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The Financial Crisis: Caused by Unpreventable or Organized Failures?

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Abstract

In this paper, I analyze cutaways of the current financial crisis against the background of normal accident theory, high reliability theory, and disaster incubation theory. To avoid future financial crises I recommend reducing pressures to make profit and organizing the global financial markets like high reliability organizations. Furthermore I argue that risk management within organizations must no longer only be a symbolic gesture. The paper's purpose is to break with the isolated financial view of the crisis's causes and effects. It is a plea for a new understanding of the financial crisis, transferring the view from the crisis's impact to its features and causal factors. The study at hand should be regarded as preparatory work for a more interdisciplinary approach to the current crisis and for special branches of science to cooperate.

Keywords: Financial Crisis, Normal Accident Theory, High Reliability Theory, Disaster Incubation Theory

JEL classification: A12, A13

1. Introduction

During the last few weeks and months a feeling of doom has dominated the financial markets. One reads and hears about crashes and disasters, collapses, and infarcts. In the words of George Soros: "We are in the midst of the worst crisis since the 1930s. […] The current crisis is the end of an era of credit expansion based on the dollar as the international reserve currency" (Soros, 2008: vii). This has led him to call for a new paradigm for financial markets.

The two mortgage institutes Fannie and Freddie and the world's largest insurance group AIG has been nationalized, the investment bank Lehman Brothers has failed, while another, Merrill Lynch, has been forced to accept a bail-out. In the UK, the state has rescued HBOS, likewise a mortgage institute. This is not a finite list, because the maelstrom of failures and stock markets crashes is continuing. The American government and the sing le states of the European Union confront this turbulence with forceful interventions, for example, the Bush administration's 700 bn. USD emergency bail-out of the banking industry. The bill allows the US treasury to clean up banks' balance sheets by purchasing distressed mortgage-backed securities. Other countries too are reverting to public intervention. In addition, central banks are trying to avoid the financial dehydration of markets and bank insolvencies. In the meantime, the financial crisis has affected the real economy. The global economy is on the brink of an economic recession, motivating national administrations to approve action plans to stimulate their economies.

Warren Buffet's words regarding complex financial products apply specifically to one source of this crisis: mortgage-backed securities. He once used the term "financial weapons of mass destruction" (BBC News, 2003) to refer to the structured credit derivatives that were sold for trillions of dollars. Investment banks constructed and sold these paper investments that were supposedly backed by loans on houses, cars, businesses, and credit cards. These products have played an important role in this crisis. However, the ongoing events show that this description also fits the financial markets as a whole. Billions of dollars of book value has had to be written down, well-establish financial institutions have disappeared, and tens of thousands of jobs have been lost. Are these the indicators of the "creative destruction" process as described by Joseph Schumpeter (e.g., Joseph Schumpeter, 1942)?

What teachings should be drawn from the crisis? What action should be taken? Besides the obvious first-aid provisions, there should be a deeper analysis of the current crisis's true causes. However, first a core question needs to be answered that will bring us closer to the actions we should take. Could this crisis have been averted or not? In other words, what could individuals and organizations have prevented? Are people helpless in the face of crises based on complex and tightly coupled systems? These questions raise the fundamental issue of the true causes of this disaster. Since the crisis's dimensions affect the real economy and, thus, lives, one might wonder whether it could have been averted. Research findings on risk handling in high risk technological systems could specifically provide evidence with which to answer this core question. However, this approach means reverting to a continuing debate: A debate between proponents of the normal accident theory, supporters of the high reliability theory, and disaster incubation theorists on the inevitability of accidents and disasters in modern, high risk systems.

The author's interest in normal accident theory, high reliability theory, and disaster incubation theory stems from an attempt to shed light, from an alternative perspective, on the current crisis. Therefore, the aim of this paper is to analyze cutaways of the current crisis against the background of normal accident theory, high reliability theory, and disaster incubation theory. What issues in the three theories provide the key to understanding what might have been avoidable about this crisis?

Although normal accident theory, high reliability theory, and disaster incubation theory originally stem from the analysis of high technology, their application to this crisis is warranted by the similarity between the current financial system's and financial products' characteristics and those of technology. There is a good reason for using, for example, "financial engineering," a term that describes a cross-disciplinary field that relies on mathematical finance, numerical methods, and computer simulations to make trading, hedging, and investment decisions, as well as facilitating the risk management of those decisions. Normal accident theory, high reliability theory, and disaster incubation theory might provide analytical frameworks for a deeper understanding of the financial crisis.

Thus, the purpose of the paper at hand is to break with the isolated financial view of the crisis's causes and effects. It is a plea for a new understanding of the financial crisis, transferring the view from the crisis's impact to its features and causal factors. Therefore, this paper also calls for a more interdisciplinary approach to the current crisis and for special branches of science to cooperate.

The remainder of the paper is organized as follows: Normal accident theory's and high reliability theory's findings with respect to the causal factors of accidents and disasters are discussed in section 2 and 3. Section 4 provides insight into the common features of major disasters' development according to the disaster incubation theory. The analysis of the current crisis' causes and recommendation theses are addressed in the discussion in section 5.

2. Normal Accident Theory

Perrow (1981) was the first to introduce the thesis that serious accidents are inevitable in special technological systems. This thesis has become known as the normal accident theory. Proponent of the normal accident theory regard the causes of failures as due to the two main dimensions of these special technological systems: interactive complexity, as opposed to linear interactions, and tightly coupled, as opposed to loosely coupled (see, e.g., Perrow, 1999: 95 ff.; Marais, Dulac, and Leverson, 2004: 1-3; Sagan, 2004: 17; see Wolf and Sampson for empirically testing the principle hypothesis of normal accident theory).

Complex interactions are unfamiliar sequences, or unplanned and unexpected sequences, and are either not visible or not immediately comprehensible (see Perrow, 1984: 78). Consequently, owing to these technological systems' complexity, there can be an interaction of multiple, independent failures[1] that designers could neither have foreseen, nor operators have comprehended. These failures differ from component failure accidents, which apply to the failure of only one component, although this may lead to the predictable failure of other components. Such latent independent failures remain undetected in the system until causal factors, or a linking of situations, reveal them (Robert and Bea, 2001: 71). In a tightly coupled system, one event follows another rapidly and invariably, so that operators have very little opportunity to intervene. The combination of interactive complexity and tight coupling results in failures escalating

[1] E.g., a simultaneous but independent failure of a fire alarm and a fire breaking out (Perrow, 1992: 16-17).

rapidly beyond control and making accidents inevitable. Before anyone understands what is happening and is able to intervene, the incident leads to a system breakdown. Thus, accidents are endemic in such a system and are called normal or system accidents.

With respect to the research question regarding the inevitability of the current crisis, the central point in Perrow's normal accident theory is whether or not people's decision making contributes to an accident or can avoid it. Beyond this paper's interest in this point, whether or not the type of decision-making structure is an integral part of normal accident theory is debatable (Perrow, 1984: 332, for critique see Hopkins, 1999: 97-98). Perrow argues that accidents are inevitable because of complexity and tight coupling's contradictory needs with regard to the way authority is structured to avoid accidents. In tightly coupled systems, in which there is little time for reflection, "authority must be highly centralized with operatives doing what they are supposed to do in a pre-determined and unquestioning manner" (Hopkins, 1999: 97). Conversely, in complex systems, decentralized decision makers may cope better with failures' unplanned interactions. Consequently, the two imperatives pull in opposite directions, making accidents inevitable. The key question raised by high reliability theorists in this argumentation is whether or not authority structures can afford both centralized and decentralized decision making. If we believe the proponents of high reliability theory's empirical evidence, accidents are preventable – even in complex, tightly coupled systems – as a simultaneously centralized and decentralized authority structure is possible.

Beyond complex interactions and tight coupling in high technology systems, Perrow extends and "more sharply conceptualize[s] normal accident theory" (Perrow, 1994b: 216) by appropriating the so-called garbage can theory (Cohen, March, and Olson, 1972). Garbage can theory relies on a model of decision making in organized anarchies, which are organizations characterized by three important characteristics: Firstly, the organization operates on the basis of problematic, inconsistent and ill-defined preferences. Secondly, the organization's processes are not understood by its members, thus the technology applied remains unclear. Thirdly, participation in the organization's decision-making process is fluid (Cohen, March, and Olson, 1972: 16; Sagan, 1993: 29). Such organizations are risky systems with a high degree of uncertainty and Perrow (1994b: 216) thus expects garbage can processes. This is a process "in which problems, solutions, and participants move from one choice opportunity to another in such a way that the nature of the choice, the time it takes, and the problems it solves all depend on a relatively complicated intermeshing of elements" (Cohen, March, and Olson, 1972: 16). Such a garbage can process inevitably results in organizations behaving in unpredictable ways.

Against this background, Perrow investigates the politics of risk decision making and of accident investigations in industries like the nuclear industry, the error-inducing marine industry, and error-avoiding industries, such as aviation (see Perrow, 1994a). The main contribution of this extension of Perrow's theory is the evidence that normal accident theory is not only applicable to high risk technology systems, but also to all error-inducing systems. This means that inevitable accidents are, in the first instance, not dictated by technology, but by poor organization and unionization in industries in which interest groups, so-called system elites, have no interest in safety. In Perrow's (1999: 339) words: "[…] there is no imperative inherent in the social body of society that forces technologies upon us. People – elites – *decide* that certain technological possibilities are to be financed and put into place." When answering the question why system elites do not put safety first, he argues: "The harm, the consequences, are not evenly distributed; the latency period may be longer than any decision maker's career; few managers are punished for not putting safety first even after an accident, but will quickly be punished for not putting profits, market share or prestige first. Managers come to believe their own rhetoric about safety first because information indicating otherwise is suppressed for reasons of organizational politics. Above all, it is hard to have a catastrophe, so the risk to any one set of managers or elites is small, while it is substantial for society as a whole." (Perrow, 1994b: 217)

While Perrow's extension of normal accident theory seems to be a great contribution, it actually has an important disadvantage. For opponents of this extension, like Hopkins (1999), garbage can theory and the incorporation of group interest and power do not refine normal accident theory. By predicting that any organized anarchies – whether or not tightly coupled and complex – will inevitably experience disaster at some stage, garbage can theory actually replaces normal accident theory. The same argumentation holds with respect to the key social science concepts of group interest and power – they are not unique to normal accident theory.

Sagan (1993) extended normal accident theory further and attempted to specify it. After studying the US nuclear deterrence system, he drew the conclusion that accidents are not only inevitable due to the complex and tightly coupled system and the organizational contradiction, but also due to more banal organizational, economic, and cultural reasons. From Sagan's point of view, production pressures and parochial interests are causes of failures because they lead to safety goals being disregarded and make safety only one of a number of competing objectives. Further causal mechanisms lie in organizations' reactions to failures, such as accusing operators of making mistakes rather than addressing the underlying causes of accidents (denial of responsibility), thereby covering up the failures for legal or public relation reasons (faulty reporting). From these reactions, Sagan drew the conclusion that organizations do not learn from such events, making accidents normal (see also Rijpma, 2003: 38, for a discussion of Sagan's extension).

Clarke (1999) focused on risk and accident management within normal accident theory. His main conclusion was that organizations' preparations for serious disasters are symbolic, not much more than window-dressing. This is above all due to the unrealistic, often overoptimistic, assumptions underlying organizations' risk management. The purpose of organizations' control arrangements is therefore not actual preparation for accidents, but rather convincing the public, especially regulatory agencies and pressure groups, that they can control the risks they face and that taking these risks is manageable. However, before a reality check of the assumption can be made, the public accepts such risks on the basis of an unrealistic assumption. There is therefore a structural coupling between the social system and the technical realization, as Luhmann (2003: 108) describes the interconnection between the social body and technology. The social body simply responds to the existence of technology, and, in this case, to the risk management and control systems within organizations, without any critical reflection on their effectiveness. It assumes that the technology/risk management is functional. Consequently, risk management is no longer organizations' private business, but has come to play a very significant external public role. Metaphorically speaking, organizations are being turned "inside out." According to Power (2007: 34-63), this is the main cause of the risk management explosion demanding the externalization and justification of organizational control arrangements.

The normal accident theory's implications for disaster avoidance seem very disillusioning and, simultaneously, quite simple. Firstly, reduce the likelihood of disasters by avoiding complex and tightly coupled systems at all cost and, secondly, by decreasing the degree of complexity or loosening a system's coupling (Hopkins, 1999: 101). Luhmann's suggestions (2003: 110) point in the same direction. First, reduce social systems' dependence on technology, second, call researchers' and organizations' attention to the informal and inherent risk measures of the installed technology's actual handling, and third, avoid excessive fear and excitement to avoid causing disasters through these factors.

In concluding the research review of the normal accident theory's status quo, it is easy to agree with Rijpma (2003: 38): "Normal accident theory has evolved from a technological theory of particular accidents to an overall pessimistic perspective on accidents and the possibilities to prevent them and cope with them." This appraisal is in line with Hopkins's (1999) critique of normal accident theory. He blames normal accident theory's limited relevance and the absence of criteria for measuring complexity and coupling. From his point of view, many of the most public disasters and accidents of our time are no more than component failure accidents and cannot therefore be analyzed with normal accident theory. The absence of clear criteria for measuring complexity and coupling makes the analyzed accidents and failures seem inconsistent and subjective, therefore making it hard to specify normal accident theory. He regards Sagan's attempt to specify normal accident theory as a failure because organizations' reactions to failures are applicable to all disasters (see also Turner, 1978) and are neither a feature of system accidents, nor do they have anything to do with complexity or coupling (Hopkins, 1999: 99).

This review of normal accident theory clarifies that normal accident theory can only be successfully applied to the current crisis if the two basic conditions of normal accident theory – complexity and tight coupling of the system – have been fulfilled. Thus, global financial markets have to be analyzed with respect to those integral parts of normal accident theory.

3. High Reliability Theory

According to the proponents of high reliability theory (first see La Porte, 1981; later, e.g., Roberts, 1990a; Roberts, 1990b; La Porte and Rochlin 1994; Weick, Sutcliffe, and

Obstfeld, 1999; Carrol, Rudolph, and Hatakenaka, 2002; Weik and Sutcliffe 2003), some organizations, called high reliability organizations, achieve outstanding safety records (Roberts, 1993) despite all of them facing complexity and tight coupling. High reliability organizations are a subset of hazardous (in the engineering sense) organizations that can be identified by answering the question: "How often could this organization have failed, with dramatic consequences? If the answer to the question is man thousands of times the organization is highly reliable" (Roberts, 1990b : 101-102; see also Roberts and Gargano, 1989; Rochlin, La Porte and Roberts, 1987). Besides this outstanding safety record, high reliability organizations, such as air traffic control systems, aircraft carriers, and nuclear power plants, are characterized by "their unique potentials for catastrophic consequences" (Weick, Sutcliffe, and Obstfeld, 1999: 81). Researchers have discovered that high reliability organizations all apply similar strategies regarding how to engage in processes to ensure reliable operations in situations fraught with potential risks and to apparently contribute to their desire to be failure free. Based on these similarities, researchers have analyzed the main influencing factors and characteristics that lead to high reliability. These factors are a "collective mindfulness," a "conceptual slack," and the organization's ability to learn.

These high reliability organizations' efforts to ensure that their personnel can respond rapidly and adequately to contingencies without having to be guided in detail by a senior person, seem the most important. Consequently, low-ranking personnel are also socialized and trained in groups to build a common group spirit of vigilance, which does, however, leave room for a critical attitude (e.g., at the team or crew level, see Flin, 1996, Zsambock and Klein, 1997, Flin, 2001). Such a culture, characterized by cogitation and by an aversion to simple interpretations (Weick, Sutcliffe, and Obstfeld, 1999; Weick and Sutcliffe, 2003), gives individuals an enduring license to think. This culture is convinced that diversity is essential and therefore it tolerates a "conceptual slack." The latter means "a divergence in analytical perspectives among members of an organization over theories, models, or causal assumptions pertaining to its technology production processes" (Schulmann, 1993: 364). Such a culture entails a decentralized decision-making ability and the power to act, even in respect of low-ranking personnel. An example of this is that crew members on a nuclear powered aircraft's carrier deck can prevent planes from departing or landing at their own discretion, without a senior person being able to overrule them (Rijpma, 2003: 39). When complexity becomes too tough for an individual to handle, however, an informal network of employees intervenes. Together, this network forms the organization's collective mind and is thus able to analyze the current problem from different perspectives before deciding on the actions to be taken. Another important characteristic of high reliability organizations is their serially connected "cooling" systems, which is a process designed to reduce stress and excitement and all the other points previously mentioned. Reverting to the example of the aircraft carrier deck, the crew member with discretion to prevent an aircraft from departing or landing, knows that many people are watching him and can intervene if failure should occur (Robert, Stout and Halpern, 1994). This secondary "cooling" system is combined with a rigorous redundancy policy to back up personnel failures

(La Porte and Consolini, 1991). These strategies are high reliability organizations' learning process in respect of technologies' complexity (Rochlin, La Porte, and Robert, 1987).

Besides extending high reliability theory from the original high reliability organizations to other ones (e.g., submarines, see Biely and Spender, 1995), it was later not only applied to an organizational level, but also to other levels of aggregation. Specifically, Morone and Woodhouse's (1986) macro sociological perspective on American society shows that high reliability can be applied to understand and explain social systems at a very aggregate level. According to these scholars, American society has learned to avoid catastrophes by conservative risk testing and acceptance, trial-and-error learning and high levels of protection. Morone and Woodhouse's study maintains that high reliability theory is not only applicable to those exotic and special organizations to which it originally applied, but that it can also act as a source of ideas for a deeper analysis of a more aggregate societal system and commercial entities. This extension is already indicated in the paper by Robert (1990: 160), who considers "international banking", as a high reliability organization.

The review of prior research has shown that high reliability refers to the main elements of the normal accident theory and develops it in the light of its critical issues. With regard to its basic attitude, high reliability theory is less pessimistic than normal accident theory: Failures and accidents in complex and tightly coupled systems are containable by means of good organizational design and good management, but in some places they are avoidable (La Porte and Rochlin, 1994; Whitney 2003; Weick and Sutcliffe, 2003). From the normal accident theory perspective, it is impossible to prevent all accidents; from the high reliability theory perspective, teams, organizations, and even society have the capability to prevent them. Instead of focusing on cutting the losses, high reliability focuses on damage prevention.

Which of the two conflicting theories is therefore the winner of the debate? In 1997, Rijpma concluded that the debate's half time score was a tie (Rijpma, 1997). Now, several years and studies later, one has to acknowledge that the debate is still ongoing and the question is still an open one. The value of the debate between normal accident theory and high reliability theory lies in the tension between the two opposing points of view. The theories should be seen as complementary, not competing perspectives (Bain, 1999: 129). The same organizations and failures have been concurrently examined by the proponents of normal accident theory and high reliability theory.[2] Instead of there being a clear winner, their research evidence is contradictory. The conclusion that can be drawn from the contradictory evidence is that, in the long run, production pressures and budget cuts make accidents increasingly probable. Consequently, a formerly high reliability organization is turned into an organization where, at the end of the day, accidents are inevitable (see, e.g., Heimann, 1997). This issue seems to be specifically important for the study at hand.

[2] See, e.g., Vaughan (1996), Heimann (1997), and Boin and Schulmann (2008), all examining NASA's Challenger disaster.

4. Disaster Incubation Theory

In 1997, the second edition of Turner's book "Man-made Disasters" (Turner and Pidgeon, 1997) was published and was pitched into the debate regarding normal accident theory versus high reliability theory. Turner's ideas have become known as the disaster incubation theory. This theory is based on Simon's (1957) "bounded rationality" framework, which allows organization to act by adoption simplifying assumptions about the environment. Like the normal accident theory, the disaster incubation theory is a theory of accidents and draws attention to the causes of disasters. However, instead of being a theory of technological necessitarianism, the disaster incubation theory has a more rationalistic, managerial perspective on disasters. As far back as 1976, Turner developed the thesis that the cause of disasters is failure of foresight (Turner, 1976). He presented a "sequence model of intelligence failure" (Turner, 1976: 378), which describes a disaster's development through various stages. Over a long incubation period, it may take many years, during which signals about impending danger are ignored or misunderstood before, in the crucial incubation stage, causal attributes cumulate and the latent danger materializes and becomes a disaster. The common features of incubating disasters are as follows (Turner, 1976: 388-391): During the disaster's first development stage there are initial beliefs and norms. In this stage, Turner observed violations of existing precautions in terms of failure to comply with them. Stage two, the incubation period, follows and is characterized by seven causal factors:

(1) Rigidities in perception and belief in organizational settings
Rijpma (2003: 40) describes this feature as the "beliefs that things won't go wrong." According to Turner (1971), all organizations develop within themselves an element of continuous culture, which not only causes effectiveness, but also the danger of a collective blindness to problems.

(2) Decoys
Organizations are not blind to all occurring problems. A contributing factor of disasters is that the action that is taken to solve well-structured problems might distract attention from less well-structured problems. Thus, dealing with a well-structured problem may comprise the danger that this action is a decoy to draw one's attention from a more uncomfortable problem.

(3) Organizational exclusivity
Turner identified disregarding complaints from individuals outside the organization as a further common feature in the incubation stage. Instead of taking the relevant risk seriously and ensuring that the concerns are unfounded, the organization regards such outsiders with contempt. This response results from the assumption of organizational exclusivity, i.e. the organization's belief that it knows the risks within the organization better than outsiders do.

(4) Information difficulties
Less well-structured problems, i.e. information in complex situations, might cause information handling difficulties. These difficulties cannot always be solved by better

communication, especially in a situation when events remain misunderstood or unnoticed. Communication and information difficulties can therefore lead to a disaster. One way to cope with information difficulties is to increase resources so that the problem is no longer ill-structured or is reduced to a manageable size (Meier, 1965). Another way is to pass (parts of) the problem to other organizations so that the task becomes an inter-organizational one (Hirsch, 1975).

(5) Strangers exacerbating the chance of risks
For Turner, the presence of public members, whom he called "strangers," within the organization is a contributing factor to disasters. The crucial factor is that they are often untrained or uninformed, and can provoke risks and activate a chain reaction if they do not act in the organization's interest.

(6) Failure to comply with discredited or out-of-date regulations
Failure to comply with existing regulations and an inadequate implementation of regulations fall into this category of causal factors. The lack of implementation can be attributed to difficulties in applying regulations to changed technical, social, or cultural conditions, or they have simply become out of date.

(7) Minimizing of emergent danger
In his analysis of disasters, Turner identified the failure to fully assess the dimension of certain risks. Risks are often underestimated and warning signs disregarded. The reaction of individuals when the full magnitude of the danger becomes obvious is particularly noteworthy. Turner states: "[T]he apparently straightforward act of strengthening precautions was not always the response; instead some individuals began to take action to shift the blame, while other sought to take control of the situation by wholly inappropriate and quasi-magical means." (Turner, 1976: 391)

After the incubation period, in the third stage, an event happens that triggers the onset of the disaster, which is stage four. In stage five, rescue and salvage actions are taken. Finally, in the stage of full cultural readjustment, new well-structured problems are defined and appropriate precautions and expectations are established (stage six). This sequence model shows that according to the disaster incubation theory, disasters are caused by organizations and individuals through sloppy organizational and managerial processes, but that organizations and individuals are also regarded as being able to intervene and stop the chain reaction.

5. Summary Discussion

5.1 Analysis of the Causal Factors in the Light of Normal Accident Theory

Although organizations were analyzed in the light of the three social theories described above, normal accident theory, high reliability, and disaster incubation theory can also be applied to other society systems, if they feature the specific characteristics underlying the particular theory, for example, interactive complexity and tight coupling in the normal accident theory. According to Luhmann's systems theory, a system is defined by a boundary between itself and its environment; this boundary divides it from an infinitely complex exterior. The interior of the system is thus a zone of reduced complexity (Luhmann, 2008). This definition clarifies that global financial markets are also systems in terms of social theory. Financial markets consist of individuals, who meet each other to buy and sell financial securities, commodities and other fungible items of value, as well as financial intermediaries and regulatory authorities. Global financial markets are "man-made": They are a totally social phenomenon constituted by the interaction of multiple international players. In this light, global financial markets' main characteristics are analyzed regarding whether they meet normal accident theory's criteria and can therefore be applied to explain the crisis's causal factors as well as to derive implications.

The aim of financial markets is to reduce complexity. They make it easier for willing buyers and interested sellers of securities to find one another, reducing the transaction costs. It is also presumed that transaction prices reflect all the available information (efficient market hypothesis). Nevertheless, complexity exists and becomes greater as the number of market participants and their resultant options increase. More precisely, complexity emerges from the market participants' contingent interaction as it (complexity) only reveals itself ex-post and cannot be predicted rationally. Thus, every market participant is always exposed to an uncertainty that complexifies the moment of decision making for an individual market participant. This sort of complexity cannot be reduced by formalizing. Formal methods are replaced by interpreting, storytelling, creative intuition, and fantasizing. Given that complexity cannot be reduced, it is instead maintained, otherwise it will increase. However, is the complexity in financial markets an interactive one, as identified by Perrow in his normal accident theory? And is this complexity accompanied by tight coupling? Since interactive complexity leads to independent failures, the current crisis must be attributed to such failures. Tight coupling manifests itself in an uncontrollable rapid escalation of failures. The development of the crisis should therefore be analyzed in terms of interactive complexity and tight coupling.

To analyze what went wrong, one has to refer to the starting point of the crisis: The development in the US mortgage market (a subsystem of financial markets). After 2000, mortgage lenders relaxed their underwriting standards considerably, making mortgages widely available to people with low credit ratings (subprime mortgages). Income standards for mortgages were also relaxed, permitting buyers to purchase higher priced homes without additional income. Between 2002 and 2006, subprime mortgages rose from two percent to 30 percent of the total loans (Moore, 2008). Relaxed underwriting standards and relaxed income standards therefore led to an expanding demand for existing properties and increasing real estate prices by increasing the pool of individuals eligible for a loan. Furthermore, the lenders invented new ways of stimulating business and generating fees through "teasers" like below-market initial rate mortgages for an initial two-year period. Since the market value of existing homes grew more than the costs of borrowing, the floodgates to speculation were opened.

It was a rational decision to own more property than the buyer wanted to occupy and to treat the purchased home as an investment or second home. Buyers surmised that when the higher mortgage rate increased in two years' time, they would refinance the mortgage, taking advanced of the homes' higher prices. Banks developed a variety of new techniques to hive credit risk off to other investors, like pension funds and mutual fund. Structured investment vehicles allowed them to keep their own risk positions off their balance sheets. Banks then sold off their risky mortgages by repacking them into collateralized debt obligations. These securities channeled the thousands of toxic mortgages into a series of tranched bonds with risk. While bankers and rating agencies underestimated the inherent risk of such bonds, the securitization[3] of mortgage risk became en vogue. In retrospect, it is clear that sooner or later the bubble had to burst. The reactions of bank, institutions, and investors to the bursting bubble were a loss of confidence and herd behavior, which caused panic and brought the entire system to the point of collapse. One cannot but help favor Luhmann's suggestion: We should avoid excessive fear and excitement so as not to cause a further crisis (Luhmann, 2003: 110). Such self-energizing developments could only be interrupted by institutions and persons outside the system interfering – states and central banks.

The rapidness of the crisis development and the helplessness of control agencies, such as governments and regulatory authorities, are an indication of the tight coupling of the system elements. However, this sequence of events shows failures based on each other rather than independent failures. This leads to the conclusion that the two main characteristics of a hazardous system have not been fulfilled; normal accident theory cannot therefore be appropriately applied.

Nonetheless, Perrow's extension of normal accident theory to other than high technological systems draws one's attention to a crucial source of the crisis. Perrow argues that system elites have little interest in safety because they put profit first; their own risk exposure is small, while the risk for the society as a whole is substantial. This is observed in the current crisis. The source of the initial failure – relaxing underwriting standards and income standards for mortgages – lay in individuals' appetency to make profit. If mortgage bankers are regarded as such system elites, they are to blame for the crisis.

Or does Sagan describe the situation better? Are mortgage bankers merely the operators under pressure to make profits and exposed to the wrong short-term incentives? Are they now accused of making mistakes instead of the true underlying causes being addressed? If Sagan is correct, disasters seem to be inevitable due to more banal causal factors. In this case, the banal factor might lie in a cultural reason: The greed for prosperity is connected to the fixed idea of the ability to attain prosperity using financial markets as a vehicle. In other words, people's belief in the possibility to make

[3]Securitization is the process of pooling assets and issuing securities. The holder is entitled to a share of the cash flows from the asset pool; this is a form of risk diversification. While securitization itself does not affect the overall risk and returns of underlying assets, the risk and returns of the securities issued by the pool can be redistributed during the process of securitization (Wallace, 2008: 13).

profit was uncoupled from the real economy. This not only applies to mortgage bankers, but also to the buyers of houses, and society as a whole. To escape Sagan's pessimistic conclusion of organizations' inability to learn from disasters, one has to call for a new conservatism – a conservatism that is not only aimed at bankers' bonuses, but also at society as a whole. The attention of governments, researchers, and regulatory and supervisory authorities must focus on this crucial issue.

6.1 Analysis of the Causal Factors in the Light of Disaster Incubation Theory

Disaster incubation theory can also shed light on the causal factors of the financial crisis. A review of the crisis's development clarifies that failures are "organized". They have their origins in failures of management and intelligence processes that incubate the crisis.

Rigidities of perception and collective blindness can be observed in a variety of situations and can only be listed by means of examples. The institutions within the financial markets system might have exemplified rigidity of perception. The institutions and, thus, the system itself upheld the idea of continuous growth due to their belief that they could manage and handle that growth (belief in organization settings). This overestimation encountered a second issue, the fear of institutional overregulation that has its source in the strong belief that markets are self-adjusting.[4] This belief leads to the strategy of minimizing the government's role. The UBS, for example, reintegrate its own hedge fund, Dillon Read Capital Management (DRCM), in May 2007, which brought the cumulative subprime engagements to about 40 bn. USD. However, not many insiders or outsiders noticed the bank's ongoing change from a Swiss home bank to an internationally active investment bank. Insiders and outsiders only became aware of the high risks that this expansion had brought when the crisis broke out. A deeper analysis of the organizations' actions during the incubation stage would be necessary to detect decoys of defection than is possible in the study at hand. Rather than identifying decoys, the organization-destroying problems should be briefly addressed. The core problem that the mortgage banks had ignored was the obviously increasing default risk, while, for the investment banks, this was in the increasing risk inherent in the mortgage-backed securities or collateralized debt obligations. The high asset prices that did not reflect the true economic value of the assets reveal that these risks were ignored. One failure that led to the increasing default risk being ignored might lie in the inaccurate application of finance models like the Capital Asset Pricing Model (CAPM). Basic finance teaches us that the true economic value of an asset is the present value of its future cash flows, using a current market interest rate. This rate has to reflect the level of risk associated with the asset cash flows. In other words, the rate should include

[4] See de Bruijne and van Eeten (2007) for a similar point. They discuss how privatization, deregulation, and liberalization undergo critical infrastructures, such as banking and finance, and the governmental initiatives regarding critical infrastructures' protection. The key finding is that current critical infrastructure protection-efforts seem very vulnerable in the light of an institutionally fragmented environment.

a spread over the current risk-free rate, with the magnitude of this spread depending on the risk. Thus, the current value of a loan can be expressed by the following equation (Wallace, 2008: 10-11):

Current value of the loan = Future cash flows / [1 + Rf + spread]

where: Rf = the current rate of return for a risk-free asset

While numerous changes were made to the lending process, such as relaxing the underwriting and income standards, which increased the default risk significantly, the pricing of the mortgages at issue did not adequately reflect the increased risk. This was due to the inputs used in the fair value equation (see equation (1)), which were sometimes based on historical values, even though the factors that affected them were changing (see in detail Wallace, 2008: 11-14). It is obvious that it is much easier to refer to historical values than to current or future values that might cause ill-structured problems, such as individual estimations or information procurement problems. This failure shows similarities to the "cultural lag of precautions" that Turner attributes to stage six of the incubation period.

System exclusivity can also be regarded as one of the causes of this crisis, which led to prophets of the crisis being ignored. In this crisis, system exclusivity lay specifically in the large network of mortgage banks, investment banks, and rating agencies that all had the same interests, so that the number of potential outsiders with expert knowledge and insider information decreased. Handling difficulties with the increasing default risks were passed to other organization by means of a mass securitization of mortgages, so that the problem became an inter-organizational one. Credit Suisse's reaction, for example, shows that the emergent danger was systematically underestimated. While UBS first wrote down its assets, Credit Suisse predicted that no write-down was required. This was a unique blindness, as it had to announce write-downs to the amount of billions of dollars three days later.

According to this analysis, disaster incubation theory seems to be highly applicable to the current crisis, especially to illustrate the failures in the financial markets as a whole as well as the failures in individual organizations. Further research, especially on an organizational level, should analyze individual incubation stages to reveal more of the causal factors of failures than the study at hand can do.

7.1 Recommendation Theses

The application of normal accident theory and single incubation stages according to the disaster incubation theory reveals that the current crisis has been caused by organized failures rather than by unpreventable ones. This leads to the question: What lessons should be learned to avoid a future crisis? Recommendations should be derived from the crisis's causal factors, which were stressed in the previous sections. Furthermore, the features associated with high reliability organizations can act as guidelines to organize global financial markets. The study at hand derived three important recommendations, which are not, however, presented as the only ones.

(1) Pressures to make profit have to be reduced

The analysis of the crisis under the normal accident theory shows that an excessive profit pursuit, combined with the idea of achieving prosperity that was uncoupled from the real economy, was one source of the crisis. Thus, it is imperative to align performance more closely with long-term interests and financial stability. This will prevent brokers from selling mortgages without checking whether borrowers have the means to repay them. However, preventing excessive profit thinking should not stop with the managers and operators in global financial markets. In the light of global financial markets' unique potential for catastrophic consequences, we need a new disruptive culture in financial markets that will prioritize safety.

(2) The global financial markets have to be organized like high reliability organizations

The desire to avoid a second crisis of the same dimension as the present one has to be the main motivation for re-organizing a system – reorganizing in terms of a high reliability organization. That is, organizations need good design and management that allow disruptive intelligence at each personnel level. In addition to the emphasis on efficiencies there is "the need to challenge managerial mindsets and re-engage a pluralist metaperspective both at the level of strategic purpose and organizational configuration." (Smart, Tranfield, Deasley, Levene, Rowe, and Corley, 2003: 733) Furthermore, we have to readjust our supervisory systems to the financial markets' global character. Global institutions like the supervisory International Monetary Fund and World Bank can take a far more active supervisory role that is more adequate than isolated supervisory actions by single states. This global oversight might result in limited global market failures.

(3) Risk management within organizations must no longer only be a symbolic gesture

The third thesis addresses the risk management systems within banks and other organizations that build the financial system. Reassuring the public can be one function of risk management but should not have a leading role. Risk management's central role has to be to submit organizational processes' underlying assumptions, such as asset pricing in banks, to a reality check. Furthermore, risk management has to reveal failures of foresight. Finally, it has to be clear that risk management is more than a "technical" system. Risk management's responsibility for the functioning of the man-made systems "organizations" and "financial markets" is derived from humans. Consequently, risk management is a system of humans. And this carries the danger of humans as risk factors. Here, too, we need secondary risk management and "cooling" systems, which could be in the form of a divergence of analytical perspectives from the relevant organization members.

8.1 Limitations and Further Research

The study at hand should be regarded as a kick-off for further interdisciplinary research analyzing the current crisis's causal factors. Without considering the financial markets system, or the single organizations constituting the financial markets in detail, the study reveals that social risk theories can specifically provide a deeper insight into the causal factors of the crisis. Where the underlying criteria of normal accident theory, high reliability theory, and disaster incubation theory are fulfilled, they can be applied on an aggregate as well as disaggregate system level to single investment banks, supervisory bodies or even the financial accounting system. From a financial accounting point of view, it would be especially interesting to see if the above social risk theories bring new arguments to the discussion about fair value's role in this crisis. Is fair value accounting a cause? Or is this a case of shooting the messenger? In the words of normal accident theory, is fair value a "system elite" or an "operator" that has to be blamed or is blamed instead of the true causes being revealed? Fair value accounting increases tight coupling in the accounting system as the tension between the measurement of assets and liabilities for accounting purposes and their market values becomes stronger. Furthermore, fair value accounting can activate a chain reaction in asset write downs, as the current crisis has shown. Therefore, the accounting system seems to meet normal accidents theory's criteria; consequently, analyzing the inherent failures in the accounting system by applying this theory seems to be a worthwhile endeavor.

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