



Institut für Volkswirtschaftslehre

Universität Augsburg

## **Volkswirtschaftliche Diskussionsreihe**

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**Beitrag Nr. 278, September 2005**

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September 2005

Keywords: Neo-Schumpeterian economics, industrial dynamics, public finance, financial markets

JEL: O30, O40, L2, P0, G10, B52

## Abstract

*Within the last 25 years large progress has been made in Neo-Schumpeterian Economics, this branch of economic literature which deals with dynamic processes causing qualitative transformation of economies basically driven by the introduction of novelties in their various and multifaceted forms. By its very nature, innovation and in particular technological innovation is the most exponent and most visible form of novelty. Therefore it is not very surprising that Neo-Schumpeterian Economics today has its most prolific fields in the studies of innovation and learning behavior on the micro-level of an economy, the studies on industry dynamics on the meso-level and studies of innovation driven growth and competitiveness on the macro-level of the economy. From a general point of view, however, the future developmental potential of socio-economic systems i.e. innovation in a very broad understanding encompassing besides technological innovation also organizational, institutional and social innovation has to be considered as the normative principle of Neo-Schumpeterian Economics. In this sense, innovation plays a similar role in Neo-Schumpeterian Economics like prices do in Neoclassical Economics. Instead of allocation and efficiency within a certain set of constraints, Neo-Schumpeterian Economics is concerned with the conditions for and consequences of a removal and overcoming of these constraints limiting the scope of economic development. Thus, Neo-Schumpeterian Economics is concerned with all facets of open and uncertain developments in socio-economic systems. A comprehensive Neo-Schumpeterian approach therefore has to consider not only transformation processes going on e.g. on the industry level of an economy, but also on the public and monetary side of an economic system. Our contribution introduces those extensions and complements to a comprehensive Neo-Schumpeterian economic theory, and develops some guideposts in the sense of a roadmap for necessary strands of analysis in the future in order to fulfill the claim of becoming a comprehensive approach comparable to neoclassical theory.*

## **1. Introduction: Basics and Hallmarks of Neo-Schumpeterian Economics**

Without doubt, economics is the science which focuses on economic welfare and the means to its increase. This can be stated as a goal for all schools in economics, among the most important being the Classical, the Keynesian and the Neoclassical school, as well as the Neo-Schumpeterian approach. But the angle of analysis differs sharply among these various approaches. One of the decisive differences can be found in the emphasis which is put on the different levels of economic analysis and their particular interrelatedness.

Due to the dominance of the Neoclassical School in the 20<sup>th</sup> century, the approach of a micro foundation of macroeconomics has wide appeal. The aggregation from micro to macro becomes possible because of the idea of representative households and firms. Although this approach may seem convincing due to its analytical stringency, its mechanistic design may lead to difficulties when it comes to the analysis of dynamic phenomena endogenously caused by the economic system.

Neo-Schumpeterian economics, by contrast, seeks to get a grip on these dynamic phenomena of economic reality. In order to do this, between the micro and the macro level of economic analysis the important meso-level is considered (e.g. Dopfer, Foster and Potts 2004). It is the meso-level of an economic system in which the decisive structural and qualitative changes take place and can be observed.

To understand the processes driving the development at the meso-level, Neo-Schumpeterian economics puts a strong emphasis on knowledge, innovation and entrepreneurship at the micro-level. Innovation is identified as the major force propelling economic dynamics. In this emphasis on innovation, the major difference in the Neo-Schumpeterian approach with respect to alternative economic approaches can be identified. Generally, one may say that novelty, i.e. innovation, is the core principle underlying the Neo-Schumpeterian approach. Innovation competition takes the place of price competition as the coordination mechanism of interest. Of course, prices are also of significance, but concerning the driving forces of economic development, they are not central. Whereas prices are basic concerning the adjustment to limiting conditions, innovations are responsible for overcoming previous limiting conditions and – as in economic reality, everything has an end - setting new ones.

The focus on novelties is thus the most important distinctive mark of Neo-Schumpeterian economics. By its very nature, innovation, and in particular technological innovation, is the most visible form of novelty. Therefore, it is not very surprising that Neo-Schumpeterian economics today is most appealing in studies of innovation and learning behavior at the micro-level of an economy, in studies of innovation-driven industry dynamics at the meso-level, and in studies of innovation-determined growth and international competitiveness at the macro-level of the economy.

From a general point of view, however, the future developmental potential of socio-economic systems, i.e. *innovation* in a very broad sense, encompassing technological innovation as well as organizational, institutional and social innovation, has to be considered as the *normative principle* of Neo-Schumpeterian economics. Instead of allocation and efficiency within a certain set of constraints, Neo-Schumpeterian economics is concerned with the conditions for and consequences of a removal and overcoming of these constraints limiting the scope of economic development. Thus, Neo-Schumpeterian economics is concerned with all facets of open and uncertain developments in socio-economic systems.

What are the consequences of this normative basis in innovation for economic analysis in a Neo-Schumpeterian spirit? Most scholars labelling themselves as Neo-Schumpeterians probably would agree on the three constitutive elements following this normative commitment:

- (i) *Qualitative change* affects all levels of the economy, and so we must consider not only structural changes but also the removal of constraints inhibiting development under the status quo and allow for development under new circumstances.
- (ii) Qualitative changes do not appear continuously in time but correspond to the idea of *punctuated equilibria* encompassing periods of smooth and regular development as well as periods of radical change.
- (iii) Finally, these processes show strong non-linearities and positive feedback effects which are responsible for *pattern formation* and other forms of spontaneous structuring i.e. they are not completely erratic, even if the innovative success by its very nature is characterized by strong uncertainty.

Although very visible at the industry level, qualitative change is happening at all levels and domains of an economy. A comprehensive Neo-Schumpeterian approach therefore also has to consider transformation processes on, e.g. the public and the monetary sides of an economy. But, before we try to outline *a roadmap* for such a *comprehensive approach to Neo-Schumpeterian Economics* we first give a brief overview on the intellectual roots of Neo-Schumpeterian Economics.

## **2. The Intellectual Roots of Neo-Schumpeterian Economics**

In order to analyze the innovation-driven development of economic systems, Neo-Schumpeterian economics draws on several intellectual roots. Obviously, first and foremost we must consider the huge legacy of Joseph Alois Schumpeter (Hanusch 1999). Schumpeter was among the first authors to stress the important role of innovation in his *Theory of Economic Development* (1912). There, he not only described economic development as the disruption of the regular circular flow caused by the introduction of novelties, but he also dedicated a large part of his presentation to the description of the entrepreneur, as the economic actor who kicks off economic development. In his later book *Capitalism, Socialism and Democracy* (1942) - following the developments of his time - he updated his ideas of entrepreneur-initiated development with the consideration of large research and development (R&D) departments of industrial firms where innovation had become a routine occupation.

Only rarely considered in the post war period, in the early 1980s Schumpeter's theories were rediscovered in *Evolutionary Economics*, which has to be considered as the second intellectual source of Neo-Schumpeterian economics. Obviously, the scope of this paper does not allow a sound appreciation of the important impact of evolutionary economics. Instead, the reader is referred to, among others, Dopfer (2001 and 2005), Hodgson, Samuels and Tool (1994), Silverberg (1998) and Witt (2003).

Evolutionary economics deals with dynamic developments taking place in historical time and therefore allows for path dependencies and irreversibilities. The major focus of evolutionary economics lies in the emergence and diffusion of novelties which are driven by creation, selection and retention, the crucial forces of every evolutionary theory dealing with either biological or with cultural evolution. The outcome of evolutionary processes is determined neither ex-ante nor as the result of global

optimizing, but rather is due to true uncertainty underlying all processes of novelty generation, and so allows for openness towards future developments - a feature of evolutionary theories which makes them ideal for analyzing innovation processes. Not surprisingly, in evolutionary economic theories, learning and the cognition of economic actors are central. Bounded-rational actors learn and experimentally search in uncertain and permanently-changing environments. The feature of path dependency corresponds well to the cumulative nature of building up knowledge. Additionally, innovation is considered as a process spurred collectively by many different actors. Heterogeneity of actors is an important source of novelty (e.g. Saviotti 1996).

The emphasis on the interaction between agents in knowledge generation and diffusion processes in evolutionary economics relates to a third strand of literature which has to be considered an intellectual root of Neo-Schumpeterian economics, namely *Complexity Economics*. Pathbreaking work in this area has been done by, among others, Kirman (1989) and Arthur (1994). (For a review of most recent applications of complexity approaches in the domains of Neo-Schumpeterian economics, see Frenken (2006).) Social systems share many commonalities with complex systems. Within the last 20 years, complexity sciences have developed tools to describe and analyze complex systems which are increasingly applied to socio-economic phenomena.

It is easy to show that innovation-driven Neo-Schumpeterian economies are perfect examples of complex systems, as defined e.g. by John Casti (2001). On this approach, simple systems are characterized by few interactions and feedbacks, whereas complex systems show close and frequent interactions of components, combined with negative as well as prominent positive feedback effects. Whereas in simple systems one finds centralized and hierarchical decision processes, complex systems have strongly decentralized structures. Furthermore, simple systems are decomposable. Complex processes, on the other hand, are irreducible, i.e. neglecting a single part has severe consequences for their understanding. Finally, whereas the behavior of simple systems can be predicted, the behavior of complex systems is - due to non-linearities caused by interaction and feedbacks - fundamentally unpredictable. It is clear that all features of complex systems can readily be found in Neo-Schumpeterian economies. Most strikingly, the unpredictability of the complex system's behavior - with respect to innovation one can

speak of truly uncertain outcomes - qualifies complexity approaches for the analysis and understanding of Neo-Schumpeterian economies.

Another intellectual source for Neo-Schumpeterian economics lies in those approaches dedicated to *change and development*. Although long run capitalistic development has been on the agenda of economics since the contributions of Kuznets, Clark and Schumpeter in the early decades of the 20<sup>th</sup> century, due to the strong dominance of short term equilibrium analysis of mainstream Neoclassical economics this tradition went out of vogue until the early 1990s, by which time a new interest in the laws of motion and industry development re-emerged, formulating stylized facts of so-called industry life cycles (eg. Utterback and Abernathy 1975, Gort and Klepper 1982, Jovanovic and Mc Donald 1994, and Klepper 1997).

Finally, Neo-Schumpeterian economics has an important source of inspiration in the mainly descriptive approaches of *systems theory*. Here, learning and the building up of competences is considered as an interactive and collective process. Besides economic actors - basically firms - institutional actors such as universities and other public research laboratories as well as the institutional frameworks and governance structures shape the innovation process taking place in national (e.g. Nelson 1993 and Lundvall 1988), sectoral (e.g. Malerba 2002 and 2005), regional (e.g. Cooke 2002) as well as corporate innovation systems (e.g. Cantwell, Dunning and Janne 2004) and is important in determining their performance.

### **3. A Roadmap to Comprehensive Neo-Schumpeterian Economics**

If we resume the basics and hallmarks of Neo-Schumpeterian Economics, given in the introduction of this paper, one easily sees that this approach can contribute a lot to the understanding of the dynamic processes going on in a capitalistic economy. This in particular is true if one looks on the real side of the economic sphere. One can even state that, without applying the Neo-Schumpeterian perspective, the complex phenomena of economic development remain nebulous, as they are inaccessible to other schools in economics. In particular, Neoclassical economics, with its orientation towards rational individuals and the price mechanism, which together are responsible for an efficient allocation of resources within a set of constraints, contrasts well to the Neo-Schumpeterian perspective.

### **3.1 The Need for a Comprehensive Approach to Neo-Schumpeterian Economics**

However, at the present stage of development, Neo-Schumpeterian economics is still far from offering a comprehensive theory of economic development. Most of the research of the last decades has primarily concentrated on the real sphere of an economy (Hanusch and Pyka 2006). Technological innovations propelling industry dynamics and economic growth obviously are a major source of economic development. But technological innovations are not the only source, nor can industry development take place in a vacuum. Instead, development is accompanied by, influenced by, and exerts influence on the monetary realms of an economy as well as the public sector. Admittedly, with respect to the stage of development of Neo-Schumpeterian economics, the high degree of maturity does not hold for Neo-Schumpeterian approaches aiming at financial markets and their development as well as on the public sector.

A comprehensive economic approach has to offer a consistent theory which encompasses all realms relevant to an improved understanding of the economic processes under investigation. This becomes even more pressing in cases in which the different realms are in close relation, mutually influencing each other, which is very likely the case for economic development. In other words, a comprehensive understanding of economic development inevitably has to consider the co-evolutionary processes between the different economic domains.

In the following paragraphs, we argue that it is high time for Neo-Schumpeterian economics to devote considerable attention to the role of the financial and public sector with respect to economic development. In particular, we introduce the comprehensive Neo-Schumpeterian approach as a theory composed of three pillars: one for the real side of an economy, one for the monetary side of an economy, and one for the public sector. Economic development then takes place in a co-evolutionary manner pushed, hindered and even eliminated within these three pillars (figure 1).



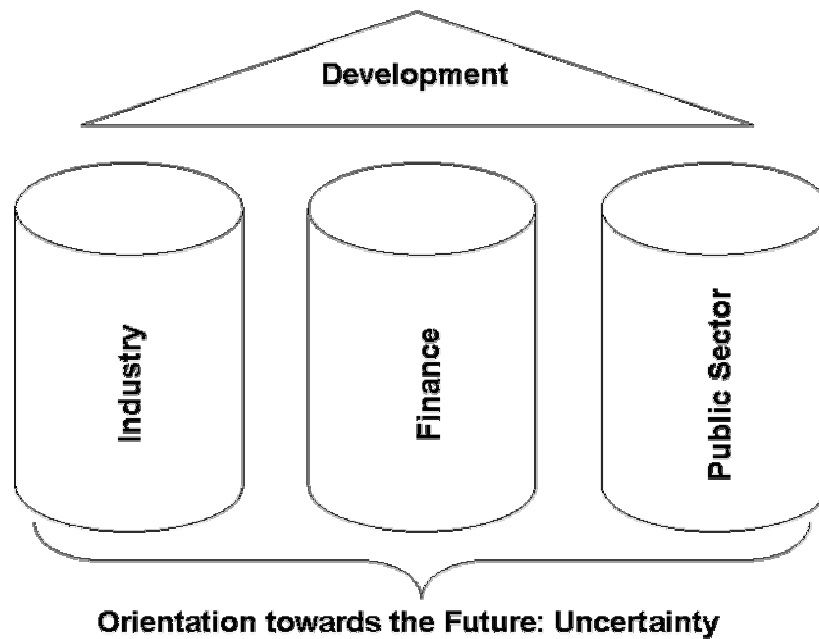


Figure 1: The three pillars of comprehensive Neo-Schumpeterian Economics

In order to understand the crucial co-evolutionary relationship, one has to consider the bracket encompassing all three pillars, namely their orientation towards the future which introduces uncertainty into the analysis. The relationships between the three pillars drive or hinder the development of the whole economic system in a non-deterministic way. Consider for example the case of the financial sector, exaggerating the developments taking place in the real sector and leading to dangerous bubble effects, which might cause a breakdown of the whole economy. Or think of the case in which the public sector cannot cope with the overall economic development, and infrastructure, education etc. become the bottlenecks of system development.

In this light, the notion of innovation, i.e. the introduction of novelties, has to be seen as all encompassing, covering not only scientific and technological innovation, but including also all institutional, organizational, social and political dimensions. Furthermore, besides this result-orientation of innovation, a process-orientation has to be considered, both because innovations are taking place in time and because of the co-evolutionary nature of economic development. Having in mind this understanding of innovation, a definition of Neo-Schumpeterian economics may appear as follows:

*Neo-Schumpeterian economics deals with dynamic processes causing qualitative transformation of economies driven by the introduction of innovation in their various and multifaceted forms and the related co-evolutionary processes.*

This definition includes the three characteristic features of Neo-Schumpeterian Economics as elaborated above, namely (i) qualitative change, affecting all levels and domains of an economy, (ii) punctuated equilibria i.e. periods of radical change followed by periods of smooth and regular development and (iii) pattern formation i.e. despite the true uncertainty, the processes to be observed are not completely erratic but spontaneously structuring.

In the following sections we will briefly outline our understanding of a *Comprehensive Theory of Neo-Schumpeterian Economics*. We begin with the first pillar namely industry development and the current and future challenges in this area of research. Then, we proceed to the financial markets and the public sector, the second and third pillar of a comprehensive approach. The final part of the paper synthesizes the three pillars by introducing the concept of the *Neo-Schumpeterian Corridor* of economic development.

### **3.2 Industry development: Current and Future Challenges for Comprehensive Neo-Schumpeterian Economics**

The *raison-d'être* of Neo-Schumpeterian economics is the prevailing transformations of economies, which persist at the macro-, the meso- and the micro-levels. However, although the transformations are very visible at the macro level, they cannot be analyzed or understood on this level (e.g. Carlsson and Eliasson 2003). The sources of these qualitative changes instead can be found in the industry dynamics at the meso-level (e.g. Saviotti and Pyka 2004). Yet, the dynamic potential of industries is propelled by the creation of novelties and entrepreneurial decisions at the micro-level of the economy.

Consider, for example, the transformation of economies with respect to employment shares towards service industries which has led to the so-called *Fourastier Hypothesis*. This by no way can be explained by referring to the proportional growth of existing industries. Instead new industries emerge again and again throughout the history of capitalism, driving out existing ones or at least changing considerably their relative weights. The emergence of the new industries is driven by innovation and tested by entrepreneurial action.

Perhaps the most severe transformation the industrialized world has undergone is the current one, caused by the increased importance of knowledge, in particular scientific knowledge relevant for production activities combined with an increasing internationalization of business. For many years now, knowledge intensification and globalization have been widely considered to be the most important challenges with which industrialized and industrializing economies are confronted (e.g. Pyka and Hanusch 2006). In addition, severe qualitative changes in the sectoral composition, in the relevant competences and in the institutional settings lead to catching up and leapfrogging processes which affect the international competitiveness of nations and regions, and confronts established companies with major technological and organizational transformation processes.

These qualitative changes can immediately be traced back to developments going on at the meso- or industry level. The underlying industrial dynamics are characterized by a crucial transformation of the nature of competition. Especially in technological intensive industries such as biotechnology-based industries and information and communication technologies, due to the high degree of complexity of the underlying knowledge base, competition no longer takes place between single companies only, but often occurs between networks of actors, where new knowledge is created and diffused collectively. Most importantly, firms often no longer compete in a price dimension only, as competition in innovation has taken the dominant role.

Accordingly, competition and cooperation are simultaneously guiding the decisions of economic actors. Whereas traditional manufacturing firms are forced by the ongoing globalization to become ever larger, either through own growth or by mergers and acquisitions on an international basis, and are acting in an environment of strong price competition, they are at the same time intensively engaged in a competition for innovation. To cope with the pressure stemming from complex modern innovation processes, they are obliged to search for possibilities of collaboration with small and new entrepreneurial and technological intensive start-up companies. In knowledge-intensive industries, we often observe the co-existence of small entrepreneurial firms, shaping technological development and contributing strongly to technological progress, and large established companies performing their business in routinized ways.

By emphasizing the decisive role of entrepreneurial business formation and the emergence of new industries, we are already hinting on the processes at the micro-level of the economy underlying all these development processes. Innovations, affecting potentially the composition of sectors, are born at the micro-level. New ideas paired with well developed absorptive capacities of entrepreneurs, who are well connected to their own financial and scientific/technological networks, lead eventually to wide and fast diffusion of novelty and thus to new industries (e.g. Grebel, Pyka and Hanusch 2003). As a prerequisite for a prolific creation of a new industry, of course, consumers also have to be aware of the new commodities and services offered.

Knowledge generation and diffusion processes stand behind innovation. Thus, an examination of knowledge in general and knowledge dynamics in particular is absolutely necessary in Neo-Schumpeterian economics. The simplified treatment of knowledge as a public good, such as it is a concern in Neoclassical economics, is intellectually no longer profitable. Instead, the tacit, local, and complex character of knowledge is emphasized.

By focusing on the generation and dissemination of new knowledge, from the point of view of knowledge dynamics, severe non-linearities enter the Neo-Schumpeterian economic system, decisively affecting the dynamics of the sectoral development as well as the sectoral composition of an economy. As a consequence, Neo-Schumpeterian Economics has rid itself of the concept of a representative agent. Heterogeneous agents with varying competences and capabilities, industries at very different stages of maturity, and institutional frameworks differing between sectors, regions and nations co-exist, enriching strongly the complexity of the economic systems under analysis. The changes going on at the macro-level of the economy then are not only the aggregates of the changes at the meso-level. Several emergent properties and non-linearities have to be considered, e.g. unbalanced growth processes, catching-up, leapfrogging as well as forging-ahead etc. become part of the economic reality.

### **3.3. The Role of Finance in Comprehensive Neo-Schumpeterian Economics**

Let us now turn to the second pillar of a Comprehensive Approach to Neo-Schumpeterian Economics, the role of finance.

Schumpeter himself gives a first hint of the important role of the financial sector for economic development in his *Theory of Economic Development* of 1912. Besides the

creative entrepreneur, the risk taking banker is the second most important force behind economic dynamics. Indeed, the entrepreneur and the banker have to be considered as in a symbiotic relationship: the entrepreneur opens up the possibilities of investment for the banker, and the banker enables venturing possibilities for the entrepreneur.

In this respect, J. P. Morgan (1837 – 1913) - as a banker who also took active roles in real ventures such as the American Railways - can be considered as an example par excellence of a Schumpeterian Banker. Generally, one can claim, that the major task for the financial sector as a whole has to be seen in the acquisition and supply of capital over time needed by firm actors for their entrepreneurial activities.

Keeping in mind the research objective of Neo-Schumpeterian economics, it is difficult to distinguish between the evolution of the financial sector and its role and function in particular stages of development in capitalist economies. For this reason, we highlight the symbiotic and co-evolutionary relationships of the real and monetary sides by giving a brief overview of the most important developments, without claim of being comprehensive.

The banker and the bank system turn out to be not sufficient in describing the prolific development of capitalistic economies. Besides banks, stock markets entered the scene and played an outstanding role for firms in their endeavors to acquire capital. The amount of capital needed to finance ventures in the new industrializing world since the end of the 18<sup>th</sup> century accelerated the diffusion of stock markets tremendously.

The mixture of bank and stock market financing only recently was extended by the emergence of private equity and venture capital firms. Basically, due to the increased techno-economic opportunities within knowledge-based economies going hand in hand with strongly felt uncertainties of scientific and technological innovation, venture capitalists appeared as a blend of financial and technological knowledge focusing on acquiring capital for risky innovative start-up companies.

These developments obviously fulfil the requirements of Neo-Schumpeterian economics as the financial sector's development follows the increasing and differentiating needs of the real sector and at the same time enable the development of the real sector. From a Neo-Schumpeterian perspective, the future orientation of the finance sector is essential and can be traced back, on the one hand, of course, to

the uncertainty of innovation processes. On the other hand, however, a major feature of knowledge creation and innovation is the extreme time consuming nature of these processes. Both characteristics make a long-term orientation absolutely necessary. However, from this alliance between uncertainty and a long-term orientation, two threads, stemming from the financial sector, may be identified for Neo-Schumpeterian development:

- (i) The actors in the financial markets are induced to shorten their time-horizons for decisions in order to reduce uncertainty. Consider, e.g., the most recent developments in financial markets, such as the introduction of obligatory quarterly reports etc., which might improve the possibilities of control, but at the same time damage severely the possibilities of long run innovative commitment on the firm side.
- (ii) Short term signals of potential technological breakthroughs are misinterpreted in the financial sphere of an economy and cause a positive feedback within expectation formation. Such a development can lead to bubble effects in the financial markets and, finally, to a major collapse of the real sector

Of course, the future orientation of Neo-Schumpeterian economics also makes it necessary to rethink the role of monetary policy and central banks. In Monetarism and Neoclassical Economics, this role is clearly defined: it is the stability of consumer prices or low inflation rates which more or less defines the only benchmark for the policy of central banks. The main instruments to fight inflationary tendencies can then be seen in regulating the supply of money and liquidity and in fixing short-term interest rates. These instruments still remain important when we turn to the Neo-Schumpeterian context. What changes, however, is the main goal of monetary policy. Besides, or even instead of, fighting consumer price inflation, the political support of growth and development in an economy or in a global economic area, for instance the European Union, takes center stage in strategic thinking, with severe consequences concerning the economic and the political role of central banks, for instance the European Central Bank.

On the one hand, this means that the supply of money and liquidity should be intended above all to foster Neo-Schumpeterian innovation dynamics, being the

main source and the basis of modern growth and development. On the other hand, central banks continuously have to consider carefully the symbiotic relationship between the real and the financial spheres of an economy, as mentioned above. Because a policy of cheap liquidity, for instance, aimed initially at inducing and accelerating economic growth, may easily turn a regular Neo-Schumpeterian development into a hyper-dynamic one, with the tendency to build up explosive bubbles on the financial, and (today, even more importantly) on the asset and energy markets. This might especially be the case when huge speculative orientated hedge funds enter the markets and try to maximize short-term profits.

In this case central banks, from a Neo-Schumpeterian perspective, have the task of observing and controlling such inflationary tendencies. For modern economies, these tendencies may be increasingly important, compared to the ordinary consumer price inflation considered exclusively in the past. This argument is even stronger if one considers that Neo-Schumpeterian dynamics, based on innovation, sooner or later will be accompanied by remarkable productivity gains and quality improvements, which very likely restrict consumer price inflation to a very moderate rate.

Summing up, we can state with Amendola and Gaffard (2005): “The problem that central banks confronted with processes of change (and hence with innovation and growth) are really facing is to deal with financial constraints to impact on real constraints – the constraints that determine the evolution of the economy and hence what eventually happens to inflation – rather than the problem of credibility of their commitment to price stability.”

### **3.4. The Public Sector in Comprehensive Neo-Schumpeterian Economics**

Let us finally turn to the third pillar of Comprehensive Neo-Schumpeterian Economics, the public sector.

Our considerations of a Neo-Schumpeterian theory of the public sector focus on the justification of the state and encompass a normative perspective in the sense of defining tasks for public activities as well as a positive-empirical perspective supposed to explain real developments.

The existence and necessity of a public sector can be explained within the Neo-Schumpeterian approach again by the persistence and inevitability of uncertainty

accompanying every kind of innovation. Schumpeter's notion of *creative destruction* in his 1942 book *Capitalism, Socialism and Democracy* hints at the two sides of the innovation coin: in every innovation process, we find winners and losers. Ex-ante it is impossible to know who will win and who will lose the innovative game. Accordingly, the uncertainty of innovation processes throws a *veil of ignorance* over the economic actors. In this sense, the ideas of John Rawls *Theory of Justice* (1971) can be transferred to the Neo-Schumpeterian context. A society can agree on a *social contract* to deal with the peculiarities and imponderables of innovation processes. This social contract then has to be executed by a state authority. In the Neo-Schumpeterian context, sure enough the social contract also applies to firm actors and entails both support for uncertain innovation activities as well as social responsibilities in the case of innovative success (e.g. Acs 2006).

The normative perspective of an economic theory of the state is supposed to guide the deviation and design of all public activities - encompassing public expenditures as well as public revenues - which in a Neo-Schumpeterian context has to include the developmental potential of the economy. In this sense, basically all public interventions have to be scrutinized, as to whether they support or hinder the potential of economic development. Accordingly, for public activities, an orientation towards the future is postulated.

Two types of failure generally endanger this goal and can be considered the cardinal errors of economies: the first deals with the danger of discarding promising opportunities too early, whereas the second deals with the possibility of staying for too long on exhausted trajectories (Eliasson 2000). In both cases, resources for future development are wasted, which demands for policy intervention.

But why do economies and economic actors tend to these failures? The sources of potential failures are manifold, but again stem from the uncertainty underlying economic processes as well as the complex nature of novelties:

A first example is given by consumers' decisions concerning so-called *merit wants* as introduced by Richard Musgrave (1958) in public finance. Due to the future orientation and the complex character as well as the high probability of positive spillover effects of merit wants, individuals tend to undervalue strongly their consumption as, e.g. in education, or to underinvest in respective activities, as, e.g. with respect to R&D. A future-oriented policy, therefore, has to consider these



shortfalls, e.g. by improving the knowledge of economic actors concerning the benefits of the respective goods and activities and/or by supporting their consumption, use and production.

A second example deals with different and unbalanced speeds of development, which is symptomatic of dynamic innovation-driven processes. Creative destruction in a Schumpeterian sense is most often closely connected to the obsolescence of labor qualifications which might cause severe problems of mismatch unemployment on the labor markets – the new qualifications are not sufficiently available, whereas obsolete qualifications abound. From the Neo-Schumpeterian economics perspective, this mismatch on labor markets demands not only an administrative design of labor policy, but also an active future-oriented or knowledge-based design. With respect to recent labor market policy designs, the Danish model implemented since the 1990s is a good example of such a future-oriented approach.

A third example for normatively defining the tasks of a Neo-Schumpeterian policy stems from the interaction dimension and, in particular, deals with the increasing need for international policy coordination. Newly-emerging economic areas challenge inter- and supranational coordination of policy in order to benefit from developmental potentials resulting from larger economic areas. An illustrative example is given by the necessary balancing act between globalization and regionalization which the European Union has to manage after the recent eastern-enlargement. On the one hand, economies of scale due to growing markets and globalization are obviously targets of policy. On the other hand, international competitiveness strongly depends on specialization and differentiation: the creativity potential of larger economic areas is essentially fed by the exploitation of the heterogeneous endowments of the regions. Thus, specialization and differentiation are processes which take place on the regional levels of economic areas.

Whereas the above examples focus on the side of public expenditures, the final example is taken from the domain of public revenues. Obviously, issues concerning the design of tax systems and the size of public deficits exert an enormous impact on the development potential of an economy. Besides questions concerning the intergenerational distribution of burdens, questions of the sustainability of, e.g., the health and pension systems, as well as of the sustainable prerequisites of economic growth and development, arise. Consider, for example, the increasing life

expectancies and demographic changes which are key issues in almost all industrialized countries and which demand new models of health insurance and pension systems. Or consider the international and interregional competition for industrial settlement, its impact on future development of nations and regions, and the role the design of tax systems plays in this competition. A future oriented Neo-Schumpeterian policy has to scrutinize whether the conditions generated by public activities allow for, or even open up, developmental potentials in the future. To refer to Isaac Newton and his famous quote on the intellectual heritage of past generations, one can also state that a Neo-Schumpeterian policy design has to allow future generations to say that they stand on the shoulders of giants and not of dwarfs.

With respect to a positive-empirical approach of a Neo-Schumpeterian theory of the state, which seeks to explain real developments, a promising starting point again comes from public finance and an empirical observation discussed more than 100 years under the heading of *Wagner's Law* (Wagner 1893). Adolph Wagner (1835-1917) formulated this *law* following empirical observations that the development of an industrialized economy is accompanied by an increasing absolute and relative share of public expenditures in GNP. According to Wagner, the reasons for the income elasticity above unity towards public goods are to be seen in the increasing importance of *law and power* issues as well as *culture and welfare* issues in industrializing and developing economies. This way, public dynamics are narrowly connected to Neo-Schumpeterian dynamics, which demand higher qualities of public goods such as infrastructure, education, basic research etc. as a condition sine-qua-non for economic development.

To avoid either an unbounded growth of public activities, which Schumpeter (1950) himself labelled *the march into socialism*, or an increasing privatization of public goods e.g. in the health and education sector - which goes hand in hand with an increasing uneven distribution of services, itself an obstacle for economic development - a policy recommendation of Neo-Schumpeterian economics has to focus on adding a qualitative dimension to Wagner's quantitative dimension. This can be achieved only by taking seriously the normative requirement in the design of all public activities of the Neo-Schumpeterian approach, namely their orientation towards future development. In the case of potential insane Wagnerian dynamics leading to an overall expansion of the public sector, Neo-Schumpeterian policy

design encompasses a strengthening of the absorptive capacities of consumers towards superior merit wants. This example illustrates the important co-evolutionary relationship between the different pillars of comprehensive Neo-Schumpeterian economics which is subject of the following final section.

**4. Conclusions: The Neo-Schumpeterian Corridor**

A comprehensive Neo-Schumpeterian economic theory focusing on innovation driven qualitative development has to offer theoretical concepts to analyze the various issues of all three pillars: industry dynamics, financial markets, and the public sector. Innovation and, as a consequence thereof, uncertainty, are ubiquitous phenomena characteristic of each of this pillars and are also intrinsically interrelated. An improved understanding of the development processes can only be expected when the co-evolutionary dimensions of the three pillars are taken into account. This is illustrated with the concept of a Neo-Schumpeterian corridor shown in figure 2.

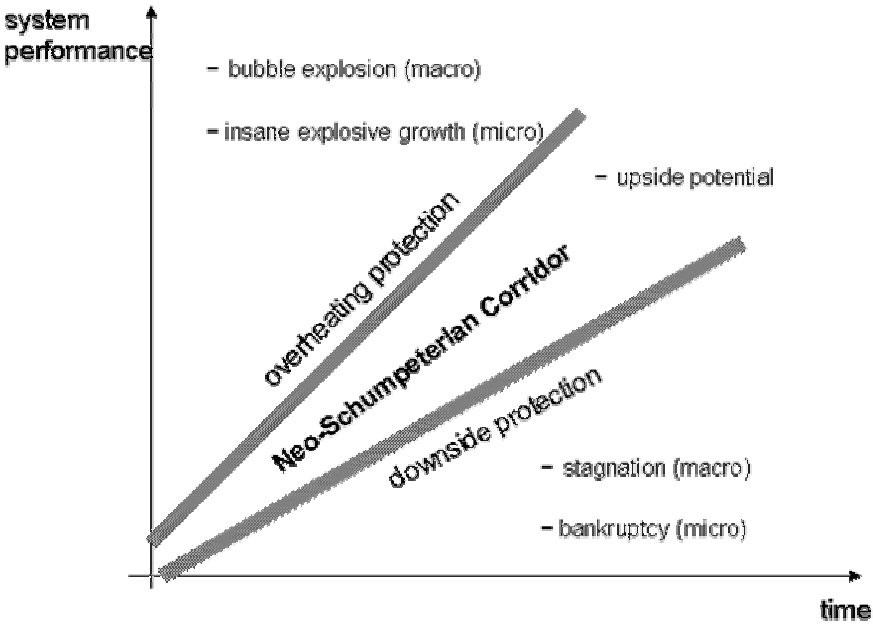


Figure 2: The Neo-Schumpeterian Corridor

In a Neo-Schumpeterian economics perspective, there exists only a narrow corridor for a prolific development of socio-economic systems. Profound Neo-Schumpeterian development takes place in a narrow corridor between the extremes of uncontrolled growth and exploding bubbles, on the one hand, and stationarity, i.e. zero growth and stagnancy, on the other hand. Economic policy in the sense of Neo-Schumpeterian economics is supposed to keep the system in an *upside potential* including both *overheating-protection*, i.e. on the macro-level bubble explosions and on the micro-

level insane explosive growth, and *downside-protection*, i.e. on the macro-level stagnation and on the micro-level bankruptcy.

A brief view on the economic history of different economies illustrates that the two threats - bubble explosion and stagnation - shape economic evolution. It emphasizes also the necessity to develop further comprehensive Neo-Schumpeterian economics, in order to get a grip on the important co-evolutionary processes.

In the post Second World War period, both Japan and Germany recovered extremely well in economic terms, whereas the United States increasingly lost ground. However, both countries fell from the Neo-Schumpeterian corridor - in opposite directions – whereas the United States returned to the corridor. What happened?

In both countries, Japan and Germany, specific institutional arrangements and organizational forms evolved after World War II which were not simple copies of the previous successful US-system but instead proved to be relatively superior. In particular, one may stress the important meaning of the financial sectors designed for economic recovery and the overtaking of the Japanese and the German industrial sectors. In both cases, long-term relationships between industry and banks opposed the short-term character of these relationships within the US financial sector. This long-term commitment was extremely beneficial for economic development of large industries in this period of comparatively stable technological environments. In the same vein, labor markets and their institutions were oriented towards long-term relationships compared with hire-and-fire policies in the US which furthered well productivity improvements.

But during the late 1970s and early 1980s, the German system could not cope with the new challenges coming from the information and communication technology revolution, as the starting event of the so-called knowledge-based economies. Its institutions and organizational designs now proved to be too sedate, and its economy drifted upwards in the stagnation sector of figure 2.

By the end of the 1980s and early 1990s, the Japanese economy broke down and moved into a development period, today referred to as the decade of near-zero-growth. The major reason was a overheating of the financial sector which led to speculative bubbles, which, after their bursting, affected the whole economy.

The American model, by contrast, was now regarded as the epitome of dynamism and entrepreneurship, and was seen as a guidepost for the 21<sup>st</sup> century. The US

economy thus entered the Neo-Schumpeterian corridor in the *new-growth* period again. Since the early 1990s, a high rate of creation of technology-intensive firms combined with a substantive raise in privately financed R&D, led to the emergence of world leading technology clusters such as the famous Silicon Valley and Route 121. Thus, economic development of the 1990s was characterized by high average growth rates, low unemployment and low inflation.

The historical examples illustrate the powerful economic dynamics shaping overall economic development. The historical examples illustrate further the explanatory power of the Neo-Schumpeterian corridor, which allows an analysis of the underlying mechanisms. In this sense, we emphasize the important need to develop further the comprehensive Neo-Schumpeterian economics approach in the directions outlined in this paper.

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