Analysing the path of "using cyclical patterns for interpreting the situation"– a different approach using path dependency theory

Abstract:

The existence of economic cycles and their presentation in cyclical patterns seems a fact. But increasing global practice of using it for interpretation of the situation especially in 'times of a crisis' leads to activation of a variety of self-reinforcing mechanisms and a global increase of path dependency which process may be described through positive feedback effects of 'increasing returns'. The accordant increase can theoretically result in increasing instabilities or strengthening of structural lock-ins in all adjacent areas. The present global conformity in "using cyclical patterns for interpreting the situation" can indicate path dependency affecting relevant nowadays crisis. Keeping this conformity alive or even increasing it results in further increasing path dependency which again reinforces and increases the crisis as following analyses will show.

Introduction

If you characterize the business cycle model as a 'mental model' which is shared by actors and used for interpretation of the situation, Denzau and North already showed that there is path dependency resulting from using it (Denzau/North 1993, North 2005). In this paper it is showed, how this is happening in the present situation, which reinforcing processes are activated, in which 'velocity' path dependency is increasing, and what may be possible outcomes. The global 'conformity', in which acts for reflation are decided, as well as increasingly visible herding effects on financial markets and in society can be substantiated and predicted as outcomes of path dependency.

In this paper it is described, how the exponential reinforcing processes that can be watched in connection with the present financial and economic crisis can be based on strongly acting path dependency. The interpretation of the situation using the economic cycle is placed in the centre of considerations. And even the analysis of this development path alone, shows increasingly activated mechanisms stabilizing the path, assuring and expanding further steps on it. 'Using the business cycle model for interpreting the situation' effects like an accelerant: Path dependency gets exponentially activated and reinforced as an effect of characterizing the situation as a crisis proposing a way out by reaching increasing returns again.

Like in a chain reaction mechanisms are activated, that intensify path dependency: after mobilization these mechanisms work reinforcing and increasingly on neighboured mechanisms. The business cycle model is more and more used for scaling the crisis, and especially for financial institutes it gets more and more difficult investing without legitimization through considering the special context of the crisis. Increasingly and in complementary structures negotiators, organizations, institutions and individual actors point out to include the 'situation of crisis' in their decisions and actions.

Governments, meta-organizations and institutions, authorities in hierarchies get more involved. They are given the power to interpret the situation, to decide how should be acted or to intervene themselves. And they tend more to use the business cycle model for interpretation of the situation, too, reaching for updated economic forecasts presented by their own institutes and show how they deeply try as to their ability to reduce the crisis for (as to the cyclic model) reaching a positive growth again as soon as possible and thus 'increasing returns'.

The lager activation and stronger acceleration of these mechanisms can be described through reactive sequences, a formalization of strongly rising path dependency. So the activation of path dependency mechanisms again can be described using path dependency. A result is an escalation in all adjacent areas, programmed by path dependency, a global more unanimous 'conformity in the appropriateness and necessity' of 'using the business cycle model for interpreting the situation' which again leads to more path dependency, herding, and societal inequalities.

As basis of this argumentation, first will be described an economic monitoring of path dependency by David, and a stochastic formalization of 'increasing returns' as a reinforcing process using a generalization of a Polya Process based on a mathematical urn model, presented in the path dependency context by Arthur. Then view will be opened up from utility theory to the political and sociological context by summarized propositions of Pierson and Mahoney. More mechanisms for stabilization and manifestation of path dependency will be mentioned. And as an alternative to description of path dependency through reinforcing processes the sequencing in a type of 'reactive sequences' will be outlined.

Afterwards the mechanisms and notations again will be summarized and the meaning of 'path dependency gets activated' or 'path dependency increases' will be clarified.

The theoretical structures will be applied to the development path of "using the business cycle model for interpreting the situation". A diagram will show how the mechanisms, which themselves act reinforcing, additionally interact in a reactive sequence. As to Arthur's

formalization of the process of increasing returns, the 'velocity' of those effects will be estimated and resulting effects like escalating inequalities, and more often and stronger herding, as e.g. on financial markets, will be deduced.

In a conclusion it will be pointed out, that path dependency may be watched from a macro perspective and accordant actions can be explained, but principally actors have the option to choose and act differently in each moment. As an alternative interpretation of the situation and as an explanation and action basis the presented theory gives the chance of de-escalation.

1. From watching path dependency to 'path dependence theory'

"A *path-dependent* sequence of economic changes is one of which important influences upon the eventual outcome can be exerted by temporally remote events, including happenings dominated by chance elements rather than systematic forces. Stochastic processes like that do not converge automatically to a fixed-point distribution of outcomes, and are called *non-ergodic*. In such circumstances "historical accidents" can neither be ignored, nor neatly quarantined for the purpose of economic analysis; the dynamic process itself takes on an *essentially historical* character." (David 1985: 332, emphasis by author)

Although the origin of the idea of path dependency might not be determined, the notation goes back on Paul A. David and W. Brian Arthur (cp. e.g. Beyer 2006). In their criticism on efficiency fundaments of neoclassical economics they point out that in a positive feedback process of increasing returns not necessarily the more efficient technology wins (cp. e.g. Arthur 1989, 1994; David 1985, 2000, 2007). David supports the thesis by research on the evolution of the typewriter and the lock-in of the QWERTY-keyboard (David 1985). The name of the keyboard consists of the letters printed on the keys of the topmost row of letters on the keyboard. This key placing is more a matter of chance. The 52nd inventor of the typewriter, Christopher Latham Sholes, created together with his friends, Carlos Glidden et al., the first typewriter which they had patented in 1867. Different problems had to be solved before readiness for start of production. Thus e.g. in a revision the visibility of the present written line could be guaranteed and the tendency of typebars to clash and jam when stuck in rapid succession or to hammer strings of repeated letters was reduced by repeated optimization. As an optimal placement of letters and numbers on keyboard there resulted a four line version of keys. The final design of key placement was fixed by the production

company in 1873. It showed the even in nowadays present keyboard line QWERTYUIOP: Especially this placement should help future salesmen to impress their customers by quickly writing the brand name: "TYPE WRITER".

"The agents engaged in production and purchase decisions in today's keyboard market are not the prisoners of custom, conspiracy, or state control. But while they are, as we now say, perfectly "free to choose," their behavior, nevertheless, is held fast in the grip of events long forgotten and shaped by circumstances in which neither they nor their interests figured." (David 1985: 333)

Even when there is no risk for present electronic keyboards to stuck, clash or jam and there is no longer a reason to place letters in row for being able to type them quickly (especially since inventing the touch system), the placement of keys on the keyboard remains quite unchanged. This is especially surprising, because other efficiency criteria, as e.g. the letter frequency in the language and thus the resulting hammering frequency optimized together with ergonomic aspects, like e.g. the convenience of different positions, would come out in a preference of a different positioning of keys (cp. David 1985; Beyer 2005).

Using the example of the QWERTY keyboard David bases the lock in of the path on the quasi irreversibility of investments: While it would be easy for the production company to change the positioning of keys, customers have to rely on their employers' typing qualities whose practice in typing on the QWERTY keyboard can be described as quasi irreversible investments.

1.1. Formalization of ‚Increasing Returns' through stochastic reinforcing processes

Arthur states as reasons for or fundamental components of self-reinforcing processes the following four aspects (cp. Arthur 1994: 112):
- large set-up or fixed costs which give the advantage of falling unit costs to increased output;
- learning effects which act to improve products or lower theirs cost as their prevalence increases;
- coordination effects which confer advantages to "going along" with other economic agents taking similar action;

- and self-reinforcing expectations where increased prevalence on the market enhances beliefs of further prevalence.

This way Arthur bases the empirical situation of increasing returns in his economic, utilitarian monitoring on effects which increase with growing output and result in a growing benefit. Thus for actors it is interesting to further follow a once chosen path. With growing effects of increasing returns it is predictable that market dominances lock in or keep growing.

Facing the question which of two technologies on the market will reach this dominance, Arthur describes the effects of increasing returns using the Polya-urn. He first shows the way of modelling on the example of the linear Polya Process and later deduces a more general model as a more realistic one, the non-linear case.
In the standard Polya Process Arthur uses the following example (cp. Arthur 1994):
In an urn there are two balls, one is red and one is white. In a process of removing from and putting back in the urn each step one coloured ball will be removed from the urn and two balls of this colour will be put back.

Because of enlarging the number of coloured balls of one colour a step, the probability increases to remove a ball from the same colour again the next step. The more often one colour is taken the higher the probability is to pick that one again the next step and the one after and most of the next steps, too. So this process describes a self-reinforcing mechanism. Furthermore it unwinds that events at the start of the process have much more impact on the end result of colour shares than later events. In this way small events as for example one single step in the process, when occurred at the beginning of the development path, have a great impact on the later colouring percentage and thus on later steps of the process. While later steps only have an incremental effect or are diminishing as to the colouring of the balls because the process might already be stuck in a lock in.

Just the same Arthur's example analyses show that at the beginning of the development path, equalling the start of the applied Polya Process, it can not be forecasted which colour relation will be reinforced or locked in later. Back applied on the technologies on a market this implies that with equal starting positions at the beginning of the development path it can not be predicted in which market shares this technologies will reinforce later, or more precisely, which technology will dominate the market in the end. This unpredictability gets described as

'nonergodicity' and is one of the characterizing attitudes of path dependent development paths (cp. Arthur 1994: 46).

In a more general case of the dual example of standard Polya Processes Arthur increases the number of considered technologies on the market, thus the number of possible ball colours in the urn. Furthermore he kicks out the hypothesis of the urn model forming the probability for the following step through the present colour relation of the ball in the urn, but also allows different probability functions. If the new probability for removing a coloured ball from the urn differs from the colour relation in the urn there will result dynamics which push the colour relation on a way to a new colour relation, where the probability calculated by the non-linear Polya Process equals the one from the linear case (cp. Arthur 1994: 41 diagram 3). Arthur demonstrates that the reinforcing of colour relations, namely the lock in, can only appear in one of the described ways. Till one of these constellations is reached the colour relation evolves along recognizable dynamics. There might still multiple outcomes in most cases so a reliable prediction of the winning technology on the market still is not possible. But by these analyses Arthur is able to reduce the number of possible outcomes from infinity to calculable number of constellations, although the process still is nonergodic.

Arthur's analyses based on stochastic modelling were often criticized by other authors as being far from reality:

"All rules are explicit and preset, and sometimes the central element of the emergence of path constitution processes is totally missing. Therefore you should be careful to try out logic on this point which does not hit the centre of the process, but just describes the status of a metaphorical representation." (Cp. Schreyögg/Sydow/Koch 2003: 266, translated by the author)

Arthur's models of path dependency only depend on the assumption of an acting mechanism of increasing returns, that is why in his considerations the returning of paths is no relevant option and the lock in seems inevitable. Especially Arthur considers coordination effects which are based on the benefit of aligned actor's decisions, but he leaves out the possible winning chance of extravagance and especially 'different' decisions and actions (cp. Beyer 2006: 28). Sydow and Schreyögg also mention concrete applications for path breaking (cp. Table Sydow/Schreyögg 2005: 25), describe the possibility of a path vanishing (cp.

Schreyögg/Sydow/Koch 2003: 274ff), and enlighten the option of a mindful path creation (Sydow/Schreyögg 2005: 26ff).

While Arthur formalized an ideal stochastic process of increasing returns and tried to characterize it more detailed using mathematics, e.g. Pierson and Mahoney presented additional mechanisms which also can have an effect of assuring continuity on development paths and thus be possible creators of path dependency.

1.2. Enlargement of the economic theory by transferring it in the political context

Instead of considering stochastic processes in the economic context, Pierson transfers the concept of path dependency in the political context, where he focuses on social processes (cp Pierson 2000). Therefore he first summarizes Arthur's (1994: 112-3) characterization of self-reinforcing processes as follows:

„1. *Unpredictability*. Because early events have a large effect and are partly random, many outcomes may be possible. We cannot predict ahead of time which of these possible end-states will reached.

2. *Inflexibility*. The farther into the process we are, the harder it becomes to shift from one path to another. In applications to technology, a given subsidy to a particular technique will be more likely to shift the ultimate outcome if it occurs early rather than late. Sufficient movement down a particular path may eventually lock in one solution.

3. *Nonergodicity*. Accidental events early in a sequence do not cancel out. They cannot be treated (which is to say, ignored) as "noise," because they feed back into future choices. Small events are remembered.

4. *Potential path inefficiency*. In the long-run, the outcome that becomes locked in may generate lower pay-offs than a foregone alternative would have.

To this one can add a general point of particular interest to social scientists: These are processes in which sequencing is critical. Earlier events matter much more than later ones, and hence different sequences may produce different outcomes. In these processes, history matters." (Pierson 2000: 253)

Pierson adds a fifth, a general aspect which as to him might be especially interesting for social scientists:

„These are processes in which sequencing is critical. Earlier events matter much more than later ones, and hence different sequences may produce different outcomes. In these processes, history matters." (Pierson 2000: 253)

Pierson points out, that the chronological order in which the events occur is fundamental. Because of 'earlier' events being more important for the whole process than later events it is necessary for monitoring events not only 'that' they occur, but 'when' they happen, therefore in which sequence of the whole self-reinforcing process they are placed. Only by considering events together with their accompanying self-reinforcing processes it is possible to reach reasons for happenings.

"If these characteristics are common in politics, then they carry major implications, both for the kinds of questions we should ask and the kinds of answers we should expect to find. Most important, they suggest the need to focus on the temporal dimensions of social processes." (Pierson 2000: 253)

So it is important not only to consider single events or their chronological order. Nevertheless it is necessary to concentrate on social processes and to make out at which moment in which state they acted how intensively. Accompanied, stabilized and accelerated by self-reinforcing processes, cause and effect can be temporal distant.

„Arguments about increasing returns, however, suggest the large dangers in any assumption that an institution arose because it serves some particularly useful purpose. [..] Many alternatives to the outcome in question might have been possible, and a dynamic of increasing returns may have locked in a particular option even though it originated by accident, or the factors that gave it an original advantage may have long since past away. *Rather than assume relative efficiency as an explanation, we have to go back and look.*" (Pierson 2000: 264, emphasis by author)

Pierson alerts that a functional perspective, in which the mere existence of manifested structures as e.g. institutions or organizations may be misused as an argument for an assured efficient outcome. For example in economics this argument is used, when stated that market mechanisms will assure that in the end realized prices, quantity supplied and demanded represent the most efficient combination. Just the same it is assumed that the technology

which is dominant in the end on a market must be the most efficient solution to a problem. But as David already stated presenting the historical evolution of the QWERTY keyboard, earlier criteria for efficiency need not to be everlasting or valid in the lock in, as for example the argument for salesmen being able to quickly write the word 'typewriter' for marketing reasons. But reinforced structures stay, like the QWERTY even on electronic keyboards. And it stays although as to present criteria a different key placement would be 'more efficient' and thus the QWERTY keyboard is inefficient now.

The strong existence and presence of self-reinforcing mechanisms in connection with reinforced structures can cause this very process, no matter whether efficient or not. Thus from the present perspective it can not be followed that a long-lasting structure must be efficient, but especially when the appearance of self-reinforcing mechanisms can be proved, only the reinforcing tendency towards a lock in can be followed. Efficiency, as to Pierson, is not an 'explanation' for the phenomenon, but the matter of efficiency is a different question which needs a detailed analysis of historical events for being answered.

1.3. Opening view to the social science context – considering reactive sequences

Mahoney even goes one step further and calls it a "paradox" (Mahoney 2000: 516-7) how utilitarian scientists try to prove a contradiction to their own theory, the strengthening of inefficiency, using this very theory, utility theory:

„*Utilitarian Explanation*. In economic history, as we have seen, analysts employ a utilitarian theoretical framework to explain self-reinforcing processes. In this framework, actors rationally choose to reproduce institutions – including perhaps sub-optimal institutions – because any potential benefits of transformation are outweighed by the costs." (Mahoney 2000: 517, emphasis by author)

„The combination of contingency during critical junctures with subsequent determinism via mechanisms of reproduction leads to a central paradox characterizing the outcomes of self-reinforcing, path-dependent sequences. Specifically, these outcomes simultaneously: 1) contradict the predictions of a theoretical framework employed by the investigator; and 2) are reproduced by processes associated with the very framework they contradict." (Mahoney 2000: 516)

For answering the question, why institutions are reproduced, Mahoney adds three perspectives, different from the utilitarian one, explaining mechanisms for stabilization of path dependency (Mahoney 2000: 517).

While the utilitarian approach focuses on actors' cost-benefit-analyses, the functionalistic approach considers the possibility that the institution has a functional position in the whole system. From the perspective of power it is possible to argument, that perhaps an elite group of actors may support this process. As a forth option, the legitimatory explanation, actors may consider it morally correct or appropriate to support the institution.

Further on Mahoney, for representing the perspective of sociological historians, introduces a different formalization of monitoring happened events: reactive sequences.

„Reactive sequences are chains of temporally ordered and causally connected events. In a reactive sequence, each event in the sequence is both a reaction to antecedent events and a cause of subsequent events. Early events in the sequence are especially important to final outcomes because a small change in one of these events can accumulate over time and make a great deal of difference by the end of the sequence." (Mahoney 2000: 526)

In a reactive sequence event A leads to event B, which causes C, which causes D etc.. Thus the sequence's outcome depends on all earlier events, especially including the first one.

„Whereas self-reinforcing sequences are characterized by processes of reproduction that *reinforce* early events, reactive sequences are marked by backlash processes that *transform* and perhaps *reverse* early events. In a reactive sequence, early events trigger subsequent development not by reproducing a given pattern, but by setting in motion a chain of tightly linked reactions and counterreactions." (Mahoney 2000: 526-7, emphasis by author)

While in a self-reinforcing process appearing effects may increase and become more strengthened, a reactive sequence acts like a chain reaction in which one initial event releases a whole chain of linked events. As to Mahoney (2000: 528-9) the initial breakpoint launching a reactive sequence is usually not totally random and thus independent of existing causalities, but can be an intersection, a conjuncture of different reactive sequences.

In this way Mahoney switches the perspective from non-predictable to monitoring a structure which at least in small steps of the sequence is predictable:

„As chaos theorists have stressed, final outcomes cannot necessarily be predicted on the basis of early events in a sequence, even if the sequence is governed by rigid mathematical laws. Yet, smaller intervals of connected events within overall sequences often can be predicted or explained. For path-dependent investigators, these smaller sets of intervening steps through which initial breakpoints produce final outcomes – not the direct link between breakpoints and outcomes – are the central objects of analysis." (Mahoney 2000: 528-9)

In comparison to different possible causalities, path dependency occurs, when an accidental historic event releases a sequence of events which follows a relative deterministic pattern (Mahoney 2000: 535).

1.4. Summary and notations used further on

For identifying patterns around the path of 'using the business cycle model for the interpretation of the situation' the common mechanisms showing a logic for assuring continuity of path dependency will be used, which Beyer summarizes as follows:

Mechanism	Logic for assuring continuity
Increasing Returns	Selfreinforcing process
Reactive Sequences	Irreversibility of chronology, quasi-irreversibility of the outcomes of progressions
Functionality	earmarking, systemic necessity
Complementarity	Interactions, effects of coordination
Power	Assurance of power, veto power
Legitimacy	Belief in legitimacy, sanctions
Conformity	Relief of decisions, mimetic isomorphism

Table 1: Showing an overview over mechanisms which may cause a path dependent continuity (cp. Beyer 2005, 2006).

As implied earlier, the considerations of 'Increasing Returns' influence theory in two ways (Mahoney 2000): On the one hand the mechanism describes a reinforcing process which Arthur approaches in modelling it through stochastic processes (cp. Arthur 1994) and which allows a description of progression opposed to a formalization through reactive sequences. On

the other hand the existence of 'Increasing Returns' is an argument in utility theory for the appearance of path dependency: As for cost-benefit analysis following the path is interesting, if positive feedback appears, and thus increasing returns. So it equates a 'pursuit of increasing returns', when actors decide for following a path after making a cost-benefit analysis.

In the following the first version of 'increasing returns' will be called the 'mechanism of increasing returns' or the reinforcing process equating the formalization of increasing returns and the second version the 'pursuit of increasing returns'.

Necessary for later monitoring of mechanisms interactions is the fact, that the utility theoretic, the functional, the legitimatory and the power centric approach (cp. Mahoney 2000) not only show different perspectives of the same fact. But they describe different mechanisms, each focussing on a different part of a structure, e.g. an institution[1], and working out this special effect.

So the mechanisms can be considered as a fan of effects for stabilization of path dependency, whereas each mechanism alone acts reinforcing and can be described in a characteristic way as increasing returns or a reactive sequence.

In the following the collected 'mechanisms' are: 'pursuit of increasing returns', functionality, complementarity, legitimacy, power, conformity.

And two types for describing the development path on which path dependency acts are: increasing returns and reactive sequences.

The mechanisms' interaction is thinkable in different ways: The mechanisms can be in a different relevance 'activated', they can act parallel, or interact weakening (cp. e.g. Kirchner 2008) or accelerating.

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[1] In this context an 'institution' can be described as 'manifested path dependency'. Through the process of 'institutionalizing' actors are effected by 'primary socialization' (cp. Berger/Luckmann 2007), which reinforcing impact on structures can be described using the 'duality of structures' (cp. Giddens 1984). These self-reinforcing effects are comparable with the general notation of path dependency, and the generalized notation of 'institutions' including routines, habituations, and standards reminds of the neoclassical notation of institutions (cp. Meyer/Rowan 1977). Using the concept therefore differs from North's way who more had a concept of institutions as 'solutions' to societal problems (cp. North 1990). This notation more approaches Ackermann's concept (cp. Ackermann 1999).

For being able to talk of ‚path dependency' as such, although there possibly act mechanisms of different intensity or direction, and how it might evolve or change, here will follow a notation:

In the following it will be talked of 'path dependency acts', 'path dependency increases' or 'path dependency gets increased', when a mechanism assuring continuity is activated, acts or gets activated. It is possible that e.g. institutions exist, but are not activated. For example in some areas the traffic lights will be switched of or switched to a flashing yellow light at nights. So the traffic lights, placed at streets, a manifested institution, stay present but depending on the daytime their lightening and their impact is changed, switched on or off.

The described mechanisms are comparably potentially present in society as institutions, organizations or implicit group processes. But in which frame the get activated, are activated, act or increasingly (inter-)act in what intensity is different (this is assumable referred to "not all path dependency is alike", Beyer 2005) and therefore interesting to analyze.

If one of the mechanisms is activated, there exists path dependency. If this mechanism is increased in its intensity or another mechanism is activated aligned, path dependency increases.

2. The development path of "using the cyclical model for interpreting the situation" gets more and more important.

Concerning the evolvement of the financial and economic crisis after the break down of an US-American bank (Lehman Brothers) globally, nearly timely parallel there was a significant downturn on financial markets. This implies that timely parallel around the globe the same decisions and actions were made and realized. This global agreement and conformity in the decisions was no random agreement in the meaning of although merely different decision criteria and individual choice of applied models accidentally the 'same' outcomes were decided. For then the agreement and conformity would only be a punctual single event, which would mean that the downturn would be compensated the very next minute,[2] which it was not. Furthermore there can be recognized a 'stabilization' in the lower numbers and even an 'increasing down turning tendency' to a lower level of market prices.

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[2] Because not every company which market price shrunk significantly was in direct contact with Lehman Brothers.

So actors were carrying on making the 'same' decisions. Especially the interpretation of the situation using the business cycle model is conform: After the downturns globally on financial markets the situation gets characterized, following the cyclical, as an 'economic downturn', which is followed, as to the economic cyclical, by a 'recession'.

So it can be stated that:

➔ There are mechanisms acting which keep the financial market prices on a 'new lower level', stabilize them or even increase the downturn.

➔ That implies acting mechanisms which reinforce actors in their decisions and/or increasingly push actors to decide following the trend and act alike.

➔ These mechanisms indicate the option of applying path dependency theory. They can be used as sign for significantly acting path dependency.

2.1. By acting according to the crisis path dependency is increased.

Especially the interpretation of the situation using the business cycle model keeps the same: After the downturns on financial markets the situation is worldwide interpreted as 'cyclical downturn' which leads to the phase of 'recession' according to the economic cyclical. Globally the situation has been described as a financial crisis and as to the cyclical a following economic crisis has been predicted.

One effect is that in using it for the interpretation of the situation the economic cyclical gains impact on the prognosis of future events. Accordingly all 'adjacent' institutions which work on this topic, as e.g. market forecasting institutes, or report on it as e.g. economic or financial media institutes attract attention and impact. This implies activation or strengthening of existing path dependency, because each institution can be described as a manifested development path with shadowing path reinforcing mechanisms.

Additionally more path dependency mechanisms get activated and/or increased:

The pursuit of increasing returns:
The greater expecting losses are forecasted in connection with the economic downturn and a possibly connected recession afterwards, the stronger the pursuit is of quickly reaching profits again and positive growth.

Functionality:

Focussing on the economic situation becomes more and more important. The business cycle model completes a function of scaling the crisis: By ranking on the economic cycle it can be read whether the crisis will get worse (in downturn), will weaken on the border to recession or recovery will be in view in a coming boom. Reflating the market becomes the solution to leave the crisis behind. Thus economic stimulus packages are discussed, packed, and decided which should improve economic activities and reflate the market. There 'cyclical summits' held with different participant groups for discussing special 'cyclical forecasts', effects of a 'bad business activity', and possibly further interventions.

Legitimacy:

Recognizing the crisis increases checkups, especially in financial areas, risky attitudes get more and more punished and risk-averse attitudes requested (and rewarded). With increasingly common uniform interpretation of the situation using the economic cyclical and basing action planning, decision processes, and investments on it, an ignoring of such 'obvious' information and situation aspects may be interpreted as 'carelessness' and can provoke legal consequences as e.g. financial drawbacks or unemployment.

Complementarity:

With increasing crisis perception it is less possible for single companies or also partly individuals to leave the crisis, possible effects of an economic downturn or a forecasted recession out of their investment decisions or ignore them, especially when larger financial or economic activities are to decide (cp. Scharfstein/Stein 1990). Thus you can expect that increasingly in contract negotiations, agreements on objectives or investment planning negotiators point out the 'situation of crisis' and possible predictions, and want to assure accordant considerations in decisions and actions.

Power:

By expecting a crisis all institutions are awakened, that might have the option for controlled interventions, especially governments and central banks. It implies that the stronger 'crisis' is perceived, the more power will be given to according hierarchies. Just the same, authorities will be given more power, if expected that they might be more able to forecast crisis effects on the individual situation than oneself and leave decision making to them. This way

economic or organizational hierarchies, meta-organizational alliances, and unions gain impact. The mechanism of 'power' gets activated and increased and path dependency gets reinforced, too.

Conformity:

Resulting form the effect of the other mechanisms, the mechanism of conformity will be increasingly activated, too: An increasing number of companies, individuals and institutions interpret the situation according to the economic cyclical as a crisis and more frequently use this circumstance as decision or action basis. By increasing risk-aversion in decisions which need to be legitimized which obtained more weight through strengthened hierarchies and accordingly more thorough bureaucratic controls and tighter complementary structures, a growing conformity in decisions and action is created. Increasingly not the individual experiences are significant, but instead if the frame institution might legitimize this decision and whether the decision is aligned to the higher authority in hierarchy which surround the individual decision maker in an organization.

Reactive Sequences:

Each moment another self-reinforcing mechanism which causes increasing path dependency is activated may be considered as an event in a reactive sequence. Increasingly activated mechanisms involve a reinforced path dependency and each self-reinforcing effect in connection with spreading activation and acting of collateral bordered path dependency mechanisms results in a total effect characteristic for reactive sequences, because of comparably small events give rise to a huge total effect:

In the considered example the 'using the business cycle model for interpretation of the situation' causes an increasing 'pursuit of increasing returns': Expected downturns should be compensated quickly and it should be acted foresighted for keeping growth positive as long as possible, riding the phase of downturn out and reaching positive growth again as soon as possible. This activates the mechanisms of functionality and complementarity. The business cycle model increasingly functions for scaling the crisis and in aligned foresighted, preventive actions group members assure each other in interpreting the situation correctly and the relevance of the cyclical pattern. Aligned group members give additional power to surrounding organizations and hierarchies, because they hope for the same interpretation of the situation and aligned with the participants preventing or intervening decisions and actions in the participants' interest. Thus the mechanism of power gets activated respectively

increased in its effect. Additionally the cyclical pattern function of scaling the crisis intensifies and objectifies crisis perception. As an effect institutional parties increasingly claim for considering this information in action decisions. Thus in the financial field some (e.g. risk-averse) investments get rewarded and other (e.g. more risky) attitudes get punished and declared as careless, 'endangering the economic situation', or harming society. Especially strengthened authorities and more frequently claimed bureaucratic controls and public punishments by a vitalized legal authority, combined with an increased fear of denunciation (e.g. a quick dismissal) within the hierarchy cause a social-wide conformity in 'using the business cycle model for the interpretation of the situation'.
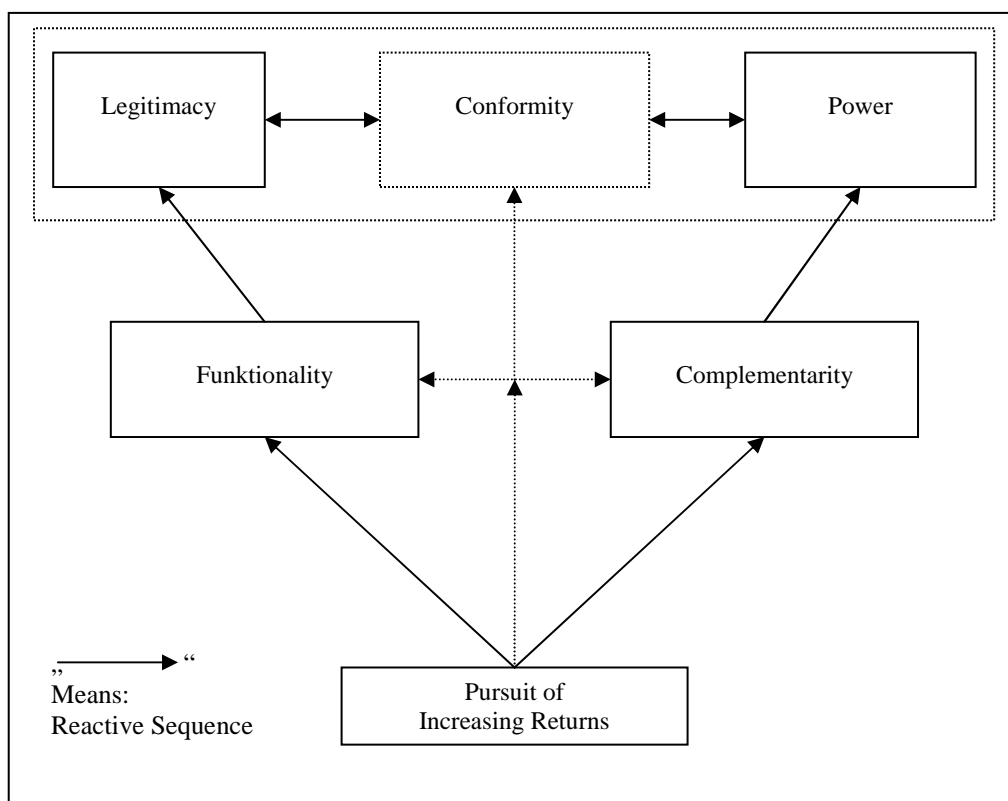

Diagram 1: The activation or reinforcing of single self-reinforcing mechanisms activates or increases linked ones. The interaction in reactive sequences equates a topping reinforcing mechanism.

Increasing Returns:

Trying to evaluate the total self-reinforcing process' effects can be based on former analyses which showed that different self-reinforcing processes can cause a multiple self-reinforcing effect e.g. focussed on the 'development path of increasingly using the business cycle model for interpreting the situation'. For estimating the velocity in which this self-reinforcing acts and possibly locks in, the self-reinforcing process can be compared with a process of

increasing returns which Arthur characterized, and analyzed in detail e.g. in the model of a Polya Process (cp. Arthur 1994).

2.2. Reinforced path dependency increases existing inequalities.

Considering first the two dimensional linear case of a standard Polya Process, it can be recognized, that the modelled Increasing Returns, as a model of a self-reinforcing process' effects, cause with the first step out of equality in ball colouring, one colour is overbalanced (cp. Arthur 1994). With further steps on the development path, thus with further impact of Increasing Returns, the colour majority gets increased and the other colour's minority gets smaller till a colour relation gets locked in.

As outlined in an earlier chapter, there are arguments against applying this model 1:1 in reality or considering it a true mapping. But Arthur's model and his generalizations can be used to model in which way increasing path dependency affects distributions. If path dependency, thus the effect of shadowing mechanisms, increases it is comparable to putting back a larger number of balls for each removed one than before (instead of 2 coloured balls before, so +1). If e.g. there are three balls put back, instead of 2 before, for each removed colour (thus +2 now, instead of +1 before), the reinforcing effect in 'one step now' equals 'two steps before'. So before it needed a serial of removing two times the same colour and thus following the path in two steps, for causing the same 'effect' on the colour relation in the urn. This implies that with increasing path dependency the 'velocity' of self-reinforcing processes increases hence 'how fast' equalities are left behind and 'how fast' inequalities get reinforced.

Additionally the increase of path dependency is not only a second parallel acting mechanism which would perhaps double the effect of the first considered increasing returns. But instead it showed up that a described increase of path dependency releases a chain of effects of path dependency mechanisms thus a self-reinforcing mechanism increases itself and at the same time activates or strengthens further self-reinforcing mechanisms.

For describing this process in the used urn model the number of returned balls per step should not only be lifted (as just described) once and kept on this higher level as long as the second mechanism interacts. But this 'lifting the number of returned balls per step' should be repeated for each additionally activated or increased self-reinforcing mechanism: So the increasing level of the number of returned balls per step again should follow a self-reinforcing process and this means exponentially.

At least at this point again a weakness of the linear standard model appears: the strongly increasing number of balls in the urn should represent through changing colour relations in the urn changes in technology relations on the market as well as probability of increasingly choosing one or the other technology. But it is not assumable that normally market volumes increase in total as the number of balls in the urn is unlimited.

So a transfer to the non-linear model is appropriate in which the probability of choosing one colour for removing a ball the next step can increase quicker than the colour relation in the urn. The discrepancy between this probability and the exact colour relation in the urn causes a dynamic which only ends in a colour relation without discrepancy that is when the probability again equals the colour relation in the urn. This probability then is significantly higher (or lower) than the mere probability after the process increase (or loss) of the considered moment. In this way the later stabilizing colour relation will be far closer to an 'extreme' (dominance of one colour).

Like this increasing path dependency results in a relevant increase (or new creation) of inequalities.

2.3. The crisis increases path dependency which again intensifies the crisis.

Related to the general increase of existing 'inequalities'[3] on financial markets and bordered sectors 'inequalities' get increased: In economic theory assumed balancing mechanisms on markets which diminish (at the most temporary) inequalities and balance in an ideally 'efficient' (and stabile) market equality are based on actors having varieties of benefit structures and decision criteria and a market equality stabilizing on a price at which preferences of supply and demand are balanced.

But if by a growing conformity in the interpretation of the situation (using the business cycle model) resulting decision criteria of all market participants is alike, a displacement to the 'one decision' of this 'conform mass' can be expected (cp. Scharfstein/Stein 1990). This 'conform mass' assimilates supply and demand in their 'price' expectations (forecasts) which are increasing exactly fulfilled by the growing 'conform mass'. And this is how the fundamental models which were used for creating the forecasts get confirmed: On the one hand 'using the business cycle model for interpreting the situation' is approved and on the other the 'decision of the mass' is verified which causes increasing herding: Instead of using the business cycle

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[3] 'Inequality' in approach to the increasing colour inequality in the urn does not mean a 'market inequality' as in economic theory of balance, because this would imply that no trade would be possible as long as no balanced price is agreed over. 'Inequality' more relates to the disposition of the market balance so the resulting price is significantly 'lowered' or 'lifted' compared to a 'normal' situation which indicates an 'under' or 'over' evaluated product depending on which trend the 'inequality' acts.

model oneself for interpreting the situation or thinking up an own action model and individual decision criteria it might be quicker to follow 'the mass' and thus might be more efficient when producing the same prediction which will occur.

Thus the escalating self-reinforcing mechanisms which especially associated with the present crisis can be watched on financial markets can be logically based on path dependency. The occurrence of a global recession therefore not only is a 'self-fulfilling prophecy', but increasingly 'programmed through path dependency'.

Concluding remarks

"The insight that novelty has historical antecedents is a refreshing one. It … provides us a way of viewing social action as being temporally located and socially embedded." (Garud/Karnøe 2001)

The novelty of the present financial and economic crisis is often described as the globality of its impact in the regional sense as well as in the substantial spread in the variety of affected persons, and the intensity of its dynamic and speed. In this paper the example of the development path of 'using the business cycle model for interpreting the situation' has been used to describe which social and decision theoretical processes presently escalate in an exponential growth.

Although there still might be a big variety of options for decision makers "the nature of human rationality limits the range of possibilities and affords a measure of predictability to the outcome of human interaction" (Hill 1997: 190). Even if it might look appropriate or rational to the single actor in each his or her own situation, following (unconsciously) a development path in decisions can provoke unrequested outcomes as analyses in this paper have demonstrated: The mere using the business cycle model for interpreting the situation as 'downturn', 'recession' or in the rapid intensity of its evolving as 'crisis' causes a pursuit of balancing interventions which results again must be visible when interpreting the situation using the business cycle model. In an increasingly reinforcing way global variables are reduced on 'cyclical indicators' and controlling mechanisms are directed to move these indicators in a cyclical desired way. Within this process, mechanisms which are not differentiated visible in a business cycle model are excluded from considerations, as e.g. mechanisms which stabilize or increase path dependency. But it has been demonstrated, that

especially these mechanisms supposable relevantly and increasingly caused and programmed the exponential growth of crisis, the escalation.

Thelen states, that "a more precise specification of the reproduction mechanisms behind particular institutions is the key to understanding important elements of both stability and change in political life." (Thelen 1999) Griffin points out that the "serious consideration of temporality and narrative form also promises unusual and creative opportunities for sociological exploration and explanation" (Griffin 1992: 405).

In this paper established theories focussing on path dependency have been merged and applied on the present situation of financial and economic crisis. The centre of application has been the development path of 'using the business cycle model for interpreting the situation'. It showed up, that self-reinforcing mechanisms are shadowing it, forming again a reactive sequence and thus interact increasingly and especially exponentially intensifying and spreading global conformity in 'using the business cycle model for interpreting the situation'. As results of this exponentially increased path dependency a growing herding on financial markets as well as increasing inequalities in every bordered area (and after this spreading new bordered areas, too, and so on), can be deduced.

This way there has been presented an alternative to 'using the business cycle model for interpreting the situation' in this paper: Using path dependency and its shadowing stabilizing and reinforcing mechanisms and their interactions for interpreting the situation.

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