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FROM HOMO-ECONOMICUS TO RISK INTEGRATION: A NEW PARADIGM FOR FINANCIAL CRISIS CYCLES

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Article Info

Keywords: financial crises, risk factors, economic models, macroeconomics, microeconomics, complexity approach, systemic risk, complex thinking.

Abstract

This paper analyzes the impact of financial crises on societies and questions the traditional economic models that are based on growth, profitability, cost-efficiency, and sustainability. The author argues that the economic theories of the past and the legitimations of regulatory interventionism by States are unable to prevent, understand or manage financial crises, which have become more intense and complex over the last two decades. The paper explores the integration of risk factors at both macroeconomic and microeconomic levels and identifies the criteria and risk factors that need to be integrated to achieve this aim. Characterizing risk through the complexity approach under the prism of systemic risk, the document argues that integrating risk factors is essential for establishing a new economic model that accounts for risk and yields a better understanding of financial crisis cycles. The paper concludes by proposing the adoption of "complex thinking" to understand, analyze, and extract the essence of the ongoing crises in our societies.

Introduction:

Financial crises have become more frequent and severe over the past few decades, causing significant damage to economies and societies. Traditional economic theories based on growth, profitability, cost-efficiency, and sustainability have failed to prevent, understand, or manage these crises. This paper argues that it is essential to integrate risk factors at both macroeconomic and microeconomic levels to establish a new economic model that accounts for risk and yields a better understanding of financial crisis cycles.

The integration of risk factors requires the adoption of a complexity approach that characterizes risk under the prism of systemic risk, taking into consideration the interdependence of economic agents and their behavior. The paper identifies the criteria and risk factors that need to be integrated, ranging from environmental and health contingencies to the asymmetry of relations between economic agents.

The adoption of "complex thinking" is proposed as a means of understanding, analyzing, and extracting the essence of ongoing crises in our societies. This approach encompasses criticism, creativity, responsibility, and the

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linking of factors without separation. The paper proposes a new paradigm of financial risks that respects their effects, their frequencies, as well as the level of intensity.

Overall, the paper argues that integrating risk factors is essential for establishing a new economic model that accounts for risk and yields a better understanding of financial crisis cycles.

ECONOMIC THOUGHT PUT TO THE TEST

Economic Theories: The Stalemate Made on Risks

Crises have become permanent since the 1970s and call into question the well-established theories based on Smithian growth, Walrasian general equilibrium, the Keynesian multiplier coefficient, and Schumpeterian innovation.

What is worse, they have gone viral since they have taken the form of financial crises to the point where we see the failure of traditional economic models and their alternative solutions. After the crises of the inflationary cycle of the 1980s, and from the end of the 1990s onwards, they have become more repetitive and more violent, to the point of establishing new cycles that challenge this traditionally established theory.

The weight of financial crises in the economy means that macro-financial balances are favored by shortterm adjustment variables, such as debt, financial assets and the money supply, to the detriment of longterm structuring projects.

The principle of virtuous growth has been called into question, since financial crises have become persistent. The economic history of our time shows that even a regulation following an overheating of the economy would not be sufficient for the taking of latent profits, if the risk factors do not integrate the economic models. However, most models are designed in such a way that after an overheated economy, the possibility of a new era of latent profits will dominate. The regulation of an economic recovery is established on the basis of classical patterns, of a complex matrix: a redistribution of credit, special tax regimes, activation of the speculative financial bubble, and the acceleration of innovation, all under the background of economic and social inequalities, conflicts of interest and pressure from rising asset prices.

This classic pattern of economic recovery creates financial crises. Indeed, the massive distribution of bank credit, although necessary for the revival of the economic activity, facilitates speculative bubbles in financial assets. It amplifies the financial cycle, revives activity but accelerates the turnaround process.

Theoretical Integration of Risks

The problem is to be able to determine the market return period. This is where the challenge lies: to succeed in identifying and integrating the risk factors inherent in the system itself.

The dominant economic thinking has always had confidence in the effectiveness of monetary policies in stemming downturns. However, over a long period of time, and since the end of the thirty glorious years, growth cycles have been less numerous and more volatile than crises cycles. Worse, since the end of the 1990s, crisis cycles have become recurrent, more intense, shorter, and profit-taking, although the more important, the more ephemeral. The system is therefore very fragile, with the following markers: the weight of debt, inequality and deregulation. It is therefore necessary to have a different viewpoint to curb these phenomena. Firstly, financial crises are endogenous to the functioning of the system itself, since growth feeds on these phenomena.

Secondly, the factors that lead to the containment of crises, such as debt, innovation and asset bubbles, are effective in the short and medium term. The system itself will have difficulty in stabilizing over a long period.

Thirdly, economic thought is curiously struck by a striking amnesia of past situations in the history of economic facts in general and crises in particular. Economic models and regimes are particularly anchored on/in the problems of recovery and growth. Each crisis has seen the models of economic thought put to the test, such as the monetarists and innovationists around Friedman, the thinkers of supply-side economics such as Laffer, Mundell, the economies of rational expectations, such as Lucas, Sargent, Wallace, and Bruno. The mathematization of economic models, accentuated by the computerization of data, has made it possible to build a powerful macro-economy, which is not infallible, since it is confronted with shocks that constantly call into question the validity of an economy that has chosen a methodological individualism.

All these models have led the economy to subdivide itself in order to be more precise, to act in a surgical manner and to become more efficient through macroeconomics, microeconomics and management. Imbalances have become structural, hence the need to have a systemic approach to crises and to integrate a deterministic approach to the complexity, according to Edgard Morin, of the systems and risks. Are these determinants of risk and complexity the result of chance or randomness?

TITLE 2: THE DETERMINANTS OF RISK AND COMPLEXITY

Transdisciplinarity

Risk has many definitions, since the approach according to the disciplines is different. According to the Larousse, it can be perceived as:

- "a possibility, the probability of a fact, of an event considered as an evil or a damage"
- "a danger, a more or less probable inconvenience to which one is exposed",
- "the act of engaging in an action which could bring a benefit, but which involves the possibility of a danger",
- "a prejudice, a possible loss that insurance companies guarantee in exchange for the payment of a premium".

Generally speaking, it is therefore perceived as the probability of an event occurring. Risk is a complex concept, which goes beyond the phenomena of chance (unpredictable events not linked to a cause) and even randomness (events linked to probable causes of occurrence, which and therefore predictable) which is its original basis. Its predictability is a method of rational anticipation, but the fact of preventing the risk creates de facto constraints that lead to new risks. To prevent risk is also to anticipate the consequences of events. These are integrated by the discipline of "risk management" which has identified four factors: danger, probability, severity and acceptability.
The notion of complexity, originally created by Henri Laborif, was largely developed by Edgard Morin, *Science with Conscience in 1982*, which distinguished itself from traditionalist approaches of separations between the social sciences and the so-called fundamental hard sciences. Complex thought integrates the inter-municipality of sciences through the phenomena of loops which the author called: "dialogic". In other words, there is an interweaving between each discipline; a transdisciplinarity that allows us to better understand and anticipate phenomena.
And this is all what is at stake with the risks that must be linked to the notion of complexity. Singularly, financial risks are nested in a transdisciplinarity and a complex exegesis which imbricate all the spheres that act on the economy and more generally on the society. Financial risks are therefore multiple, of several kinds, and are interwoven with each other, as in the Latin etymology of complexity, which comes from the word "complexus" meaning intertwining.

The "Complex Thinking" Approach to Risk

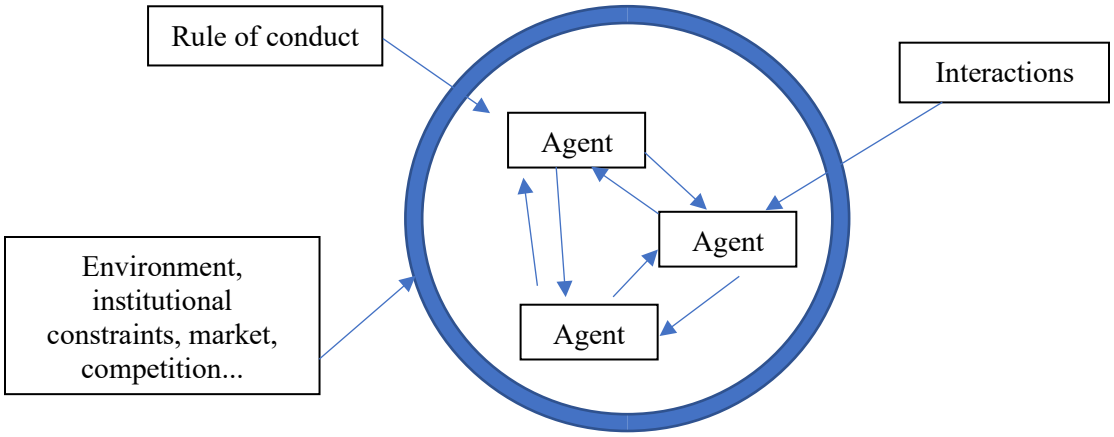
Economic thought has often been distinguished by two approaches; that of the solidity of risk-free models and that of separation from other disciplines. Complexity teaches us to link factors by loops. In order to establish its scientific credibility, economic theories have often taken the opposite approach of the absence of inter-commonality with other disciplines through the mathematization of models. Complexity teaches us to link without separating, to establish connections and loops. These loops are mechanically natural and produce cycles. These cycles are sometimes increasing, sometimes decreasing, "self-creative" and "self-destructive". It is this mechanism that makes complexity a being, a complex system, which multiplies infinitely to create new models.
It would therefore be useful to speak of "complex thinking" to understand, analyze, and extract the essence of the ongoing crises in our societies. Complex thinking is a whole thing of its own, since it encompasses: criticism, creativity, responsibility. In order to better understand them, it is necessary to move from simple thinking (guessing, preferring, and believing) to complex thinking that integrates research, hypotheses, and results.
Complex thinking in the field of risks leads us into having a pragmatic method within the framework of the following tripartite theoretical corpus: information, cybernetics, systems.

Firstly, in the field of information theory, the treatment of risks consists in gathering the maximum amount of information from economic agents within the framework of their exchange relations. This information, however, can be biased because of the asymmetric relations between economic agents; the theory of the relationship between the principal and the agent. However, it can also be optimized and balanced. In this case, the risks are reduced and therefore better controlled. For this first paradigm, we will be speaking of asymmetric or informational risks.

Secondly, in the field of cybernetic theory, the risk approach is seen as a logical continuation of phenomenology. Indeed, through empirical observation, it links knowledge and very diverse information; even information that is divergent or conflicting. The phenomenology of risks is mathematically the result of statistical and probabilistic analysis. It allows the simulation of risk scenarios, their impacts, their graduations, and their predictions on the results obtained. For this second paradigm, it is about phenomenological or knowledge risks.

Thirdly, in the field of complex systems theory, risks can be analyzed either empirically or formally. Empirically, the systemic risk approach refers to chaos theory. As in meteorology and chemistry, it is possible to model risks by means of probabilistic equations to determine the points of convergence of risks. The work carried out by Henri Poincaré, precursor of this theory, was deepened by Edward Lorenz (1963). Chaos theory is identified by the existence of attractors that can either be circular, punctual or strange. In a formal way, the systemic approach of the risks is done by the simultaneous study of all the components and not in an isolated manner. Since the creation of the "Santa Fe Institute" in the United States in 1984, it has been proven that economic analysis tools are insufficient to understand the risk problem. This institute has demonstrated the importance of interactions between economic agents. We thus have the following diagram:

FIGURE 1 THE CYCLE OF INTERACTIONS



The sequential risk table is then as follows:

TABLE 1 RISKS AND MODELS

	The properties of complex systems:			
The sequences	**The rationality of economic agents**	**The interactions**	**The market collapse**	**New emergences**
The risks	Knowledge risks	Risks of nuisance	Systemic risks	Knowledge risk...

In the first sequence, not only is the rationality of economic agents limited, but it is also disrupted by stimuli (laws, environments, competition, markets, etc.) that interact with the agents themselves, thus modifying their behavior and developing knowledge risks.

The second sequence is marked by the weight of interactions on the markets, information distortions, informational asymmetry, and specificities of the markets (duopoly, monopoly, multiple competitions, state of supply and demand, etc.); with all of these phenomena tending to create nuisance risks.

The third sequence, which represents the market collapse, is consecutive to the sequential following of the preceding events, provoking de facto the most important major risk, which is the systemic risk.
Finally, the fourth sequence, the new emergences, once again draws a new cyclical sequence of economic models. This new emergence is neither only planned, nor only piloted by a supreme authority, although the latter contributes strongly to it. The system emerging from chaos will be regenerating anew.
Consequently, the economic market is in itself a complex system, like ants in an ant hill. The economic agents are the consumers and the environment is the supply. Any action of an economic agent on the market (purchase, sale, behavior, information, etc.) interacts with other economic agents, causing these actions to influence prices, products, information and the strategy of the actors. Market prices are therefore emergent phenomena and stimuli offers.

THE NEW RISK PARADIGM: THE CASE OF FINANCIAL CRISES

The Graduation Approach

We have thus approached the question of risk from the angle of "complex thinking", thus allowing us to identify the theoretical and empirical structure of economic markets and their organizational models through: information theory, cybernetics theory and systems theory.
All economic models have their own cones of uncertainty evolving in the following way: disorder/order/disorder/order, which gives them a self-regulation. These increasing and decreasing factors generate risks. In the financial field, there are two types of risk: systemic risk and idiosyncratic risk.
Systemic risks stem from a significant probability of market dysfunctions spreading to all sectors, and causing de facto paralysis of sectors, or even of the entire system; are accelerated by the cross-financing of holdings; what is known as the domino effect. These risks are mainly the result of an endogenous event. An example is the Société Générale, with its equity investments leading to losses. We can also cite the example of French banking strategies that have invested in areas that are not very stable and not very profitable, which has led to the fragility of the French banks concerned, hence a need to set aside provisions and to redeploy their strategies towards their own domestic markets.
Idiosyncratic risks are specific to each company. They are their own marker. Each company has its own risk linked to these weaknesses, of which an endogenous or even exogenous factor can affect its solvency and sustainability. For example, an exogenous factor is the development of a law that can affect the company, making it more fragile. The endogenous factors can be linked to bad management decisions or to operational dysfunctions (IT, logistics). These second factors are numerous and inherent to each company, like the strata of a yarrow. These risks are sometimes difficult to identify because of their unpredictability.
Thus, for an extension of complex thinking, the fundamental foundations of the new risk paradigm are based on the following presuppositions:

- The existence of common and transdisciplinary laws which govern all complex systems, such as the laws of physics, mathematics, chemistry, biology, economics, law, sociology,
- These laws are relational by nature; they interact within their own complex internal system,
- The bases of these laws have their own internal systems. With their degrees of autonomy depending on their own spaces, time, as well as the internal structure of each discipline.

Thus, systemic risks arise when the bases governing the complex systems of the economy and particularly the financial economy are undermined. Due to the transdisciplinarity of systems and their interactions, in the field of financial economics, systemic risks mechanically and durably impact all sectors by becoming widespread.
Similarly, idiosyncratic risks tend to affect organizations in their internal structures because of their fragility, lack of autonomy, time, or even agility of the entity to adapt to changes in an increasingly complex world.
Although financial crises exist, persist and are so repetitive, it is because the laws that govern the phenomena of complexity, transdisciplinarity, relationality and autonomy do not imply that these crises are either deterministic or predictable. They can nevertheless be predictable, in the sense that they can be probabilized through mathematics and organizational sciences. However, the complexity of financial crises also comes from the

cognitive, decisional and relational aspects of beings, their limited rationality, their environment, their individualism, and their interests. Not only are systems sensitive; but organizations are even more so, even by their essence and nature.

What are systems and organizations sensitive to?

They are sensitive to the contingency game, to the relationship and to their environment.

The complex systems approach allows us to better understand the new risk paradigms and especially the financial risk. It is therefore appropriate for financial theory, like biology or medicine, to develop conceptual tools that are adapted to its own field of concern in order to make it intelligible.

Relying on work of Edgar Morin, founder of complexity, in order to continue building the new paradigm of risk, we continue with the three principles of complexity in order to juxtapose them with our problem statement.

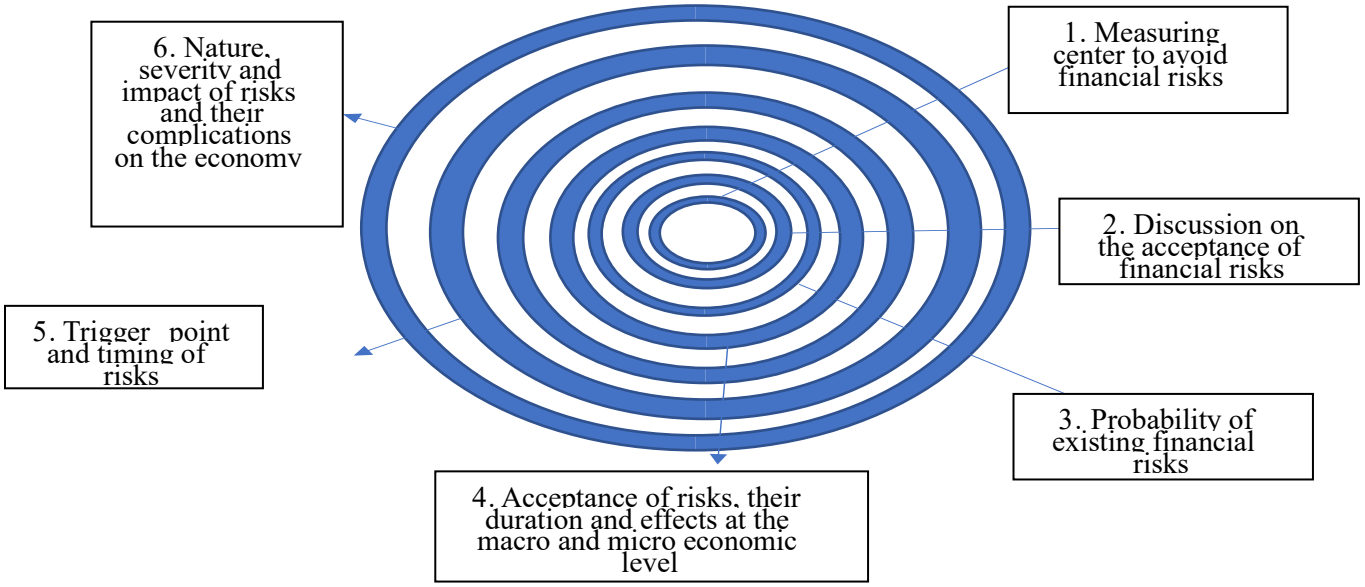
The three principles are: "dialogic", "recursive", "hologrammic". The use of these three principles would make the new risk paradigm more open, self-critical and communicative in order to better prevent it.

It is in fact a question of privileging information, communication, understanding and knowledge around a new conception of thought.

Let us take medicine as an example of the discipline. We accept the principle of a so-called positive communication, because of the complexity of a disease and its explanation between the doctor and his patient. Perceptions and presentation methods can be decisive. In this discipline, positive information to qualify a symptom is more persuasive than negative wording to convince the patient to accept the notion of risk of infection. Similarly, relative risk is more persuasive than absolute risk. Presenting negative results in a positive way encourages the patient to accept the risk, but gives them hope for a chance. Also, numerical information with rates, with the same denominator, the use of feedback, relative risk instead of absolute risk, are all effective elements in the decision, in the acceptance of risk taking by the patient. This facilitates the dialogue between the physician and the patient.

Based on this approach, we can build the genome of the new paradigm of financial risks, according to a scale of graduation that respects their effects, their frequencies, as well as the level of intensity as follows.

FIGURE 2 RISKS AND COMPLEXITIES



Each economic model, each organization, each entity, each company must be able to integrate this approach of prevention and of occurrence, to the impacts of risks.

If we look at the history of crises, they have been numerous, with each one having a different origin from the other. The systemic crises were those of 1929, 1974, and 2007. Nevertheless, for the last two decades they have been more frequent, shorter and more violent. Particularly since the 2000s, they often originate in Southeast Asian

countries because of the dependence of Western countries on Eastern productive economies, and more particularly on China.

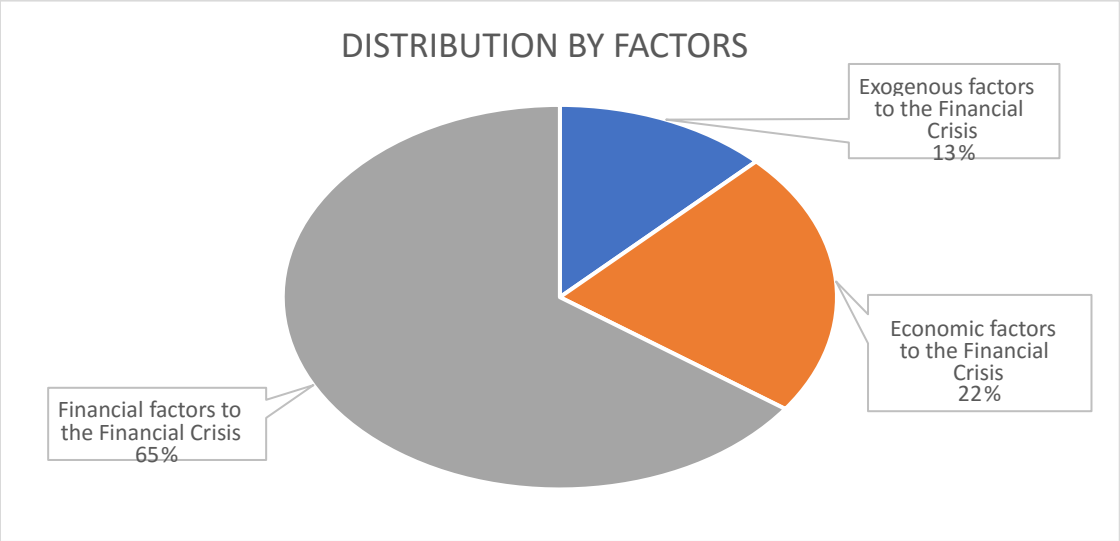
The paradox is that in order to get out of such dependence, a complete revision of the economic models is needed, which will see the integration of risk as a major player in growth and development. **Without a risk adjustment variable, there can be no reliable economic models**. Risk is part of the axiomatic of complexity, with three pillars: knowledge, uncertainty and understanding. From a theoretical point of view, all economic models must integrate the genome of the risks indicated above.

The Empirical Results

From an empirical perspective, based on a survey carried out on a sample of 120 people from different socio-professional categories[1], we can characterize the risks as follows.

Of the people surveyed, 65% believed that the causes of financial crises ensue from financial factors, 22% believed that it comes from economic factors, and 13% believed in that it stems from exogenous factors.

FIGURE 3 ORIGINS OF CRISIS



And according to this sample, the questions relating to crisis factors are as follows: for exogenous factors, it is all about questions pertaining to political conflicts, environmental problems, and the insufficiency of financial information. For economic factors, it is all about the issues related to the role of states, rising prices, unemployment, economic inequality, and economic growth. For financial factors, it is about the issues related to asset values, currency devaluation, financial conflicts, flow controls, financial corruption, financial innovation, credit distribution, debt burden, interest rates, stock market speculation, the cost of money, the behavior of lobbies, as well as the volatility of financial products.

ANALYSIS OF IDIOSYNCRATIC FINANCIAL RISK

The Financial Approach

Although systemic risk seems to be complex, idiosyncratic risk is just as complex. Its complexity results from the multitude of fields that must be taken into consideration when identifying it. It appears as a millefeuille because it is multiple and specific to each organization, each company, each entity. It is not taken into consideration in the traditional financial risks known as "market risk, interest rate risk or price risk". Idiosyncratic risk is situated in the relationship: Constraints/Return/Market.

We can thus draw up these risks according to the following nomenclature:

TABLE 2 RISK WITHIN THE FIRM

Idiosyncratic risks related to the activity		**Idiosyncratic risks related to the firm**	
Identification	**The risks**	**Identification**	**The risks**

The area	Risk of disintegration	Company's history	Unsuitability of aging structures
Exogenous shocks	Risk of disintegration	Equity capital	Solvency risk
Competition	Risk of loss of competitiveness	Financial independence	Risk of dependence on third parties
Successive crises	Risk of disintegration	Debt capacity	Risk of the limit of indebtedness
Speculative bubbles	Risk of mimetic behavior of actors	Treasury	Risk of illiquidity
Regulatory constraints	Legal risk of nonapplication of regulatory measures	Activity and diversification	Risk of loss of competitiveness and know-how
Economic dynamics of the market	Risk of loss of competitiveness	Profitability	Sustainability risk
		Strategy	Management risk
		Mergers/acquisitions	Risk of loss of competitiveness
		Organization, technology, logistics	Operational risk
		Company's size	Risk of critical or optimal size

The idiosyncratic risks linked to the firm are more numerous than those linked to its environment. In other words, a firm is more threatened by its internal constraints than by its external constraints, although the latter should not be neglected. We can also see that, although the identification of the potential risk is different, the impact in terms of risk is often identical.

To mitigate such risks, the firm's strategy and its managers are therefore crucial. The firm must adapt according to the information available to the managers, while taking into consideration the random elements that can be expected, if not predicted. The firm is not independent; its strategy also depends on that of the actors and its environment. The more relevant the strategy is when the environment is uncertain, the more the firm consolidates its future.

The actors' strategy on the specificity of the return [yield] and the "Private Equity" proves to be crucial to face both exogenous and endogenous shocks. Thus, in order to approach idiosyncratic risks, several modeling methods must be adopted: the one linked to time series, the one linked to the variance of the firm's portfolio, as well as the one linked to market volatility.

The risk measure of the portfolio variance can be modeled as:

$$\mathbf{Vt = (1/N)\ \Sigma\ [\ \Sigma\ r^2id + S\ \Sigma\ (rid\ rid\ \_\ 1)\ ]}$$

with: rid = Fd + ɛ id

Fd >> Expresses the systemic risks

ɛ id >> Expresses the idiosyncratic risk

The measure of volatility is expressed as follows: $St = V_t - V_{ewt}$

Thus, the greater the volatility, the higher the idiosyncratic risk. Idiosyncratic risk depends on time, favorable or unfavorable market developments, as well as the firm's performance or profitability.

Ultimately, for idiosyncratic risk to be put under control the measurement sample size should be large and the frequency of data should be constantly fed. This tends to force firms into setting up a real department for

calculating and evaluating idiosyncratic risks, like the example of the measurements made by the scientific community in the monitoring of volcanoes and even cyclones.

The Accounting Approach: The Example of Net Income

In addition, with regard to the profit or loss generated by the firm, it is accountably recorded as a liability on the balance sheet. These liabilities represent the firm's debts, and in the net income generated, there is a portion that goes to the shareholders, a portion that goes to the firm itself and a portion that goes to the employees. The part that goes to the company should not be considered as a debt.

Also, this result is not really a flow. It results from the firm's activity; it can be either positive or negative. However, the impact is not the same. When it is positive, there is an undefined part that belongs to the firm itself and a part that is paid to shareholders. As for the part that must be disbursed by the company, it has recourse to its cash flow, thereby leading to a frantic race for maximum profitability. When the impact is negative, it cannot be disbursed. It generates the constant need for managers to consolidate the firm's equity by additional contributions. In other words, by creating an inflow.

In short, the accounting approach to net income from the idiosyncratic risk perspective requires a differentiated analysis and marks this new paradigm.

CONCLUSION

We had set out on analyzing and developing the reasons why economic theories fail to integrate their models on risk. Management science also has the same approach, based on virtuous and sustainable growth. Only contingency theory has a different approach by integrating the existence of obstacles to growth models.

The deep reasons for this impasse stem from the fact that economic models have placed absolute confidence in growth. However, crisis exists and has become more and more persistent. It therefore signifies that growth and crisis are two intertwined phenomena. Thus, these phenomena appear as cycles, identified by famous authors, Kitchin, Juglar, Kuznets, Kondratiev who sought to analyze and identify the economic reasons for crises.

Nonetheless, it is the risk factors that are at the origin of financial crises. And more specifically, with regards to financial risk factors, we have identified them in two categories, systemic risks and idiosyncratic risks. The former leads to the phenomena of major crises, while the latter develop recurrent micro-crises. We have analyzed them using the complexity theory. This has allowed us to build a new risks paradigm, especially for the financial risks. Though also, idiosyncratic risks have helped us in this approach, to build a forecasting model.

Beyond these theoretical and methodological approaches, if we want to win this crisis battle, we must resolutely take the path of treatment and integration of risks in each model, in our approaches and our attitudes.

It is all these that forms the whole!

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ENDNOTE

Sample of respondents: students (4%), private sector employees (11%), public sector employees (10%), public sector executives (12%), private sector executives (13%), company managers (21%), unemployed (3%), retired (4%), professionals (10%), craftsmen and traders (13%).

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