The Keynesian Revolution From a Philosophy of Science Perspective: Revolutionary or Evolutionary?

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"To understand my state of mind, however, you have to know that I believe myself to be writing a book on economic theory which will largely revolutionise ... the way the world thinks about economic problems" [Keynes, 1973, pp. 492-3].

"The revolutionary character of Keynes' General Theory continues to be actively debated in the literature" [Aschkeim and George S. Tavlas, 1990, p. 1].

"[T]he history of the [Keynesian] revolution is, perhaps, the worst told story of our era" [Galbraith, 1970, p. 51].

1. Introduction

The philosophy of science literature has been applied to economics in a number of areas. The most controversial debate in the applications of this literature to Keynes' theories concerns the appropriateness of Thomas Kuhn's "scientific revolution" approach versus Imre Lakatos' more evolutionary "scientific research program" framework [Kuhn, 1970a and 1970b, Lakatos, 1970]. In each case, one or more frameworks of scientific change have been applied to the particular author's interpretation of Keynes. However, the revolutionary versus evolutionary nature of Keynes' impact depends on which interpretation of Keynes is utilized.

This paper goes beyond the limited interpretations of Keynes offered in these applications, and considers the revolutionary versus evolutionary nature of Keynesianism according to all of the major depictions of Keynes. Interpretations of Keynes have been made by: the "Fiscalists", the "IS/LM Apparatus", the "Monetarists", the "Disequilibrium Approach", the "Rational Expectations" school, the New Keynesians and the post-Keynesians. It will be shown how Keynes introduced both revolutionary and evolutionary ideas. Thus, a more complex hybrid of evolutionary and revolutionary analyses is utilized.

2. The Revolutionary Versus Evolutionary Character of Keynesianism and the Major Interpretations of Keynes

The schools of thought or theories which have interpreted Keynes in a more evolutionary manner include the Fiscalists, the IS/LM Apparatus, the Monetarists, the Disequilibrium Approach, the Rational Expectations School, and the New Keynesians.

A. The Fiscalist Keynesians

The Fiscalist Keynesians, as E. Ray Canterbery terms them, were among the first Keynesians. The most important Fiscalist Keynesian theories were advanced from the late 1930s through the early 1950s [Canterbery, pp. 151-3; Breit and Ransom, pp. 84-9, 141-2]. Fiscalists repudiate Say's Law and the Quantity Theory of Money [Stanfield, p. 101]. They highlight Keynes' belief that planned investment and savings are unlikely to be matched. In equilibrium, injections will probably not match leakages at an output level consistent with full employment. Fiscal policy is relied upon to boost aggregate demand in downturns [Breit and Ransom, pp. 71-4]. Alvin Hansen's work on the multiplier, Abba Lerner's explanation of "functional finance", and Paul Samuelson's "Keynesian Cross" (i.e. the income/expenditure model associated with the injections/leakages approach) are Fiscalist contributions which underscore the importance of fiscal policy [Canterbery, pp. 153-4; Breit and Ransom, pp. 90, 142].

B. The IS/LM Apparatus

While the Fiscalist version of Keynes usually is presented to undergraduate economics students
at the introductory level, the IS/LM apparatus is ordinarily an intermediate-level representation of Keynesian theory. The IS curve is based on the Keynesian Cross. The IS/LM apparatus was first published by J.R. Hicks in 1937 and was later developed by Hansen. [Hicks, 1937, pp. 156-7; Canterbury, pp. 153-4; Breit and Ransom, p. 93]. It did not become popularized until the 1950s and '60s [Canterbury, pp. 153-4; Breit and Ransom, p. 93]. It depicts the Keynesian money market, as well as planned investment and savings in a state of simultaneous equilibrium. The interest rate helps link the product and money markets. As with the Keynesian Cross, the equilibrium level of national income consistent with full employment is a special case. Furthermore, government fiscal and monetary policy can be effective in increasing employment in both approaches when investment declines [Hicks, 1937, pp. 156-7; Gordon, 1981, pp. 101, 110, 114-5, 138-9].

Yet despite these similarities, the IS/LM framework is a good deal more "classical" (or pre-Keynesian) than the Keynesian cross; the former underemphasizes the role of imperfect expectations while the latter highlights the importance of such a divergence for unintended inventory changes [E. Roy Weintraub, 1975, p. 541; Canterbury, pp. 157-9]. Indeed, while some have noted that Keynes found little wrong with Hicks' interpretation, Keynes did criticize Hicks' IS/LM apparatus for failing to model unmet expectations adequately [Blaug, 1978, p. 62; Meltzer, pp. 37-8]. The IS/LM framework is also more neoclassical than the Keynesian Cross because leakages continually equal injections in the former. Further, the role of the interest rate is overemphasized in the IS/LM framework [Brothwell, p. 541].

When viewed in the light of the Keynesian Cross or IS/LM model, Keynesianism provides an evolutionary change. These frameworks can explain the determination of equilibrium income, and thus employment, at both full and less-than-full employment levels. Pre-Keynesian theory becomes a special case of Keynesian theory.

C. The Monetarists

Say's Law and the Quantity Theory of Money made a comeback with the rise of Monetarism in the 1950s and '60s [Canterbury, p. 165; Breit and Ransom, pp. 228-30]. According to Monetarists, Keynes' contributions amount to wage rigidity, money illusion, and statements which can be related to the slopes of the IS/LM curves [Friedman, 1970, pp. 215-6; Branson, 1972, pp. 284-7]. While imperfect information allows price expectations to remain unmet in the short run for both schools, the problems of lagged supply responses and rigid wages are solved in the long run [Friedman, 1970, pp. 215-6, 234; Blaug, 1980, p. 219]. Thus, differences between Keynes and the Monetarists are reduced to disagreements over the slopes of the IS/LM curves and the speed of price and quantity adjustments [Blaug, 1980, p. 219; Brown, 1981, pp. 284-7].

Once again, Keynesianism could be seen as constituting an extension of pre-Keynesian macroeconomics, although Monetarists have often found it to be a negative (degenerate) contribution [Blaug, 1980, p. 219].

D. The Disequilibrium Approach

Hicks (in 1939) and Don Patinkin (in 1956) depicted Keynes' ideas in an even more general framework than the IS/LM apparatus provides. For Patinkin and Hicks, imperfect expectations and price rigidities (though not necessarily wage rigidities) create involuntary unemployment [Hicks, 1939, pp. 259, 266-70; Patinkin, 1965, pp. 337-43; E. Roy Weintraub, 1979, pp. 57, 66-7; Chase, p. 12]. What did Keynes think of general equilibrium models? He stated, 'I shall hope to convince you someday that Walras' theory and all others along those lines are little better than nonsense' [Chase, p. 12].

During the Monetarist revival in the 1960s, a group of economists elaborated on the work of Patinkin and Hicks. Lead by Axel Leijonhufvud and Robert Clower, these economists also interpret Keynes' General Theory as describing an economy in general disequilibrium as opposed to unemployment equilibrium (with disequilibrium isolated in the labor market). In their view, Keynesianism differs from pre-Keynesian macroeconomics in the following basic ways: (1) imperfect information and disequilibrium trading are prevalent, (2) disequilibrium causes "wrong" (i.e. nonequilibrium) price and quantity signals to be sent. (3) individuals are constrained in their attempts to achieve their "notional" or planned levels of demand, and (4) quantity adjustments rather than price adjustments predominate. Disequilibrium in the labor market reduces income and thus constrains consumption in the product market with feedback effects. No auctioneering process is available to rectify the problem [Clower, pp. 114-23; Leijonhufvud, pp. 51-8, 81-91; Canterbury, pp. 160-1; Blaug, 1978, pp. 680-2].
According to this Disequilibrium interpretation, Keynes’ contributions can be seen as an extension of pre-Keynesian thought, both empirically and theoretically [E. Roy Weintraub, 1979, pp. 66-7]. Keynes’ insights provide an explanation for empirically-grounded disequilibrium trading [Tobin, pp. 23-4]. Theoretically, the classical view of the simultaneous clearing of all markets in a general equilibrium framework becomes a special case [Clower, p. 123].

The accuracy of this interpretation of Keynes is questionable. As Clower admits, the Disequilibrium interpretation is not based so much on what Keynes actually wrote as much as what he held “in the back of his mind” [Blaug, 1978, p. 682]. But, as Allan Coddington notes, “This is a problem of reading not so much between the lines as off the edge of the page” [Coddington, p. 1268].

E. Rational Expectations


Attention thus shifted to the type and amount of information agents possess and the manner in which this information is processed. RE theorists isolate involuntary unemployment caused by wage rigidity as the only novel Keynesian contribution [Kohn, pp. 1217, 1220]. A good example of this depiction of a Keynesian model by an RE economist appears in Thomas Sargent’s Macroeconomic Theory. This model contains six structural equations and differs from the classical model presented by Sargent by only one equation: the wage equation [Sargent, 1979, pp. 18, 46]. It is interesting to note that Franco Modigliani’s depiction of the Keynesian and classical models in 1944 differentiated them by only the wage equation, as well [Modigliani, p. 65].

RE economists find Keynes to have extended the classical model, but in a degenerative manner because: (1) what it claims to explain – involuntary unemployment – is empirically nothing more than voluntary unemployment, and (2) it provides no rational microeconomic basis for wages to be sticky [Lucas, 1981b, pp. 220, 241-4; Kohn, pp. 1217, 1220].

Once again, Keynes has been misinterpreted. RE economists, Monetarists and others view Keynesianism as amounting to sticky wages despite the statements of many economists, including Keynes, that sticky wages are not central to the General Theory’s position concerning the determination of unemployment [Salant, p. 1180]. Indeed, Keynes takes great pains in the General Theory to state that cutting wages would probably worsen unemployment, not alleviate it [Keynes, 1936, pp. 18, 257-81; Brown, p. 126].

Also, Keynes does note rational reasons why workers resist wage cutting; they fear their relative wage would be cut if their nominal wage were reduced [Keynes, 1936, pp. 14, 264]. Keynes cites wages as sticky due to institutional factors (union multi-year contracts), as well, and notes that if individual workers cut their nominal wages, real wages would probably not decline significantly [Keynes, 1936, pp. 13-5, 265-6]. He also finds empirical support for his view that nominal wage cutting would not result in reduced unemployment [Keynes, 1936, p. 9].

F. New Keynesianism

The most recent strain of Keynesianism is New Keynesian (NK) economics. This school focuses on the causes and repercussions of price and wage rigidities. Price-setting behavior results in price rigidities which, in turn, create involuntary unemployment due to the requisite quantity adjustments. However, Keynes assumes price-taking behavior in the General Theory [Keynes, 1936, pp. 268, 270]. Furthermore, even though Keynes believed otherwise, NK “efficiency wage” models accept the idea that sticky wages are a source of involuntary unemployment for Keynes. NKs provide rational foundations for wage rigidity in response to RE economists [Gordon, 1990, pp. 115, 1136-7, 1153]. The basic premise of NK efficiency wage models is that not only are wages a function of productivity, but productivity is a function of the wage, as well. Firms may not cut nominal wages when product demand falls due to the efficiency
wage effect; cutting the nominal wage reduces the real wage, and thus productivity, so that unit labor costs may rise. Gift exchange relationships, shirking, turnover costs, and morale problems are all related to this efficiency wage effect [Akerlof and Yellen, pp. 4-8]. Most of the empirical evidence has lent support to the efficiency wage effect [Pernecky, 1990, pp. 91-94, 98].

According to the NK interpretation of Keynes, the General Theory provided a positive expansion of classical economics; rigid wages and prices are sources of involuntary unemployment and are ramifications of microeconomic rationality.

G. The Post-Keynesians

The post-Keynesian (PK) interpretation of Keynes provides a reaction to the neoclassical “bastardizations” of Keynes just described [The Editors of the Journal of Post Keynesian Economics, pp. 3, 6-7]. PKs see Keynes as providing a revolutionary change, and view the theoretical usage of uncertainty as the most crucial and revolutionary of Keynes’ contributions. Indeed, they often equate the Keynesian Revolution with the concept of uncertainty, which results from Keynes’ depiction of the economy in historical time as opposed to logical reversible time. People do not know the future in historical time. In logical time, the orthodox notion of equilibrium is obtained because agents know their future behavior and the relevant behavior of others. Thus, they are capable of achieving a situation in which they do not wish to change their behavior [Robinson, 1980, p. 48; Arough, pp. 395-423]. As Robinson states,

On the plane of theory ... [Keynes’] revolution lay in the change from the conception of equilibrium to the conception of history; from the principles of rational choice to the problems of decisions based on guess-work or on convention [Robinson, 1980a, p. 48].

PKs distinguish a situation involving uncertainty from one of risk in which the probability distribution of future events is known. In Keynes words,

[H]uman decisions affecting the future ... cannot depend on strict mathematical expectations since the basis for making such calculations does not exist; and that it is our innate urge to activity which makes the wheels go round, our rational selves choosing between the alternatives as best we can, but often falling back for our notice on whim or sentiment or chance [Keynes, 1936, pp. 162-3].

And elsewhere he writes,

By uncertain knowledge, let me explain, I do not mean merely to distinguish what is known for certain from what is only probable... about these matters there is no scientific basis on which to form any calculable probability whatever. We simply do not know [Keynes, 1937, pp. 213-4].

Uncertainty has a number of important implications. First, majority opinion and past experience must be relied upon in decision making [Keynes, 1936, p. 213-5; Lawson, 1985, pp. 916-7]. Economic decisions are still “rational”, though not in the neoclassical sense used by Robinson in the quote above. As Tony Lawson writes, “For Keynes, it seems, economic behavior is rational if, given the knowledge that is available, there are good reasons underlying the adopted behavior” [Lawson, 1985, p. 918]. But even though recent experience and consensus are the most reliable guides to the future, they can be “flimsy” and thus subject to “sudden and violent” change. The most important manifestation of behavior under uncertainty is the volatility of investment [Keynes, 1936, pp. 147-63, 213-5].

Because uncertainty has been widely rejected, PKs view the Keynesian revolution as an aborted revolution. But in the 1930s there was a problem which the economics profession deemed more pressing. This was the anomaly of the Great Depression [Bleaney, p. 1]. Paul Samuelson states, even Chicago School economists, “... maintained a theoretical belief in Say’s Law ... [but] ... were motivated to sign manifestos in 1931 calling for anti-depression fiscal deficits” [Samuelson, p. 5]. Some have stated that the major goal of the General Theory was to provide an explanation of the Great Depression and offer policies to alleviate unemployment [Peterson, pp. 66-7]. Keynes himself perceived that what he was doing was presenting a general theory, which included full employment as a special case [Keynes, 1936, p. 3].

Yet Keynes also noted that he was doing something more. As the quote at the beginning of this paper states, he viewed himself to be contributing something revolutionary. There are a number of accounts of a Kuhnian religious-type conversion process ensuing in the wake of the
General Theory. Samuelson cogently notes this in describing his own experience, “This is a study that ought to delight Thomas Kuhn ... I seek to explain ... why I was vulnerable to the heretical analyses of Keynes’ General Theory” [Samuelson, p.4].

What were the novel contributions of Keynes? The following are the most important: (1) the consumption and savings functions, (2) the multiplier, (3) a justification for the potency of fiscal and monetary policies, (4) investment as a function of the marginal efficiency of capital, as well as the interest rate, (5) the speculative demand for money and the determination of the interest rate by money supply and demand, (6) unemployment equilibrium in the product market, (7) labor market disequilibrium, (8) the focus on aggregates, (9) the emphasis on the short run over the long run (10) the depiction of agents as responding to nominal rather than real magnitudes, (11) the determination of employment by aggregate demand and productive capacity rather than by labor demand and supply, (12) uncertainty, and (13) p=f(w) i.e. the primary importance of wages in the determination of prices when there is significant unemployment of labor and raw materials [Keynes, 1936; Robinson, 1980b, p. 174; Blaug, 1984, p. 371; Blaug, 1991, 178; Davidson, 1984, pp. 563-72; Samuels, pp. 5-6; Peterson, pp 5-6].

All but the last two have been accepted by the macro orthodoxy. As to p=f(w), only introductory textbooks have depicted Keynes’ view that marginal costs primarily determine price at sufficient unemployment. Beyond this basic level of analysis, the Keynesian aggregate supply curve (with price on the vertical axis) has been generated under the assumptions that: (1) workers have imperfect price information, and (2) wages are rigid. While wage rigidity does enter into this concept of p=f(w), both assumptions yield a nonvertical short-run aggregate supply curve based on the insensitivity of wages to price changes, rather than on the sensitivity of prices to wages and other marginal costs. Of course, perfectly competitive industries equalize price and marginal costs according to neoclassical theory. This differs from Keynes in that he believed that the price would not reflect marginal revenues, i.e. demand, at significant levels of unemployment, but rather be a function of marginal costs alone. Only PKs highlight uncertainty and p=f(w) as contributions made by Keynes. Some even identify them as the “two halves of the Keynesian Revolution” [Robinson, 1980a, p. 173].

PKs relate the constructs of p=f(w) and uncertainty. Due to uncertainty concerning the short-period demand price and revenues, producers adopt a cost-plus pricing rule. The price is set as a mark-up over marginal costs, which consist mostly of wage costs. For instance, the firm may estimate a standard output level and set the mark-up over the associated expected costs which generates a normal rate of return. By doing so, shareholders can be satisfied and firms can generate funds for internal finance [Davidson, 1972, pp. 21, 34-8; E. Roy Weintraub, 1979, p. 14]. Rigidifying wages offers a means of stabilizing prices in light of uncertainty. Long-term contracts are negotiated, in part, to achieve this stability [Keynes, 1936, pp. 270-1; Davidson, 1972, pp. 149-50].

Mainstream macroeconomists have not rejected uncertainty and largely ignored p=f(w) on empirical grounds. Uncertainty is confirmed by observation. The primary importance of wages in price determination has been empirically confirmed, as well [Sylos-Labini, pp. 6-7]. Furthermore, anecdotal and statistical evidence were compiled during the post-War period when marginalist versus mark-up pricing was debated by neoclassicals [Lee, 1984, pp. 1111-2].

The neoclassical response to this evidence took a variety of forms. One response was that marginalist pricing applied to more competitive sectors while mark-up pricing applied to the rest. Another was that the evidence should be ignored; both forms of pricing were only theoretical abstractions which did not need to be tested. Neoclassicals ultimately resolved the dispute by assimilating the mark-up idea. For instance, they noted that the marginalist concepts of the demand curve, marginal costs, and fixed costs were all used in mark-up pricing. The mark-up was over constant costs and could serve as a proxy for the price elasticity of demand. Furthermore, it was stated that the two theories would produce identical predictions for long-run prices. It was also argued that if firms actually used mark-up pricing, they needed only to act “as if” they were using marginalist pricing: or firms needed only to attempt to use marginalist pricing even if they were not able to [Lee, 1984, pp. 1112-8]. Thus, the revolutionary idea of mark-up pricing, related to uncertainty and reflecting p=f(w), was ignored by most economists.

Uncertainty also created a theoretical anomaly, as well as a methodological one; formal
models and even theory itself were deemed impossible if uncertainty were accepted [Blaug, 1978, pp. 682-3; Lucas, 1981b, pp. 223-4]. But PKs have been able to incorporate uncertainty into their models [Arough, pp. 408-9, 415-9]. As to the implication of uncertainty in pricing, PKs have developed formal models with mark-up pricing rules [Eichner, 1985, pp. 28-74].

Uncertainty can be formalized using Keynes’ methodological approach, as well. Keynes assumes that long run expectations about investment are met in order to demonstrate the importance of effective demand in determining employment. He relaxes this assumption in order to show the impact uncertainty in investment decisions would have on effective demand [Kregel, 1976, pp. 211-5]. A number of aggregate supply/aggregate demand models which incorporate uncertainty along the lines of the model in the General Theory have been developed by PKs [E. Roy Weintraub, 1979, p. 41; Chick, 1983, pp. 82-31; Dutt and Amadco, pp. 122-31].

The lack of widespread recognition of p=f(w) as a Keynesian construct makes its rebuke questionable, as well. Although Keynes specifically spells out his views on the importance of wages to price determination in chapter twenty-one of the General Theory, many neoclassical economists refuted Keynes in the 1970s on the grounds that he provided no explanation for the anomaly of cost-push inflation [Peterson, pp. 68, 72-3]. Meanwhile, Monetarism made a comeback in this period, even though it highlighted a theory of demand-pull inflation [Brothwell, 1982, p. 382].

Thus, uncertainty and p=f(w) presented anomalies in that they were revolutionary constructs which were incongruent with previous theory. Ideas which are part of a new paradigm are likely to be misunderstood, as Kuhn notes [Kuhn, 1970a, pp. 267-78]. Uncertainty became misinterpreted and assimilated as risk, while p=f(w) was considered tantamount to marginalist pricing. At the aggregate level, p=f(w) was incorporated into the mainstream by interpreting the associated aggregate demand and supply framework as implying imperfect price expectations and wage rigidity. The true meaning and significance of each idea was ignored. Yet they are empirically corroborated. Thus, a great degree of subjectivity has been involved in the rejection of these two contributions of Keynes. But Kuhn notes that a competing paradigm is not judged as bad science as much as nonscientific.

[10] Other, subjective factors must have been present for mainstream economists to have looked past them.

3. Conclusion

While the models of Lakatos and Kuhn concerning the evolutionary versus revolutionary nature of scientific change are helpful in analyzing Keynes’ impact, neither is sufficient. As to the Lakatosian model, while pre-Keynesian theory can be seen as a special case of the General Theory, there has not been a simple extension of pre-Keynesian thought. Keynes’ evolutionary views on uncertainty and p=f(w) have been largely ignored as Keynesian contributions - progressive or otherwise.

Rather, the Kuhnian emphasis on the revolutionary nature of paradigm change, as well as the importance of subjectivity in paradigm battles, appears to be superior. Still, the Kuhnian model is insufficient in providing an explanation for the Keynesian revolution because there is much overlap between the pre-Keynesian and Keynesian paradigms. The new and old paradigms were not as incommensurable as Kuhn suggests. Much Keynesian theory was accepted, although its two most revolutionary elements have been rejected by the mainstream.

Two important external factors in the history of science have been political legitimation and professionalization (i.e. the enforcement of methodological norms) [Laudan, pp. 58, 63]. An analysis of the impact of the Keynesian revolution may well have to begin with such external factors to understand why the Keynesian revolution was partially eclipsed.

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Notes

1. For preference for the Lakatosian application over the Kuhnian one, see Blaug, 1976; and Blaug, 1991. For preferences for the Kuhnian version over the Lakatosian one, see Arough, 1987; Conts, 1969; Leijonhufvud, 1976; Stanfield, 1974; and Ward, 1972). Leijonhufvud does note the “neoclassical synthesis” version of Keynes, which includes wage rigidity, to be evolutionary and consistent with the Lakatosian framework, where Keynes becomes a
special case of pre-Keynesian theory. However, he finds his disequilibrium version of Keynes to be revolutionary and thus more applicable to Kuhn’s analysis [Leijonhufvud, 1976, pp. 86-103]. This paper will have widely differing applications of Lakatos and Kuhn. Martin Brofenbrenner rejects the Kuhnian approach, preferring an evolutionary one, although he doesn’t cite Lakatos [Brofenbrenner, 1977, pp. 150-1].

2. I thank Sandy Darity for pointing this out to me.

3. For further support of the thesis see Kobli, p. 193; Raff and Summers, pp. 57-86. For disconfirming evidence see Leonard, pp. 136-50. Insider-Outsider models add harassment costs to the training and replacement costs cited in the turnover-cost efficiency wage model. [Lindbeck and Snower, pp. 103-8].

4. The term “post-Keynesian” is not used here to include the neo-Ricardian Keynesians. Neo-Ricardian Keynesians accept Keynes’ theory of effective demand, highlighting the investment/savings link. They also concur in his rejection of orthodox wage and interest rate determination. However, they believe that Keynes did not go far enough. They cite his acceptance of the marginal product of labor in wage determination, and the possibility in the General Theory of a lower interest rate raising investment and output until full employment is reached, as examples [Dutt and Amadeo, pp. 44, 63, 78]. Furthermore, they believe short-period fluctuations resulting from uncertainty do not have an impact on the focus of their analysis: the long-period [Carvalho, p. 218; Dutt and Amadeo, pp. 50, 58].

5. To further quote Joan Robinson,

As soon as the uncertainty of the expectations that guide economic behaviour is admitted, equilibrium drops out of the argument, and history takes its place... Human life does not exist outside history and no one has correct foresight of his own future behaviour, let alone of the behaviour of all the other individual’s which will impinge upon his [Robinson, 1980a, p. 48].

Elsewhere she writes,

Once we admit that an economy exists in time, that history goes one way, from the irrevocable past into the unknown future, the conception of equilibrium based on the mechanical analogy of a pendulum swinging to and fro in space becomes untenable. The whole of traditional economics needs to be thought out afresh [Robinson, 1980b, p.174].

6. G.L.S. Shackle notes that even trial and error won’t lead to a greater understanding of the true probability distribution because the environment is too dynamic [Shackle, 1972, pp. 8-9, 20-3, 53-4, 76, 122-3, 183-4, 428, 432-3].

7. Post-Keynesians also find the institution of money and liquidity preference to be important manifestations of uncertainty. Money provides a store of wealth: a risk-free asset which people hold out of uncertainty over future asset prices [Keynes, 1937, p. 216]. Money allows people to put off spending until they have more information, as well [Shackle, 1972, p. 200]. Money also offers a unit of account for future payments in contracts [Davidson, 1977, pp. 11-7; Moore, 1979, pp. 123-4].

8. See, for instance, Davidson, 1972, pp. 151, 162; Minsky, p. 4; Robinson, 1980b, pp. 172. Chase, p. 20; Dow, 1982-3, p. 304; Arough, pp. 403-4.

9. Indeed, Keynes described his own conversion as religious [Guthrie, 1987, p. 54].

10. Non PKs have developed formal models under uncertainty [Nelson and Winter, 1982]. C. Alan Garner notes that behavioral research in cascaded inference models and Bayesian models offer formal theories consistent with Keynesian uncertainty [ Garner, pp. 419-22].

11. This idea that Keynes’ lack of clarity in the General Theory may have contributed to the misinterpretation is addressed by Leijonhufvud. He notes that if this were the problem, any misinterpretation would have been corrected by now [Leijonhufvud, p. 10].

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