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On the Renaissance of Schumpeterian Economics

von

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ON THE RENAISSANCE OF SCHUMPETERIAN ECONOMICS

By Uwe Cantner and Horst Hanusch*

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1. Introduction

In the past years the significance of Joseph Alois Schumpeter in economic theory as well as in economic practice has increased continuously. Speculative minds even predict that the last quarter of the 20th century may become and may be called the "Age of Schumpeter".[1] This late discovery of Schumpeter's thought leads us to two important questions we want to focus on in the course of this paper. First, why did it take nearly 70 years until Schumpeterian Economics has been taken seriously? Secondly, how does the Schumpeterian heritage influence the actual research in the so-called field of Evolutionary Economics?

To begin with, let us first of all observe Schumpeter's scientific work. Basically, it can be divided into three main sections:

(1) The first part covers his critical discussion of current economic theory. It begins with "Das Wesen und der Hauptinhalt der theoretischen National-ökonomie" (1908) and ends with "History of Economic Analysis" (1954 posthume).

(2) A second collection of Schumpeters's scientific contributions deals with the theory of social and institutional change starting with "Die Krise des Steuer-staates" (1918) and ending with "Capitalism, Socialism and Democracy" (1942), and "The March into Socialism" (1950).

(3) The third field of Schumpeter's research is concentrated on the theory of economic development of market economies. This section may be considered as the core of Schumpeter's work. His first and most significant publication in this respect is "Die Theorie der wirtschaftlichen Entwicklung" (1912) followed by quite a number of other contributions and ends with his "Business Cycles" (1939).

The importance of Schumpeter to current economic research, to economic life as well as economic policy, can in fact be found in the third section which deals principally with economic development. Therefore we want to concentrate our lecture entirely on

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1 See GIERSCH, H., (1984).

this part of Schumpeter's work, without of course denying the importance of his contributions in the other two research fields. We direct our attention mainly to his volume "Die Theorie der wirtschaftlichen Entwicklung" (The Theory of Economic Development) published in a first edition in 1912.

Our procedure is as follows: In the next paragraph we will briefly outline why the Schumpeterian approach is currently undergoing such a remarkable renaissance. After that we will introduce the essential elements of Schumpeter's theory of economic development. Based on these elements paragraph 4 deals with the current state of research in the field of so-called Evolutionary Economics. Finally, some implications for economic policy will be drawn.

2. The renaissance of Schumpeter's ideas

Studying Schumpeter and his work one of the first questions which arises is why it had to take nearly 70 years until his theory of economic development was taken seriously, until scholars all over the world started to supplement and to improve his ideas. At a first glance it is astonishing that, of all others, Keynesian theory became the most celebrated approach and was contrasted only by Monetarism and, just recently, by the theory of Rational Expectations.

There are many reasons which demand for a change in paradigm, from Keynes to Schumpeter, reasons concerning economic policy as well as economic theory.

(1) From a political point of view the failure of Keynesian economics cannot be denied anymore. Dominant in the classrooms as well as in practical economic policy during the decades after World War II Keynesianism lost its capability to handle the real problems of market economies in our days. At the end of the Great Depression when Keynes published his main ideas, the proposed solutions to cure unemployment by increased state budgets was, without question, an ingenious product of thought. Because at that time the importance of a rigid wage system and the lack of demand might have been as significant as Keynes assumed in his "General Theory".

But since the 70's and increasingly since the beginning of the 80's the macroeconomic conditions in industrialized market economies have altered dramatically. These years were characterized by global changes in the structure of economies, by severe unemployment and by high inflation. The Keynesian medicine was no longer effective. Apparently, the slowing down of economic development did not seem to be a Keynesian medium-term recession, rather than a lasting crisis which can be explained far better by using terms like *"industrial dynamics"* and *"structural change"*. In such a situation it is not surprising that economists and politicians look for approaches focusing especially on these phenomena. And, one of those economists whose theoretical work is devoted to the dynamics and structural changes of market economies is Joseph Alois SCHUMPETER.

(2) A second reason for the Schumpeter renaissance might be seen in the state of arts of neoclassical "Mainstream Economics". Here, purely adaptive behavior is discussed, only exogeneous shocks and their effects on market equilibria are analysed, although with mathematical stringency and elegance. This may perhaps help to understand inflation and unemployment in the short and hopefully in the medium run, but its explaining power for long-term phenomena is considerably poor.

Schumpeter's approach to look at the development of market economies seems to deliver the better solutions. In its original version it lacks a formal representation. And it is this lack which might explain additionally the (transitory) "victory" of Keynesian Economics. Nowadays more than ever, however, the attempts to formalize his descriptive theory are increasing really exponentially. They are using just recently developed mathematical tools and are applying models of chaos, self-organization and bifurcation, adopted from physics and biology. Thus, also on the theoretical side new dimensions for scientific progress are opened which are very well suitable to Schumpeterian economics.

So, let us have a closer look at Schumpeter's theory of economic development.

3. Theory of Economic Development

Schumpeter understood his "Theorie der wirtschaftlichen Entwicklung" as a necessary supplement to "Das Wesen und der Hauptinhalt der theoretischen Nationalökonomie" and therefore to current economic theory at that time. In the preface of his first edition he states:[2]

> "Es soll den größten Teil dessen erfüllen, was ich in dem letztern gelegentlich vorwiegend kritischer Erörterungen versprochen habe. Da Behandlungsart wie Stoff aber wesentlich andere sind, so habe ich es nicht als zweiten Band oder als Fortsetzung bezeichnet, zumal dafür Sorge getragen ist, daß diese Arbeit auch unabhängig von jeder anderen gelesen werden kann. [...] Die Verschiedenheit in der Stoffbehandlung und die Verschiedenheit der Ziele der beiden Arbeiten können diesen Anschein hervorrufen, doch wird, so meine ich, eine nähere Betrachtung jeden Leser vom Gegenteil überzeugen."

Schumpeter's concept is purely theoretical although it lacks a mathematical formulation. It intends nothing else than to make clear and understandable the development of a capitalistic market system.

Now, how does Schumpeter envisage this development?

He recognizes economic development as a process which originates from within the system *itself*. Thus, he does not aim at purely adaptive behavior reactive to exogeneous changes or shocks, but, contrariwise, emphasizes an *evolutionary process* whose driving forces are inherent to the system. Schumpeter says:[3]

> "By 'development', therefore, we shall understand only such changes in economic life as are not forced upon it from without but arise by its own initiative, from within."

Development is therefore to be considered as active change, not (only) in an adaptive, but primarily in an evolutionary sense.

What are the primary features of such an evolutionary process?

Schumpeter gives the answer himself by describing the traditional concept of equilibrium as a special case within development:[4]

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2 Preface to the first edition, see SCHUMPETER, J.A., (1935).

3 SCHUMPETER, J.A., (1963) (Transl. by R. Opie), p.63.

4 SCHUMPETER, J.A., (1912), p.489 (cited in SHIONOYA Y. (1990), p.321).

> It follows from our entire thought that a dynamic equilibrium does not exist. Development in its ultimate nature consists of the disturbances of an existing static equilibrium and does not have the tendency to return to a previous or any other equilibrium. Development alters the data of a static economy [...] Development and equilibrium are opposite phenomena excluding each other. Not that a static economy is characterized by static equilibrium and a dynamic economy by a dynamic equilibrium; on the contrary equilibrium exists only in a static economy. Economic equilibrium is essentially a static equilibrium.

This quotation emphasizes two essential features of evolutionary processes:

(1) First, within the process of development the conditions, data and parameters of the static sytem are changed *continuously*. Therefore the system cannot be formalized dynamically, in the usual mathematical sense. The variable "time" cannot be interpreted as being theoretical and reversable but becomes a *historical* and *irreversable* parameter.

(2) Secondly, in an evolutionary context the concept of equilibrium is unknown. The latter being merely an "attractive aesthetic device, but economic life and history show cycles and discontinuities as a normal feature" as Herbert Giersch once stated.[5]

At this stage of reasoning a further question arises: What is the *object* and who is the *subject*, the initiator of change?

The objects in Schumpeter's concept of change are *innovations* and the initiators of development are the *entrepreneurs* who perform in innovations.

Schumpeter defines innovations as the success of new combinations. With this definition he covers the following five cases:[6]

(1) New products or products with new qualities: called product innovations;
(2) new production processes: called process innovations;
(3) access to new markets;

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5 GIERSCH, H., (1984), p.105.

6 see SCHUMPETER, J.A., (1934), p.100-101; SCHUMPETER, J.A., (1963), p.66, (translated by OPIE R.).

(4) exploitation of new sources of raw materials and semi-finished products;
(5) implementation of new organisational structures.

The name "entrepreneur" is used by Schumpeter as a terminus technicus for someone who does something new, who succeeds with new combinations. The entrepreneur's motivation is determined by the pursuit of profit, his actions are creative and risky and they are the reason why new things are created and old things are destroyed. Schumpeter's entrepreneur is therefore deeply involved in a process of "*creative destruction*" and he stands in striking contrast to the so-called static-oriented managers whose activities are mainly devoted at the circular flow and can thus be characterized as conservative and administrative.

In the end, the entrepreneurs' activities lead to wavelike movements in economic development. These are inherent to evolutionary processes and cannot be eliminated without eliminating evolution itself.[7]

To summarize briefly: We have worked out three core elements of Schumpeter's theory of economic development, (a) its character as an evolutionary process, in which equilibrium is unknown and in which time is historical; (b) innovations as objects of change and development; (c) the entrepreneur (contrary to the "statischen Wirt" (static host)) as initiator of this development.

Let us now, in the following, present the state of research in Schumpeterian economics. Our review will concentrate on the three core elements of the discussion above, namely *development, technology* and *structure*. We shall start with the general characteristics of development, and then, in a second step, shall analyse their relation to technology and structure.

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7 STOLPER, W., (1990).

4. The Schumpeterian Paradigm: Development - Technology - Structure

As already mentioned, Schumpeter's theory of economic development is purely descriptive, and as yet economists have not succeeded in presenting a formal model. And for quite a long time this even seemed to be a hopeless endeavour. However, in the last years, especially since the end of the 70's, the single elements of Schumpeter's approach are a major field of research.

Development

Especially in the last years research increasingly focuses its attention on the concept of development, described as a Schumpeterian evolutionary process. Two major and fundamental principles have already been worked out, the so-called *"determined" chaos* and the *positive feedback effect.*

What is meant by these two concepts?

(1) Evolutionary development is, as we have seen, characterized by changes originating from within the system. They cannot be repeated identically and are therefore not predictable. Nevertheless, the future is determined in some way, even if there multiple possibilities of developing a system exist. This is true for economic systems as well as for cultural or political ones.

This view implies, on the one hand, that economic systems can develop freely to a certain degree. There exist lee-ways for human action, chance and initial conditions play a decisive role, so that the system cannot find an ever repeating equilibrium. On the other hand, however, there is stability oberservable to a certain extent, because the system may take a course which develops around so-called *"strange attractors"*. To understand their characteristics we now introduce the concept of *positive feedbacks.*

(2) Positive feedbacks are production effects, better known as increasing returns to scale. They are, of course, nothing new in economics. In his "Principles of Economics" Alfred MARSHALL has already given a precise description of their main

features. But Marshall, as well as modern neoclassical economics, rendered this concept as a special and decreasing returns as the normal case in production theory. As far as one is dealing with a resource-dependent economy this might be acceptable. But the more *knowledge* and *experience* are becoming major factors of production, the more increasing returns become the rule. Their importance is growing from day to day and in many sectors they already are the characteristic element of production.[8]

How can we describe the nature of a system characterized by positive feedbacks?

The starting point may be a situation with several possibilities for further development, a "determined" chaos. The way of development chosen is - as already mentioned - dependent on numerous, often occasional events or parameters and cannot be predicted. But, as soon as a single special path is selected we may observe a *"lock-in"-effect. "Selectional advantages"* appear which induce positive feed-backs and make changes on other paths quite difficult or even impossible. The once selected path must by no means be the best one possible. On the contrary, sub-optimal solutions occur very often and even have to be accepted as standards or technical norms.[9]

Approaches to formalize *"determined" chaos* and *positive feedbacks* are still at an early stage. Some scholars, for example Brian ARTHUR, try to apply findings in modern non-linear physics and in evolutionary biology to cope with the problem. By employing examples of competing technologies[10] and locational patterns of industry[11] he and his research group in Santa Fe were already able to present simple models of evolutionary development.[12] Besides this, we should, of course, mention the more

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8 ARTHUR (1990a) states: "... by and large the parts that are *knowledge-based* (high technology) are subject to increasing returns. [...] Knowledge-based products - computers, pharamceuticals, missiles, aircraft, autos, software - require very large up-front investmnets for research, development, and retooling." (italics by W.B. ARTHUR).

9 See ARTHUR, W.B., (1990a): Example of the video market, where the systems VHS and Betamax compete. The loser Betamax is considerd as technological superior. DAVID, P.A., (1985), p.332-337: Example of QWERTY-system which dominated although technological inferior.

10 See ARTHUR, W.B., (1990a).

11 See ARTHUR, W.B., (1990b).

12 See ARTHUR, W.B., Y. ERMOLIEV und Y. KANIOVSKI, (1987), p.294-303.

traditional macroeconomic attempts by, for example, ROMER, GROSSMAN, and HELPMAN which have recently become known as "The 'New' Growth Theory".[13]

Let us now focus on the field of *technology* and *innovation*. How do the actual findings here fit within an evolutionary context?

Technology

Basically the Schumpeterian approach is micro-oriented, the key elements being the entrepreneur as initiator, and innovations as the objects of development. It is therefore not at all surprising that in the early beginnings (in the 60's and 70's) research in the economics of technology focused primarily on micro problems. In particular *innovations* are a main point of interest because (progress in) *technology* in a dynamic context is nothing else than the realization of new solutions and devices. In this respect quite a number of economists have concentrated on *technology* and *technical progress* and their respective economic consequences.[14]

Of course, a discussion also exists on the macrolevel concerning the famous Kondratieff-theory of long waves. But we do not want to comment on this theory here furtheron but restrict ourselves entirely to a disaggregated view, i.e. the micro and the meso level.

The field of research on the micro level covers the total process of formation and diffusion of technical improvements. The adoption of and the adaptation to new technical devices are not seen as ad-hoc processes but it is taken into account that they need time to mature. Major research is therefore devoted, for instance, to the product life cycle[15] and the so-called S-curve.[16]

However, within this framework only partial and, above all, only mechanistic models have been presented. The special evolutionary character of development has not been

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13 See for instance ROMER, P.M., (1990); GROSSMAN, G., and E. HELPMAN, (1990).

14 New combinations in form of new markets are discussed in the marketing literature; new forms of organizations are a matter of the mangement of innovations and strategic planning.

15 See for instance UTTERBACK, J.M., (1979).

16 A good survey is delivered e.g. by METCALFE, J., (1988).

taken into consideration. It was not until the beginning of the 80's that *innovations* were understood within an evolutionary context, and that primary characteristics of such a process could be formulated, although only in a purely descriptive manner. Again, *"positive feedbacks"* are of major interest and importance.

How can the evolutionary process of innovation be characterized?

Referring to DOSI (1988)[17] such a process is (a) dependent on the respective current technological paradigm[18], it is (b) selective, (c) finalized in quite precise directions and (d) cumulative. These characteristics are the reason why technological development evolves along a relatively ordered path, commonly called a *technological trajectory*.

The first three attributes represent *"lock-in"-effects* where the process of innovation follows a special trajectory. A *positive feedback* is to be seen in the cumulative feature which implies that the technical progress to be realized depends on the technological level already achieved. Here again we may observe, on the one hand, *selectional advantages*. On the other hand, so-called *band-wagon-effects* become obvious. The latter cause a firm, a sector or even a country, which has presently built up a technological lead, to keep this lead also in the future. Therefore, especially *band-wagon-effects* are responsible for economic structures.

This leads us to the third core element of the Schumpeterian approach, to the importance of structure and structural change.

Structure

Schumpeter distinguishes, as we know, between the concept of the static-oriented manager and the entrepreneur. Therefore, in his world we have to consider at least two units within an economy: firms or sectors engaged in innovations and others

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17 DOSI, G., (1988).

18 The notion of technological paradigm refers to a network of technological trajectories belonging to a basic innovation as e.g. electricity, information technology, biotechnology, plastics, etc.

which are not.[19] An aggregative model, as it is usually applied in Mainstream Economics, is thus no longer appropriate to grasp economic reality. The model has rather to represent structure, differences and asymmetries. These can be observed with respect to behaviour, to dynamics, innovations, or productivity, on the firm level, on the sectoral and even on the international level.[20]

In the past, the concept of structure has excited interest especially in the field of meso economics and in the theory of international trade. In the latter one, the notion of a technology-gap between countries can serve as key variable to explain differences in the pattern of trade, production and growth. Innovations are the ultimate shaping forces of leads and lags, of higher or lower technological levels, of economic success or failure. Moreover, such differences last considerably due to the cumulative feature of the process of innovation and the mechanism of positive feedbacks. In this respect the evolutionary approach is the only appropriate one which can help to understand the forming and the changing of structures.

An analytical formulation of *structural change*, however, has not been presented yet. The traditional approaches are rather empirical and descriptive. Sectoral dynamics within an economy which Schumpeter described as *"creative destruction"*, as the appearance of something new, basically destroying most of the "old", has yet no comprehensive theoretical basis. However, in the literature first attempts to bring these phenomena into a formal model are found.[21] Of course, a broad field for further research is opened.

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19 Of course we do not have to restrict ourselves to only two sectors. For example PAVITT distinguishes four sectors in an economy which differ in their innovative behaviour. PAVITT, K., (1984).

20 See ABRAMOVITZ, M., (1988).

21 See for example AGHION, P., and P. HOWITT, (1989).

5. Implications for Economic Policy

We want to close this lecture on Schumpeter and his impact on current economic thought by dealing briefly with some implications of his ideas for economic policy.

What influence does Schumpeter have on economic policy?

With emphasis on *"innovations"* and *"entrepreneurs"* Schumpeter's theory of development is devoted primarily to the *supply side* of the economy. Proper conditions for innovative activities and a stable and predictable atmosphere for entrepreneurs are then the main prerequisites to provide prosperity and economic change. Demand side considerations do not matter in any respect, as SEIDL states:[22] "We should remove the fetters red tape, high marginal tax rates, and controls chaining entrepreneurial initiatives. [...] Let us leave the entrepreneurs to take care of the supply, and the demand will follow up of its own accord, because today needs are still far from being satisfied." Consequently, government and its economic policy should more or less play a passive and meager role.

With respect to *technology*, however, even many supply side oriented Schumpeterians think that the public sector is intended to be involved *actively*. They base their opinion on the well-known argument of market failure. Advances in technology can be characterized as public goods with the consequence of sub-optimal market outcomes. Private firms will spend less money on R&D than the social optimum would require. Whether this is really true in reality, must remain an open question. Nevertheless, public good effects are often arguments for an active technology policy leading to high subsidies for private R&D projects.

But, regarding Schumpeter as a purely supply-sider, isn't that a too simplistic interpretation of his intention and insights? How do we have to handle the topic if we base our considerations on an *evolutionary approach* with an uncertain and unpredictable future? Should the state then become more actively involved or should it still play only a minor role in politics?

In our view the usual supply-side arguments lose their significance considerably within an evolutionary context since they are based on the normal, orthodox view of

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22 SEIDL, Ch., (1984), p.151.

economic life. NELSON and WINTER put it as follows:[23] "Orthodox theory cannot adequately provide that analysis and understanding because it is an ahistorical world in which genuine novelties do not arise."

But, if we take such genuine novelties into account, then how must the right concept of economic policy be formulated?

Here we are indeed unable to present an elaborated frame for an evolutionary economic policy. What we can do is only try to grasp some ideas without any claim to introduce fully integrated and theoretically based recommendations. Until now, even technology policy lacksa fundamental theoretical framework.

To give an idea of evolutionary economic policy let us start with the effects accrueing from an evolutionary development. If this development is driven by the process of *creative destruction* public policy has to perform at least one major task, as STOLPER[24] has already pointed out. The process of *adaptation* following the *creative destruction* has to be accelerated. This means, on the one hand, that the prospering sectors of an economy are not to be hindered in their development, and, on the other, that declining sectors are not to be kept alive artificially.

A first claim, therefore, could be that government has to secure *income* but not necessarily secure jobs. This could even mean that it should be obliged to speed up the fall of waning sectors.

Consequently this poses some importance on *social policy*. Without a capable system of social security the process of development would be deprived of parts of its impetus. Only social policy accompanying the *creative destruction* will help to make the whole process politically acceptable.

Besides the social perspective we want to emphasize the question of *ecology*. Especially here politics have to recognize that innovations and structural changes to an essential part form the natural environment of mankind. They do not only influence the living conditions of present but also that of future generations. Hence, development cannot be seen and evaluated regardless of these ecological aims of society.

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23 NELSON, R.R., and S.G. WINTER, (1982).

24 STOLPER, W., (1984), p.7.

However, technological change also being "environmental"-oriented is heavily dependent on government regulation.[25]

Therefore, a second claim might be that government has to care for and install preventive measures which could help ex-ante to protect society from undesirable or even desasterous outcomes. Thus, the understanding of the path-dependency of technological change and its impact on environment is of substantial help for designing policy devices. These may then be implemented ex-ante, for example as pollution preventing measures rather than ex-post as only pollution disposal.

These examples show that economic policy in an evolutionary context is difficult to practise. It must be laid out in an indirect way, it has to be complementary as well as acceptable in social, and preventive in ecological terms. But even then an uncertain and unpredictable future may disturb all the hopes and aspirations which public policy stands for.

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25 KEMP, R., and L. SOETE, (1990), pp. 245.

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