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Crisis Prevention - What Is Necessary to Avoid the Next Crisis?

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Abstract

The current economic crisis could deliver valuable lessons for economic agents. However, it seems that those have not learnt essential lessons, continuing their "business as usual". A dynamic simulation model presented in this chapter highlights that this is likely to lead to the next crunch in the offing. Even before we have mastered this crisis the next one is already looming. Does prevention have a chance? How can it be achieved?

1 Introduction

The purpose of this contribution is to give a causal explanation of the current economic crisis from a theoretical perspective and to derive lessons for crisis prevention in the future. We do not want to explain the specific case; rather use the case to develop a fundamental structure explaining recurrent crises.

The research questions are: "How can the current economic crisis be explained by the behavior of economic agents, namely corporate managers?", and "What can we learn for crisis prevention in the future?"

For the purpose of answering these questions, we revert to simulation. We used a simulation methodology specialized on the representation of complex systems and their dynamic behavior. The methodology which appears to be the most adequate among the different simulation approaches is System Dynamics (SD) [Forrester, 1961; Sterman, 2000; Morecroft, 2007; Schwaninger, 2009]. It provides the necessary synoptic approach for a theory-driven, top-down study, as opposed to a other methodologies, e. g., agent-based modeling. In addition, SD considers the systems modeled as continuous processes as opposed to discrete-event processes, as needed, e. g., in logistics. Finally, as we are in search of a causal explanation, the common statistical models are not appropriate, as they rest on correlation, while SD is grounded in the concept of causality [Meadows 1980].

After these fundamentals, we will proceed at presenting a qualitative model of the emergence of a crisis followed by its quantitative corollary. On that basis, we will simulate scenarios which will then be discussed to gain some insights. The paper will close with some conclusions for crisis prevention.

2 Qualitative Model

Where does the crisis come from? A much heard answer is: "In politics, in the financial sector, and in management grave errors were committed. The dialogue might continue as follows: "Why these errors?" "Because of wrong actions." "Why these wrong actions?" "Because of wrong thinking." Indeed, complex problems such as this crisis often begin with the mental models of the agents. And, as the Conant-Ashby-theorem tells us, the quality of the models on which we base our decisions is crucial for the quality of the results [Conant and Ashby, 1983].

When constructing the following model, we have built on an archetypal principle, acted upon widely - some would say "paradigm" - adopted by the majority of managers in contemporary business. We are talking about the principle of profit maximization.

The unit of analysis for our model is the aggregate of private firms of the economy. We present the model as a Causal Loop Diagram (CLD). It starts with two crucial loops (Figure 1). The first loop begins with the variable *Profits*, representing the actual profits generated. The difference between the *Profit Goal* and the actual *Profits* is a *Discrepancy*, which triggers *Short-term Measures for Profitability*. These measures tend to enhance

the profits. This *Operations Loop (B1)* is a balancing one. In other words, the changes of values in the loop are dampened: if *Measures* are enhanced, *Profits* are increased, which results in a smaller *Discrepancy* and therewith in a tendency toward lesser *Measures*, in the next period.

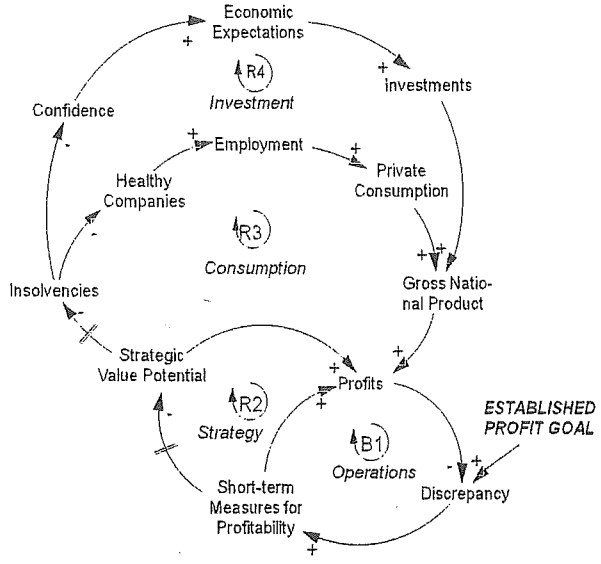

Figure 1: The Qualitative Model

But the *Short-term Measures* have a second consequence. With a delay (expressed by the crossbar) it deteriorates the *Strategic Value Potential*, i. e., the longer term preconditions for the achievement of profits. The *Value Potentials*, on their part, impinge positively on *Profits*, i. e., the bigger they are, the more *Profits* will be generated in the mid- to long-term, and the other way around. This *Strategy Loop (R2)* is a reinforcing one.

The qualitative model contains two more loops. The third loop *Consumption (R3)*, which is of the reinforcing type starts with *Strategic Value Potential*, which as it increases tends to attenuate *Insolvencies*. *Insolvencies* then enhance the body of *Healthy Companies*, which generate *Employment*. The stronger *Employment*, the greater *Private Consumption* and the higher *Gross National Product* (GNP). This *Consumption Loop* is closed as the *GNP* feeds positively on *Profits*, etc.

The fourth loop *Investment (R4)* is of the reinforcing type, as well. It imputes a negative causal relationship between *Insolvencies* and *Confidence* - an expression of what is often called business climate. The higher the Confidence, the more promising are the *Economic Expectations* of (potential) investors, and these ultimately trigger the *Investments*. Then, the loop is closed via *GNP*, *Profits*, etc.

It is useful, to build such a qualitative model, as in that process the crucial variables emerge and their interrelationships are made explicit. However, this is not enough for obtaining insights about the behavior of the system under study. For that purpose, it is necessary to build a quantitative model and to engage in simulations.

3 Quantitative Model

We built a System Dynamics model based on the CLD just outlined. The model has been subject to a standard validation process [see Forrester and Senge, 1989; Barlas, 1996; Sterman, 2000; Schwaninger and Groesser, 2009; Groesser and Schwaninger, submitted]. We have submitted the model to context-related tests (e. g., configuration test), direct and indirect structure tests (e. g., extreme conditions tests, sensitivity tests), and model behavior tests (in particular behavior reproduction tests, with the use of economic data from the Swiss Federal Office of Statistics). We cannot claim to have achieved a "complete validation"; the model has been created for teaching purposes. It fulfills basic validation tests; but is not strong enough to satisfy highest publications standards. We have reached a level of confidence though, that justifies using the model for didactical purposes, i. e., to demonstrate the emergence of a crisis as a function of economic agents' goals, and to generate insights. We refer to the model as a conceptual-theoretical model; not as an empirically-based theory. This paper would be overstretched, if we tried to explain the model. Instead of continuing with a discussion of formal aspects, we proceed at elaborating the most important scenarios we calculated.

4 Scenarios

Due to space limitations, we are limiting ourselves to two scenario settings, which will be extended in the discussion (Section 5). Both scenarios vary the level of *Profit Goals*:

- Scenario A: The goal ambitions of the managers are high. Their goal is *profit maximization*. This expresses a short-term orientation.
- Scenario B: The managers adopt a long-term perspective, striving for *viability*. Therefore, their profit goals are more modest.

The results of the scenario runs are plotted in Figures 2 and 3. The Profit goals are set at 25 % (Scenario A) and 8 % (Scenario B). On the assumption that the companies are not overleveraged, these percentages represent the

characteristic orientations toward *profit maximization* and *viability* in a roughly right way.

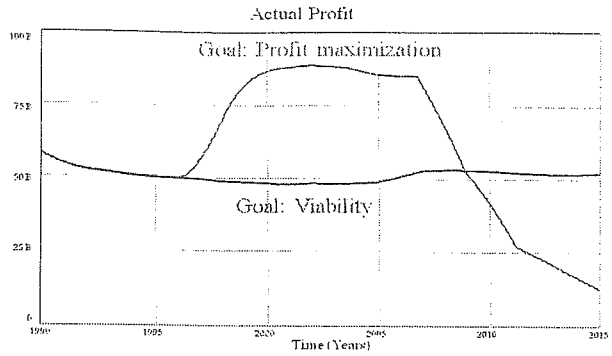

Figure 2: *Profits* plotted for the two scenarios

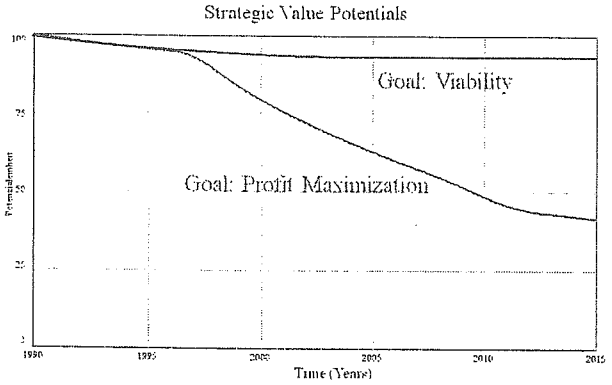

Figure 3: *Value Potential* plotted for the two scenarios

Figure 2 shows the curves of actual *Profits* for both scenarios. The difference between the two are substantial. The *profit maximizers* achieve very high profits in the short run. However, they inevitably face a collapse of the profit curve, as *Value Potential* has been degraded due to their short-termism (Figure 3). In addition, the reduced *Strategic Value Potential* leads to higher unemployment rates and subsequently to lower gross consumption. Moreover, the *Confidence* in the economy is eroded leading to a delayed and sustained reduction of investments which impact on *GNP* and *Profits*. On the other hand, the firms striving for *viability* invest in *Value Potential* not in short-term profits - they invest in the future. They achieve a moderate profit, but they achieve it continually over years. In the end, they will reap economic benefits superior to those obtained by the maximizers. In addition, they will not suffer from the boom and bust cycle, the frictions entailed by layoffs, the brain drain accompanying it, and the difficulty of rebuilding the firm, once the crisis is over.

Our scenarios have reverted to Weberian ideal-types[1] [Weber, 1997]: We have contrasted Scenarios A and B in a way that in either case one goal orientation is dominant, - *Profit Maximization* (A), or *Viability* (B).

5 Discussion

There is a principle from system theory that says: If you maximize one variable in a complex system, you inevitably trigger bottlenecks and unstable or chaotic behavior [Adam, 1985]. A second principle, which is from the theory of strategy, maintains: Short-term advantages result in long-term costs, and long-term advantages have to be "bought" via short-term sacrifices. Or, in practical terms, you cannot maximize your profits without losing value potential [Gälweiler, 2005]. The scenarios described above are illustrations of these principles, of the first one indirectly and of the second one directly.

These may be valuable insights, but does the model tell us anything about crisis prevention? From the analysis to this point, we can deductively derive two conclusions: First, in the case of Scenario A (Profit maximizing orientation) the emergence of a crisis is compulsory, but - given a special investment from outside[2] - over time the situation will be healed and economic prosperity resume. However, if the maximization goal persists, the next crisis will emerge cogently after a few, perhaps five to seven, years. We have examined this proposition by extending the time horizon of our simulations over 15 additional years. The respective simulations confirm the first proposition: Figure 6 shows that the temporary extra investment succeeds in inducing new growth and *Profits* straightaway. However, an overshoot is produced, with a consecutive collapse, both being even more scathing than the ones in the former crisis. As far as *Value Potential* is concerned, the investments lead to a temporary, minor recovery, but the retrogression turns out to be unstoppable.

[1] "An ideal type is formed by the one-sided accentuation of one or more points of view and by the synthesis of a great many diffuse, discrete, more or less present and occasionally absent concrete individual phenomena, which are arranged according to those one-sidedly emphasized viewpoints into a unified analytical construct..." [Weber, 1997: 88].

[2] We have introduced a yearly extraordinary investment, from external sources, into *Strategic Value Potential*, between 2010 and 2014, resulting in nine units growth in *Strategic Value Potential* per annum.

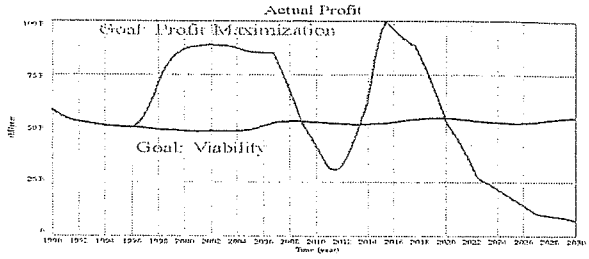

Figure 4: Long run trajectory of *Profits*

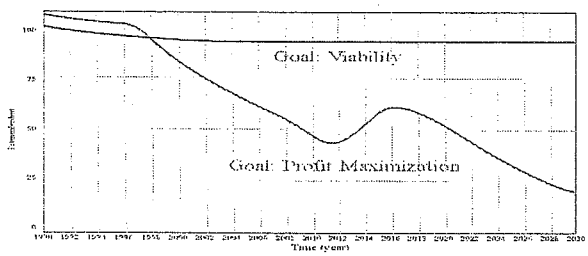

Figure 5: Long run trajectory of *Strategic Value Potential*

The second proposition is that in the case of Scenario B (Viability orientation) the crisis is likely not to happen. The data confirm this proposition (Figures 4 and 5). The crisis does not happen even though no additional investments from outside have been necessary. The *Viability orientation* proves to accrue even more benefits as time proceeds (Figure 5).

These analyses result in valuable clues for crisis prevention. Conceptually, the case is clear: Strive for *Viability*, do not maximize *Profits*, maintain and rebuild *Value Potential* high!

6 Conclusions

Simulations based on the model outlined here, unveil a pattern which may surprise many. It shows a recurrent pattern of overshoot and collapse. While economic agents are still grappling with the consequences of the last crisis, the next one is already building up. The simulation says, that within seven years or so, we shall probably be in the next crunch. This is not very surprising for the authors, as the overshoot and collapse pattern is frequently observed in different contexts (e. g., management of environmental resources).

The message of the current crisis is that our way of doing business is not sustainable. It is a reminder, because since the report to the Club of Rome "The Limits to Growth" [Meadows et al., 1972, 2004] the necessity of revising our economic practices has been a recurrent theme, which has also been discussed in public. These discussions appear to have borne some fruits, e. g., many firms are more hesitant to restrain their research and development activities [see, e. g., Terpitz, 2009]. However, the mainstream business continues "as usual" [Gratwohl, 2009], fixed on the level of short-term levels of profits and how to maximize them. If this pattern persists, the next crisis is around the corner.

Future economic models should especially consider the social and ecological aspects linked to economic crises. This way, a deeper understanding of the structures linking the economy, the social system, and nature could be gained.

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