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Entrepreneurship in the service sector as a product of alertness and judgment

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Abstract:

Private and public services dominate modern society, and research on innovation systems related to services is of increasing importance in economics and management. This paper presents a model that can be used to explain innovation and innovation policy in production and services, where the key is to use the entrepreneur as a concept within an institutional framework.

In past decades, academic economists, management scholars and policymakers have often used entrepreneurship and institutional economic theory. In a recent article, Casson (2014) proposes that entrepreneurship studies should get back to basics by drawing on early literature, cognition and information processing.

Kirzner's (1973) concept of entrepreneurship is especially of interest, because it stresses two important conditions. First, it describes the market as a process more than as an equilibrium. Second, it focuses on opportunities in combination with spontaneous learning.

The purpose of this paper is to argue that the entrepreneurship concept can benefit from theories of the firm in the analysis of service innovation, and that insights from Austrian economics can be enhanced by Casson's (1982) concept of entrepreneurship as judgmental decisions made under conditions of uncertainty. In addition, the institutional framework for decisions can be described as making decisions using satisficing as opposed to optimization, which is familiar from traditional economic theory (Simon, 1976).

Based on the discussion the paper presents a model, which illustrates certain parts of Schumpeter's comprehension of the importance of innovation to economic development, but without Schumpeter's theory of money and business cycles.

It is demonstrated that there might be a conflict between the two goals, growth and stability. This dilemma can be alleviated by innovation policy and exogenous stabilization, because the stability of an economy increases by the existence of mechanisms that ensure relatively large exogenous research and a strong exogenous stimulation of research and development (R&D) from e.g. exogenous research.

1. The service economy

The service economy dominates modern society in terms of jobs and production. Both public and private sector services are a major part of the production measured when calculating gross domestic product. This has not always been the case, however. In the eighteenth century, for example, the physiocrats considered farming and other primary sectors as the only source of creation of wealth (Quesnay, 1759). Much of what we today call service, the physiocrats considered as consumption because their philosophy defined service as the spending of wealth created by production. The successors to physiocracy, the classical economists, analyzed manufacturing and physical production as the center of the economy. Even today, economic thinking more often concerns physical production than service.

One issue is that some services, e.g. a philharmonic orchestra, use the same amount of input as they did many years ago, a phenomenon known as Baumol's cost disease (Baumol, 1966). Similar to the persistent hunt for an increase in productivity in the service sector, research on innovation and productivity is seeking to expand knowledge about the area. The means for increasing productivity within services are not only difficult to come up with but also challenging to implement (). Aside from this, measuring the various aspects and components of service and the use of input in services is often an arduous task. In other words, quantifying the ways in which productivity is increased in services is a complex issue. Moreover, significant parts of innovation within services are incremental, less noticeable steps. Literature on production processes often focuses on microeconomic production theories, managerial inspiration, or guidance.

In general, the innovation view can be applied to services (Sundbo, 1998, p. 343). Measures used for more technological kinds of R&D however, are often unsuited for services because the innovation of processes in services in particular is often intangible. In some analyses, distinguishing between innovations in companies that offer services and the more general concept of innovation in services is important (Coombs & Miles, 2000).

2. Entrepreneurship

Long-neglected by management scholars and economists, entrepreneurship has undergone a dramatic comeback in research over the last two decades, due not only to a renewed interest in the works of Schumpeter, but also in the theories of the firm as described by Coase (1937) and others.

Currently, entrepreneurship is a topic discussed in various disciplines, including economics, business administration and small business economics. Other fields that examine entrepreneurs

and entrepreneurship comprise social sciences like sociology, anthropology (Thornton, 1999) and business history (Landes et al., 2010). The meaning of the term entrepreneur, which is used with quite different meanings in, e.g., economics, business, sociology, history and anthropology, has been examined by various researchers (Elkjaer, 1991; Westhead & Wright, 2000; Landström & Lohrke, 2010).

These different meanings can be illuminated by ask the following important dichotomous questions: Is the entrepreneur a person or a function? Does the person or function exist at all times, or only at a specific time or phase in the development of a business or an organization? Is the entrepreneur an elitist concept, or something that is carried out by nearly everyone at all times, both by manufacturers and consumers? Do entrepreneurs exist solely in a market context or also within an organization?

A review of the use of the term entrepreneur reveals that it generally covers two significant categories of entrepreneurs. The first category is the small business dominated by the owner/manager and founder; more broadly, it can refer to a small and medium enterprise (SME) or even a corporation. In the second category, the entrepreneur is a function in the economy used in either a broad or a narrow sense.

Business schools tend to incorporate entrepreneurship into disciplines like management and marketing, where the curriculum and core of specific entrepreneurship courses often involve business plan writing, venture funding and legal institutions. Another emphasis is practitioner-oriented, where managers receive “how to” guidance.

The concept of entrepreneurship has a long history in economic theory. Cantillon (1755), who wrote one of the first texts on economics, highlighted the entrepreneur as having to pay costs to gain an insecure income in contrast to hired labor with a negotiated secure income. The entrepreneur as a concept, however, disappeared for various reasons from the British and the French research traditions (Elkjaer, 1991). At present, the economic nature of the entrepreneur as a concept has not been identified in several theories of the firm. Another aspect in an analysis of the missing awareness of the entrepreneur in economics is that psychological interest in the entrepreneur often does not fit with mainstream economic theory. Moreover, for many mainstream economists, the most well-known use of entrepreneur is Schumpeter’s (1934) theory, which views the entrepreneur as a factor in an explanation or theory about economic growth and business cycles according to which technical development occurs a continuous activity, while economic development appears in waves or business cycles due to changeable economic and financial conditions. To Schumpeter technical inventions, when introduced commercially, are called “innovations”, which initially take place at the bottom of the business cycle and are carried out by a few gifted individuals, who Schumpeter calls entrepreneurs. If they succeed, other entrepreneurs

soon follow, as does, consequently, an economic recovery. This theory, known for its use of the term creative destruction, considers it beneficial to society that inefficient firms do not survive during a recession, thus providing more room for entrepreneurs and their inventions. Schumpeter's view is often considered as imprecise and speculative, in addition to being unsuitable for economic forecasting. As consequence mainstream economists often have a skeptical attitude toward the entrepreneur, due mainly to the functional use of the entrepreneur concept Schumpeter (1934) proposed, and due to institutional theories in general.

Today, the word entrepreneur is often used to describe the founder of a company or the owner/manager of a small entrepreneurial firm trying to survive the company's first years in business in the attempt to gain a solid footing. According to this view, the entrepreneur ceases to be entrepreneurial and becomes managerial, which is a legacy from, among others, Schumpeter (1934).

The analysis of service undertaken here, however, requires a different definition of entrepreneurship than Schumpeter's. Hence, this paper takes the approach that the firm processes information as an ongoing operation in a way that makes entrepreneurship a continuous activity. In other words, entrepreneurial issues that matter in the early stages do not disappear overnight. Incorporating the concept of the entrepreneur into the theory of the firm is beneficial for the simple reason that the entrepreneur is embedded in a company and a company has an entrepreneurial function (Foss & Klein, 2012).

3. Theories of the firm

This paper employs the entrepreneur as a conceptual tool to describe and analyze the economy. An entrepreneur is not restricted to self-employed individuals who make decisions related to the market. Instead, the point is that an entrepreneurial theory of the firm is suitable in dealing with services because its approach is more dynamic than many of the mainstream economic theories that operate with the static equilibrium approach.

Coase (1937) and the "theories of the firm" are an important approach to using the entrepreneur as a concept. The theories of the firm and organizational economics have developed as research on transaction cost economics (Williamson, 1985), behavioral theories (Cyert & March, 1963), agency theory (Holmström, 1979), property rights theory of the firm (Hart & Moore, 1990) and evolutionary theories (Nelson & Winter, 1982). The management literature contains resource and knowledge-based views (Wernerfelt, 1984). Management and strategic approaches also use the concept of the entrepreneur (Drucker, 1985).

Baumol (1990) highlights the role of institutions in guiding entrepreneurs into productive, unproductive or destructive activities. Notably, most entrepreneurial activity benefits society, but not all of it, which is where important institutional matters involving law, ethics and corporate social responsibility come into play. Henrekson and Sanandaji's (2011, p. 47) states: "Entrepreneurs sometimes have the opportunity to evade institutions, which tends to undermine the effectiveness of the institutions, or cause institutions to change for the better. Lastly, entrepreneurs can directly alter institutions through innovative political entrepreneurship".

4. The market as a process

Neo-Austrian economics represent a major source for the study of the market and the entrepreneur. The point of this paper is to enhance Neo-Austrian theory with the concept of judgmental decision made under uncertainty as the key to understanding the performance and organization of a firm providing services. Knight's theory (1921), for example, defines judgment as an essential factor.

The market is a fundamental institution in economic theory, and the service industry generally depends on market conditions and on the creation of income and demand in general. This implies that understanding the market as an institution in order to analyze the growth of the service industry is important. In the following paragraphs, the market as an institution is dealt with as part of a framework for understanding the conditions the service industry faces. The focus is on Austrian economic theories that stress the market more as a process than as an equilibrium.

Von Mises' (1949) work, highly influential in the field of Austrian economics, was a key source of inspiration for Kirzner (1973). Economics is based on more than just material matters within the Austrian approach, because political economy is a branch of scholarship that concerns "praxeology". Mises states, "Human action is a manifestation of the mind. ... Mind is simply the word to signify the unknown factor that has enabled men to achieve all that they have accomplished: the theories and the poems, the cathedrals and the symphonies, the motorcars and the airplanes" (1949, p. 142).

From a methodical point of view, Kirzner (1973) strongly disagrees with Robbin's (1935) definition of economics as the science of the allocation of scarce resources with the purpose of maximizing competing ends. According to Kirzner (1973), the Austrian School of economic thought lost its influence because of the aforementioned definition of economic science, which did not sufficiently analyze the market as a process. The relevance of the Austrian contribution is that stressing the market as a process makes analyzing the service industry more convenient.

The Austrian School's purpose by analyzing the economy is often described as *insights*, i.e. that paying attention to certain important processes in the market is important and valuable, despite the fact that mainstream economic theory does not always do this. Hence, the contribution of the Austrian School approach involves the analysis of fundamentals like market prices, subjective costs, incentives and competition in order to supplement the understanding of economic conditions as depending on known ends and means.

The Austrian School analyzes how the market creates changes through the interactions of the participants and the conditions for change in prices, services and processes. A central point is that the decisions made by market participants change the conditions within the market in the current and subsequent periods. This is one reason for the development of and existence of current and future opportunities.

According to mainstream economics, as voiced, for example, by Clark (1899), the market economy has strong equilibrating forces and the factors of production are allocated according to their marginal economic remuneration. This is part of the phenomenon known as Baumol's disease (1966), in which the factors of production in the service industry that have low marginal products have the same salary as the factors employed by physical production that have high marginal products. This puzzle illustrates the need to analyze the service industries using a different approach besides the concept of equilibrium.

Neo-institutionalists, e.g. Williamson (1985), analyze the economy without using an equilibrium concept, which is in somewhat stark contrast to mainstream economics. The Austrians take an intermediate position, claiming that economic analysis should focus on the processes characterizing the market more than the outcome. According to the Austrians, the adjustment to equilibrium is not simple, and whilst it is necessary, it is not sufficient. Mises does not deny the relevance of the concept of equilibrium, but states that finding the conditions of reciprocally consistent decisions; i.e. equilibrium, should not be the main purpose of the analysis, claiming, "The Austrian School, too, uses the idea of rest and equilibrium which economic thought cannot do without. But it is always aware of the purely instrumental nature of such an idea, and similar aids". Mises (1978, p. 36)

Two concepts central to Mises and Kirzner's understanding of the market as a process are the entrepreneur and experience. The entrepreneur is used in describing the market as a process: "Entrepreneur means acting man in regard to the changes occurring in the data of the market" (Mises, 1949, p. 255). According to Kirzner, human action comprises an entrepreneurial aspect that cannot be analyzed with a mainstream economic framework involving optimization and efficiency. Kirzner (1973) believes that the entrepreneurial aspect is of decisive importance to all

economic activity and development states. Kirzner's concept of alertness, which is exercised by both producers and consumers, can be performed both in the market and in a hierarchy, which stands in contrast to Schumpeter and Casson's assumptions about the entrepreneur.

This concept of the entrepreneur in an Austrian sense seems to be especially well suited for analyzing the service industry because it takes an atomized, individual approach, accentuates both processes and the appearance of opportunity. In the sense it is used here, entrepreneurship is a way of thinking or acting involving opportunity and activities like creativity, innovation and alertness. (Tichy & Bennis, 2007) has the interesting view that: "leadership judgment occurs not in a single moment but throughout a process".

In this paper, the entrepreneur is a function. In some cases, the entrepreneur can be pinpointed as a person or as one or a few people who exercise the entrepreneurial function. For example Kirzner's concept of pure entrepreneurship is suitable, because it claims that alertness can be exercised in markets as well as in hierarchies. In the latter case, the entrepreneur is often a team or a process more than a person. Moreover, consumers also exercise Kirzner's pure entrepreneurship.

5. Opportunity

An analysis of opportunity is essential to entrepreneurship, not least in the service industry. A useful approach is the individual-opportunity nexus, due to its focus on "How, by whom, and with what consequences opportunities are discovered, evaluated, and exploited" (Shane & Venkataraman, 2000, p. 218). According to their principle, opportunities come from market disequilibrium caused by different expectations and beliefs. Shane & Venkataraman (2000) maintain that with regard to strategy, management scholars are interested in 1) how entrepreneurial opportunities *arise*; 2) how and why some individuals *see* the opportunities, i.e. how and why opportunities are discovered by some people and not by others and 3) the different modes of *action* used to exploit the opportunities and how entrepreneurs use processes in different ways to exploit the opportunities..

Ad 1) The main philosophical issue is: Does an opportunity exist independently of the entrepreneur or is it a creation of the entrepreneur? Opportunities come into existence in several different ways, caused by both exogenous shocks creating disequilibrium and by the endogenous processes moving the economy towards equilibrium. Schumpeter (1934) stresses the significance of the first reason, exogenous technical shocks, while Clark (1899) emphasizes equilibrating forces (1899). Other entrepreneurs often create opportunities available to other entrepreneurs. Holcombe (2003) uses the personal computer, which gave rise to subsequent products like the mouse and other

accessories, in addition to software, to emphasize this. The new opportunities that arose from the introduction of personal computers did not stop there. Dell, for example, represents an entrepreneur that introduced a new business model because of the actions of other entrepreneurs. An interesting aspect of opportunities is that utilizing an entrepreneurial opportunity does not necessarily diminish the possible opportunities available to other entrepreneurs. Quite often, the exploitation of an opportunity gives rise to new opportunities for other entrepreneurs.

Ad 2) Different individuals vigilance related to surrounding opportunities are based on different *knowledge* about past and current values. Important are different *alertness*, and different *judgments* about future values. The internet means that knowledge about past and current circumstances is becoming more available and synchronized, thus allowing entrepreneurs (including organizations) who are able to apply sophisticated methods and use, for example, big data have an advantage over others. The different judgments made by various entrepreneurs may come from knowledge, calculations and even sense they have about the future. Many of the opportunities exploited by entrepreneurs are not new, but rather ones that had unutilized potential or capacity that went unrecognized by other entrepreneurs. Kirzner uses the metaphor of finding money on the sidewalk that others just walk by because they are unalert. Seeing the opportunities that are available is part of entrepreneurship.

Ad 3) Jorde and Teece's (1988) ideas implies engrafting specific knowledge and a certain scope by establishing a hierarchy. By exercising alertness, the hierarchy and its personnel acquire routines that create knowledge about internal procedures and the surrounding markets (Elkjær, 2013). The ongoing learning that takes place is paramount to the survival of the business or the organization (Teece, 1982). The different modes of action are rooted in past experience and current judgments.

6. Risk

The market is an institution with strong incentives. An agent in the market can make a fortune in a short time based on one extreme outcome, but also go bankrupt based on another extreme outcome.

As mentioned above more than two and a half centuries ago, Cantillon (1755) carried out an analysis of the market economy, using the concept of the entrepreneur to describe how some people face an insecure income and risk. The consequences of failure are often very severe. Knight (1921), who also discusses how entrepreneurship in a corporation is associated with risk, stresses the entrepreneurial function as a bearer of "true uncertainty", which cannot be subject to mathematical statistics. Considering what risks are at play, Cantillon (1755) describes the

entrepreneur as an agent buying materials to process and hire labor, while Knight (1921) writes about large-scale investments made in a corporation.

Innovation involves an element of uncertainty and risk. Jorde and Teece (1988, p. 7) define it as follows: “Innovation is the search for, and discovery, development, imitation and adoption of new processes, new products, and new organizational structures and procedures. It involves risk taking and uncertainty”. Nielson and Winther (1982) also concur with this definition.

Mainstream neoclassical theory often presumes that risk can be dealt with by using statistical theories of probability. In contrast to this position, Knight (1921) and Casson (1983) stress true uncertainty as a condition of the entrepreneur when making decisions. The individual perception and decision might be right or wrong and this implies a risk that cannot be subject to calculation. As a rule, successful entrepreneurs make sound judgments. The market test of this is whether or not the successful entrepreneur’s organization generates a profit, which is the basis of sustainable entrepreneurship.

The process of judgmental decision making makes use of publicly available and private information, as well as improvisation. Risk and uncertainty are closely related to judgmental decision making. The entrepreneur may have information not available to other people, and the entrepreneur considers the risk involved with a particular project to be small or smaller than estimated by other entrepreneurs. Pooling of information in an organization is an asset.

7. Organizations matter

Casson recognizes the role of opportunity and that the risk involved becomes a reality when the apparent opportunity is subject to the market test. Casson (1982) argues that all individuals make decisions, but that entrepreneurs specialize in this activity and that judgmental decision-making is the defining characteristic of the entrepreneur. In most cases, the entrepreneur is related to both a professional and commercial organization.

According to Simon (1976), organizations generally have a goal but often the goals are not subject to optimization but satisficing. A well-known example is a company that wants to buy real estate. The management searches for a lot or a building that fits certain requirements and begins to negotiate when a good option is found. Knowledge about the real estate market and statistics is useful. The process, however, cannot be characterized as optimizing. Many decisions are made like this and involve satisficing, which is a process that comprises a sequence of incremental, often minor innovations. Fuglsang (2011) describes this as bricolage. Satisficing most often occurs when exercising the function of entrepreneurship and judgment. A commercial hierarchy has to achieve a certain level of profitability in order to survive. For this purpose, the assumption of satisficing

(Simon, 1976) seems more suitable than optimizing agents (Debreu, 1959). These findings are the reason behind the following approach.

Casson (2005) emphasizes the entrepreneur as a missing component in several theories of the firm. Casson believes that the entrepreneur is paramount to the growth of a firm because *judgment* is essential for success in making multifaceted decisions under uncertainty. Most of all, the entrepreneur is an information manager.

Information and information costs are crucial to the entrepreneur in a dynamic sense because of the volatility of the market. Key investments are most often due to long-term volatility. Because of the unpredictable nature of change, the appropriate strategy is to delegate the responsibility of judgment and decision to an able individual with experience, a social network and sources of information. Within a hierarchy, the responsibility to react on short-term opportunities can be delegated to others under the supervision of the principal entrepreneur. One of the reasons for the existence of hierarchies is the need for pooling of resources and screening options at several hierarchal levels according to their importance, potential and risk (Elkjaer, 1992).

Other dominant factors are the relative importance of supply and demand factors. Some companies make their profit from having the capability to monitor the demand of the market and the competence to react suitably to the observed changes. Some changes are tangible or physical, while others are intangible, like a change in consumer values or a legal institution. Other companies pay attention to the production process and cost reduction. Accounting is also of importance to entrepreneurship.

This view is useful when analyzing services because the focus is not on the flow of physical output and materials but information. Entrepreneurs create organizations that are able to identify and monitor the dominant sources of information. A characteristic of the entrepreneur is not only fixed capital but also constant monitoring and using alertness to find and exploit the options available in an ever-changing market.

The role of the entrepreneur as a market maker and builder of hierarchies implies that judgment is related to both transactions costs and governance (Williamson, 1985). Coase (1937) describes this approach to the entrepreneur as a builder of markets and hierarchies.

The market as an institution causes economic restrictions upon a company, because it has to achieve a certain lower profit. This is the reason for the behavioral assumption satisficing. This understanding knits Knights' concept of the entrepreneur together with Casson and Simon’s.

8. Entrepreneurship as alertness and judgment

Figure 1 illustrates the connection between key individuals mentioned in this paper. The arrows reflect Kirzner, Casson and Simon's own assertions about who influenced them.

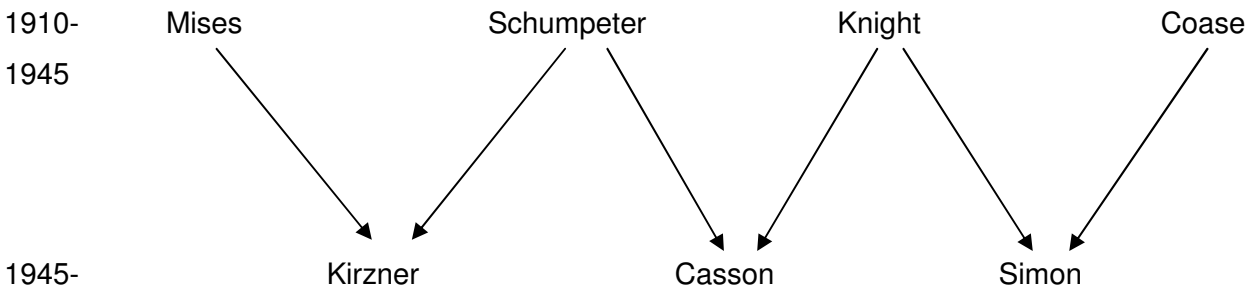

Figure 1. The connection between the influence of key individuals on various entrepreneurship theories

Figure 2 illustrates the connection between central concepts from the theories of entrepreneurship discussed in this paper.

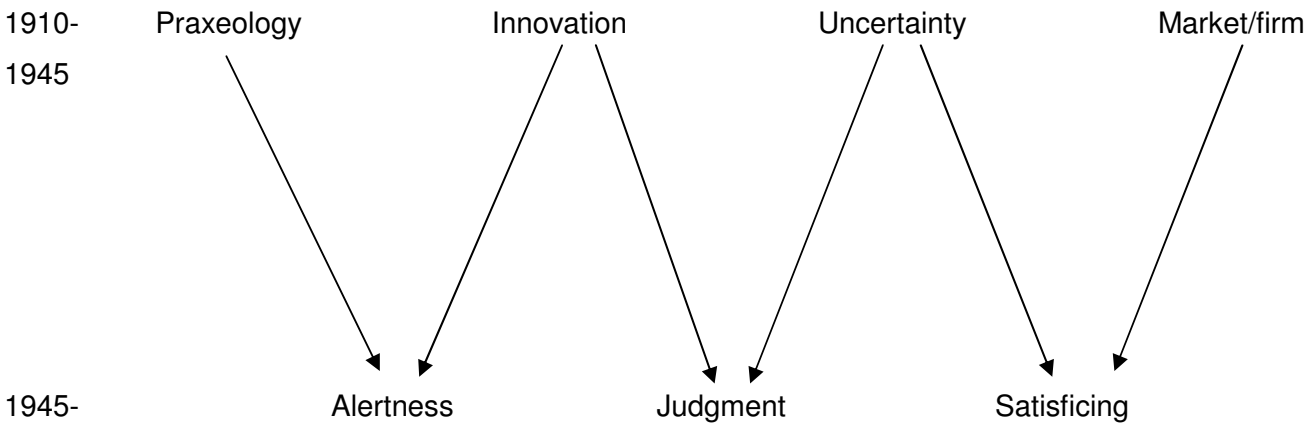

Figure 2. The connection between central concepts from theories of entrepreneurship

Based on the above discussion, the entrepreneur can be defined as follows:

The entrepreneur in a market and in an organization is a function, which entails a complementary use of alertness and judgment subject to satisficing (Elkjær, 1992, p. 112)**.**

This definition, which links entrepreneurship to alertness and judgment, was developed during a research project (Elkjær, 1992) designed to incorporate the entrepreneur in institutional theories of the firm. A somewhat similar approach is used in other research (Foss & Klein, 2012).

This definition can be used to illustrate how innovation and entrepreneurship interacts with economic development.

The following pages account for the relationship between the entrepreneur, production and private and public R&D.

The model, which comprises four real variables, has these attributes:

- The entrepreneur is the combined use of alertness and judgment subject to satisficing
- Processes involving entrepreneurship and R&D are at the center of the analysis
- The entrepreneur is also significant in equilibrium
- Exogenous research and innovation policy are part of the model

In the model, industry undertakes R&D, production and marketing. Besides industry, however, there is also exogenous research and stimulus of the process. A large number of agents exercise demand and supply in the market. From the Austrian School's atomized perspective, all individuals have limited and partial information about market conditions. See the appendix for a discussion of some of the model's technical properties and their consequences.

The variable's values at time t:

E(t): Entrepreneurship defined as alertness and judgment subject to satisficing

P(t): Production including service

R(t): R&D with the purpose of innovation

G(t): Exogenous research and supporting activities (not least public enterprise)

The four variables are difficult to quantify. Entrepreneurship as defined by the Austrian school is difficult to quantify, because it is carried out by many individuals. Production of services is difficult to measure due to certain qualitative aspects. Moreover, if R&D comprises small, nearly invisible steps or bricolage, then counting it is impossible. The same applies to the extent of exogenous research and innovation policy.

The model rests on three assumptions. First, the exercise of entrepreneurship depends on both the level of production (the realized profits) and R&D (the potential profits). Both cost leaders and

suppliers of differentiated products increase profit by increasing production within relevant intervals (Porter, 1985). Entrepreneurship means alertness and judgment applied not only to existing products and markets but also to new markets and new products.

$$E(t) = a_1 P(t) + a_2 R(t) \quad (1)$$

- a_1 expresses the effect of the size of production to entrepreneurship
- a_2 expresses the effect of the size of R&D to the level of entrepreneurship

The connection between entrepreneurship and production is, furthermore, that advanced products and services often demand an ongoing relationship between the supplier and the customer. A globalized market enhances these circumstances. Moreover, the psychological principle is that reward (profit) stimulates the company to maintain the relationship and to spend entrepreneurial energy on selling more to the same costumers and on finding more costumers. New companies based on existing production and existing companies (spin offs) are most likely to survive and grow (Danish Business Authority).

If a company applies a strategy of differentiation, R&D is paramount as a competitive strategy. R&D stimulates entrepreneurship, because R&D implies new opportunities from new products and processes. The incentive is to be aware of the opportunities before competitors are. The level of entrepreneurship can adjust to changes in production and R&D without significant time lag. Kirzner (1973) claims that “pure entrepreneurship” is exercised without resources.

Second, production adjusts gradually to a change in the level of entrepreneurship.

$$\frac{dP(t)}{dt} = b[E(t) - \beta P(t)] \quad (2)$$

- β expresses the change in the level of production by a change in the level of entrepreneurship
- b expresses the tempo with which the production adjusts to a change in the level of entrepreneurship

Orders are due to entrepreneurship, because the sale of products and services demands alertness and judgment. An increase in the level of entrepreneurship will increase the production gradually until

a certain level. Equation (2) states that a certain level of entrepreneurship (contact to customers, etc.), $\beta P'$, corresponds to a certain level of production P', which is reached after a time lag, depending on the size of b. Technically, the coefficient $1/\beta$ expresses the increase in production caused by a change in entrepreneurship by one unit.

Third, changes in both the level of production and exogenous research and policy change the level of R&D. Production stimulates R&D because R&D, innovation, learning and knowledge are related as ongoing activities linked to production (Teece, 1982).

$$\frac{dR(t)}{dt} = c_1[P(t) - \gamma R(t)] + c_2[G(t) - R(t)] \qquad (3)$$

- γ expresses how changes in the level of production influence the level of R&D
- c_1 expresses the tempo by which changes in the production influence the level of R&D
- c_2 expresses the tempo by which changes in the exogenous research influence the level of R&D

An increase in production and income provides room for a gradual increase in R&D. Equation (3) states that an increased level of production increases the level of R&D by the factor $1/\gamma$. The coefficient c_1 describes the tempo of the increase.

Exogenous research also stimulates R&D. Partnerships between universities and companies are often fruitful, for example.

The causality of the model can be expressed by figure 3:

Production $\rightarrow$ Entrepreneurship $\leftarrow$ R&D cf. (1)

Entrepreneurship $\Rightarrow$ Production cf. (2)

Production $\Rightarrow$ R&D $\Leftarrow$ Exogenous research cf. (3)

Legend: $\rightarrow$ The level of one of the variables influences the other without significant time lag.

$\Rightarrow$ A change in one of the variables generates a gradual adjustment of the other until a certain higher (or lower) level.

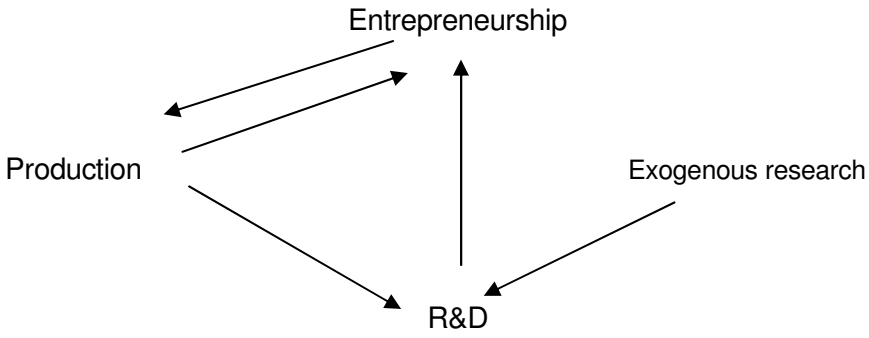

Figure 3. Causality of The model

Production and exogenous research stimulate R&D, not entrepreneurship. According to e.g. Schumpeter, entrepreneurship does not create inventions (R&D) but rather innovations. In addition, this assumption is inspired by Sarasvathy (2008) and the principles of effectuation. R&D is a process generally paired with existing resources, production and wealth and mainly takes place in that sense.

The three main features of the model are:

- R&D increases production but only via entrepreneurship
- Entrepreneurship without R&D can only increase production to a certain limit
- The effort of entrepreneurship and R&D combined increases production
- Innovation policy (exogenous research) is important

When the economy demonstrates the above properties, the model illustrates 1) that significant exogenous research stabilizes and stimulates the economy and 2) that encouraging private R&D to use findings from exogenous research is essential.

The appendix provides further detail and an analysis of the stability of the model.

9. Conclusion

The argument made in this paper is that the entrepreneur is a useful concept for explaining development by innovation, technical and organizational change in the service sector. In addition the point made in this paper is that Kirzner's concept can benefit from Casson's ideas on institutional context, which describe entrepreneurship as decisions made under uncertainty.

The Austrian School considers the market as a process, not a condition. The purpose of their research is to *understand* this process rather than predicting its outcome (forecasting). Because of this perspective, the Austrian School is often considered as being in opposition to neoclassical economic theory and its use of the concept of equilibrium. The disharmony between Austrian

theory and the use of the concept of equilibrium is only seeming. The idea behind the Austrian School is to enhance the use of the concept of equilibrium with analyses explaining the movement towards equilibrium. The Austrian contribution to an analysis of the service industry is that the *process of change is significant* and not a matter of course.

The entrepreneur is often a process more than a person. In some cases, pinpointing certain individuals or roles as practitioners of the entrepreneurial function is not possible. The actual application of alertness and judgment, subject to satisficing, can instead be the entrepreneur, both in the market and in the organization. In the organization, this is known as intrapreneurship.

In general entrepreneurial alertness and judgment are applied where future services and goods, and processes of production, suggest a higher price for the future output than the input.

The model illustrates certain parts of Schumpeter's comprehension of the importance of innovation to economic development, but without Schumpeter's theory of money and business cycles. Another difference compared to Schumpeter is that the entrepreneur is not invisible in equilibrium.

In the model both the size of the actual production and R&D stimulate entrepreneurship.

An increased exogenous research will increase the production of equilibrium by increased R&D and increased entrepreneurial activity. For the sake of increased R&D it is important to have a mechanism that ensures an increase in production is transformed to increased R&D.

In the appendix it is demonstrated that there might be a conflict between the two goals, growth and stability. It is demonstrated that this dilemma can be alleviated by exogenous stabilization. The stability of an economy increases by the existence of mechanisms that ensure relatively large exogenous research and a strong exogenous stimulation of the R&D from the exogenous research policy.

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Appendix:

In the following paragraphs the conditions to existence and stability of equilibrium is discussed (sections 1 and 2). It is demonstrated that there might be a conflict between the two goals, growth and stability. It will be demonstrated that this dilemma can be alleviated by innovation policy and exogenous stabilization.

1. The characteristic of equilibrium is that the variables do not change their value if the exogenous variables do not change. The conditions to equilibrium can be found by giving dP/dt and dR/dt a value of zero in the equations (2) and (3), and subsequently by solving the equations (1), (2) and (3) with regards to E, P and R.

If the values of equilibrium are called E_L, P_L and R_L, and exogenous research is represented by G_L; the following three equations will be true after equilibrium is reached:

$$E_L = a_1 P_L + a_2 R_L \tag{4}$$

$$0 = b(E_L - \beta P_L) \tag{5}$$

$$0 = c_1(P_L - \gamma R_L) + c_2(G_L - R_L) \tag{6}$$

The three equations (4), (5) and (6) are derived from (1), (2) and (3). By substituting equation (4) into equation (5), we find the connection between production and R&D in equilibrium.

$$P_L = \frac{a_2}{\beta - a_1} R_L \tag{7}$$

For technical reasons, β is assumed to be different from a_1.[1] If the determined value for P_L enters equation (6), we can solve the equation regarding R_L, and find the value of equilibrium of R&D:

$$R_L = \left[\frac{c_2(\beta - a_1)}{(c_1 \gamma + c_2)(\beta - a_1) - (c_1 a_2)} \right] G_L \tag{8a}$$

[1] It is a general assumption that the coefficients can't have values which would cause one or more of the denominators in the right side of the fractions (8) and (9) to be zero, or negative equilibrium values..

⇳

$$R_L = \left[\frac{c_2(\beta - a_1)}{c_2(\beta - a_1) + c_1[\gamma(\beta - a_1) - a_2]} \right] G_L \qquad (8b)$$

By substituting a rearrangement of (8a) into (7) the value of equilibrium of the production P_L appears:

$$P_L = \left[\frac{c_2 a_2}{(c_1\gamma + c_2)(\beta - a_1) - (c_1 a_2)} \right] G_L \qquad (9)$$

We can observe in (8b) and (9) that R_L, P_L and therefore E_L are all dependent on exogenous research, G_L. The coefficients b, c_1 and c_2 are all positive and express the tempo at which the economy moves towards equilibrium. Even if the value of the production does not change in equilibrium, you find both R&D and entrepreneurship in equilibrium because of changes in products and product lifecycles. This means that innovation also takes place in equilibrium.

In order to estimate the stability of the equilibrium E is eliminated from (2) and (3) by use of (1), resulting in the characteristic equation to (2) and (3) being constructed:

$$\begin{vmatrix} -b(\beta - a_1) - \lambda & ba_2 \\ c_1 & -(c_1\gamma + c_2) - \lambda \end{vmatrix} = 0 \qquad (10)$$

This equation is rewritten into the characteristic polynomial, which in this case is a quadratic polynomial at normal form:

$$\lambda^2 + \{c_1\gamma + c_2 + b(\beta - a_1)\}\lambda + b\{(\beta - a_1)(c_1\gamma + c_2) - a_2 c_1\} = 0 \qquad (11)$$

A necessary and sufficient condition of absolute asymptotic stability of the equations (2) and (3) is that all the roots in the characteristic polynomial of the equations have negative real parts. In this case the fulfillment of the following two inequalities implicates that the real part of the roots to λ in the characteristic polynomial are negative:

$$c_1\gamma + c_2 + b(\beta - a_1) > 0 \qquad (12)$$

and

$$(\beta - a_1)(c_1\gamma + c_2) - a_2 c_1 > 0 \qquad (13a)$$

Because of the assumption that all coefficients are positive is the fulfillment of the following inequality (14) sufficient that the first inequality (12) is fulfilled. We notice that the conditions of stability also ensure that the stationary solutions are positive. At the same time, the fulfillment of inequality (14) is a necessary condition in order to fulfill the inequality (13a).

$$\beta > a_1 \qquad (14)$$

Therefore the two inequalities (13a) and (14) represent the necessary and sufficient conditions for stability.

The inequality (14) implies that as a condition to stability, the level of entrepreneurship activity, βP_L, which is needed to generate the production in equilibrium, must be larger than the level of entrepreneurship activity, $a_1 P_L$ that will emerge without R&D.

$$\beta P_L > a_1 P_L \qquad (15)$$

If $\beta < a_1$ the value of either R&D, or the production will be negative in equilibrium, cf. (7), which is absurd. Therefore the assumption is that (15) and therefore (14) are fulfilled. Because (15) is fulfilled, the entrepreneurial activity and the production cannot influence/affect one another in an upward, never ending, spiral. An industry or an economy without R&D cannot experience never-ending growth. This seems to make sense.

If the other condition of stability, the inequality (13a), is not fulfilled, then R&D, entrepreneurial activity and production will be able to drive one another upwards in a never ending spiral in a similar way. Stability, i.e. the fulfillment of the inequality (13a), implies an upper limit of the values of a_1 and a_2. It is not possible to determine offhand if an increase in c_1 will make the left side of the equation in (13a) bigger or smaller overall.

Limited values of a_1 and a_2 imply that according to (1) an upper limit to the level of entrepreneurial activity, which is determined by given values of production and R&D.

Moreover the inequality (13a) implies that the stability of an equilibrium is increased with increasing values of β and γ. Stability in the model implies a limit to the effect on the production caused by a marginal increase in the entrepreneurial activity, and that an increase in the production only has a limited effect at the level of R&D. This seems to make sense.

The stability is encouraged if the coefficient c_1 in equation (3) is not too large, i.e. it is suitable to stability, if there is a time lag until the effect of an increase in production brings R&D to a higher level. Fulfillment of this condition does not seem unrealistic because an increase in production demands

immediate investments in increased stocks of goods, receivables and capacity, which might postpone an investment in R&D.

On the other hand the stability is increased by a large value of c_2, cf. (13a), which implies that increased exogenous research has a direct effect at the level of R&D in industry. If the inequality $(\beta - a_1) < a_2$ is valid then the equilibrium values for R&D and production are increased, if c_2 is increased – ceteris paribus – cf. (8a) and (9).

2. The comparative statics of the system will now be discussed. It is investigated in this context how the advanced system is influenced by an increase in G_L, exogenous research.

The equation (8b) calculates the change in R&D caused by a change in exogenous research. Fulfillment of the condition of stability (14) implies that the numerator in the fraction on the right-hand side of the equation (8b) is positive. In the same way fulfillment of the other condition of stability, equation (13a), conditions a positive denominator.

This inequality is fulfilled if both conditions are fulfilled:

$$\frac{dR_L}{dG_L} > 0 \tag{16}$$

Increased exogenous research will increase the level equilibrium for the R&D of an industry.

Because the inequality $\beta > a_1$ is fulfilled, we can deduce from equation (7) this inequality:

$$\frac{dP_L}{dR_L} > 0 \tag{17a}$$

An increase in the equilibrium values of R&D increases the production in equilibrium.

The inequalities (16) and (17a) give this inequality:

$$\frac{dP_L}{dG_L} > 0 \tag{17b}$$

An increased exogenous research will increase the production of equilibrium by increased R&D and increased entrepreneurial activity.

Finally we can set up this equation by using equation (4):

$$\frac{dE_L}{d\,G_L} = a_1 \frac{dP_L}{dG_L} + a_2 \frac{dR_L}{dG_L} > 0 \qquad (18)$$

Increased exogenous research implies an increased incentive for increased entrepreneurial activity, because of increased production and increased R&D. It follows that an increased exogenous research will increase the equilibrium values of entrepreneurial activity, production and R&D.

It appears from the setup of inequalities that diminishing exogenous research will have a decreasing effect on the industrial F&U, production and the entrepreneurial activity.

3. Next, the importance of the mutual relations between the size of the industrial R&D, the exogenous research and the production will be discussed. The size of the private R&D in relation to the exogenous research can be deduced from equation (8b). For example, if and only if (19) is fulfilled, then the numerator will be bigger than the denominator:

$$\gamma(\beta - a_1) < a_2 \qquad (19)$$

The industrial R&D is **larger** than the exogenous research in equilibrium if inequality (19) is fulfilled. R & D is less than (or equal to) the exogenous research if (19) is not fulfilled.

The fulfillment of (19) implies that a_1 and a_2 have to be large. This means there has to be a strong effect from the scope of R&D as well as production to the entrepreneurial activity.

In addition to this, β and γ have to be small. 1/β is a factor which shows the increase in production brought forward by an increase in the entrepreneurial activity by one unit, cf. (2). The production is increased by an efficient entrepreneurial function. In case the causality from changes in the entrepreneurial activity to changes in the production is strong (which in the model means β is small), the industry will be more disposed to increase R&D than by a weaker connection between changes in the entrepreneurial activity and changes in the production.

As can be seen from equation (3), 1/γ is an expression of the effect on R&D of a change in production by one unit. In case this effect is strong, i.e. γ is small, the possibilities to fulfill the inequality (19) is significant too. An industry, in which an increase in production has an important impact at the level of R&D, will be more disposed to increased R&D than an industry with a weaker connection between changes in production and changes in R&D. For the sake of increased R&D it is important to have a mechanism that ensures an increase in production is transformed to increased R&D.

A conflict exists between a condition with a large R&D in relation to the size of the production and exogenous research, (i.e. large coefficients a_1 and a_2, alongside small coefficients β and γ), and fulfillment of inequality (13a), the critical condition of stability. From (13a) it is evident how smaller

values of β and γ results in the inequality being more difficult to fulfill, i.e. the system has weak properties of stability. A large R&D in relation to the exogenous research and the production will not only generate growth but also reduce economic stability.

However, there is another effect that stimulates stability. As can be seen from inequality (13a), the coefficient c_2 influences the fulfillment of the conditions of stability. This is discussed in the paragraph.

First we rewrite (13a):

$$(\beta - a_1)(\gamma + \frac{c_2}{c_1}) - a_2 > 0 \qquad (13b)$$

It is evident from (13b) that stability is increased with a large value of $(\gamma + c_2/c_1)$. If we want stability in a situation with a large R&D in relation to production and exogenous research – which in (13b) is illustrated with an in relation to a_2 small value of γ and $(\beta - a_1)$ – then the systems stability has to be created by the relation c_2/c_1. With other terms the stability of an economy increases, firstly with a large R&D in relation the size of the production and the exogenous research, and secondly if exogenous research stimulates R&D without delay.

Summarizing: the stability of an economy increases by the existence of mechanisms that ensure relatively large exogenous research and a strong exogenous stimulation of the R&D from the exogenous research.