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A Schumpeterian Renaissance?

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A Schumpeterian Renaissance?

This paper endeavours to address three main questions. First, has there actually been a 'Schumpeterian Renaissance'? Second, if so, which of the main features of this renaissance have been especially influential? Finally, which of these features has been particularly contested and what has been the outcome of these debates?

Early work on the economics of invention and innovation often commented on the lack of attention to these topics in the mainstream literature, or indeed, in any of the published literature, e.g. Jewkes, Sawers and Stillerman (1958) or Rogers (1962). In his book on '*Diffusion of Innovations*' (1962), Rogers reported that he could find only one study of diffusion of industrial innovations in the economics literature and as late as 1973, in a major survey article, Kennedy and Thirlwall still complained at the lack of attention to innovation.

The same complaint certainly could not be made today and this is indeed one indication that there has been a Schumpeterian renaissance in the late twentieth century, continuing to this day. Rogers (1986) himself in his later work on diffusion of innovations commented on the rapid proliferation of studies in this field in the 1970s and 1980s. A more general indication of the upsurge of interest in the economics literature as well as in the related management literature is provided by the appearance of a number of new journals in the 1980s and 1990s (Table 1). This change is also evident in the numbers of papers dealing with 'Schumpeterian topics in such major journals as the *Economic Journal*, *The American Economic Review*, the *Journal of Economic Literature* and the *Harvard Business Review*.

In the period just after his death, much of the literature concentrated on one rather narrow aspect of Schumpeter's legacy – the role of large monopolistic firms in innovation (see Kamien and Schwartz, 1975, for a summary of this debate). This was sometimes erroneously construed as Schumpeter's main contribution to economics and described as the Schumpeterian theorem. As with several similar debates, it has been largely resolved by various contributors to the Schumpeterian renaissance, who have shown that in the early phases of a technological revolution typically many small firms compete, although one or a few of these may enjoy temporary monopolistic positions and earn exceptionally high profits. Recent evidence has confirmed abundantly Schumpeter's theory of 'band-wagon' effects in which these high profits are eroded and competed away by new entrants, not before, however, some of them have grown into very large successful firms. In the later stages of rapid diffusion, these profits may confer exceptional advantages in market power, incremental innovation and scale of R&D, as has evidently been the case with Microsoft, to take only one example from recent history. An evolutionary view of changing technology and market structure resolves many such problems despite the complexities of the turbulent competitive struggles and occasionally of government intervention. Attention to the high degree of uncertainty about the outcome of such struggles and depth of empirical analysis of their evolution has been one of the main achievements of the Schumpeterian renaissance.

Schumpeter's main point that competition from the new or improved product, process or organisation is a more devastating form of competition than non-innovative competition has been abundantly confirmed, absorbed and disseminated by numerous case studies of

management in almost every industry. See, for example, Crépon et al. (1998) for a statistical approach to productivity gains from innovation, or Christensen and Rosenbloom (1998) for the case of competition *between* innovative firms. So, too, has his point that there are phases in this struggle when large monopolies do enjoy some advantages, despite the persistent dogmatic insistence of some of his critics that they are always harmful to technical progress and economic efficiency. Perhaps the stronger evidence of the Schumpeterian renaissance is in the attention paid to management of innovation in management courses, schools and textbooks (see for example, Tidd, Bessant and Pavitt (1997) and Porter (1990) for competition in innovation between nations). Lundvall (2003) has reported that Google came up with 5,000 references to "national systems of innovation".

Historians still wrestle with the definition and evaluation of the Renaissance in Italy six centuries ago, so that it is hardly surprising that the contemporary evaluation of the Schumpeterian renaissance is controversial. Bibliometric evidence, although it is quite persuasive of a considerable growth of interest in some of Schumpeter's main ideas, does not in itself demonstrate that any of his ideas became dominant in the economics profession, nor which of his ideas have had the greatest influence beyond this profession.

Consequently, the viewpoint of this article is a purely personal one and certainly would not claim to be definitive. It is however based on about fifty years of research and discussion from the time of Schumpeter's death (1950) until the present day. This has been sufficient to convince this author that Schumpeter's central ideas: that innovation is the crucial source of effective competition, of economic development and the transformation of

society, have become very widely accepted. They were, of course, neither original to Schumpeter, nor unusual for Germany in the nineteenth and twentieth centuries. Reinert (1995, 2002) has argued convincingly that they were actually quite widespread among German economists both before and during the '*Methodenstreit*'. Schumpeter himself acknowledged his debt both to Marx and to Schmoller, while other ideas, such as the expression 'Creative Destruction' have been traced to Sombart.

The formulation of the young Marx and Engels in their exuberant '*Communist Manifesto*' (1848) has scarcely been improved upon either by Schumpeter or his followers, as a succinct summary of some of the most significant features of capitalist economies:

'The bourgeoisie cannot exist without constantly revolutionising the instruments of production and thereby the relations of production and with them the whole relations of society … Constant revolutionising of production, uninterrupted disturbance of all social conditions, everlasting uncertainty and agitation, distinguish the bourgeois epoch from all earlier ones.'

Despite their total disagreement on the source and role of profit and ownership under capitalism, Schumpeter derived his theory of the erosion of profit margins during diffusion of innovations also from Marx.

It should be noted that Schumpeter took the side of Menger in the *Methodenstreit* and repeatedly during his lifetime insisted on the value of Walrasian equilibrium theory (Freeman and Louçã, 2001: 43-44). This has caused some of his biographers and critics to describe his theory and indeed his whole life as a paradox (Allen, 1991: 4). Nevertheless, it is quite understandable that Rosenberg (1994: 41) should insist on his point that

Schumpeter made a more radical challenge to neo-classical orthodoxy than any other twentieth century economist. Although his work was indeed paradoxical, the renaissance of his influence in the last twenty years, has certainly not been based on equilibrium theory but on his evolutionary dynamics. Several recent authors have emphasised that Schumpeter's method was a pluralistic combination of the historical institutional perspective of Schmoller with the use of formal analytical techniques (Ebner, 2000; Shionoya, 1991). This combination is believed to be in the tradition of Schmoller himself. The discussion is partly semantic but be this as it may, the Schumpeterian renaissance derives from his evolutionary ideas. And as Dahren (1984) put it: 'Schumpeterian dynamics is characterised by its focus on economic transformation (page 25).

II

However, the Schumpeterian renaissance has not simply been based on a more widespread recognition of the importance of innovation. Although this was certainly a major feature of most of his work, if it had been the only one, then others would deserve more credit than him. His distinctive contribution was based on his recognition of some special features of the innovative process in the evolution of capitalist societies, notably the clustering of innovations and the explosive growth of new firms and industries based on these clusters. He described this evolution as a succession of industrial revolutions and it is the recognition of this historical process which has characterised the Schumpeterian renaissance, just as Dahmen (1984) foresaw in his theory of structural change and development blocks.

The clustering of inventions and innovations, of the inputs and the outputs of research and development activities, has been apparent from all the work on measurement of scientific and technical activities which has proliferated since Schumpeter's death. Early work was mainly concerned with the measurement of inputs into innovative projects and indirect measures of inventive output, especially patent statistics, which had of course been available for centuries but seldom used much by economists until the proceedings of the first major conference on "*The Rate and Direction of Inventive Activity*" (Ed. Nelson, 1962) became available. This Conference was a herald of the Schumpeterian renaissance and was followed by a brilliant demonstration by Schmookler (1966) of the use of patent statistics for economic analysis. He maintained that the appearance of clusters of patents in various industries after major productive investment in those industries demonstrated that invention and innovation were generally demand-led and not technology-led. This initiated a fruitful debate among Schumpeterians, even though the most influential paper concluded that Schmookler's interpretation of clustering was mistaken (Mowery and Rosenberg, 1979) since the clustering measured the numerous follow-through inventions of the rapid diffusion phase of innovation rather than the crucial original inventions and innovations.

This debate and several others in the 1960s and 1970s also began to make use of the newer statistics of science and technology which were becoming available, culminating in the systematic measurement of innovations themselves (Arundel et al. 2003). Before these most recent developments surrogate measures of innovative activities, such as R&D statistics, provided a valuable additional impetus to the new wave of Schumpeterian

research in such areas as the relationship between innovation and economic growth, innovations and international trade performance or innovations and profitability.

Even long before official innovation surveys, much painstaking work on individual industries had already provided convincing evidence of clustering and explosive growth directly related to these clusters (e.g. Hofbauer, 1966). On a broader canvas, historians too had used economic statistics to confirm some of Schumpeter's points, especially on the growth of leading industries in technological revolutions (Table 2). In the most recent period the semi-conductor industry and the computer industry in several countries both had growth rates which far exceeded those of other industries. As in previous revolutions, this rate was several times more rapid than the average growth rate of industrial output (Table 2).

This last point reminds us that the actual course of events in the real economy has probably been more persuasive than any theoretical arguments or historical statistics. The effects of the diffusion of information and communication technology (ICT) have been so obvious to almost everyone that it has become quite difficult for opponents of Schumpeter's theory of successive technological revolutions to sustain their argument, at least in this case. The successive spurts of innovation and growth in the electronics industry, the telecommunication industry, the computer industry and the Internet have made the ICT revolution a commonplace and the expressions "Information Society" and "Knowledge Economy" have passed into general use (e.g. Castells, 1996, 1997, 1998). The numerous books and papers on this topic are testimony to the Schumpeterian renaissance, whether or not they acknowledge his direct or indirect influence.

Whilst there are relatively few people who would be ready to defend the proposition that there has not been an ICT revolution, surprisingly there are still a few who cling to the notion that there never was an industrial revolution in Britain in the first place, although the evidence of contemporary observers, of artists and writers, of artefacts and of economic statistics is almost as strong as in the contemporary revolution. However, some of the most authoritative and best-known historians have used and defended an essentially Schumpeterian framework, particularly with respect to the first industrial revolution (Hobsbawm, 1964 and 1962; Landes, 1969 and 1993). The compelling evidence of the industrial statistics is discussed in Freeman and Louçã, 2001: 24-31. Schumpeter himself confronted early exponents of the idea that there never was an industrial revolution and whilst conceding that there was a little substance in their ideas, nevertheless gave them a firm if gentle rebuff (Schumpeter, 1939, Vol. 2: 253-255).

Whilst to speak of a "Schumpeterian Renaissance" does imply that the general spirit of his work and his main ideas have become a significant influence on the general climate of ideas, it certainly does not imply that every one of his propositions and theories have been accepted. Nor is that what he himself would have wished. On the contrary, he was quite emphatic that he did not want a "school" of disciplined followers, but expected that further research on innovation, whilst enriching and reinforcing some of his ideas would falsify others. This has indeed been the general outcome of the Schumpeterian renaissance, which has usually been marked by a lack of dogmatism and a readiness to accept the evidence of new empirical research studies.

An example of this spirit is the re-assessment of the role of incremental innovation by most scholars in the Schumpeterian renaissance. Schumpeter himself drew a sharp distinction between 'entrepreneurs' who were responsible for innovations, as acts of 'will not intellect', and managers who were 'mere' imitators. He did however recognise that during the diffusion of an innovation further significant improvements could be made in both product and process, as well as financial and organisational innovations, necessary for opening new markets and introducing the product to new countries. Thus, he remarked with respect to the automobile that it would never have diffused so widely if it had remained the same product as at its inception, and if it had not transformed its own environment. Moreover, his strictly functional definitions of 'entrepreneurs', 'capitalists', 'owners' and the 'mere head or manager of a firm' (Schumpeter, 1939, Vol. 1: 102-109) left room for the designation of any individual as an entrepreneur (innovator). In his terminology, an entrepreneur might have any official job title and he himself argued that the leaders of R&D groups in the large German electrical firms were 'entrepreneurs' in his sense of the word. The function could be temporary in the course of a career so that the same individual could be innovator, manager, owner or capitalist, sequentially or all together.

Researchers in the Schumpeterian renaissance have made use of his definitions to distinguish the role of a 'product champion' (Schon, 1973) as the individual who struggles to push an innovation through to its launch against various obstacles, by an 'act of will'. Other researchers, for example, Project SAPPHO (Rothwell, 1992; Freeman, 1974) made a distinction between 'Technical Innovators' and 'Business Innovators' and examined the role of each in various industries. In some industries, the same person often performed

both functions; in others, they were usually different people with the 'Business Innovator' being that person in the management and organisational structure who acted as the champion for the technical innovator.

All of this was very much in Schumpeter's tradition, but the results of research demonstrated increasingly that the role of incremental innovations was extraordinarily important and that users of innovation played a key role in this process of incremental improvement. Schumpeter's remarks about the automobile would apply even more to the computer and to other products of the earlier revolutions as well (see, for example, Mowery and Nelson, 1999).

Studies such as that of Hollander (1965) on the source of productivity gains in the rayon industry, in successive generations of Du Pont plants showed that incremental process innovations were just as important as incremental product innovations. These perceptions were further enhanced by the research of Lundvall and his colleagues at Aalborg on user-producer interactions and innovations (Lundvall, 1985). Arrow's seminal paper on the economic implications of learning by doing (1962) and the Aalborg work on learning by user-producer intervention led to the general acceptance of these ideas by the economics profession and management theorists. Lundvall himself extended his theory to the study of another sphere of influence of the Schumpeterian renaissance – the "national system of innovation" (see his chapter in Volume ….. of this work).

So influential was the evidence of the empirical research on innovation that it led some scholars to argue for the abandonment of the distinction between incremental innovations

and more radical innovations, as well as between innovations and their diffusion (Silverberg, 2002) and between invention and innovation. However, even though these boundaries are difficult to draw, Schumpeter's distinctions have proved valuable in conceptual terms, especially in relation to inventions.

III

Already during his lifetime, Schumpeter's theory of Business Cycles was strongly contested (Kuznets, 1940) and he was disappointed by the reception accorded to what he thought of as his major contribution to economic theory – his two volumes on Business Cycles (1939). During the Schumpeterian renaissance his work on this topic has continued to be the subject of heated controversy. As is well-known, it was Schumpeter who introduced the expression 'Kondratieff Cycles' into the literature to designate those long-term fluctuations in economic growth which the Russian economist, Nikolai Kondratieff had identified and analysed in the 1920s. Schumpeter's contribution was to explain these cycles in terms of successive technological revolutions. Unfortunately, he failed to analyse satisfactorily either the timing and the phases of the technological revolutions or the timing of the related, but necessarily later phases of the associated business cycles. Treating them as synchronous has led to a great deal of confusion.

Since his death, while his theory of successive technological revolutions has been very influential, his attempt to defend the nature and periodicity of the Kondratieff cycle has encountered continuous strong criticism (e.g. Solomou, 1987; Rosenberg and Frischtak, 1984; and see Louçã and Reijnders (eds) for a set of papers on the statistical debate). Although it has been prolonged and sometimes heated this debate has also been an important part of the Schumpeterian renaissance and has led to some fruitful outcomes as

well as to the refutation of some of Schumpeter's own ideas about business cycles. In the early days of the Econometrics movement, Kondratieff was welcomed into the Econometrics Society and his work was taken very seriously by leaders of the movement, such as Frisch and Tinbergen, as well as by Schumpeter. Partly because of Schumpeter's efforts his work gave a lasting impetus to qualitative and historical research on long-term fluctuations in economic development, as well as the purely quantitative analysis which preoccupied many of his critics.

The same is true of Schumpeter's own work on business cycles despite the heavy criticism which it has encountered. In their discussion of the numerous contributions to long wave theory, Freeman and Louçã (2001) distinguish three main streams of analysis: model analysis, statistical and econometric analysis and historical analysis (Table 3). Whilst they themselves believe that a synthesis of the historical approaches is likely to be the most fruitful for evolutionary economics, they nevertheless emphasise the positive stimulus which the whole Schumpeterian debate on business cycles has given to economic theory as well as to the elucidation of appropriate statistical techniques in the analysis and modelling of economic fluctuations.

Recent new work with the Cambridge Growth Model (Köhler, 2003) suggests that there may still be hopeful results to be achieved by a synthesis of the various techniques shown in Table 3. This work further indicates the increasing need to integrate the environmental dimension with long-term analysis of this kind. This could help to remedy a major weakness of the Schumpeterian renaissance: lack of sufficient attention to this dimension of economic and structural change.

Finally, there has been a major positive development arising from the recent Schumpeterian work on long wave analysis: new work on financial capital and technological revolutions (Perez, 2002). The work of Perez not only makes a major contribution to the resolution of several of the major problems arising in the prolonged debate about the timing of "technological revolutions" and business cycles, it also provides for the first time a set of ideas which fill one of the major gaps in the Schumpeterian renaissance: the role of credit creation in Schumpeterian evolution. Neither Schumpeter nor the neo-Schumpeterians had hitherto related the evolution of credit creation to the evolution of new technologies (see Perez, 2002 and her chapter in Volume …. of these three volumes).

Conclusions

Like Fagerberg (2003), this chapter concludes that the "Schumpeterian renaissance" has been a real phenomenon. Its main feature has been the resurgence of ideas about innovation, including industrial revolutions. Although it has led to heated debate, these have themselves been a constructive contribution of the renaissance and have enriched evolutionary theory in economics. Fagerberg (2003) was justified in his view that the ideas of the 'neo-Schumpeterian' evolutionary economists, although departing in some respects from Schumpeter's own ideas, were nevertheless strongly influenced by the Schumpeterian renaissance.

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Table 1

The Schumpeterian Heritage : Journals dealing mainly with Innovation and Management of Innovation

Title	Date of Inception
Technological Forecasting and Social Change	1951 or 1965?
Research Policy	1971
Science and Public Policy	1973
Economics of Innovation and New Technology	1980
Structural Change and Economic Dynamics	1989
Journal of Evolutionary Economics	1991
Industrial and Corporate Change	1991
Industrial Innovation	1993
Technovation	1980
International Journal of Technology Management	1983
Technology Analysis and Strategic Management	1988
International Journal of Innovation Management	1997
International Journal of Entrepreneurship and Innovation	1999

Table 2 Estimated Growth Rates of Leading Industries and Firms in Technological Revolutions

Industry	Period	Growth Rate per annum
Cotton (UK)	1770-1801	8%
Railways (UK) (freight) (passengers)	1837/1846- 1866/1874	13% 9%
Steel (USA)	1880-1913	11%
Automobiles (USA) Model T (Ford)	1908-1927	14%

Source: Author's estimates based on data in Freeman and Louçã (2001)

Table 3.Three types of analysis of long-term economic fluctuations

MODEL ANALYSIS	STATISTICAL AND ECONOMETRIC ANALYSIS		HISTORICAL ANALYSIS
	Kondratiev		Trotsky
	Oparin		
	Kuznets		
	Imbert		
	Dupriez		
	Duijn	Mandel	Maddison
Forrester	Kleinknecht	SSA	
Sterman	Menshikov	Gordon	Regulation Schools
Mosekilde	Hartman	Aglietta	
	Metz	Boyer	Freeman
Mensch	Reijnders		Pérez
	Ewijk	Reati	Tylecote
	Zwan	Kuczynski	Fayolle
Silverberg		Shaikh	Bosserelle
		Entov	
		Poletayev	
		Moseley	
	(others: Sipos, Chizov, Craig/Watt, Glismann, Taylor, Nakicenovic, Marchetti)		(others: Braudel Wallerstein; Modelski)