over a period of time, i.e., a single time series of recorded outcomes. A stochastic process provides a universe of such time series. Time statistics refer to statistical averages (e.g., the mean, the standard deviation, etc.) calculated from a singular realization over an indefinite time space. Space statistics, on the other hand, refers to statistical averages calculated at a fixed point of time observation and are formed over the universe of realizations (i.e., space statistics are calculated from cross-sectional data).

If the stochastic process is ergodic, then for an infinite realization the time statistics and the space statistics will coincide. For finite realizations of ergodic processes, time and space statistics coincide except for random errors, i.e., they tend to converge (with the probability of unity) as the

number of observations increase. Consequently, if the ergodic axiom is applicable, statistics calculated from either past time series or cross-sectional data are statistically reliable estimates of the space statistics that will occur at any future date.

The ergodic axiom therefore assures that the outcome associated with any future date can be reliably predicted by a statistical analysis of already existing data. The future is therefore never uncertain- it can always be reliably predicted by a sufficient statistical analysis of already existing data. Future outcomes, in an ergodic system, are probabilistically risky but reliably predictable. (In a nonstochastic deterministic orthodox economic model, the classical ordering axiom plays the same role as the ergodic axiom of classical stochastic models.^v)

In an ergodic world, in the long run, the future is predetermined and can not be changed by anything human beings or governments do. It follows that any government market regulation or interference into normal competitive market (assumed ergodic) processes, may, in the short run, prevent the system from achieving the full employment level assured by the axioms of a classical Walrasian system. In an ergodic system where the future can be reliably predicted so that future positive yields of real assets can be known with actuarial certainty, and where the gross substitution axiom underlies all demand curves, then as long as prices are flexible, money must be neutral and the system automatically adjusts to a full employment general equilibrium. If, on the other hand, prices are sticky in the short run, then it will take a longer time for the gross substitution theorem to work its way through the system but, at least in the long run, a full employment general equilibrium is still assured. In Keynes's general theory analysis, on the other hand a full employment equilibrium is not assured in either the short-run or the long-run.

Samuelson [C-L, 1996, p. 163] has stated that in his view Keynes's analysis is a "very

slow adjusting disequilibrium” system where the “full Walrasian equilibrium was not realized” in the short-run because prices and wages do not adjust rapidly enough to an exogenous shock. Nevertheless the economic system would, if left alone, achieve full employment in the long run.

In contrast, on the very first text page of The General Theory, Keynes [1936a, p. 3] explained “that the “postulates of the classical [Walrasian] theory are applicable to a special case only and not to the general case.... Moreover the characteristics of the special case assumed by the classical theory happen not to be those of the economics society in which we actually live, with the result that its teaching is misleading and disastrous if we attempt to apply it to the facts of experience”.

In the preface to the German language edition of The General Theory [1936b, p. ix] Keynes specifically noted ”This is one of the reasons which justify my calling my theory a general [emphasis in the original] theory. Since it is based on fewer restrictive assumptions [‘weniger enge Voraussetzungen stütz’] than the orthodox theory, it is also more easily adopted to a large area of different circumstances” [Second emphasis added]. In other words, Keynes argued that what made his analytical system more general than the classical (or more recent Walrasian general equilibrium) analysis is that Keynes’s general theory requires a smaller common axiomatic base (fewer restrictive axioms) than any other alternative theory. Alternative theories then are special cases that impose additional restrictive axioms to the common axiomatic foundation of the general theory. The onus is therefore, on those who add the restrictive axioms to the general theory to justify these additional axioms. Those theorists who invoke only the general theory axiomatic base are not required, in logic, to prove a general negative, i.e., they are not required to prove the additional restrictive axioms are unnecessary.

IV. SAMUELSON'S KEYNESIAN AXIOMS THAT KEYNES AND THE POST KEYNESIANS OVERTHROW IN THEIR GENERAL THEORY REVOLUTION

Keynes was primarily a monetary theorist. The words money, currency, and monetary appear in the titles of most of his major volumes in economics. Post Keynesian monetary theory evolves from Keynes's revolutionary approach to analyzing a money using economy where money was never neutral even if a hypothetical pure competitive market conditions including instantaneously flexible wages and prices exists. Keynes (1936a, p. 26) argued that even if such a purely competitive market existed it would not automatically achieve a full employment general equilibrium in an a money-using economy.

Keynes compared those economists whose theoretical logic was grounded on the classical special case additional restrictive axioms to Euclidean geometers living in a nonEuclidean world "who discovering that in experience straight lines apparently parallel often meet, rebuke the lines for not keeping straight-- as the only remedy for the unfortunate collisions which are taking place. Yet, in truth, there is no remedy except to throw over the axiom of parallels and to work out a non-Euclidean geometry. Something similar is required today in economics" [Keynes, 1936a, p. 16].

To throw over an axiom is to reject what the faithful believe are "universal truths". The Keynesian revolution in economic theory required economists to "throw over"of three restrictive classical axioms from its theoretical foundation. Post Keynesian monetary theory has followed Keynes's fewer restrictive axiom analytical framework. In light of Keynes's analogy to geometry, Post Keynesian monetary theory might be called non-Euclidean economics.

The classical axioms that Keynes threw out in his revolutionary general analysis were

[1] the neutrality of money axiom, [2] the gross substitution axiom, and [3] the axiom of an ergodic economic world.

In 1935 Keynes explicitly noted that in his analytic framework money matters in both the long and short run, i.e., money is never neutral. Money affects real decision making. In 1935 Keynes wrote:

“the theory which I desiderate would deal...with an economy in which money plays a part of its own and affects motives and decisions, and is, in short, one of the operative factors in the situation, so that the course of events cannot be predicted either the long period or in the short, without a knowledge of the behavior of money between the first state and the last. And it is this which we mean when we speak of a monetary economy” [Keynes, 1935, pp. 408-9].

As Keynes's developed his theory of liquidity preference he recognized that his theory of involuntary unemployment required specifying "The Essential Properties of Interest and Money" [1936a, ch. 17] that differentiated his results from classical theory. These “essential properties” assured that money and all other liquid assets are never neutral. These essential properties [Keynes, 1936a, pp. 230-231]are:

[1] the elasticity of production of all liquid assets including money is zero or negligible,
and

[2] the elasticity of substitution between liquid assets (including money) and reproducible goods is zero or negligible.

A zero elasticity of production means that money does not grow on trees and consequently workers can not be hired to harvest money trees when the demand for money increases. Or as Keynes wrote: t “money...cannot be readily reproduced ;-labour cannot be turned

on at will by entrepreneurs to produce money in increasing quantities as its price rises” [Keynes. 1936a, p. 230]. In other words, when the demand for money (liquidity) increases, private sector entrepreneurs can not hire labor to produce more money to meet this increase in demand for a nonreproducible (by the private sector) good.

In classical theory, on the other hand, money is a reproducible commodity. In many neoclassical textbook models as well as in the Walrasian system, peanuts or some other reproducible product of industry is the money commodity or numeraire. Peanuts may not grow on trees, but they do grow on the roots of bushes. The supply of peanuts can easily be augmented by the hiring of additional workers by private sector entrepreneurs.

The zero elasticity of substitution, assures that portion of income that is not spent on by the products of industry for consumption purposes, i.e., savings, will find, in Hahn's [1977, p. 31] terminology, "resting places" in the demand for nonproducibles. Some forty years after Keynes, Hahn rediscovered Keynes's point that a stable involuntary unemployment equilibrium could exist even in a Walrasian system with flexible wages and prices whenever there are "resting places for savings in other than reproducible assets"[Hahn, 1977, p. 31].

Hahn rigorously demonstrated what was logically intuitive to Keynes. Hahn [1977, p. 37] showed that the view that with “flexible money wages there would be no unemployment has no convincing argument to recommend it Even in a pure tatonnement in traditional models convergence to [a general] equilibrium cannot be generally proved” if savings were held in the form of nonproducibles. Hahn [1977, p. 39] argued that “any non-reproducible asset allows for a choice between employment inducing and non-employment inducing demand”. Accordingly, the existence of a demand for money and other liquid nonreproducible assets (that are not gross

substitutes for the products of the capital goods producing industries) as a store of "savings" means that all income earned by households engaging in the production of goods is not, in the short or long run, necessarily spent on the products of industry. Households who want to store that portion of their income that they do not consume (i.e., that they do not spend on the products of industry) in liquid assets are choosing, in Hahn's words "a non-employment inducing demand" for their savings.

If the gross substitution axiom was universally applicable, however, any new savings that would increase the demand for nonproducibles and therefore would increase the price of nonproducibles (whose production supply curve is, by definition, perfectly inelastic). The resulting relative price rise in nonproducibles vis-a-vis producibles would, under the gross substitution axiom, induce savers to increase their demand for reproducible durables as a substitute for nonproducibles in their wealth holdings. Consequently nonproducibles could not be ultimate resting places for savings as they spilled over into a demand for producible goods [Cf. Davidson, 1972].

Samuelson's assumption that all demand curves are based on an ubiquitous gross substitution axiom implies that everything is a substitute for everything else. In Samuelson's foundation for economic analysis, therefore, producibles must be good gross substitutes for any existing nonproducible liquid assets (including money) when the latter are used as stores of savings. Accordingly, Samuelson's Foundation of Economic Analysis denies the logical possibility of involuntary unemployment^{vi} as long as all prices are perfectly flexible.

Samuelson's brand of Keynesianism is merely a form of the classical special case analysis that is "misleading and disastrous"[Keynes, 1936a, p. 3] if applied to the real world. In the absence

of a restrictive universally applicable axiom of gross substitution, however, income effects (e.g., the Keynesian multiplier) can predominate and can swamp any hypothetical classical substitution effects. Just as in non-Euclidean geometry lines that are apparently parallel often crash into each other, in the Keynes-Post Keynesian non-Euclidean economic world, an increase demand for "savings" even if it raises the relative price of nonproducibles, will not spill over into a demand for producible good and hence when households save a portion of their income they have made a choice for "non-employment inducing demand".

Finally, Keynes argued that only in a money-using entrepreneur economy where the future is uncertain (and therefore could not be reliably predicted) would money (and all other liquid assets) always be nonneutral as they are used as a store of savings. In essence Keynes viewed the economic system as moving through calendar time from an irrevocable past to an uncertain, not statistically predictable, future. This required Keynes to reject the ergodic axiom.

Keynes never used the term "ergodic" since ergodic theory was first developed in 1935 by the Moscow School of Probability and it did not become well known in the West until after the second world war and Keynes was dead. Nevertheless Keynes's main criticism of Tinbergen's econometric "method" [Keynes, 1939a , p. 308] was that the economic data "is not homogeneous over time". Non-homogenous data over time means that economic time series are non-stationary, and nonstationary is a sufficient (but not a necessary condition) for nonergodic circumstances. Consequently, Keynes, with his emphasis on uncertainty had, in these comments on Tinbergen, specifically rejected what would later be called the ergodic axiom – an assumption that Samuelson has declared is a foundation necessary to make economics a hard science.

In sum, Samuelson theoretical foundations requires three classical axioms that are the

equivalent of the axiom of parallels in Euclidean geometry. Clearly then Samuelson's macroeconomics is not applicable to the "non-Euclidean" economics of a money-using entrepreneurial system that Keynes developed in his General Theory.

V. LIQUIDITY AND CONTRACTS

Nevertheless, the question may remain "Does applying Keynes's smaller axiomatic base make any difference in our understanding of the real world in which we live vis-a-vis applying Samuelson's classical axiomatic foundation version of Keynesianism?". The answer is definitely yes because only if we overthrow these three classical axioms that are an essential part of Samuelson's foundations of economic analysis can the concept of liquidity play an important role in our analysis – as it does in our lives.

Important decisions involving production, investment and consumption activities are often taken in an uncertain (nonergodic) environment. Hiring inputs and buying products using forward contracts in money terms are a human institution developed to efficiently organize time consuming production and exchange processes. Since the abolition of slavery the money-wage contract is the most ubiquitous of these contracts. Unemployment, rather than full employment, is a common laissez-faire outcome in such a market oriented, monetary production economy.

The economy in which we live utilizes money contracts -- not real contracts -- to seal production and exchange agreements among self-interested individuals. The ubiquitous use of money contracts is an essential element of all real world entrepreneurial economies. Moreover recontracting without income penalty (an essential characteristic of the Walrasian system) whenever parties have entered into a contract at a price other than the implicit full employment general equilibrium price is never permitted under the civil law of contracts. Why, one might ask

Samuelson, do economies continue to organize production and exchange on the basis of money contracts, if such use interferes with the rapid achievement of a socially optimal general Walrasian equilibrium?

The use of money contracts has always presented a dilemma to classical theorists.

Logically consistent classical theorists must view the universal use of money contracts by modern economies as irrational, since such agreements fixing payments over time in nominal terms can impede the self-interest optimizing pursuit of real incomes by economic decision makers.

Mainstream economists tend to explain the existence of money contracts by using non-economic reasons such as social customs, invisible handshakes, etc. -- societal institutional constraints which limit price signaling and hence limits adjustments for the optimal use of resources to the long run.

For Post Keynesians, on the other hand, binding nominal contractual commitments are a sensible method for dealing with true uncertainty regarding future outcomes whenever economic activities span a long duration of calendar time. In organizing production and exchange on a money contractual basis, buyers need not worry about what events happen in the uncertain future as long as they have, or can obtain, enough liquidity to meet these contractual commitments as they come due. Thus liquidity means survival in a money-using contractual entrepreneurial directed market economy. Bankruptcy, on the other hand, occurs when significant contractual monetary obligations can not be met. Bankruptcy is the equivalent of a walk to the economic gallows.

Keynes's general theory that emphasizes money and liquidity implies that agents who planned to spend in the current period need not have earned income currently, or previously, in order to exercise this demand in an entrepreneur system. All these buying agents need is the liquidity to meet money contractual obligations as they come due. This means that investment

spending , which we normally associate with the demand for reproducible fixed and working capital goods, is not constrained by either actual income or inherited endowments. This type of exogenous spending is constrained , in a money-creating banking system, solely by the expected future monetary (not real) cash inflow (Keynes, 1936a, Ch. 17) upon which banks are willing to make additional loans.

In a world where money is created primarily only if someone increases their indebtedness to banks in order to purchase newly produced goods, then real investment spending will be undertaken as long as the purchase of newly produced capital goods are expected to generate a future of cash inflow (net of operating expenses) whose discounted present value equals or exceed the money cash outflow (the supply price currently needed to purchase the capital good.)

For any component of aggregate demand not to be constrained by actual income, therefore, agents must have the ability to finance purchases by borrowing from a banking system that can create money. This Post Keynesian financing mechanism where increases in the nominal quantity of money are used to finance increased demand for producible goods results in increasing employment levels. Money, therefore, can not be neutral and can be endogenous.

To reject the neutrality axiom does not require assuming that agents suffer from a money illusion. It only means that "money is not neutral" [Keynes, 1935, p. 411] in the sense that; money matters in both the short run and the long run, affecting the equilibrium level of employment and real output. If it weren't for Samuelson's insistence on neutral money as a foundations for all economic theory, economists might recognize that in a money-using entrepreneurial economy that organizes production and exchange with the use of spot and forward money contracts, money is a real phenomenon. The money neutrality axiom must be rejected..

Arrow and Hahn [1971, pp. 356-7] implicitly recognized this necessity of overthrowing the neutral money axiom when they wrote:

"The terms in which contracts are made matter. In particular, if money is the goods in terms of which contracts are made, then the prices of goods in terms of money are of special significance. This is not the case if we consider an economy without a past or future. . . . if a serious monetary theory comes to be written, the fact that contracts are made in terms of money will be of considerable importance" [italics added].

Moreover Arrow and Hahn demonstrate [1971, p. 361] that, if production and exchange contracts are made in terms of money (so that money affects real decisions) in an economy moving along in calendar time with a past and a future, then all general equilibrium existence theorems are jeopardized. The existence of money contracts -- a characteristic of the world in which we live -- implies that there need never exist, in the long run or the short run, any rational expectations equilibrium or general equilibrium market clearing price vector. Samuelson's Walrasian foundation is not a reliable base for real world economies that use money and money contracts to organize economic activities.

VI. CONCLUSION

Paul Samuelson saved the term "Keynesian" from being excoriated from post second world war textbooks by the McCarthy anti-communist movement at the time. But the cost of such a saving was to sever the meaning of Keynes's theory in mainstream economic theory from its General Theory analytical roots. Keynes's revolution was to demonstrate that in a money using, market-oriented economy, supply-side market imperfections including the fixity of money wages and/or prices are not necessary conditions for the existence of involuntary unemployment equilibrium,

while flexible wages and prices and pure competition are not sufficient conditions to assure full employment equilibrium, even in the long run.

Samuelson's view of Keynesianism resulted in aborting Keynes's revolutionary analysis from altering the foundation of mainstream macroeconomics. Consequently what passes as conventional macroeconomic wisdom of mainstream economists at the beginning of the 21st century is nothing more than a high-tech and more mathematical version of 19th century classical theory

In winning the battle against the forces trying to prevent the teaching of suspected communist inspired "Keynesian" economics in our universities, Samuelson ultimately lost the war that Keynes had launched to eliminate the classical theoretical analysis as the basis for real world economic problems of employment, interest and money. In 1986 Lorie Tarshis recognized this when he noted "I never felt that Keynes was being followed with full adherence or full understanding of what he had written. I still feel that way" [C-L, p. 72].

Mainstream economics – whether espoused by Old Neoclassical Keynesians, New Keynesians, Old Classical or New Classical theorists, etc^{vii} – relies on the three classical axioms that Keynes discarded in his general theory attempt to make economics relevant to the real world problems of unemployment and international trade and international payments. As a result these problems still plague much of the real world in the globalized economy of the 21 century.

REFERENCES

- Arrow, K. W. And Hahn, F. H. (1971). General Competitive Analysis Holden-Day, San Francisco.
- Buckley, W. F. (1951). God and Man at Yale, Chicago, Henry Rigney.
- Colander, D. C. And Landreth, H (1996). The Coming of Keynesianism To America. Elgar,

Cheltenham.

Davidson, P. (1972), Money and The Real World. London: Macmillan,

_____ (1998), "Post Keynesian Employment and Analysis and The Macroeconomics of OECD Employment" The Economic Journal, 108.

_____ 2002, Financial Markets Money and The Real World, Elgar, Cheltenham.

Debreu, G. (1959), The Theory of Value, New York: J. Wiley.

Hahn, F. A. (1977). "Keynesian Economics and General Equilibrium Theory" in The Microfoundations of Macroeconomics, edited by G. C. Harcourt. London, Macmillan.

Hicks, J. R (1979), Causality in Economics. New York: Basic Books.

Keynes, J, M. (1935), "A Monetary Theory of Production" in The Collected Writings of John Maynard Keynes, XIII, edited by D. Moggridge. London, Macmillan, 1973a. All references are to reprint.

----- (1936a), The General Theory of Employment, Interest, and Money. New York, Harcourt, Brace..

----- (1936b), The General Theory of Employment, Interest, and Money, German Language edition, Duncker and Humboldt, Berlin.

----- (1939a), "Professor Tinbergen's Method", Economic Journal, 49, reprinted in The Collected Writings of John Maynard Keynes, XIV, edited by D. Moggridge. London, Macmillan, 1973b. All references are to reprint.

----- (1939b), "Relative Movements of Real Wages and Output", The Economic Journal, 49, reprinted in The Collected Writings of John Maynard Keynes, XIV, edited by D. Moggridge. London, Macmillan, 1973b. All references are to reprint.

------(1937), "The General Theory", Quarterly Journal of Economics, reprinted in The Collected Writings Of John Maynard Keynes, XIV, edited by D. Moggridge. London, Macmillan, 1973b. All references are to reprint.

_____ (1973a, 1973b). The Collected Writings of J. M. Keynes. London: Macmillan, Volume XIII, 1973(a); Volume XIV, 1973(b).

Samuelson, P. A. (1947), Foundations of Economic Analysis. Cambridge, Harvard University Press.

Samuelson, P. A.(1948). Economics: An Introductory Analysis. New York, McGraw-Hill.

Weintraub, E. R. (2002). How Economics Became a Mathematical Science, Durham: Duke University Press.

NOTES

i. For almost a quarter of a century after World War II, governments actively pursued the types of economic policies that Keynes had advocated in the 1930s and 1940s. The result was that per capita economic growth in the capitalist world proceeded at a rate that has never been reached in the past nor matched since. The average annual per capita economic growth rate of OECD nations from 1950 till 1973 was almost precisely double the previous peak growth rate of the industrial revolution period. Productivity growth in OECD countries was more than triple (3.75 times) that of the industrial revolution era.

The resulting prosperity of the industrialized world was transmitted to the less developed nations through world trade, aid, and direct foreign investment. From 1950-73, average per capita economic growth for all less developed countries (LDCs) was 3.3 per cent, almost triple the average growth rate experienced by the industrializing nations during the industrial revolution. Aggregate economic growth of the LDCs increased at almost the same rate as that of the developed nations, 5.5 per cent and 5.9 per cent respectively. The higher population growth of the LDCs caused the lower per capita income growth. (See Davidson, 2002, pp. 1-3).

ii. As Weintraub [2002, p. 113] noted, Debreu was a Student of Bourbakian mathematics and Bourbakians believe "good general theory does not search for the maximum generality but for the right generality".

Keynes searched for a “maximum” general theory, that is a theory built on the smallest axiomatic foundation that could be applied to the real world. Debreu’s Theory of Value [1959] was a “direct analogue of Bourbaki’s [analysis] right down to the title....{Debreu}sought to establish the definitive analytic mother-structure from which all further work in economics would depart, primarily by ‘weaking’ its assumptions... But this required one very crucial maneuver that was nowhere explicitly stated, namely that the model of Walrasian equilibrium was the root structure [the right level of generality] from which all further work work in economics would eventuate” [Weintraub, 2002, p. 121]

iii. Mainstream economists called this sticky interest rate argument the ‘liquidity trap’ where at some low, but positive, rate of interest the demand to hold money for speculative reasons was assumed to be perfectly elastic (i.e., horizontal). After the Second World War, econometric investigations could find no empirical evidence of a liquidity trap. Had mainstream economists read The General Theory, however, they would have known that on page 202 Keynes specifies the speculative demand for money as a rectangular hyperbola – a mathematical function that never has a perfectly elastic segment. Moreover eyeball empiricism led Keynes [1936a, p. 207] to indicate that he knew of no historical example where the liquidity preference function became “virtually absolute”, i.e., perfectly elastic. In sum, from both a empirical and theoretical view, Keynes denied the existence of a liquidity trap.

iv. The particular proof that Keynes claimed was irrelevant was the classical assertion that a fixed and unchanging downward sloping marginal product curve of labor was the demand curve for labor and so that falling wages must increase employment. In chapter 20 of The General Theory Keynes specifically develops an “employment function” that is not the marginal product of labor curve and does not assure that aggregate effective demand is fixed.

What the marginal productivity of labor curve indicates is that if in response to an expansion of aggregate effective demand, private sector entrepreneurs hire more workers to produce an additional flow of output per period, then in the face of diminishing returns (with no change in the degree of competition), the rise in employment will be associated with a fall in the real wage rate. In other words, the marginal product of labor curve is, for any given the level of effective demand and employment, the real wage determining curve. For a complete analysis of this point see Davidson (1998) or Davidson (2002).

v. True uncertainty occurs whenever an individual cannot specify and/or order a complete set of prospects regarding the future, either because: 1) the decision maker cannot conceive of a complete list of consequences that will occur in the future; or, ii) the decision maker cannot assign probabilities to all consequences because "the evidence is insufficient to establish a probability" so that possible consequences "are not even orderable" (Hicks, 1979, p.113, 115). In such cases ordering is not possible.

vi. To overthrow the axiom of gross substitution in an intertemporal context is truly heretical. It

changes the entire perspective as to what is meant by "rational" or "optimal" savings, as to why people save or what they save. It would deny the life-cycle hypothesis. Indeed Danziger *et al.* (1982-83) have shown that the facts regarding consumption spending by the elderly are incompatible with the notion of intertemporal gross substitution of consumption plans which underlie both life cycle models and overlapping generation models currently so popular in mainstream macroeconomic theory.

vii. Some economists, e.g., behavioral theorists, have tried to erect ad hoc models suggesting that agents do not always act with the economic rationality of classical theory's decision makers although there is nothing in their analysis that denies the possibility that rational decision making is possible. Unfortunately, such theories have no unifying underlying general theory to explain why such "irrational" behavior exists. Behavioral theorists can not explain why those who undertake non-rational behavior have not been made extinct by a Darwinian struggle with those real world decision makers who take the time to act rationally.

Had behavioral theorists adopted Keynes's general theory as their basic framework, irrational behavior can be explained as sensible if the economy is a non-ergodic system. Or as Hicks (1977, p. vii) succinctly put it, "One must assume that the people in one's models do not know what is going to happen, and know that they do not know just what is going to happen." In conditions of true uncertainty, people often realize they just don't have a clue as to what rational behavior should be.